

37TH TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER
GRADUATE SCHOOL OF BIOMEDICAL SCIENCES

STUDENT RESEARCH WEEK

Let's get
BIOPHYSICAL

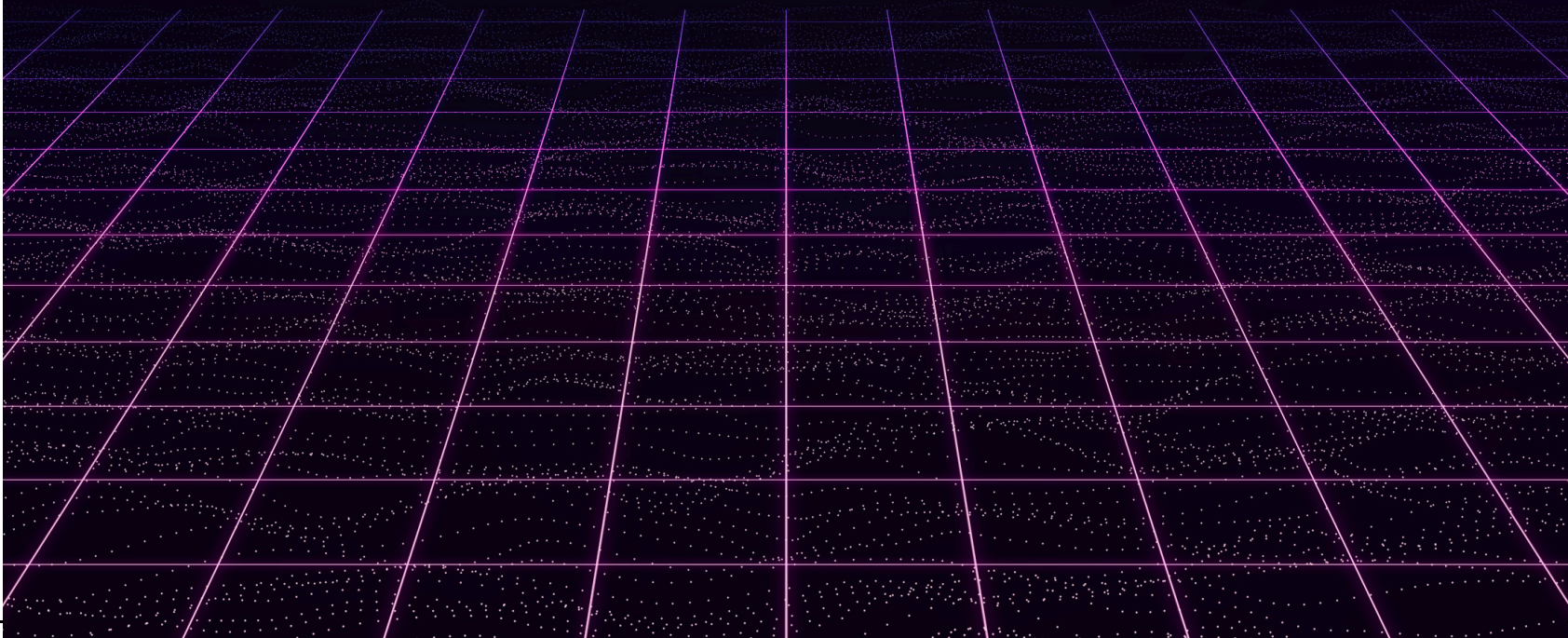


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37th Annual Student Research Week
February 26th-28th, 2025
Texas Tech University Health Sciences Center (TTUHSC)
Lubbock, Texas
Hosted by the Department of Cell Physiology and Molecular Biophysics

The Graduate School of Biomedical Sciences 2025 Student Research Week Committee:

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Vice-Director of Operations: Philip S. Antwi-Adjei

Vice-Director of Marketing: Alexis Rodriguez

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Student Research Week Banquet: Robert Barnes, Rozenn Moundounga, and Simranjeet Kaur, Graduate School of Biomedical Sciences Graduate Student Association; Conrad Saucedo, Cell Biology and Biochemistry

Appreciation Dinner: Sharla Cook, Christy Grisham, Lisa Castillo, and Dr. Michael Wiener, Cell Physiology and Molecular Biophysics

The 2025 Student Research Week Committee would like to extend their warmest thanks to the following for their contributions and support in making Student Research Week a great success this year:

The Graduate School of Biomedical Sciences staff: Leslie Fowler, Ashlee Rigsby, Pamela Johnson, Debbie Martinez, Danny Boren, Dr. Kari Dickson, and Dr. Brandt Schneider

Office of Communication and Marketing: Suzanna Cisneros, Kelly Podzemny, TR Castillo, Mark Hendricks, Ashley Hamm, Marcie Aultman, Natalie Stanislaus, Jordan Pape

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SOM Office of the Dean: Charity Donaldson

Office of Research and Innovation: Audrey Deleon and Carleigh Smith

CISER: Julie Isom

The departments of Cell Physiology and Molecular Biophysics, Immunology and Molecular Microbiology, Cell Biology and Biochemistry, Pharmacology and Neuroscience, Internal Medicine, Orthopaedic Surgery, Obstetrics and Gynecology, Medical Education, Graduate Medical Education, and the Center for Membrane Protein Research (CMPR).

Graduate School of Biomedical Sciences at Lubbock, Abilene, and Amarillo, the School of Medicine, the School of Health Professions, the School of Pharmacy, and Texas Tech University.

Dr. Beverly Chilton for establishing the Bette B. Chilton scholarship in honor of her mother.

Dr. Tiva Kasemsri for establishing the Academic Excellence Award.

Center for the Integration of STEM Education and Research (CISER) for sponsoring the Undergraduate Award category.

We also are very grateful to all the TTUHSC faculty and staff for their guidance and support.

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Greetings:

It is my great pleasure to welcome everyone to the 2025 Graduate School of Biomedical Sciences Student Research Week on February 26th - 28th. The theme for this year's event is "Let's Get Biophysical." We are very pleased to host two distinguished keynote speakers: Rajini Rao, Ph.D. Professor in the Department of Physiology and Director of the Cellular and Molecular Medicine Graduate Program at John Hopkins School of Medicine and Daniel Minor, Ph.D. Professor in the Department of Biochemistry and Biophysics and Cellular and Molecular Pharmacology at the University of California San Francisco Cardiovascular Research Institute.

I am extremely indebted to the 2025 Student Research Week Organizing Committee: Co-Directors: Nghi (Skyler) Tran and Megan Skains; Vice-Director of Marketing: Alexis Rodriguez; Vice-Director of Operations: Philip Adjei; Vice-Director of Poster Coordination: Caezaan Keshvani; GSA President: Robert Barnes. They have done outstanding work organizing the event this year!

I am particularly grateful for the hard work and assistance from Pam Johnson, Kari Dickson, Leslie Fowler, Ashlee Rigsby, Debbie Martinez, and Tres Boren. Special thanks to the host department chair, Dr. Wiener, and the entire faculty and staff of the host Department of Cell Physiology and Molecular Biophysics. As always, thanks to Dr. Jones for coordinating activities with the School of Medicine. The GSBS faculty, staff, and students make Student Research Week a success year after year. Finally, I would like to thank Chancellor Mitchell, President Rice-Spearman, Provost D'Agostino, Senior Vice-President for Research McMahon, and Drs. Prien, Dufour, Wiener, Neugebauer, Jones, Yeomans, Siddiqui, Abbruscato, Srivastava, Shurmur, Kasemsri, and Chilton for their support that has made this event possible. Thanks also to our many donors and supporters who have helped make this event possible.

To help celebrate the 37th Student Research Week, the GSBS, the GSA, and the Department of Cell Physiology and Molecular Biophysics are very excited to host a dinner and evening at the Spirit Ranch. Funds raised from donations and a silent auction that evening will be used to support student scholarships. Thanks to all donors for their help in making this special event possible.

Every year, the GSBS Student Research Week is a wonderful opportunity to meet our students, learn about their work, and discuss research in general. Thanks to the students, faculty and staff for participating.

Let's greet our speakers with a warm TTUHSC welcome!

Thanks much and all the best!

Brandt L Schneider

Brandt L. Schneider, Ph.D.
Dean of the Graduate School of Biomedical Sciences



Welcome!

On behalf of the organizing committee of Student Research Week (SRW), we extend a warm welcome to the 37th Annual Student Research Week 2025: Let's Get Biophysical. SRW is a yearly event coordinated and organized by student volunteers from the Graduate School of Biomedical Science (GSBS) at the Texas Tech University Health Sciences Center (TTUHSC), Lubbock Campus. SRW is an incredible event that brings together students from various TTUHSC and TTU campuses and gives them the opportunity to present their research. SRW is an event packed with opportunities for students to showcase their research in poster sessions, lightning talks, and a poster competition judged on hypothesis, methodology, and communication skills, plus a vendor show to connect with industry leaders showcasing the latest in research tools and technology.

Every year, SRW features a new theme highlighting advances in various areas of biomedical research. This year's SRW, hosted by the Department of Cell Physiology and Molecular Biophysics (CPMB) at TTUHSC, embraces the spirit of the 80's with the theme "Let's Get Biophysical!" We are going into a deep dive into the captivating world of biophysics, with a special focus on membrane protein research. Membrane proteins play vital roles in processes like signal transduction and molecular transport, making them fundamental to understanding life's molecular machinery. But to truly understand these complex proteins, we have to "get biophysical"—harnessing powerful techniques like electrophysiology, crystallography, and computational simulations to uncover their molecular mysteries. Two outstanding biomedical scientists will give keynote addresses on Friday, February 28th, highlighting this topic.

Our first speaker, Dr. Daniel L. Minor, Jr. will be giving his talk titled "Electrosome Assembly: A First Structural View at Ion Channel Biogenesis" at 9:30 AM. Dr. Minor received his B.A. in Biophysics and Biochemistry from the University of Pennsylvania in 1989. He then went on to receive his Ph.D. in Chemistry from the Massachusetts Institute of Technology in 1996. After postdoctoral studies focusing on ion channel structure and functions at the MRC Laboratory of Molecular Biology and the University of California San Francisco (UCSF), he joined the faculty at the UCSF where he is currently a professor in the Cardiovascular Institute and Departments of Biochemistry and Biophysics and Cellular and Molecular Pharmacology. His research focuses on the structure, chemical biology, and biogenesis of ion channels and exploring the origins of toxin resistance mechanisms.

Our next speaker, Dr. Rajini Rao, will be giving her talk titled "Translating Biophysics: The Golgi Calcium Pump in Disease" at 1:15 PM. She received her Ph.D. in Biochemistry at the University of Rochester, N.Y. in 1988 and postdoctoral training in Genetics at Yale University before being recruited to Johns Hopkins University as Assistant Professor in 1993. She is currently a professor of Physiology at the Johns Hopkins University School of Medicine in Baltimore, Maryland. Dr. Rao is an active educator and mentor. Her research centers on the role of ion transporters, including secretory pathway Ca^{2+} -ATPases and endosomal $\text{Na}^{+}/\text{H}^{+}$ exchangers, in human disorders ranging from cancer to neurodegeneration.

(continued on next page)

Both speakers are outstanding scientists representing this year's theme with their discoveries, research, and achievements. The SRW committee encourages everyone to attend the keynote speaker seminars in the Academic Event Center in Lubbock. Additionally, we will have student talks on Friday, February 28th.

The student poster sessions are set for February 26th and 27th, featuring over 250 students from TTUHSC and TTU campuses showcasing their research. We invite you all to join us for these sessions to learn from experts and peers and, in turn, make this event a success. The vendor show will feature various vendors supplying biomedical science devices and technologies. This will be held on Wednesday, February 26th.

Finally, this event would not have been possible without the dedicated efforts of SRW 2025 TTUHSC team members. We would like to thank the faculty and staff of the GSBS, the Department of Cell Physiology and Molecular Biophysics, Offices of Student Services and Marketing and Communications, and the School of Medicine. We would also like to thank President Dr. Rice-Spearman, Chancellor Dr. Mitchell, Dr. McMahon, Dr. D'Agostino, Dr. Schneider, Dr. Wiener, Dr. Jones, and Dr. Prien. Lastly, we want to thank all the participants of the 37th Annual Student Research Week, as their ideas, research, and collaborative efforts make this such a successful event each year.

Sincerely,
The 37th Annual Student Research Week Committee,
Nghì (Skyler) Tran, Megan Skains, Alexis Rodrigues, Philip S. Antwi- Adjei, Caezaan Keshvani, Amanda Garcia, Javaria Baig, Abena Dwamena, Augustina Potokiri, Keyona Stubbs, Asha Worsham

SCHEDULE OF EVENTS

WEDNESDAY, FEBRUARY 26

10A - 12P	Poster Session I (unjudged)
12P - 1P	Lunch
1P - 3P	Poster Session II (unjudged)
1P - 4P	Vendor Show

THURSDAY, FEBRUARY 27

10A - 12P	Poster Session III (judged)
12P - 1P	Lunch
1P - 3P	Poster Session IV (judged)
6:30P - 10P	Graduate Student Association Banquet (Spirit Ranch, 701 Regis St., Lubbock, TX 79403)

FRIDAY, FEBRUARY 28

9A - 3P	Silent Auction
9A - 9:30A	Breakfast
9:30A - 10:30A	“Electrosome Assembly: A First Structural View at Ion Channel Biogenesis” Daniel L. Minor, Ph.D.
10:45A - 11:45A	Lightning Talks Session I
11:45A - 1:15P	Student Lunch w/ Keynote Speakers
1:15P - 2:15P	“Translating Biophysics: The Golgi Calcium Pump in Disease” Rajini Rao, Ph.D.
2:30P - 3:30P	Lightning Talks Session II
3:30P - 4:30P	SRW Awards Ceremony and Closing Remarks

All events will be held in the Academic Event Center in Lubbock and broadcasted to AMSOP-335 (Amarillo) and ABSPPH-2401 (Abilene)

GUEST SPEAKERS



Daniel L. Minor, Jr., Ph.D.

Cardiovascular Research Institute

Departments of Biochemistry and Biophysics, and Cellular and Molecular

Pharmacology

University of California, San Francisco, California

Daniel Minor received a B.A. in Biophysics and Biochemistry, magna cum laude, from the University of Pennsylvania in 1989. He received a Ph.D. from the Massachusetts Institute of Technology in Chemistry in 1996 for biophysical studies of protein folding. Following postdoctoral studies on ion channel structure and function at the MRC Laboratory of Molecular Biology and the University of California San Francisco, he became a faculty member at the University of California San Francisco. He is currently a professor in the UCSF Cardiovascular Research Institute and Departments of Biochemistry and Biophysics, and Cellular and Molecular Pharmacology and a Faculty Scientist at the Lawrence Berkeley National Laboratory. His laboratory focuses on the structure, chemical biology, and biogenesis of ion channels and exploring the origins of toxin resistance mechanisms.



Rajini Rao, Ph.D.

Professor, Department of Physiology

Director, Graduate Program in Cellular & Molecular Medicine

The Johns Hopkins University School of Medicine, Baltimore, Maryland

Rajini Rao is professor of Physiology at the Johns Hopkins University School of Medicine in Baltimore, Maryland. She received her Ph.D. in Biochemistry (1988) at the University of Rochester, N.Y. and postdoctoral training in Genetics at Yale University before being recruited to Johns Hopkins University as Assistant Professor in 1993. Her laboratory investigates ion transporters, including secretory pathway Ca^{2+} -ATPases and endosomal $\text{Na}^{+}/\text{H}^{+}$ exchangers, with a focus on their role in human disorders, ranging from cancer and autism to neurodegeneration. As director of the NIGMS-funded T32 training Ph.D. program in Cellular & Molecular Medicine at the Johns Hopkins School of Medicine, Rao plays an active role in graduate education. She is a long-standing advocate for women in science and has held multiple elected leadership roles in the Biophysical Society and ASBMB, chaired FASEB and Gordon conferences and served on journal editorial boards and grant review panels at the NIH, DOD and HHMI.

STUDENT LIGHTNING TALKS

ABULKADER ALMOSA, Undergraduate

Relation of Social Determinants of Health with Survival Outcomes Among Patients with Eye Cancer in West Texas.

PRESTON CAMPBELL, Undergraduate

Novel model of blood-brain barrier in vitro suggests dysregulation of TXNIP and GUCY1A1 as key mediators of HIV-induced neurocognitive disorders

GARRETT DAVIS, Graduate Medical Education Sciences

Bridging the layers: Advancing medical students' understanding of male and female perineal anatomy.

BRADY MILLER, Graduate Medical Education Sciences

Addressing Diabetes Early: Integrating Comprehensive Education Across Preclinical Organ Systems.

KENNEDY LEONARD, School of Medicine, Year 1

The contribution of the amygdala endocannabinoid system to mGlu5 functions in pain.

JONATHAN CHAVIRA, School of Medicine, Year 2

Enhancement of Cell Survival during Temporary Preservation of Large Split Thickness Skin Grafts.

JACOB HALL, School of Medicine, Year 2

Dimethyl fumarate causes DNA repair deficiency and synergistically kills BRCA-proficient ovarian cancer cells in combination with Olaparib.

ANGELICA NIBO, School of Medicine, Year 3-4

The Barriers to Care Encounter: Preparing Preclinical Students to Face Health Disparities By Amplifying the Voices of Representative Patient Populations in Simulated Scenarios.

SIMRANJEET KAUR, Biotechnology

Chronic arsenobetaine exposure in mice impacts cognitive function and alters brain gene expression.

MARIO ULICES RODRIGUEZ, Biotechnology

HIV Nef Variants Associated with Pulmonary Hypertension Induce Differential Production of Inflammatory Cytokine in Pulmonary Vascular Endothelial Cells in vitro.

FLAVIA SARDELA DE MIRANDA, Graduate School of Biomedical Sciences, Year 3+

It's all about TIME... Cryoablation of triple-negative breast cancer induces the abscopal effect altering the Tumor Immune Microenvironment in distant tumors

NARESH SAH, Graduate School of Biomedical Sciences, Year 3+

Enhanced efficacy and reduced toxicity of CF10: a novel candidate for colorectal cancer therapy.

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CASE STUDIES

RARE COLLISION TUMOR DIAGNOSIS AIDED BY IMMUNOSTAINING

Gaurav Agrawal, MBA; Lara Shehadeh, B.A.; Sabrina Zheng, B.S.; Jonathan Aldrete, MD; Cameron West, MD, FAAD

Introduction: Collision tumors are co-occurrences of distinct neoplasms located in the same or adjacent anatomical sites with overlapping features. Collision tumors are rare, with the prevalence of squamo-melanocytic collision tumors unknown. While both invasive squamous cell carcinoma and desmoplastic melanoma may present with spindled morphology on histology, appropriate immunohistochemical staining can be utilized to confirm collision diagnosis and tumor staging.

Methods: An 88-year-old male presented with a 12 mm ulcerated lesion on the left forearm. The lesion was biopsied by shave technique.

Results: Histopathologic examination revealed both highly atypical keratinocytes extending from the epidermis discontinuously into the dermis and a second population of atypical spindled cells within the dermis, arising adjacent and deep to atypical epithelioid melanocytes within the epidermis.

Immunohistochemical staining with pan cytokeratin highlighted the first component, supporting a diagnosis of invasive, well-differentiated squamous cell carcinoma, while MART-1 and SOX-10 highlighted the atypical epithelioid and spindled cells, supporting a diagnosis of superficial spreading melanoma with spindle cell features.

Conclusion: This case highlights the need for awareness of uncommon collision tumors and the supportive and confirmatory nature immunohistochemistry can play in aiding diagnosis of complex tumors.

CBD TOXICITY AND LACTIC ACIDOSIS: ONE VERY BAD TRIP

Michael Ammons, MS, MSHA; Meagan Sheldon, NP; Kenneth Nugent, MD

BACKGROUND

The use of marijuana and its cannabinoid constituents continues to increase in the US. One of the many challenges with this increase in consumption involves toxic episodes requiring acute medical care.

CASE DESCRIPTION

A 29-year-old man with no prior medical history presented to the ED after EMS received a call reporting a man in an unresponsive state preceded by an emetic episode. EMS stated that the patient was lethargic when they arrived on the scene; however, in transit, he became combative and was given 400 mg IM ketamine. After arrival, the patient became combative again in the ED followed by episodes of emesis which led to intubation for airway protection. The patient's highest BP in the ED was 153/78 mmHg, and his maximum HR was 165 bpm. The patient was successfully extubated less than 24 hours post admission to the ICU. Urine drug screen was positive for marijuana, while alcohol, acetaminophen, and salicylate levels were negative. His anion gap with was 15 mmol/L. Lactate was initially elevated at 4.1 mmol/L and eventually decreased to 2.4 mmol/L.

Post extubation, the patient was questioned regarding the details of his overdose. The patient reported consuming CBD containing gummies labeled as "Nerds". Attempts to locate the exact product were made with the patient; however, these were unsuccessful. Despite this, the patient reports with confidence that he ingested a total dose of 1600 mg. The patient denied consuming CBD or other THC containing products on a regular basis.

DISCUSSION

The patient described in this case report ingested a large number (dose) of edible CBD products, which likely resulted in his progression through a sequence of toxic states requiring mechanical ventilation. Clinicians should consider the possibility of cannabinoid toxicity when patients present to the emergency

department with agitation, tachycardia, and anion gap metabolic acidosis associated with increased lactic acid.

HYPERTENSIVE CRISIS IN OCCIPITAL ARTERY RESULTED IN AN EPIDURAL HEMATOMA

Marcos Arciniega, MS; Prudhvi Gundupalli; Benedicto Baronia, MD

Introduction: Most epidural hematomas are caused by the middle meningeal artery but can arise from any artery between the dura mater and the skull. Hypertension (HTN) is a serious risk factor for intracerebral hemorrhages, resulting in vascular remodeling and dysfunction. Fluid dynamics illustrates that fluid, blood in this instance, will follow the path of least resistance to try and establish equilibrium, which can result in unique development of hemorrhaging. Prior literature has yet to showcase an epidural hematoma resultant of an occipital artery bleed.

Presentation: A 37-year-old male was consulted with the neurological surgery team for a basal ganglia hemorrhage. Patient's history was remarkable for uncontrolled HTN. The patient underwent a decompressive craniectomy. Computed tomography (CT) angiography was unremarkable. 4 month follow-up images revealed right ventriculomegaly. Patient had surgery for a ventriculoperitoneal shunt. Deterioration 24 hours post-op led to CT, which revealed an epidural hematoma. Decompressive craniectomy was performed to evacuate the hematoma and address the occipital artery.

Discussion: Damage to the occipital artery would have resulted in immediate bleeding in the nuchal tissue and seen on the scalp through the incision. Therefore, it can be concluded that the HTN after the surgery led to arterial bleeding. Fluid travels with the least amount of resistance, thus the arterial bleeding traveled through the burr-hole. The bleeding went down the pressure gradient (less pressure from the shunt). Since the dural opening was small and filled with the catheter, the hematoma couldn't transport into the subdural space and remained in the epidural space.

Conclusion: The patient experienced a hypertensive episode that resulted in the rupture of the occipital artery following surgical interventions. The hemorrhage became prominent in the epidural space from the burr hole, creating an epidural bleed.

CASE OF EARLY DETECTION OF MESENTERIC ISCHEMIA ULTIMATELY RESULTING IN NECROTIC WITH INITIALLY NEGATIVE EXPLORATORY LAPAROTOMY

Christian Bell, BS; Shreya Reddy, MD; Amanda Bell, MD; Kenneth Nugent, MD

Acute mesenteric arterial embolism is an emergent condition that can manifest in patients with cardiovascular disease, typically accompanied with sudden, severe periumbilical pain, nausea, and vomiting. Once patients present with symptoms, a significant reduction in perfusion has likely occurred, as minor infarcts will usually be ameliorated with the abundant collateral circulation of the SMA without producing symptoms. Normal treatment involves starting anticoagulants to prevent further clotting, obtaining CT imaging to localize the embolism, and conducting an exploratory laparotomy to identify and resect areas of necrotic bowel. Here, we report a patient who presented with typical symptoms of acute mesenteric arterial embolism and obtained a CT to visualize the large embolism, yet laparotomy revealed no ischemic damage to the bowel yet that necessitated resection. Despite performing a successful mechanical embolectomy to allow reperfusion, within days this patient ultimately developed necrotic bowel tissue resulting in resection. This rare case of an early detection of mesenteric ischemia illustrates the rapid onset of damage to the bowel, explores the timeline of its progression to a necrotic state even with re-established circulation, and highlights the importance of a multifaceted treatment plan for acute mesenteric arterial embolism.

THE FIRST REPORTED CASE AND PROBABILITY OF REPRODUCTIVELY NORMAL SISTERS DEVELOPING OVARIAN DYSGERMINOMAS: A CASE REPORT

Abbey Bing; Adithi Govindan; Karmilena Gonzales; Rylee Hubbard; Chinnadurai Mani, PhD; Komariah Palle PhD; Mark Reedy, MD

Ovarian dysgerminoma is a rare malignant germ cell tumor predominantly affecting young women under 25 years of age. The incidence of dysgerminomas in the United States is estimated to be approximately 0.3 to 0.6 cases per 100,000 women annually. Despite its rare nature, it is the most common ovarian germ cell tumor (0.3 - 0.6/100,000) and accounts for approximately 1-2% of all ovarian tumors in females. So far, no specific inherited genetic predisposition has been identified, although congenital syndromes which involve gonadal dysgenesis, like Turner's and Klinefelter's Syndromes, are known to increase the risk of germ cell tumors, with dysgerminoma being the most common (about 30%). Despite its malignant nature, the overall prognosis for dysgerminomas is generally positive, especially when detected early. We present a case of genetically normal sisters who were individually diagnosed and treated for this germ cell cancer. Given the rarity of this tumor, the likelihood of two genetically normal sisters both developing dysgerminomas is exceedingly low, so we calculate the probability of this occurring randomly. We also emphasize the importance of early detection and referral to the appropriate specialty as knowledge of the malignancy determined a different treatment for each sister.

ENDOSCOPIC SINUS SURGERY COMPLICATED BY INCOMPLETE SURGICAL HISTORY: A CASE REPORT

Jeffrey L. Black, B.S.; Kolos K Nagy, B.S.; Bennett Schackmuth, B.S.; Drew H Smith, M.D.; Winslo K Idicula, M.D.

An 11-year-old male with a history of nasal obstruction, allergic rhinitis, and turbinate hypertrophy presented to the clinic with complaints of recurrent tonsillitis. After history and physical exam, the patient was deemed a candidate for adenotonsillectomy, left total ethmoidectomy, left maxillary antrostomy, and frontal sinusotomy, and the patient's guardian elected to proceed. Intraoperative findings were significant for a duplicated middle turbinate and scarred uncinate process, indicative of prior surgical intervention not given in the patient's history. Endoscopic procedures involving the nasal cavity and paranasal sinuses depend heavily on the recognition of anatomical landmarks. It is critical that prior injuries and procedures are given in the history of the patient so the physician is aware of any anatomical differences that may alter the course of intervention. This case presents a patient where inaccurate surgical history was given, and anatomical landmarks in the nasal cavity were altered and only noticed during the endoscopic sinus procedure.

SURGICAL MANAGEMENT OF REFRACTORY HEPATOLITHIASIS: A CASE REPORT

Brendan Burkholder, B.S.; Rohan Pendse, B.S.; Seena Firouzbhakt, B.S.; Ahmed Elfedaly, M.D.; Basem Soliman, M.D., Mohamed Elfedaly, M.D.

Hepatolithiasis, or intrahepatic bile duct stones, is a condition characterized by the formation of calculi within the bile ducts of the liver, prevalent in Southeast Asia but rare in Western countries. Complications include recurrent biliary colic, jaundice, and cholangitis, potentially leading to liver abscesses and secondary biliary cirrhosis. This case report discusses a 42-year-old Asian male with a history of choledocholithiasis and hepatic cholelithiasis, presenting multiple times with obstructive jaundice and ascending cholangitis. Despite multiple ERCP procedures and sphincterotomies, CT imaging revealed persistent intrahepatic lithiasis confined to the right hepatic lobe. The patient underwent right hepatectomy and Roux-en-Y hepaticojejunostomy. His postoperative course was uneventful, with rapid recovery and successful follow-up. Hepatolithiasis management is challenging due to high recurrence rates and complex treatment

requirements. Risk factors include bile stasis, infections, biliary anomalies, and dietary habits. This case underscores the importance of comprehensive surgical intervention, meticulous preoperative planning, and multidisciplinary care for managing refractory hepatolithiasis. Effective management of refractory hepatolithiasis involves advanced surgical approaches and long-term follow-up to prevent recurrence and improve outcomes. Future research should focus on novel therapeutic strategies to enhance patient care.

MISDIAGNOSED PERFORATED APPENDICITIS IN A 22-MONTH-OLD

Esther Burns, BS, Katelyn Lunini, MS, Jordan Clement, DO

Introduction: Acute appendicitis is a common surgical emergency in pediatrics; however, it is rare in the first few years of life. Perforation of the appendix increases complications and risks of morbidity. Younger patients have higher rates of perforation (74% in 1-1.9 years, 49% for 4-4.9 years). Clinical presentation varies, and can be misdiagnosed as gastroenteritis, bowel obstruction, or constipation. This case follows the clinical course of a 22-month-old female with perforated appendicitis. **Case Presentation:** A 22-month-old female presented with fever, vomiting, diarrhea, and decreased urine output of 5 days duration. She had been previously admitted to an outside hospital for dehydration and abdominal distention with tenderness. Pt was treated with Rocephin for concern of pneumonia. Concerns persisted, and she was transferred to our hospital. Initial exam showed mildly distended abdomen with tenderness with normal bowel sounds and no rebound or guarding. All vital signs were within normal limits. WBC was normal at 8.93 though CRP was elevated at 57.9. Rocephin was not continued for her viral pneumonia. Abdominal x-ray for evaluation of constipation was suspicious for intussusception. Abdominal ultrasound revealed an enlarged and inflamed appendix with adjacent abscess, consistent with acute perforated appendicitis. An emergent laparoscopic removal of a walled-off perforated appendix with aspiration of exudate was done. The patient's postoperative course included persistent oxygen desaturation, ileus requiring tube decompression, and total parenteral nutrition with PICC line placement. The patient eventually improved and was discharged in stable condition on postoperative Day 9. **Discussion:** Appendicitis in young children can present atypically causing delay in diagnosis and increased risk of perforation. This patient's presentation, initially diagnosed as dehydration with pneumonia, then constipation with ileum highlights the importance of keeping a broad differential that includes rarer diagnoses. Prompt imaging and surgical intervention are critical for managing the perforated appendix and preventing further complications.

FRIDAY NIGHT FRIGHTS – A TACKLE GONE WRONG

Caleb Curry, DO; Jennifer Mitchell, MD, FAAFP, FAMSSM

18 yo M high school tailback was tackled and thrown down on crown of his helmet, did not lose consciousness. He continued to play but was not acting right, so was asked to leave the field by officials, then started walking toward the endzone when he collapsed. He reported numbness and weakness of his right extremities, so c-spine was stabilized and helmet and shoulder pads removed. He was taken by EMS to the ED under spinal precautions. In the ED he still had R-sided numbness, paresis, neck and upper back pain, and headache, which prompted imaging and neurosurgery consult. Imaging showed no abnormality, but due to persistent deficits he was admitted to the ICU for monitoring and additional evaluation. Admitted to ICU for neuro checks and imaging. Day 2 strength improved globally though not back to baseline. Day 3 still reported heaviness in feet with unsteady gait. Day 4 was back to baseline with symmetric strength, 5/5 globally on exam without unsteadiness. Discharged home to follow-up with PCP. Trauma team discharge instructions: "avoid contact sports for 6 months" and "see PCP for problems." His parents didn't know what to do, so went to orthopedist, was referred to PT and PCSM team. Athletes' long-term health is most important when managing transient hemiplegia. There are few formal guidelines for management of CCN and SCIWORA. It's well established that CCN resolves in 48 hours and resolution of SCIWORA varies, some having residual deficits. Deficits that resolve can be managed with an individualized

approach, but persistent deficits should never be cleared for contact/collision sports. Clearance may be allowed after a 1st SCIWORA with complete resolution if there's no other red flags. Guidelines recommend lifetime restriction following a 2nd CCN event. This case discusses diagnosis and management of SCIWORA and highlights the continued knowledge gaps regarding SCIWORA even with increasing accessibility of MRI.

ALLOPURINOL HYPERSENSITIVITY INDUCED STEVEN-JOHNSON SYNDROME

Hannah Chaudhury, BS; Brooke Walterscheid, M.D.; Michelle Tarbox, M.D.

Introduction

Stevens-Johnson Syndrome (SJS) is a severe and life-threatening condition characterized by widespread rash and blistering progressing to skin and mucosal detachment. Highly associated with adverse drug reactions, with allopurinol being a leading causative agent. Early cessation of the offending agent is imperative in improving patient morbidity and mortality.

Case Presentation

54-year-old male presented with sudden, macular rash to the right upper abdomen, progressing to involve desquamation of the oral and scrotal mucosa. Two months prior, he was initiated on allopurinol for suspected uric acid control. Other medications included Olmesartan and metoprolol, which he had been tolerating for several years. Upon realization of the rash, he immediately stopped the medication and alerted the prescriber- likely a life-saving decision on his part. Punch biopsy revealed interface dermatitis and keratinocyte necrosis consistent with SJS. The patient was advised to avoid allopurinol and fully recovered with supportive therapy (ie wound care, fluid resuscitation, infection prevention) over the following weeks.

Discussion

The diagnosis of allopurinol hypersensitivity induced SJS was made based on: the clinical presentation, characteristic skin lesions, and microscopic analysis. Each day remaining on the offending agent is associated with up to a 30% increase in mortality per day. Early recognition and withdrawal of the perpetrating drug is essential in preventing further progression of the reaction. Allopurinol induced SJS is uniquely linked to acute liver failure- careful monitoring is required.

Conclusion

Allopurinol hypersensitivity induced SJS is exceedingly rare reaction to this widely distributed medication. Allopurinol is prescribed to approximately 3.6 million people per year in the US. Our patient's immediate cessation was imperative in minimizing his morbidity and mortality rate. Counseling and education on potential side effects is a life-saving effort in the early detection of SJS.

SEVERE IRON DEFICIENCY ANEMIA LEADING TO CARIOGENIC SHOCK AND HIGH OUTPUT CARDIAC FAILURE IN A PEDIATRIC PATIENT

Julieann Cherukara, Anosha Shetiya, Mohamad Al-Rahawan

Iron deficiency anemia (IDA) is the most common nutritional deficiency in children, often causing fatigue and pallor. In severe cases, it can lead to high-output cardiac failure and cardiogenic shock. As the body compensates for reduced oxygen-carrying capacity by increasing cardiac output, it can overwhelm the heart's function, leading to volume overload and heart failure. This case highlights how severe IDA can cause acute cardiac decompensation. We present a 3-year-old girl who presented in extremis to the emergency department with hypoxemic respiratory failure, sepsis, cardiogenic shock, metabolic acidosis, and severe IDA. Her mother initially suspected respiratory syncytial virus (RSV) due to similar symptoms in a sibling, but the child's condition rapidly deteriorated. On arrival, the child was unresponsive with a fixed gaze, grunting respirations, and absent central perfusion. Blood work revealed severe IDA with a hemoglobin of 1.4 g/dL, MCV 66 fl, RDW-CV 21.2, iron level of 14 µg/dL, iron saturation of 4%, total iron-binding capacity (TIBC) of 399 µg/dL, ferritin of 3 ng/mL. Echocardiography showed poor left ventricular

function with an ejection fraction (EF) of 33.4% and a right-sided pleural effusion. Enalapril was initiated for LV reverse remodeling, and oral ferrous sulfate was given for severe IDA. The child developed cardiac failure as the heart tried to compensate for anemia by increasing cardiac output, leading to volume overload. She required inotropic support, a transfusion of packed red blood cells, and Lasix. Ferrous sulfate was initiated, and the patient was intubated and placed on mechanical ventilation. Once stabilized, she was discharged with hemoglobin of 12.8 g/dL, MCV of 86.4, and EF of 62%. This case emphasizes the importance of recognizing severe IDA as a cause of cardiogenic shock and heart failure in pediatric patients. Early treatment with transfusion and iron supplementation is crucial in improving outcomes.

PSEUDOMONAS MENDOCINA BACTEREMIA: A CASE REPORT HIGHLIGHTING A POTENTIALLY EMERGING PATHOGEN

Alistair Disraeli; William Derrick MPH; Jacob Nichols MD

Case Report

A 57-year-old female with a past medical history of atrial fibrillation status-post ablation, chronic leg wounds, hypertension, congestive heart failure with preserved ejection fraction, and recent treatment for bilateral lower extremity cellulitis presented to the emergency room with fever, nausea, vomiting, watery diarrhea, shortness of breath, diuresis, polydipsia, and chronic leg wounds. An extensive infectious workup was conducted including, urinalysis, urine culture, blood culture, and stool culture.

Her clinical course was uneventful, with rapid resolution of fever and diaphoresis within days of expanding antibiotic coverage. Blood culture results revealed *Pseudomonas mendocina* bacteremia, and urine culture was positive for *Klebsiella pneumoniae*.

Discussion

At the time of writing, *Pseudomonas mendocina* has been documented to have caused infections only rarely in humans, with only 16 previously reported cases of *P. mendocina* in the world. Of these reported cases, the most common infections were infective endocarditis, central nervous system infections, and skin and soft tissue infections.

The case highlighted in this study is another skin and soft tissue infection caused by *P. mendocina* that subsequently progressed to bacteremia with sepsis. The patient was treated successfully with ceftriaxone adding to the evidence that third generation cephalosporins are effective in treating *P. mendocina*.

Conclusion

Further evaluation and analysis of patients who present with this organism is needed to understand the natural history and disease course for patients who contract infections due to *P. mendocina*. Cases of infection due to this organism are rare in the literature and documentation of these cases as they are identified clinically is crucial to understanding this pathogen and any changes in the frequency, location, and characteristics of these infections in different populations.

RECURRENCE OF CHROMOPHOBE RENAL CELL CARCINOMA

Isaac Edwards; Chase Renstrom; Dr. Marshall Willis

Introduction: Chromophobe renal cell carcinoma (chRCC) is a rare subtype of renal cell carcinoma. It generally presents as a localized mass with a favorable prognosis compared to other renal malignancies. However, its recurrence post-nephrectomy, particularly in retroperitoneal regions, is infrequent. This case explores the recurrence of chRCC in a 37-year-old male after initial nephrectomy of a left renal mass.

Case Description/Methods: A 37-year-old male presented with dyspepsia and worsening epigastric pain. Despite improvement with Omeprazole, symptoms persisted, prompting further investigation. An abdominal ultrasound revealed a suspected left renal mass, which was later confirmed by CT scan. Following the diagnosis of a left renal mass, the patient underwent nephrectomy, and histopathological analysis confirmed chromophobe renal cell carcinoma. Two years postoperatively, a follow-up CT scan revealed a retroperitoneal nodule. A CT-guided biopsy was performed, and pathological examination

identified neoplastic cells with an infiltrating pattern, consistent with recurrence of chromophobe renal cell carcinoma.

Discussion/Results: While chRCC typically has a low recurrence rate, particularly in younger patients who undergo complete surgical resection, this case underscores the potential for recurrence, years after nephrectomy. The patient's recurrent chRCC highlights the need for long-term follow-up and careful monitoring with imaging, as the atypical presentation may delay diagnosis. Furthermore, it supports the importance of considering biopsy for suspected recurrent renal malignancies. Overall, understanding the behavior of chromophobe renal cell carcinoma and optimizing surveillance strategies may improve outcomes in cases of recurrence.

Conclusion: This case highlights the rare recurrence of chromophobe renal cell carcinoma in the retroperitoneum, emphasizing the significance of ongoing surveillance and biopsy in patients post-nephrectomy.

A GIANT PROLACTINOMA AND GENDER IDENTITY DISORDER: A CASE REPORT

Mary A. Elhawi, B.S ; Dr. Shazia Ahmad, MD

Giant prolactinomas are large (>4 cm) prolactin-secreting tumors that cause hypogonadism by suppressing gonadotropin-releasing hormone and testosterone pulsatility. In children, they can delay or prevent puberty, impair growth, and cause galactorrhea or menstrual irregularities.

A 21-year-old biological male with depression and gender identity disorder presented with progressive left-sided weakness over 6-12 months, beginning in the left leg and later affecting the left arm and gait. Imaging revealed a large suprasellar mass (4.9 cm) with mass effect on the third and right lateral ventricles. Lab results showed hyperprolactinemia (>4700 ng/ml) with low testosterone, FSH, and LH. The patient was treated with a dopamine agonist.

This case highlights a rare presentation of prolactinoma in a young male, where hypogonadotropic hypogonadism hindered puberty and secondary sexual development. The patient perceived his delayed development as normal, but it led to significant challenges, including bullying, social isolation, and depression. Unlike typical cases, his giant prolactinoma caused progressive neurological symptoms, including left-sided weakness and gait disturbances, due to its impact on adjacent brain structures. Effective management of such cases requires a multidisciplinary approach, addressing endocrine, neurological, and psychological aspects. Gender identity concerns further complicate treatment, as hormonal therapy may worsen mental health. Comprehensive counseling and clear communication about treatment goals are vital to balancing medical care with mental well-being.

This case underscores the importance of recognizing atypical presentations of prolactinomas in young adults, particularly those with delayed puberty, growth abnormalities, and neurological symptoms. Early diagnosis and a holistic care plan can improve outcomes and address the unique challenges posed by such complex cases.

DON'T WORRY, IT'S ALL IN YOUR HEAD

John Evans, DO; Jennifer Mitchell, MD, FAAFP; David Edwards, MD, FAMSSM

This is the case of an 18y/o male Track and Field athlete who presented with two months of worsening headache, fatigue, and dizziness. On exam, he had some neurologic deficits. Due to concern of increased intracranial pressure, he was sent to the Emergency Department for further evaluation. An MRI of his brain showed a mass in the left cerebellar hemisphere. He was admitted to the hospital, where the mass was excised by Neurosurgery. Subsequent pathology studies revealed the mass to be a Cerebellar Hemangioblastoma. This case report discusses the presentation, exam, lab and imaging results, outcome, and return to activity for this patient. It also discusses the diagnosis of hemangioblastoma and how to recognize and treat it.

A DOUBLE-EDGED SWORD: NAVIGATING KRATOM USE DISORDER IN A YOUNG ADULT WITH PTSD AND ACADEMIC CHALLENGES.

Jedidiah Feyisetan; Regina Baronia M.D MEd; Poorvanshi Alag, M.D., DABOM.

Kratom use disorder is an emerging concern, particularly among young adults who turn to this plant-derived substance with opioid-like properties as a maladaptive coping mechanism for stress and mental health challenges. This case highlights a 20-year-old college student grappling with severe kratom use disorder, post-traumatic stress disorder (PTSD), and major depressive disorder (MDD), compounded by academic stress, familial expectations, and trauma history. Despite ongoing treatment with Prozac and therapy, the patient struggled with escalating kratom use, withdrawal symptoms, and persistent anxiety and depression.

This study explores the bidirectional relationship between substance use and psychiatric symptoms, emphasizing the importance of an integrated approach to care. Treatment included Suboxone for withdrawal management, Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) for PTSD, and pharmacological support for mood and anxiety disorders. By addressing substance use and mental health concurrently, this case underscores the complexity of dual diagnoses and the critical need for innovative, empathetic, and tailored strategies to support young adults in high-stress environments.

STREP INVASION: A RARE CASE OF STREPTOCOCCAL TOXIC SHOCK SYNDROME WITH INVASIVE GROUP A STREP DISEASE

Drs. Eudys Briceno-Brito, Maria Gasque, and Gabriella Giambanco

Intro: Toxic Shock Syndrome (TSS) is a life-threatening, toxin-mediated illness caused by *Staphylococcus aureus* or *Streptococcus pyogenes*. It results in hypotension, capillary leak, and multiorgan failure due to superantigen-induced cytokine release. Diagnosis is clinical, requiring fever, rash, hypotension, desquamation, negative serologic tests, and involvement of three organ systems. Mortality is significantly higher in *S. pyogenes* (30-70%) than *S. aureus* (5%).

Case: A 12-year-old male presented with fever, rash, diarrhea, emesis, and joint pain following a history of sore throat. He developed shock, acute kidney injury (AKI), and disseminated intravascular coagulation (DIC) and was admitted to the PICU. Cultures confirmed *S. pyogenes* in blood, respiratory, and joint fluid samples. Management included fluid resuscitation, antibiotics, IVIG, ECMO, and surgical interventions, including fasciotomies and bilateral below-knee amputations due to necrosis.

Despite advanced interventions, the patient developed complications, including fungal sepsis, cerebral infarctions, and refractory intracranial hypertension. Imaging revealed bilateral strokes and hemorrhagic conversion, leading to severe neurologic decline. Persistent high intracranial pressures necessitated multiple neurosurgical interventions. Ultimately, care was withdrawn due to progressive neurologic deterioration and poor prognosis.

Conclusion: This case highlights the aggressive nature of invasive GAS infections, requiring early recognition, aggressive resuscitation, and multidisciplinary management. Complications such as AKI, necrosis, and neurologic injury underscore the importance of vigilant monitoring and flexible treatment strategies. The decision to withdraw care involved transparent communication with the family, addressing cultural concerns and language barriers. Despite advances in critical care, outcomes remain poor in severe cases, emphasizing the need for ongoing research to improve survival and quality of life.

RADIATION THERAPY AS TREATMENT FOR REFRACTORY CONDYLOMA ACUMINATA/BUSCHKE-LÖWENSTEIN TUMOR - A CASE STUDY

Karmilena Gonzales; Ashlyn Anderson; Abbey Bing; Dr. Mark Reedy, M.D.; and Dr. Komaraiah Palle, Ph.D.

Human Papillomavirus (HPV) consists of over 200 viruses, 40 of which infect humans, 14 with oncogenic potential, and two (HPV 16, 18) responsible for approximately 70% of all HPV-related malignancies. Two non-

oncogenic/low-risk HPV viruses (6,11) cause 90% of genital warts. We present a case of a 64-year-old with treatment-refractory lower genital and perianal condyloma acuminata referred to the UMC Cancer Center gynecologic oncology service for a large exophytic vulvar, perineal, and perianal condyloma acuminata. After failing topical therapies EGCG, TCA, Podophyllin, and 5-FU cream, with or without desiccation procedures, topical toll-like receptor 7 with systemic retinoic acid therapy, intratumoral BCG, MMR, and HPV vaccine, radical resection of vulva, perineum and perianus was performed with bilateral V-Y advancement flaps, we elected to perform a diverting loop colostomy and use fractional radiation. We discuss the disease and therapeutic efforts which failed until using an unconventional therapy, external beam radiation. A pictorial history of the patient's therapies is reviewed. The major immune mechanisms required to produce a durable cell-mediated innate and adaptive immune response are discussed. which produced complete resolution of this disease and clearance of the HPV virus. We describe the therapeutic interventions employed, highlighting how conventional external beam radiation successfully treated this recalcitrant benign condition and cleared the HPV infection.

UNRECOGNIZED FOREIGN BODY-INDUCED BOWEL OBSTRUCTION AND SUBSEQUENT COMPLICATIONS IN A 4-YEAR-OLD FEMALE

Rekha Goswami, B.S., Katelyn Lunini, M.S., Esther Burns, B.S., Jordan Clement, D.O., Elisabeth Conser, M.D.

Foreign body ingestion is common in the young pediatric population, most recognized by symptoms of GI upset or obstruction. However, GI obstructions can have variable presentation, causing a delay in diagnosis and surgical management to avoid life-threatening complications. Radiographs are first line for the investigation of foreign objects, but up to 64% of ingested objects are radiopaque. Investigation and removal can also be done by endoscopy, laparoscopy, or open surgical methods. A 4-year-old female presented to the emergency room with abdominal pain and mild distention, following four days of constipation and preceding two days of bilious vomiting with feeding intolerance. X-ray visualized a dilated bowel with moderate stool burden, and fecalization of the terminal ileum. A CT scan suggested an ileus. No surgical intervention was suggested. Bowel regimens lead to a large bowel movement overnight, with discharge the next day. She was readmitted 5 days later with worsening abdominal pain, diarrhea, fever, and vomiting. She was tolerating only fluid intake. A CT abdomen showed mesenteric edema and enteritis. Pediatric surgery suggested that the CT air-fluid mismatch at the cecal junction represented a radiolucent foreign body blockage. A diagnostic laparoscopy identified a firm mass in the small bowel, too large to remove laparoscopically. Open surgery was performed, and a blue foam ball was removed. The patient recovered over two days, with brief concern for infection of the surgical wound that cleared with antibiotic use. The patient gradually advanced to a normal diet and was discharged with no further complications. Foreign body obstructions can have vague abdominal symptoms. The difficulty to confirm an object on imaging can lead to delayed diagnosis. A foreign body ingestion must be ruled out early, as these cases can present with nonspecific symptoms, but progress quickly with catastrophic complications.

FAMILIAL DYSGERMINOMA IN TWO SISTERS: CASE REPORT

Adithi Govindan; Dr. Canice Dancel; Abby Hubbard; Dr. Mark Reedy

Ovarian dysgerminomas are a rare germ cell tumor that primarily affects the young population. Although dysgerminomas can co-occur in siblings and other family members, there is not one identifiable heritable mutation that causes the germ cell tumor. Germ cell tumors, including dysgerminomas, can occur in patients with partial or complete gonadal dysgenesis, however some patients are phenotypically normal as in this case study. Here, we discuss the two phenotypically normal sisters aged 19 and 11 years old at the time of their diagnosis, who were diagnosed with a right ovarian dysgerminoma. We discuss their presentation, treatment course, and follow-up.

LIPOMYELOMENINGOCELE CAUSING A RAPIDLY PROGRESSIVE ACQUIRED CHIARI I MALFORMATION IN INFANCY

Caylor W. Hafen; Usiakimi Igbaseimokumo, M.D.;

Lipomyelomeningocele present peculiar challenges because prophylactic surgery does not consistently prevent the development of deficits and may be associated with a more difficult subsequent repair. This has led to the contrary view of carefully monitoring asymptomatic patients to delay the initial repair. An infant with asymptomatic lumbar lipomyelomeningocele who was born without a Chiari malformation but rapidly developed an acquired Chiari malformation in the first year of life is presented here to illustrate another facet of this complex problem. The arguments for and against prophylactic repair and the safety of lipomyelomeningocele repair in the presence of a severe Chiari malformation are discussed.

LONG TERM CLINICAL AND ELECTRODIAGNOSTIC FOLLOW-UP OF LONG NERVE ALLOGRAFT RECONSTRUCTION OF ULNAR NERVE: A CASE REPORT AND REVIEW OF THE LITERATURE

*Justin Harder, BS; Caroline J. Cushman, BS; Evan Hernandez, BS; Cameron Cox, BA;
Robert N. Kurtzke, MD; Brendan J. MacKay, MD*

Case: With the advancement, expansion of the indications for application, and more widespread use of nerve allografts, it is necessary to examine their effectiveness in complicated reconstructive problems such as long gap repair. This article discusses a young patient who suffered a large traumatic left proximal ulnar nerve injury with a gap of 68 mm. Approximately one month after injury, the ulnar and musculocutaneous nerves were reconstructed with an allograft, and an anterior interosseus nerve transfer was performed. The patient underwent secondary reconstructive procedures including volar plate advancements, and left abductor pollicis longus to extensor pollicis brevis tendon transfer. The patients' progression was followed from the time of initial reconstruction to 4.5 years postoperatively with clinical and electromyography data.

Conclusion: This article provides a unique opportunity to investigate long term follow up data on an individual with a long proximal nerve gap injury. Long term follow-up of such injuries is limited in the literature, prompting the need for the reporting of such data. A gold standard for repair of long proximal nerve injuries cannot be established without further reporting of statistics with extended follow-up. Utilizing the diagnostics detailed in this case will hopefully provide a framework towards how to approach and document long gap repair in future studies.

FACIOSCAPULOHUMERAL MUSCULAR DYSTROPHY MANIFESTATIONS IN THE HAND: A CASE REPORT

Alexander Hayek; Andrew Ibrahim; Patrick Udenyi; Saad Majeed; Nicholas Bays; Adam Horvit, MD; Lee Reichel, MD

INTRODUCTION

Facioscapulohumeral muscular dystrophy (FSHD), the third most common muscular dystrophy following Duchenne and myotonic dystrophy, typically involves progressive weakness of the face, shoulder, and upper arm muscles. FSHD involvement of the hand, however, is exceptionally rare and poorly characterized in the literature. This case highlights a unique clinical presentation of FSHD with isolated hand symptoms as the initial manifestation, encouraging an index of suspicion for FSHD in the distal upper extremity.

CASE PRESENTATION

A 26-year-old man with a history of prior fracture of the left ring finger presented with a two-month history of inability to extend the left ring and small fingers. Examination revealed fixed flexion of the left ring and small finger metacarpophalangeal joints at 70 and 90 degrees, respectively, without atrophy, sensory deficits, tenosynovitis, strength loss, tenodesis testing, or radiographic abnormalities. Electrodiagnostic studies showed diffuse myopathy, suggesting FSHD, later confirmed by genetic testing. Two tendon transfers were performed to restore hand function, yielding significant improvement at over one-year

follow-up.

DISCUSSION/CONCLUSION

This case represents a unique presentation of FSHD involving the hand as the primary clinical manifestation, a finding not previously documented. Isolated hand symptoms may serve as an early clue for FSHD diagnosis, warranting further investigation and reporting of similar cases. Subsequent evaluation at the one-year follow-up revealed diffuse muscular involvement, including the shoulder girdle, paralleling similar cases of ulnar neuropathy where atrophy of the first dorsal interosseous muscle often goes unnoticed. This emphasizes the need for comprehensive examinations, as clinicians may focus on the apparent pathology without considering broader evaluations. Operative findings of muscle-tendon continuity but overt laxity may explain inconclusive diagnostic tests, such as the tenodesis test. This case highlights the necessity of clinician awareness and underscores the need for research into FSHD presentations in the distal upper extremity.

OCULAR AND SYSTEMIC MANIFESTATIONS OF TUBGCP4 RELATED MICROCEPHALY AND CHORIORETINOPATHY SYNDROME: A CASE REPORT AND REVIEW OF LITERATURE

Quratulain Shekoh; Aidan Hayes; Ernesto Ponce-Cruz; Zeid Nawas; Dr. Temiloluwa Abikoye

Background

TUBGCP4-related microcephaly and chorioretinopathy (MCCRP3) is a rare, autosomal recessive disorder characterized by primary congenital microcephaly and distinctive chorioretinopathy, often accompanied by various ocular anomalies. This condition results from mutations in the TUBGCP4 gene, leading to abnormal microtubule organization and reduced protein production. It typically presents with ocular and developmental impairments.

Case Report

An 8-month-old female with congenital microcephaly and suspected developmental delays presented with frequent downward gazing and difficulty looking upward. Her birth history was unremarkable, though she had a low occipital-frontal head circumference at 4 months. At 6 months, she was diagnosed with a systolic cardiac murmur and peripheral pulmonic stenosis. Genetic testing revealed two pathogenic variants in the TUBGCP4 gene: c.1651C>T p.R551*, inherited from her mother, and c.1746G>T p.L582-, inherited from her father. These variants are associated with MCCRP3, which can cause vision and learning difficulties.

Findings

Ophthalmic evaluation showed high hyperopia and anisometropic astigmatism in both eyes. Fundus examination revealed optic nerve pallor and tractional bands in the left eye, along with multiple chorioretinal scars and lacunae across the retina. MRI and an EUA scheduled to assess retinal changes and potential brain malformations came out negative. Glasses were prescribed to address hyperopia and astigmatism.

Conclusion

This case reinforces the association between TUBGCP4 mutations and MCCRP3, highlighting characteristic ocular findings such as chorioretinal lesions, optic atrophy, and microcephaly. The remarkable finding is the identification of a truncating mutation (c.1651C>T p.R551*), which has only been reported once in the literature, emphasizing the genetic basis of MCCRP3. Early recognition and intervention are crucial for managing visual impairments and monitoring developmental progress.

OCULAR AND SYSTEMIC MANIFESTATIONS OF TUBGCP4 RELATED MICROCEPHALY AND CHORIORETINOPATHY SYNDROME: A CASE REPORT AND REVIEW OF LITERATURE

Quratulain Shekoh; Ernesto Ponce-Cruz; Zeid Nawas; Dr. Temiloluwa Abikoye

Background

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DUAL 3Q29 MICRODELETION AND 6Q25.3-Q27 TERMINAL DELETION: A RARE CASE OF COMBINED GENOMIC ABERRATIONS AND CLINICAL IMPLICATIONS

Dr. Latisha McLaurin MD; Dr. Jordan Clement, DO

Introduction 3q29 microdeletion syndrome and 6q25.3-q27 terminal deletions are rare genetic conditions with distinct yet overlapping phenotypic manifestations. The 3q29 microdeletion, with an estimated prevalence of 1 in 30,000–40,000 (Williatt et al., 2005), is characterized by dysmorphic features (microcephaly, micrognathia, low-set ears), growth and developmental delays, intellectual disability, and neurologic abnormalities such as gait ataxia and hypotonia. Associated features include congenital heart defects, feeding difficulties, and failure to thrive. Behaviorally, affected individuals may exhibit hyperactivity, anxiety, and aggression. Conversely, 6q25.3-q27 terminal deletions are even rarer, with limited case reports, but are known to cause craniofacial dysmorphisms (short philtrum, thin lips, high-arched palate), growth abnormalities (IUGR, short stature), neurologic deficits (hypotonia, motor delays, seizures), and gastrointestinal complications (GERD, feeding intolerance) (Caselli et al., 2016). **Case Presentation** We report a 2-year-old male with dual chromosomal deletions involving 3q29 (1.58 Mb) and 6q25.3-q27 (7.27 Mb). Born

SGA (1.780 kg) at 37 weeks to a G2P2 mother, he exhibited IUGR, microcephaly, and persistent feeding difficulties requiring NICU support. Despite interventions, feeding intolerance continued, and at 12 months, he demonstrated motor delays, mild hearing loss, and failure to thrive. Genetic testing revealed maternal inheritance of 3q29 deletion and a de novo 6q25.3-q27 deletion. The mother had exhibited micrognathia, mild microcephaly, and learning delays. Additional findings in the patient included delayed bone age, connective tissue laxity, primary hypertension (HTN), requiring multidisciplinary management (PT, OT, ST, endocrinology, cardiology). Discussion This case highlights the rare occurrence of dual deletions, especially a de novo mutation accompanied by an inherited deletion, contributing to complex phenotypic variability. While both deletions independently cause developmental and growth abnormalities, their combined effect remains poorly understood. The patient's presentation underscores the importance of genetic testing, early intervention, and comprehensive care planning.

BUTTON BATTERY INGESTION BY CHILDREN: A CASE REPORT AND REVIEW OF RISKS, OUTCOMES, AND MITIGATION STRATEGIES

Jason R. Jesudass, BS; Michael Selby, B.A; Kolos K. Nagy, B.S; Nayeon Kim-Thiesse, MD; Winslo K. Idicula, MD

A 23-month-old male presented to OSH with dyspnea, dysphagia, and drooling concerning for foreign object ingestion. Chest X-ray demonstrated a foreign object in the upper esophagus measuring 2.1 cm in diameter. The patient was immediately scheduled for microscopic laryngoscopy, bronchoscopy, and removal, where the foreign object was determined to be a button battery. Though the button battery was successfully removed and the patient was spared from any serious complications and eventually discharged, this case is a stark reminder of the danger that button batteries pose to the health of unsuspecting children who may readily explore their environments in a highly tactile manner. Button batteries are essential household items, and the prevalence of button battery ingestion by children has sparked controversy and subsequent legislative interference. Reece's Law has made strides on this forefront, requiring button batteries and batteries of any kind to be manufactured, sold, and stored in accordance with protective measures set forth by Congress intended to mitigate the incidence of ingestion by young children. Herein, we aim to discuss common risks, outcomes, and mitigation strategies associated with button battery ingestion by children.

OSELTAMIVIR-ASSOCIATED SEVERE CUTANEOUS ADVERSE REACTION COMPLICATED BY MULTISYSTEM ORGAN FAILURE

Rebecca Joseph, BS; Ethan Matthew, MD; Jonathan Aldrete, MD; Bryce Stash, MD; John A Griswold, MD, FACS; Michelle Tarbox, MD

Background

Stevens-Johnson Syndrome (SJS) and Toxic Epidermal Necrolysis (TEN) are rare, life-threatening mucocutaneous reactions often triggered by medications. While SJS/TEN is most commonly associated with antibiotics and anticonvulsants, oseltamivir-induced cases are rarely reported. This case describes a 19-year-old female who developed SJS/TEN overlap syndrome following oseltamivir administration, complicated by acute respiratory distress syndrome (ARDS), *Clostridioides difficile* colitis, and severe transaminitis. This highlights the need for early recognition, aggressive supportive care, and innovative wound management strategies.

Case Description

A previously healthy 19-year-old female presented with fever (102.3°F), myalgias, and back pain. She tested positive for Influenza A and was prescribed oseltamivir. Within 24 hours, her fever worsened, with tachycardia (120 bpm) and truncal erythema. By day three, she developed violaceous plaques on her forearms, followed by widespread papules, plaques, and bullae, with mucosal desquamation.

Interventions

Laboratory tests revealed marked transaminitis (AST 716 U/L, ALT 1166 U/L), suggesting hepatic involvement. She was airlifted to a burn center, where biopsy confirmed SJS/TEN overlap. Her condition deteriorated to ARDS requiring intubation and prone positioning, as well as *C. difficile* colitis requiring vancomycin. On

hospital day 5, she underwent autologous skin cell suspension therapy of affected areas.

Results

The patient improved rapidly following treatment. She was extubated within 24 hours. She was discharged four days later with stable vitals, resolved transaminitis, healing wounds, and no long-term complications.

Discussion/Conclusions

This case highlights the potential for severe multisystem complications in oseltamivir-induced SJS/TEN, including hepatic dysfunction, ARDS, and secondary infections. The marked transaminitis observed suggests immune-mediated hepatic injury, an underrecognized aspect of SJS/TEN. Additionally, this case supports the potential role of autologous skin cell suspension therapy in managing extensive epidermal loss. Early drug discontinuation, aggressive supportive care, and multidisciplinary wound management are crucial for optimizing outcomes.

PRELIMINARY BURR HOLE FOR EVD DURING ICP MONITORING PLACEMENT IN THE OR IN CASE OF SEVERE EDEMA AND INVISIBLE VENTRICLES

Valeria Diaz-Pacheco, M.S., Alyson Willis, B.S., Alexandra Munson, B.A., Laszlo Nagy, M.D.

Introduction: Pediatric head injuries are prevalent and can have a long-lasting impact on the patient's life and development. Severe head injuries can result in parenchymal swelling, which often requires burr holes to relieve the increased intracranial pressure and to evacuate hematomas, if present. The urgency of this procedure depends on the initial physical exam and imaging studies. With any burr hole placement, an intracranial pressure (ICP) monitor placement is required to help with medical management. While an external ventricular drain (EVD) may also be indicated in patients who present with hydrocephalus, this indication may not be initially evident in patients who present with severe edema and slit ventricles. However, as the injury progression continues, there could be a high chance that an EVD placement may be needed. Therefore, in this study, we highlight the importance and benefits of creating a preliminary burr hole for EVD during ICP monitoring placement in the OR. This procedure requires making an additional burr hole that would allow for bedside EVD placement if necessary. **Methods:** We performed a preliminary burr hole for future EVD placement during ICP monitoring in the OR. **Results:** In this study, we present a case in which an 11-year-old presented in the ED with a severe head and neck injury. Initially, the CT showed edema and slit ventricles. The patient was transferred to the OR, where two burr holes were made, one for ICP monitoring and one as a preliminary for EVD placement if indicated later on. The patient required an EVD two days post-trauma, and this was done at the bedside. **Conclusion:** By proactively creating the additional burr hole, it allowed for time-efficient injury management, enabling the patient to avoid another procedure in the OR and decreasing the chance of infection.

ANALYSIS OF FACTORS IMPACTING TIMELY TREATMENT OF PEDIATRIC RETINAL DETACHMENT

Akash Maheshwari, MBA; Kelly Mitchell, MD

Retinal detachment is the separation of the photoreceptor-containing neurosensory retina from the underlying retinal pigment epithelial layer. Once a retinal detachment involves the macula, a small but important area of the retina responsible for central vision, major vision impairment can occur. Examining and diagnosing a retinal detachment early is extremely important.

Our case presentation is of a 10-year-old female who has been in the foster care system since birth. She had been living with her current foster mother for one year; her foster mother recalled that the patient had noticed decreased vision in her right eye for the entire year that they had been living together. The patient was seen by a pediatric ophthalmologist who observed a chronic inferior macular-off retinal detachment of the left eye (OS) most likely secondary to lattice degeneration. After being evaluated by a retina specialist, there was concern that symmetric degenerative lattice lesions may exist in the right eye (OD). She was taken to the operating room, where exam under anesthesia OD demonstrated a large lattice plaque

superiorly with two atrophic holes. She received prophylactic laserpexy OD. She underwent OS repair of her current retinal detachment where a 5 millimeter scleral buckle was placed, meticulous shaving of the vitreous cavity was performed to flatten the retina, circumferential laser adherence was utilized to stabilize the retina, and silicone oil was injected to keep the retina in place.

This case is a distressing reminder of the importance of screening using dilated fundus exams in children. Moreover, vision changes experienced by pediatric patients are diagnostic clues that should be fully explored in a timely manner. Furthermore, children with unstable living situations or from disadvantaged socioeconomic backgrounds may face unique challenges and barriers to care which can delay diagnosis and definitive treatment.

CHRONIC MIGRAINES ELIMINATED WITH SPECIALIZED NASAL PROCEDURES: A CASE REPORT

Saad Majeed, Hibah Majeed, Adam Kacem, Farees Syed, Yasmeeen Welch, Patrick Udenyi, Adam Amor, Alex Hayek, Marcos Arciniega, Willem Northcut

Introduction Nasal abnormalities, such as misalignment or swelling of nasal structures, may result in contact between sensitive tissues inside the nose and nasal structures. This contact can trigger pain signals causing headaches and migraine-like symptoms. This case report describes a patient who developed nasal contact migraines, highlighting the importance of considering nasal abnormalities as potential triggers in headache pathogenesis. Case Presentation: An 18-year-old female athlete presented with an eight-month history of new daily onset migraines. Her pain radiated along the forehead and above the eyes. Her pain ranged from a 3 to a 9, in severe cases, on a 10-point scale. Symptoms included nausea, light sensitivity, dizziness, impaired memory, and nasal airway obstruction. After consulting with a neurologist, an MRI scan of the brain was performed and no abnormalities were observed. Nortriptyline was prescribed and no marked improvement was observed. Her case was then presented to an otolaryngologist. CT scan showed the following results. The nose revealed a left septal deviation with large, inferior, and middle turbinates. A large posterior septal spur showed impingement onto the left middle turbinate. The frontal Sinus tracts were narrowed. The maxillary and right sphenoid sinus presented with mucosal thickening. The patient had a septoplasty, inferior turbinectomy, bilateral middle turbinectomy, and bilateral frontal sinus balloon dilation performed on her. Immediately after her procedure, she was migraine-free and remained so until her last clinic visit almost one year after her procedure. Conclusion: This case demonstrates how nasal abnormalities can activate nociceptive pathways, leading to migraine episodes. By recognizing this interplay, healthcare providers can offer more effective treatment options, potentially reducing reliance on traditional pharmacological interventions and improving patient outcomes. Further research is necessary to continue refining diagnostic and treatment strategies, while a comprehensive diagnostic approach that includes ENT evaluations and imaging is crucial for identifying nasal contact points.

OPTIMIZING MANAGEMENT OF RECURRENT SPLENIC ABSCESES IN A PATIENT WITH SPLENOCOLONIC FISTULA SECONDARY TO CROHN'S DISEASE

Hayden Mathews; Colby Gordon; Bradley Kent; Dr. Eduardo Morfa Romero, M.D.

Crohn's disease frequently causes gastrointestinal fistulas, but splenocolonic and splenocutaneous fistulas are rare. These uncommon complications pose diagnostic and management challenges, often requiring tailored interventions. We present the case of a 37-year-old male with Crohn's disease who developed a splenocolonic fistula complicated by recurrent splenic abscesses. The patient presented with abdominal pain, fever, nausea, vomiting, diarrhea, and persistent purulent drainage from a previous subphrenic Jackson-Pratt drain site. Abdominal computed tomography confirmed the presence of a previously diagnosed fistulous tract involving the small bowel, spleen, and colon, but also revealed air in the splenic hilum and along the prior drain site, suggestive of an incipient splenocutaneous fistula. Wound cultures identified *Escherichia coli*, *Enterococcus faecium*, and *Streptococcus anginosus*, consistent with enteric

origin. Although broad-spectrum antibiotics and drainage were initially employed, the persistence of symptoms and recurrent abscess formation raised concerns about the adequacy of prior management. An earlier elective splenectomy might have alleviated these complications and reduced the risk of abscess recurrence. This case highlights the importance of weighing definitive surgical options, such as splenectomy, against conservative measures such as drainage, in managing rare complications of Crohn's disease. Early multidisciplinary evaluation and consideration of preemptive surgical intervention may optimize outcomes. Further research is needed to guide optimal strategies for managing splenic fistulas in Crohn's disease.

CASE STUDY: THE IMPACT OF EMOTION-FOCUSED THERAPY ON WOUND CARE ANXIETY IN A PEDIATRIC BURN PATIENT

Cameron Miller; Isaac Edwards; Sydney Crane M.S. LMFT-S; Monica Osterbauer M.S.; John Griswold, MD

Pediatric burn injuries often result in significant psychological distress, including heightened anxiety, trauma responses, and behavioral challenges, which can impede recovery. This case study examines the use of Emotion-Focused Therapy (EFT) as a nonpharmacologic intervention to reduce wound care anxiety in a pediatric patient recovering from 45% total body surface area mixed partial and full thickness burns sustained in a motor vehicle accident.

Methods: The patient presented with severe anticipatory anxiety, panic attacks, and avoidance behaviors during dressing changes and wound care, which required frequent sedation that prolonged recovery. Integrated behavioral health providers employed EFT interventions to enhance emotional awareness and regulation. Techniques included deep breathing, guided imagery, music therapy, and patient empowerment through active participation in wound care.

Results: EFT interventions resulted in a significant reduction in the patient's anxiety and reliance on sedatives. The patient demonstrated improved cooperation during wound care, accelerated physical recovery, and an earlier-than-expected discharge. Behavioral changes included increased emotional regulation, self-efficacy, and active involvement in care.

Conclusions: This case highlights the critical role of integrating psychological interventions like EFT into pediatric burn treatment. Addressing emotional distress through EFT not only improved the patient's psychological well-being but also enhanced the physical recovery process, emphasizing the need for a multidisciplinary approach to care in pediatric burn settings.

PEDIATRIC CASE OF PHACOMATOSIS PIGMENTOKERATOTICA ASSOCIATED WITH SEVERE HYPOPHOSPHATEMIC RICKETS

Karter Morris; Dr. Latisha Mclaurin, MD

Epidermal nevus syndromes (ENSs) are characterized by epidermal nevi with subsequent involvement of other body systems, and consist of several subgroups based on clinical presentation. Phacomatosis pigmentokeratotica (PPK) is a rare ENS that may present with an array of extradermal abnormalities. There are currently less than 50 PPK cases described in the literature. We present the case of 3-year-old female who was adopted from China with a "birthmark." She presented to the clinic with an apparent ENS consisting of multiple brown nevi, sebaceous nevi, and hyper/hypopigmented patches largely concentrated to the left side of the body and covering approximately 25% TBSA. In addition to the dermatologic findings, the patient suffered from multiple skeletal deformities including rotatory scoliosis, craniotabes, and changes in the hips, knees, lower leg, ankles and wrists consistent with rickets. Other abnormalities included ptosis of the left eye, moderate left-sided hemiparesis and hemiatrophy, evidence of type I focal cortical dysplasia, left lateral ventricular enlargement, left hemimegacephaly, dysplasia of the left temporal and parietal lobes, and an ostium secundum atrial septal defect. The diagnosis of PPK with secondary hypophosphatemic rickets was made. Skeletal manifestations improved upon treatment with

Phos-NaK and calcitriol, although multiple procedures would be needed for fracture management and prophylaxis.

CHRONICALLY PROGRESSING GRISEL'S SYNDROME WITH COMPLETE ROTATIONAL SUBLUXATION OF C1-C2

Valeria Levin; Alexandra Munson; Alyson Willis; Laszlo Nagy, MD

Background: Grisel's syndrome is a rare cause of atlantoaxial subluxation, usually following an infection and inflammation of the surrounding tissues. Symptoms include neck pain with movement and reduced mobility. Diagnosis is based on clinical presentation, underlying infection, and imaging. Research Question: This study emphasizes the importance of addressing Grisel's Syndrome early to prevent further atlantoaxial instability and surgery, while also highlighting changes in tilt that occur with chronic progression of the condition. Methods: Case report. Results: We present a case of a 7yo boy who presented with a chronic progression of Grisel's Syndrome with complete rotational subluxation of C1-C2. Three months prior, the patient was diagnosed with pharyngitis, viral gastroenteritis and had experienced neck pain for two months. The following month, the patient presented with a neck muscle strain with significant limited range of motion and parents reported two positive strep tests within the past month. A month later, the patient presented to the ED with a suspected C1-C2 dislocation and neck instability, confirmed by an MRI c-spine. Conservative treatment with a c-collar, diazepam and pain medication was given, and the patient showed significant improvement within 12 hours. Patient was discharged with a c-collar and muscle relaxants with a scheduled follow-up appointment in two weeks. At the time of the scheduled appointment, the patient received an x-ray which showed pseudosubluxation from C2-C4 and patient was admitted to the hospital. While the patient had been compliant with the c-collar, the CT showed left rotational dislocation. A follow-up MRI on the same day showed a right rotational dislocation. These findings indicate the severe instability of the ligaments, most likely as a result of the chronically developing Grisel's Syndrome. Conclusion: While a conservative approach is the preferred initial management, our case report suggests that chronic Grisel's syndrome more likely to lead to further atlantoaxial instability, eventually requiring surgery.

SPONTANEOUS CSF HYPOTENSION AS A CAUSE OF PROGRESSIVE TONSILLAR DESCENT AND SYRINX FORMATION 12 YEARS AFTER UNCOMPLICATED CHIARI DECOMPRESSION

Kolos K. Nagy, BS; Andrew F. Ibrahim, BS; Ryan D. Morgan, BS; Laszlo Nagy, MD

Chiari malformations are treated in high numbers by pediatric neurosurgeons across the world. After Chiari decompression, the cerebellar tonsils can ascend or remain in the same position, but symptoms generally resolve, and patients can return to their normal way of life. Redemonstration of Chiari malformation after surgical treatment is extremely rare, but if present, special consideration and an accurate differential diagnosis is necessary to elucidate the underlying cause. In patients experiencing spontaneous intracranial hypotension due to cerebrospinal fluid (CSF) leak, low pressures in the thecal sac may cause the cerebellum to sink through the foramen magnum, mimicking the presentation of Chiari malformation Type I. We present a case where after successful Chiari decompression and asymptomatic status for 12 years, a patient presented with headaches, tonsillar descent, and syrinx formation secondary to dural rupture and spontaneous CSF leak. After intracranial pressure monitoring confirmed low and negative pressures, a successful empirical epidural blood patch was performed that caused near immediate resolution of symptoms and halt of tonsillar descent.

THE IMPORTANCE OF PATIENT COMPLIANCE IN GLAUCOMA TREATMENT

Bryce Palmer

Introduction: Glaucoma is a common eye disease that is a leading cause of irreversible blindness yet is largely preventable when detected and treated early. Glaucoma treatment is complicated, however, by the need for frequent follow-up testing and strict patient compliance. This case explores the detrimental effect of poor compliance and decision making from a 33-year-old female with primary open-angle glaucoma. **Case Description/Methods:** A 33-year-old female with a family history of glaucoma presented with elevated intraocular pressure (IOP) in their right eye (OD) during an otherwise healthy eye exam. The patient was prescribed latanoprost drops which corrected IOP at first, however noncompliance caused IOP to become elevated once again. Over the next three years, the patient underwent argon laser trabeculoplasty (ALT) and was given multiple combinations of IOP-lowering drops. While helpful initially, symptoms worsened due to poor compliance, leading to significant vision loss. IOP was eventually stabilized with an Ahmed Tube Shunt, but the patient demanded it removed due to discomfort. The patient was counseled that removal and continued noncompliance with drops would lead to irreversible vision loss, but still they persisted. The shunt was removed and the patient continued to be noncompliant with medicated drops. Despite further treatment, the patient went blind OD within a year of shunt removal. **Discussion/Results:** While glaucoma treatment typically has favorable outcomes, this patient's case highlights the dangerous potential of the disease. Despite early diagnosis and multiple interventions, including topical medications, laser therapy, and surgical management, the patient's persistent noncompliance led to irreversible vision loss. Furthermore, this case underscores the challenge of patient autonomy in medical decision making, specifically when refusal of treatment leads to otherwise preventable blindness. **Conclusion:** This case highlights the importance of compliance in glaucoma treatment and raises discussion on how patient autonomy can affect clinical outcomes.

ACUTE PSYCHOSIS FROM A PITUITARY ADENOMA

Heidi Pargas, MD; Roderick Olivas, MD; Joy Osaji, MD; Rebecca Farias, MD

Introduction

A pituitary adenoma is defined as an incidentaloma or a functional adenoma. Incidentalomas cause no symptoms and are found mistakenly. Functional adenomas are symptomatic, the most common being prolactinomas. Symptoms are galactorrhea, gynecomastia, loss of libido, loss of fertility, and osteopenia. In rare cases, increased prolactin can lead to acute psychosis.

Case

We discuss Ms. A, who is antipsychotic naïve, has a past psychiatric history of generalized anxiety disorder treated with sertraline, and a medical history of asymptomatic adenoma. She presented with audible hallucinations that started 2 months prior. Prolactin was greatly elevated in her labs on admission. She denied any galactorrhea or associated symptoms. Neurosurgery was consulted and started bromocriptine. Aripiprazole was started by our team. The size of adenoma will be monitored. There was improved psychosis following treatment.

Discussion

The literature hypothesizes that elevated prolactin levels cause an increase in dopamine production. This dopamine elevation serves to activate the negative feedback loop decreasing prolactin. The increased dopamine then causes acute psychosis through the activation of the mesolimbic and inhibition of the mesocortical pathways. Theories hypothesize patients with acute psychosis have increased levels of prolactin. Aripiprazole increases the dopamine activity in the mesolimbic pathway treating the psychosis and acts as an antagonist in the tuberoinfundibular pathway which decreases prolactin.

Conclusion

At this time, the literature exploring the correlation between hyperprolactinemia and acute psychosis is limited. The literature agrees that starting aripiprazole and bromocriptine as the preferred method. Our

patient is still struggling with psychosis due to non-compliance but has shown improvement while on treatment. Further research is needed to truly certify correlation and better treat patients struggling with this disorder.

MYCOPLASMA PNEUMONIAE-INDUCED RASH AND MUCOSITIS IN AN 11-YEAR-OLD MALE: A CASE REPORT

Milcah Poothakary, BA; Becky Joseph, BS; Elias Lines, MD; Jonathan Aldrete, MD; Tala Porter, MD; Michelle Tarbox, MD

Mycoplasma pneumoniae infections have significantly increased across the United States since Spring 2024, particularly affecting young children. While typically causing mild respiratory illness, *M. pneumoniae* can rarely present with severe mucocutaneous manifestations. We present a case of mycoplasma-induced rash and mucositis (MIRM) in an adolescent male who presented with progressive oral and ocular mucositis following confirmed *M. pneumoniae* infection. The evolution from initial respiratory symptoms to development of characteristic mucosal-predominant involvement illustrates the diagnostic challenges in recognizing this early as a distinct clinical entity. Prompt recognition of MIRM facilitated early initiation of targeted therapy, ultimately resulting in a smooth recovery and favorable clinical outcome.

SURGICAL REPAIR OF SUPERIOR MESENTERIC VEIN ANEURYSM

Lauren Puig; Mackenzie Coffin; Grace McCrea; Dr. Tyler Mouw, MD

Introduction

Visceral venous aneurysms (VVAs) are rare vascular malformations, and case reports are critical for informing surgical decision-making. This report describes the discovery and management of a superior mesenteric (SMV) aneurysm identified during evaluation for back pain.

Methods

Abdominal CT imaging revealed a 3.2 cm saccular aneurysm of the SMV at the middle colic branch junction, with no evidence of thrombosis. Due to the risk of rupture, surgical intervention via tangential aneurysmectomy was performed.

Results

The aneurysm was successfully resected, and vessel patency was preserved. Pathological evaluation suggested a likely congenital origin, possibly due to embryological vessel merging abnormalities or an underlying connective tissue disorder. Venous aneurysms are significantly rarer than arterial aneurysms, likely due to the lower pressure in the venous system.

Conclusions

This case highlights the successful surgical management of a rare SMV aneurysm through tangential aneurysmectomy. Although venous aneurysms are uncommon, surgical intervention is crucial to prevent life-threatening rupture. This report contributes to the limited body of literature on VVAs and supports proactive surgical management in similar cases.

SWIFT ONSET, SWIFT RECOVERY: UNUSUAL NONRHEUMATIC MYOCARDITIS IN A YOUNG ADULT POST GROUP A STREPTOCOCCAL PHARYNGITIS

Andres Rios; Colby Wood; Ricardo Isaiah Garcia; Emily C. Mitchell; Dr. Jacob Nichols, MD

This case report highlights the unusual presentation and management of nonrheumatic myocarditis in a 24-year-old male, an age demographic not commonly associated with myocardial complications following Group A streptococcal pharyngitis. The patient, devoid of any prior medical history, manifested symptoms one day after being diagnosed with Group A streptococcal pharyngitis, a stark contrast to the typical progression of myocardial complications. The swift onset of symptoms and the patient's subsequent clinical presentation necessitated a comprehensive diagnostic approach. The patient's symptoms were

successfully alleviated with amoxicillin and anti-inflammatory therapy, underscoring its potential efficacy in managing nonrheumatic myocarditis. This case serves as a poignant reminder of the importance of maintaining a broad differential diagnosis, especially in atypical presentations, and the pivotal role of timely clinical intervention. The insights from this report contribute to the broader understanding of nonrheumatic myocarditis, emphasizing the significance of tailored diagnostic and therapeutic strategies to ensure optimal patient outcomes.

RAPID RECURRENCE OF PEDIATRIC PILOCYTIC ASTROCYTOMA

Orson Robertson, Ryan Morgan, Vishal Bandaru, Abhinav Karnati, Muhittin Belirgen M.D.

Pilocytic astrocytomas are classified as WHO Grade 1 tumors, characterized by well-differentiated cells and slow growth, with a recurrence rate of approximately 19% following gross-total resection in cerebellar cases. Recurrences are typically small (<1 cm) and occur over an extended period, with an average time to recurrence of 32.4 months. This case report presents an unusual instance of a rapidly recurring pilocytic astrocytoma in the posterior fossa of a pediatric patient. Despite gross-total resection on the second day of admission and confirmation of Grade 1 pathology, the tumor recurred within 3.5 weeks with a diameter far exceeding typical recurrence sizes, measuring 4–5 cm. A subsequent near-total resection left residual tumor adjacent to the brainstem, but recurrence occurred again within 3 weeks. Repeat pathology confirmed the original diagnosis of Grade 1 pilocytic astrocytoma. Given the atypical rapid growth and recurrence, the patient was prescribed a combination of trametinib and dabrafenib for 12 months post-operatively and did not show further growth. This case highlights the need to consider early screenings of recurrent cases of pilocytic astrocytomas.

ADAPTING ADULT PROTOCOLS FOR PEDIATRIC OLIGODENDROGLIOMA: A RARE CASE STUDY

Dr. Ritika Rodgers, MD; Kaitland Dunham, MS-2; Rebecca Joseph, MS-3; Dr. Chibuzo O'Suoji, MD

Background: Oligodendrogliomas (OG) are rare central nervous system tumors that arise from glial cells, with pediatric cases accounting for less than 10% of all diagnoses. This case presentation aims to illustrate the manifestations of a grade 3 oligodendroglioma in a pediatric patient, explore the adaptations of adult-based treatment strategies, and evaluate the clinical outcomes and implications for future pediatric neuro-oncology practices. **Case Presentation:** A 10-year-old right-handed female presented to the emergency department with a 5-month history of progressively worsening neurological symptoms including headaches, vomiting, gait instability, and diplopia. Brain imaging demonstrated a heterogeneous left frontal lobe mass as well as vasogenic edema, mass effect, and midline shift. Following gross total resection, pathology revealed a WHO grade 3 oligodendroglioma with a 1p/19q codeletion, OLIG2 positivity, and low IDH1 R132H mutation signal. The patient underwent external beam radiation and a 6-cycle adjuvant chemotherapy regimen per the NCCN CNS 13 protocol, consisting of lomustine, procarbazine, and vincristine (PCV). **Results:** Post-treatment imaging demonstrated stable residual disease without progression. The patient experienced treatment-related complications, including hemiparesis, chemotherapy-induced mucositis, and an anaphylaxis-like reaction. Despite these challenges, the patient demonstrated a favorable response to the adapted adult protocol. **Conclusion:** The diagnosis and management of pediatric oligodendrogliomas are complicated by numerous factors. This case presentation illustrates the variability in clinical manifestations, molecular profiles, anatomical locations, and therapeutic responses observed in patients with oligodendrogliomas. Ultimately, the case highlights the importance of individualized treatment strategies and the critical need for ongoing research to improve outcomes for this rare and challenging pediatric brain tumor.

FRONTOETHMOIDAL ENCEPHALOCELE – A RARE CASE REPORT

Wm. Zachary Salter BS; Winslo Idicula MD

Background: Encephaloceles are a type of open neural tube defect, allowing brain and meninges to herniate through a structural defect in the skull. The majority of all encephaloceles, (80%) are found in the occipital area of the cranium, whereas other locations such as frontoethmoidal and basal, collectively referred to as nasal encephaloceles, and much less common. Additionally, most cases of nasal encephaloceles are found in Southeast Asian countries, with very rare cases found in Europe, North America, and the Middle East. The incidence in Thailand is approximately 1 in 5,000 – 6,000 live births compared to 1 in 35,000 – 40,000 in the West. Nasal encephaloceles can cause CSF rhinorrhea or nasal obstruction in children. Case: This case documents a 23-month-old male presenting to the ED with recent nasal fracture and dacryocystitis. MRI showed a 1.3 cm soft tissue density at the nasal bridge. Neurosurgery and Otolaryngology performed a joint case to correct the defect. The Neurosurgery team began with case by performing a bicoronal cranioplasty and dural resection. With the bicoronal exposure, the tract was removed from the glabella defect and involved dura was excised. The nasal pit was ellipsed from the dorsum and using a lacrimal probe, the tract was circumferentially dissected down to the defect. The nasal dorsum was then closed. The frontal bone was reconstructed with split calvarial bone which was contoured to the defect after all involved tissue was excised. The contoured graft was then secured with Prolene sutures. The pericranium was then used to re-surface the bony defect and graft region. The bicoronal flap was then laid in its native position and closed with vicryl for deep, and monocryl for skin. Conclusion: This case demonstrates a rare congenital neural tube defect in the skull that was successfully corrected with good functional and aesthetic results.

MUSIC BOX SPINY KERATODERMA

Michael A. Selby, B.A, Mary A. Elhawi, B.S, Helen Chen, MD, Michelle Tarbox MD

Spiny Keratoderma, or "music box spine keratoderma," is a rare skin condition characterized by spiny papules on the palms and soles (1,3). Its pathophysiology remains unknown, though proposed factors include medications, trauma, and ectopic hair growth. Treatment for this condition involves topical creams, but success is limited, with some reports of efficacy with oral retinoids or treating underlying malignancy (1). There are different known forms of this condition such as familial and acquired. The familial type usually presents in adolescence while the acquired type is usually seen in older adults and is more often associated with internal malignancy (1, 2).

We present a case of a 76-year-old male with a prior history of bladder cell carcinoma and melanoma who presented with numerous 1-2 mm punctate papules on bilateral palms. Despite utilizing various treatments including topical retinoids, urea creams, and topical steroids the patient found little relief and resorted to manual debridement with a razor 2-3x weekly. The occurrence of Spiny Keratoderma among the patient's relatives underlies the hereditary nature of the condition with 29.8% of cases being hereditary. (1,4). The presented case highlights the intricate nature of Spiny Keratoderma, emphasizing its familial and acquired forms and its potential association with systemic diseases and malignancies. (1, 2) Thus, our report aims to spread awareness of this as a clinical entity with dermoscopy and clinical photos as well as consolidate a list of various treatments for this disease.

TRICHOBEZOAR AND RAPUNZEL SYNDROME: CASE REPORT OF A RARE CONDITION WITH RARE COMPLICATIONS

Dylan Simkins, MD; Zachary Baxter, DO; Whitney Boineau, DO; Brevin Thomason; Sabrina Hirani

Background: Rapunzel Syndrome is a rare subset of trichobezoars characterized by the extension of the hair mass beyond the stomach, with strands migrating past the pylorus into the small intestine.

Case: A 17-year-old female with a history of autism spectrum disorder presented with a 5-year history of intermittent abdominal pain of unknown etiology with acute worsening of symptoms. She endorsed sharp epigastric pain with radiation to her back in addition to nausea and non-bilious vomiting. Initial lab work-up was consistent with acute pancreatitis. A CT scan of the abdomen showed stomach distention and findings suggestive of acute pancreatitis. The patient was admitted to the hospital for medical management and after several days of hospitalization lipase levels had returned to normal range. Despite this, the patient continued to have severe abdominal pain and nausea incongruent with resolving acute pancreatitis. Further discussion revealed a remote history of trichomania. An upper GI series was obtained which showed a large amount of material within the stomach and a small bowel gas pattern consistent with obstruction. The patient was quickly taken to the operating room for exploratory laparotomy. A large gastric bezoar was found in the stomach with a portion of the bezoar obstructing the ileocecal valve. The bezoar and obstruction were removed. Patient quickly improved post-op and was discharged home.

Conclusion: This case illustrates an atypical presentation of Rapunzel syndrome with initial pancreatitis then subsequent development of a bowel obstruction after the pancreatitis resolved. Pancreatitis is an extremely rare complication of Rapunzel syndrome with only 5 other known cases reported in pediatric patients.

DIVERSE COLLAGEN GENE CHANGES PRODUCE SIMILAR EHLERS-DANLOS SYNDROME

Sahil Tonk; Dr. Golder Wilson, MD PhD

Introduction:

Ehlers-Danlos syndrome (EDS) is a connective tissue disorder described by its tissue laxity and autonomic symptoms, with links specific to vessel laxity and blood pooling. Due to genetic changes in collagen genes, such as type I and V collagen of which are known to be involved in osteogenesis imperfecta and the classical type of EDS; recent breakthroughs in genome sequencing have contributed to our understanding of genome networks. Such networks play an instrumental role in tissue dysplasia and autonomic dysfunction, with novel genes identified through whole exome and gene panel sequencing.

Methods:

This study focuses on the clinical characteristics of 1261 EDS patients, cross-referenced with DNA variants identified by whole exome sequencing. Of those evaluated, 120 patients had systematically evaluated histories and physical exams. Testing exhibits 53 variants in collagen type V genes, 4 novel variants in collagen type XV, XVII, XVIII, and XXVII, and 79 variants in other collagen genes previously linked to other diseases. Statistical analysis will be used to compare the clinical profiles of patients with collagen type V gene changes to those with other collagen gene changes found within the cohort.

Results:

Prior studies stipulate that EDS patients with different collagen gene mutations show similar phenotypes, despite variations in clinical symptoms such as tissue laxity, neurologic, and autonomic findings. A similar outcome is expected in the cohort with collagen type V mutations and those with other collagen mutations, with tissue-specific symptoms potentially dependent on the gene in the collagen.

Conclusions:

This study aims to bring to light the emerging genetic relationships in EDS, showcasing how whole genome analysis can provide insight into precision medicine. This work will aid in updated screenings and criteria to better aid our populations on a local, state, and national level in a diagnosis.

A RARE OCCURRENCE OF OROPHARYNGEAL AND NASOPHARYNGEAL SYNECHIAE SECONDARY TO TRAUMA

Eric Tran, B.S.; Jordan Kankam, B.S.; Drew Smith, M.D.; Joshua Demke, M.D.

Introduction

Synechiae refers to abnormal adhesions or scar tissue that develops between two normal separate anatomical surfaces. Here, we present a rare trauma in which oropharyngeal and nasopharyngeal synechiae resulted in partial stenosis and functional impairments with speech, swallowing, and airway. We also discuss our surgical efforts to improve these deficits.

Case Presentation

A 72-year-old-female with a self-inflicted gunshot wound to the face resulted in trauma to the oral, oropharyngeal, and nasopharyngeal cavities. Initially, she went to the operating room for direct laryngoscopy, which showed complex lacerations of her posterior pharyngeal wall and tongue base. We were able to close some of the more anterior tongue lacerations but much of the tissue was tattered and torn with its location making direct repair challenging. She underwent tracheostomy and G Tube. Eight months later, the patient presented to the otolaryngology clinic with oropharyngeal and nasopharyngeal synechiae resulting in near total stenosis of her throat at the level of the tongue base, causing her dyspnea, impaired speech articulation, and dysphagia. She consented to surgical lysis of the scar bands. In the operating room, the patient underwent awake fiberoptic intubation and bilateral scar bands connecting her tongue base to her poster palate and pharyngeal wall were released with needle tip cautery. This left her with a midline soft palate dehiscence that was addressed and closed in layers to create a more normal soft palate. The patient followed up in the clinic a week later with significant improvement in breathing and swallowing. The soft palate continues to heal and will be observed closely for any re-formation of synechiae.

Discussion

Oropharyngeal and nasopharyngeal synechiae are a highly rare occurrence that needs further understanding of the healing process after a traumatic injury, as well as postoperative complications that may come from their abnormal adhesion.

DOXYCYCLINE SCLEROTHERAPY FOR MANAGEMENT OF RECURRENT SEROMA OF THE NECK AFTER TOTAL THYROIDECTOMY: A CASE REPORT

Nathan Tran, BS; Nadia Tello, MD; Tam Nguyen, MD

Introduction: Seromas are a common postoperative complication characterized by abnormal fluid accumulation in surgical sites. In head and neck surgeries, recurrent seromas present significant management challenges, especially in high-risk patients with comorbidities. Conventional treatments, such as aspiration and drainage, often fail to prevent recurrences. Doxycycline sclerotherapy has shown promise in addressing refractory seromas. **Presentation of Case:** We present the case of a 54-year-old woman with papillary thyroid carcinoma and extensive comorbidities who developed a recurrent seroma following a total thyroidectomy with bilateral neck dissection. Initial management of drainage, debridement, and antibiotics were ineffective. The patient subsequently underwent doxycycline sclerotherapy, with 500 mg of doxycycline instilled over 10 days. The treatment results in a significant reduction in fluid accumulation and a complete resolution of the seroma. **Results:** Quantitative analysis revealed a marked reduction in fluid volume from a mean of 286.7 mL to 114.6 mL post-sclerotherapy ($p = 0.013$).

Discussion: Doxycycline induces fibrosis through endothelial damage and inhibition of matrix metalloproteinases and vascular endothelial growth factor which stabilizes the cavity and prevents fluid reaccumulation. The successful application in this case aligns with prior reports of its use in lymphatic malformations and seromas following mastectomy and abdominal surgeries. **Conclusion:** This case highlights doxycycline sclerotherapy as a safe, cost-effective, and minimally invasive option for managing

recurrent seromas. Further research is warranted to establish a standardized protocol and broaden its clinical application.

SERENDIPITOUS HEALING OF A CONGENITAL PSEUDOARTHROSIS OF THE CLAVICLE FOLLOWING ACUTE INJURY: A CASE REPORT.

Joel P. White, BS; Travis Winston, MD

Congenital pseudoarthrosis of the clavicle (CPC) is a rare anomaly characterized by incomplete ossification of the clavicle, first described in 1910 by Fitzwilliams. The condition typically presents in early childhood with a painless midshaft deformity and normal upper extremity function. CPC is more common in females, often unilateral on the right, with left-sided cases sometimes associated with dextrocardia. Despite its rarity, with only 200–300 reported cases globally, CPC poses significant cosmetic and functional concerns over time. Surgical treatment is customary for symptomatic patients.

We report a unique case of a 5-year-old boy referred for nonunion of a right clavicle fracture. Radiographs revealed characteristics suggestive of CPC rather than trauma-induced nonunion, including well-corticated edges and absence of proximal callus formation. The diagnosis of CPC with an acute superimposed injury was made. Given initial callus formation, conservative treatment and periodic radiographic monitoring were chosen. Over six months, significant callus formation bridged the pseudoarthrosis site, achieving near-complete ossification. The patient returned to sports with understanding of potential risks. Two years later, a sports injury caused an acute clavicle fracture. Radiographs demonstrated normal healing, with no evidence of CPC.

This case is the first documented spontaneous ossification of CPC without surgical intervention, suggesting that acute periosteal injury may trigger ossification in CPC cases. This observation highlights the potential of noninvasive treatments, such as mechanical or ultrasound stimulation, for CPC management. However, testing these approaches remains challenging due to the condition's rarity and established surgical standards.

This case emphasizes the importance of thorough patient history and radiographic evaluation to prevent misdiagnosis. It also provides a framework for exploring alternative management strategies for CPC, potentially reducing the need for surgical intervention.

CHART REVIEWS

OPTIMIZING LAPAROSCOPIC APPENDECTOMY OUTCOMES USING AN ILEOCECAL FOLD OF TREVES BUTTRESS TECHNIQUE

Taru Bharadwaj; Jean Dai; Shreya Mallena; Teresa Vu; Lajohn Quigley, M.D., FACS; Basem Soliman, M.D., FACS; Izi Obokhare M.D., FACS, FICS

Background: Laparoscopic appendectomy (LA) is the preferred treatment for acute appendicitis; however, it still presents with risk of complications such as infection and bleeding. Improper closure of the appendiceal stump can contribute to the development of postoperative complications. This study evaluates the efficacy of a novel buttress technique using the ileocecal fold of Treves to reinforce the staple-line closure of the appendiceal stump.

Study Design: We conducted a retrospective cohort study involving 351 patients who underwent LA between 2022 and 2024 at two hospitals. Patients were divided into two groups: those who received the fold of Treves buttress technique (n=90) and those who underwent standard staple closure (n=261). We analyzed demographic variables existing surgical comorbidities between patients who received the fold of Treves buttress method and those who received the traditional staple technique during LA. Within each

group, we compared numerical outcomes, including postoperative complications and hospital length of stay (LOS). We performed statistical analysis using a 2-tailed Welch's t-test. Additionally, we used Chi-squared analysis to assess differences in the presence of postoperative complications.

Results: Our results demonstrate that using the fold of Treves buttress technique to secure the appendiceal stump during LA results in favorable outcomes. There is a statistically significant decrease in post-operative complication rates and LOS for cases of perforated appendicitis.

Conclusion: The use of autologous tissue in this technique offers a cost-effective alternative to commercial buttress materials with the potential to improve patient outcomes in LA. Further studies are necessary to validate these findings and assess the broader applicability of this technique.

COMORBIDITIES AMONG PEOPLE LIVING WITH HIV: INSIGHTS FROM A 5-YEAR REVIEW AT THE UMC HEALTH SYSTEM

Elizabeth Burks; Bennett Schackmuth; Aya Bou Fakhreddine; Jacob Nichols, MD; Sharilyn Almodovar, PhD

Background: Human Immunodeficiency Virus (HIV) remains a major public health challenge, impacting 39 million people worldwide. In the United States, the southern region experiences the highest rate of diagnoses. However, data surrounding HIV in West Texas remains limited. In this study, we explore the prevalence of common comorbidities among individuals living with HIV in West Texas.

Methods: A retrospective chart review was conducted using anonymized patient data from the UMC Health System, covering the period from April 30th, 2019, to May 1st, 2024. We examined 144 conditions affecting multiple organ systems. Descriptive statistics were used to summarize patient demographics, clinical characteristics, and comorbidities.

Results: A total of 578 patient records were reviewed. Patients all had a positive HIV diagnosis and at least one comorbidity. Among the sample, 80.62% were males and 19.38% were females, with an average age of 47.26 years. The majority of patients (72%) resided in Lubbock County, with other notable counties including Hale and Terry. The most prevalent comorbidities were hypertension (43.08%), respiratory tract infections (26.64%), diabetes (20.24%), chronic viral hepatitis (15.4%), and mycoses co-infections (12.46%).

Conclusions: To our knowledge, this is the first study assessing comorbidities among people living with HIV in West Texas. Aligning with national epidemiological trends and similar studies, hypertension and co-infections are high in those living with HIV. This study highlights the importance of comprehensive, multidisciplinary treatments and emphasizes the need for greater awareness among healthcare providers in West Texas. Insights from this study can guide screenings and treatment strategies, ultimately improving patient outcomes.

HYPOSPADIAS AND STRETCHED PENILE LENGTH (SPL): PROSPECTIVE COMPARISON OF DISTAL AND PROXIMAL SPL IN 643 PREPUBERTAL PATIENTS

Caitlin Chapman, Nicol Corbin Bush, MD, MSCS

Intro: Hypospadias is a congenital anomaly characterized by an abnormal location of the urethral meatus potentially resulting from endocrine disruption, ranging from distal to proximal defects. While stretched penile length (SPL) in boys without hypospadias has been studied extensively, few report SPL in those with hypospadias - with variable methods of measurement, small sample sizes, and rare comparison of distal vs proximal defects. Many patients with proximal hypospadias are told they have "micropenis". Methods: Consecutive patients with hypospadias underwent SPL measurement during surgery in a prospectively-collected database. SPL was measured by the same surgeon in all cases from the pubic bone to the tip of the penis, before and after correction of ventral curvature (VC) when present. All patients were included,

including those with known syndromes/genetic abnormalities. SPL was analyzed for all patients with hypospadias at each surgery. Data was normally distributed. T-test analyzed differences in distal vs proximal SPL and VC. Pearson correlation compared SPL at the first and subsequent surgeries, with $p < 0.05$ significant. Patients Tanner 2-5 were excluded. Micropenis was defined as 2 standard deviations below normal SPL for age, measured in 12-month increments (Goel et al, 2024). Results: In 643 patients (286 distal, 357 proximal) patients, average age was older in the proximals vs distals (30.7 vs 23.2 mos, $p = 0.0005$), and VC was more severe (64.9 vs 28.1 degrees, $p < 0.0001$). Repeated measures showed excellent correlation of SPL with minimal change at 6 month intervals ($r = 0.97$). While SPL statistically differed in distals vs proximals (61.3mm vs 57.9, $p > 0.0001$), the relevance of a 3.4mm difference is likely limited. Conclusion: In the largest study of systematically recorded SPL in patients with hypospadias, there is a 3.4mm difference in those with distal vs proximal hypospadias. Less than 1% of patients had micropenis. Such information is crucial to appropriate counseling of families.

MANAGEMENT STRATEGIES FOR UCL INJURY IN THE ADOLESCENT POPULATION

Cade Crump BS; Paul Gaschen MD; Brendan Mackay MD

This case series discusses the increasing incidence of medial Ulnar Collateral ligament (UCL) injuries among adolescents, and subsequent treatment modalities for this population at University Medical Center in Lubbock, Tx. Various management strategies were analyzed via retrospective chart review. Five cases met inclusion and exclusion criteria and underwent surgeries such as UCL primary repair and reconstruction. The overall outcomes were largely favorable, with mostly minor complications, and emphasized the importance of physical therapy post-surgery to improve joint function in these young patients. Notably, the rising trend of UCL injuries in young adolescents, not just those in athletics, necessitates a thorough evaluation of treatment approaches to improve recovery and decrease further injuries in this vulnerable population. Optimized treatment strategies are key to prevent further complications later in life.

EVALUATING PILLAR PAIN OUTCOMES FOLLOWING CARPAL TUNNEL RELEASE SURGERY WITH FRACTIONAL CO2 LASER THERAPY

Caroline J. Cushman, BS; Brennon G. Henderson, BS; Wm. Zachary Salter, BS; Andrew F. Ibrahim, BS; Evan J. Hernandez, BS; Brendan J. Mackay, MD

Introduction: Carpal Tunnel Syndrome (CTS) is the most common peripheral entrapment neuropathy of the upper limb. Postoperative pillar pain is a significant complication following carpal tunnel release (CTR), often impeding daily activities. This study evaluates the efficacy of fractional CO2 laser therapy for reducing pillar pain after CTR.

Materials & Methods: A retrospective review was conducted using the University Medical Center database from 2021-2024, identifying patients who underwent CTR and subsequently received fractional CO2 laser therapy for pillar pain. Out of 175 procedures initially identified, 30 procedures in 23 unique patients met the inclusion criteria. Data collected included demographics, comorbidities, pre- and post-treatment VAS pain scores, and SCAR-Q survey responses assessing scar satisfaction.

Results: The average pre-laser VAS pain score was 5.23, which significantly decreased to 1.87 post-laser ($p < 0.0001$). Patients reported high satisfaction with their scars, with SCAR-Q scores reflecting positive outcomes in appearance, symptoms, and psychosocial impact. Scores for the SCAR-Q scales range from 0 to 100, with higher scores representing a better outcome. The SCAR-Q survey revealed that most patients were not bothered by their scars post-treatment, with scores of 73.5 for appearance, 85.0 for symptoms, and 85.0 for psychosocial impact.

Conclusions: Fractional CO2 laser therapy effectively reduces postoperative pillar pain and improves scar satisfaction in patients following CTR. Given its potential, CO2 laser therapy can serve as an effective

treatment for postoperative pillar pain when all other traditional treatments are exhausted, providing a new avenue for management of idiopathic recalcitrant pillar pain in hand surgery.

THE CORRELATION BETWEEN BRAIN NATRIURETIC PEPTIDE LEVELS AND SIX-MINUTE WALK DISTANCE IN PATIENTS WITH HEART FAILURE WITH A PRESERVED EJECTION FRACTION.

Gaspar Del Rio-Pertuz MD, Natnicha Leelaviwat MD, Mitchell Devolder BS, Erwin Argueta MD, Kenneth Nugent MD

Patients with heart failure with preserved ejection fractions (HFpEF) often have complex presentations and have significant comorbidity. This diagnosis occurs more frequently in older women with hypertension, diabetes, and obesity. Their cardiac disorder and their comorbidity limit their physical activity levels. Management of these patients requires regular follow-up with adjustment of the medication, if needed. Trends in simple laboratory tests, such as a brain natriuretic peptide levels, could help determine responses to treatment and prognosis. This study analyzed the correlation between BNP levels and six-minute walk test distances in patients with established HFpEF. The study included 21 patients with a mean age of 61.1 ± 9.1 years. All patients had hypertension, 11 patients had diabetes, and 10 patients had chronic kidney disease. The mean BNP level was 490.0 ± 653.5 pg/mL. The mean six-minute walk distance was 300.4 meters ± 120.8 meters. There was no significant correlation between the six-minute walk distance and the BNP. Consequently, this study demonstrates that routine measurement of BNP levels does not provide significant information about the patient's overall physical performance level.

ACCESS TO BREAST CANCER SCREENING IN WEST TEXAS AND ITS IMPACT ON BREAST CANCER DETECTION

Vy Do; BA, MS2, Texas Tech University Health Sciences Center School of Medicine

Breast cancer is the second most common cancer diagnosed in women in the United States, number one cancer and women worldwide, yet many do not participate in screening programs which would lead to early detection of breast cancer. Besides the fear of discomfort and social concerns about the environment of breast exams, there are other aspects that likely impact the negative participation in screening. We suspect that this lack of breast cancer screening has actually worsened since the pandemic. Drawing from an extensive collection of literature, the articles offered insight as to what factors most likely affect the frequency of breast cancer screening. The analysis showed that although early mammography screening has been proven to reduce breast cancer outcomes, factors such as education level, educational outreach, availability of screening, financial constraints, and cultural perceptions play significant roles in determining whether women engage in screening programs. The literature review also suggests that interventions such as community-based education, patient navigation, and improved healthcare accessibility will help mitigate these barriers and increase screening rates in underserved populations. We are awaiting IRB approval for a comprehensive assessment of breast cancer screening rates in Lubbock, El Paso, surrounding counties, as well as the border region. Our goal is to compare these screening rates with county census data to identify disparities. Additionally, we will evaluate the social determinants of health for individuals who have participated in screening and examine how education and financial factors correlate with screening rates across these regions. By investigating these factors, we aim to gain insight into potential methods to enhance screening efforts and improve early detection in West Texas, especially in underserved communities.

CASE-CONTROL ANALYSIS OF ASSOCIATIONS BETWEEN DERMATOFIBROMA, MALIGNANCIES, AND AUTOIMMUNE CONDITIONS: REVISITING A HISTORICAL TREND

Zarek Driver, BS; Jean Pizano, BS, BSA; Kritin K Verma, BS, MBA; Kevin T. Nguyen, BA; Justin Pizano, BS; Michelle B. Tarbox, MD

Introduction: Dermatofibroma is a benign fibrohistiocytic skin tumor, often presenting as a firm, slow-growing nodule on the extremities. Though typically harmless, it may be mistaken for malignant lesions like dermatofibrosarcoma protuberans or melanoma, complicating diagnosis. Dermatofibromas can cause irritation and itching, and their etiology remains unclear. Research on their link to malignancies or autoimmune conditions is limited. **Methods:** This retrospective study used the NIH's All of Us database to identify dermatofibroma cases via ICD-10 code D23.9, yielding 645 cases and 2,801 matched controls (age, race, sex). The study analyzed associations with malignancies using odds ratios. **Results:** Dermatofibroma patients did not show a statistically significant association with bladder cancer (OR 0.079, 95% CI 0.0109–0.5721, $p = 0.0120$), breast cancer (OR 0.3705, 95% CI 0.2741–0.5001, $p < 0.0001$), cervical cancer (OR 0.0644, 95% CI 0.0159–0.2611, $p = 0.0001$), lung cancer (OR 0.2712, 95% CI 0.0984–0.7478, $p = 0.0117$), renal cancer (OR 0.2470, 95% CI 0.0769–0.7935, $p = 0.0189$), prostate cancer (OR 0.1364, 95% CI 0.0722–0.2577, $p < 0.0001$), skin cancer (OR 0.2618, 95% CI 0.2056–0.3335, $p < 0.0001$), thyroid cancer (OR 0.3488, 95% CI 0.1820–0.6686, $p = 0.0015$), Crohn's disease (OR 0.1293, 95% CI 0.0476–0.3509, $p = 0.0001$), rheumatoid arthritis (OR 0.1074, 95% CI 0.0675–0.1711, $p < 0.0001$), colorectal cancer (OR 0.1132, 95% CI 0.0359–0.3577, $p = 0.0002$), endometrial cancer (OR 0.3236, 95% CI 0.1167–0.8972, $p = 0.0301$), ovarian cancer (OR 0.1949, 95% CI 0.0471–0.8060, $p = 0.0240$), and head and neck cancer (OR 0.2262, 95% CI 0.0544–0.9399, $p = 0.0408$). Eye cancer was not significantly associated (OR 1.0858, 95% CI 0.1212–9.7311, $p = 0.9414$). **Conclusions:** Findings suggest dermatofibroma may not be linked to cancers and autoimmune conditions, contradicting prior studies. Limitations include manual data acquisition, potential population representation issues, and unaccounted confounding variables. Further research is needed.

DOES OBESITY INCREASE RISK FOR ACHILLES TENDON RUPTURE?

Chad Elliott, MS; Alvin Ouseph, MS; Alexander Abraham, MD; Jarrod Martinez, PhD; Jerry S Grimes, MD

Background: Achilles tendon rupture (ATR) is a common injury with an estimated incidence of around 7 to 40 per 100,000 person-years. This injury is typically sustained during sporting activity when there is a sudden push-off, jumping, or acceleration movement and is often accompanied by a sudden onset of pain with an audible “pop” or “snap” at the injury site. Studies have shown mixed results for body mass index (BMI) as a risk factor for ATR. This case-control study aims to compare the BMI of patients diagnosed with a primary ATR to age and sex-matched controls diagnosed with an ankle sprain. **Methods:** A retrospective chart review of 168 patients was performed, which included 56 patients with ATR age and sex-matched with 112 ankle sprain controls. Demographics and BMI data were collected and compared across the two groups. BMI was divided into subclasses to better characterize the sample. **Results:** The mean BMI for the ATR was 33.4 and ankle sprain was 31.9, which was not statistically significant ($p = .2514$). When BMI was divided into subclasses, an expansion of the existing National Institute of Health classification, there were significantly fewer patients who sustained ATR compared to ankle sprain controls in the class 1, normal weight group (BMI 18-25; $p = .020$). Participating in sports at the time of injury was the only other statistically significant risk factor ($p = <.001$). When patients were separated by participation in sports, there was a significant difference in mean BMI between the ATR and ankle sprain groups ($p = .015$). **Conclusion:** There was no statistical difference in mean BMI between patients with ATR and an ankle sprain control group. However, our data showed that patients with a class 1 BMI from 18-25 are less likely to sustain an ATR, which suggests that patients at higher BMIs have an increased risk of ATR.

EVALUATING THE INCIDENCE OF FEVER FOLLOWING VINCRIStINE ADMINISTRATION IN PEDIATRIC PATIENTS THROUGH A RETROSPECTIVE CHART REVIEW

Zackery Gray; Tenley Lehman; Kirtana George; Dr. Mohamad M. Al-Rahawan, MD

Background: Vincristine is a commonly utilized chemotherapy agent for various types of pediatric cancers. The FDA label for vincristine states that fever is a possible side effect, meaning fever without underlying etiology following the administration of vincristine is possible. Fever in patients receiving chemotherapy always triggers a sepsis workup. Only a handful of vincristine-induced fevers have been reported in literature, but true incidence is not known. Methods: In collaboration with the Clinical Research Institute at TTUHSC, we compared the incidence of fever after vincristine administration to fever incidence following administration of all other chemotherapy agents. This study is an IRB approved retrospective chart review of children 0-17 years old in Lubbock, TX with a cancer diagnosis who received chemotherapy between January 1, 2017 – August 1, 2024. Any temperature exceeding 100.4°F is considered a fever. Fever occurring within 48 hours of chemotherapy administration, with a negative infectious workup, is considered chemotherapy related. Results: Our initial analysis included 61 patients from one treatment center. We have now identified an additional 97 patients at a second treatment center who fit the inclusion criteria. In this second cohort, there were 62 males and 35 females with an average age at cancer diagnosis of 6.8 years. Leukemia was the most common diagnosis, occurring in 52 of the 97 patients. As with the initial cohort, this cohort includes patients who received vincristine monotherapy or multidrug chemotherapy with or without vincristine. Therefore, the incidence of fever following vincristine can be compared to that following other chemotherapy agents. Conclusions: Data collection and analysis for both cohorts are complete. We are now combining the datasets to enable a meaningful assessment of vincristine's role in chemotherapy-induced fever. These findings may improve fever management in children receiving vincristine.

RELATIONSHIPS BETWEEN THYROID AND COGNITIVE FUNCTION AMONGST OLDER RURAL WEST TEXANS: A PROJECT FRONTIER STUDY

Brennon Henderson; Kanishk Yankarla; Dr. Boris Decourt; Dr. J. Josh Lawrence

Introduction: Thyroid function has been examined in recent years for its potential relationship with age-associated cognitive decline. A previous study associated thyroid dysfunction with cognitive impairment among aging rural West Texans (Johnson et al. 2011). Using a female cohort from Project FRONTIER (PF; Facing Rural Obstacles to Healthcare Now Through Intervention, Education & Research), they found that high TSH (thyroid-stimulating hormone) and low FT4 (free thyroxine) levels significantly correlated with poorer cognitive performance, assessed with RBANS (Repeated Battery for the Assessment of Neuropsychological Status) scores. With growth of the PF database, the present study seeks to validate these associations using a larger sample size with both male and female participants.

Methods: After receiving the relevant PF patient information, participants with missing variables or blood markers beyond 4 SD (standard deviations) outside the mean were excluded. Data was analyzed using SPSS (Statistical Package for Social Sciences, v29).

Results: A significant positive correlation between TSH and Visuospatial/ Constructional RBANS category ($p=0.033$) was found when combining all participants. However, this relationship disappeared when analyzed in gender/ethnicity subgroups. Females and Non-Hispanics in this PF sub-cohort were significantly more likely to be diagnosed with Hypothyroidism ($p<0.001$). No significant intergroup differences were seen with Hyperthyroidism; however, this is likely due to the relatively small number with this diagnosis ($n=11$).

Conclusions: Age-associated cognitive decline is multifactorial, and there may be links between certain aspects of cognition and thyroid function. Our study shows that women and Hispanics are more likely to experience thyroid dysfunction. Therefore, if a correlation truly does exist between thyroid function and

cognition, aging women and Hispanics with thyroid dysfunction may need special care to combat cognitive decline. Further research is warranted to more fully elucidate these relationships and better provide healthcare in rural West Texas populations.

EVALUATING THE IMPACT OF SURGICAL STAPLE DENSITY IN BIODEGRADABLE TEMPORIZING MATRIX APPLICATION ON BURN PATIENT OUTCOMES

Zahraa Hmood, BS; Merry Mathew, BS; Dr. John Griswold, MD; Dr. Alan Pang, MD; Abdul Awal, MS

Introduction: Full-thickness burns necessitate skin grafting, often employing dermal regenerative matrices such as Biodegradable Temporizing Matrix (BTM) to prepare the wound bed. BTM is secured with surgical staples to ensure close contact with the wound bed, which is essential for optimal graft integration and healing. However, the impact of staple density on patient outcomes remains uncertain. This study aims to investigate the association between staple density (staples per square centimeter) in BTM application and clinical outcomes in burn patients. **Methods:** A single-center retrospective chart review was conducted on patients who underwent BTM grafting between 2017 and 2024. Data collected included patient demographics, total body surface area (TBSA) burned, and staple density. Primary outcomes measured were graft take (%), hospital length of stay (days), time to skin grafting (hours), need for additional grafting, wound infection rates, postoperative bleeding incidence, and mortality. Statistical analyses, including linear and logistic regression models, assessed the relationship between staple density and clinical outcomes. **Results:** Among 39 patients, the mean staple density was 0.23 staples/cm². A higher staple density was significantly associated with a lower infection risk (OR 0.06, p = 0.014) and a reduction in hospital length of stay by 74.9 days per additional staple/cm² (p = 0.033). Although not statistically significant, higher staple density was linked to improved graft take (>80%) (OR 4.1, p = 0.613) and a 57.7% reduction in the need for additional grafting (p = 0.317). It was also associated with a 4% reduction in postoperative bleeding risk (OR 0.96, p = 0.990) and a 98.77% reduction in mortality odds (OR 0.0123, p = 0.642). **Conclusion:** These findings suggest that increased staple density in BTM application may correlate with reduced infection risk and shorter hospital stays in burn patients. However, further research with larger sample sizes is needed to validate these associations.

CUTANEOUS T-CELL LYMPHOMA PREVALENCE STRATIFIED BY AGE, RACE, AND ETHNICITY

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Cutaneous T-cell lymphoma (CTCL) is a rare form of non-Hodgkin's lymphoma characterized by uncontrolled T-cell proliferation in the skin. As of 2023, the estimated incidence of CTCL in the United States was 12.4 cases per million, as reported by the SEER database, though it represents only 48% of the U.S. population. To provide a more comprehensive estimate of CTCL prevalence across a more diverse national cohort, we utilized the All-of-Us Research Program (AURP), which includes populations traditionally underrepresented in research. A cross-sectional analysis of 459,972 participants in the AURP identified 382 CTCL cases, yielding a prevalence of 0.0830% (95% CI, 0.0747-0.0914). The prevalence increased with age, reaching its highest rate (0.274%) in the 91+ age group. Gender distribution showed that 49.7% of CTCL cases were female, and prevalence varied across racial groups, with the highest prevalence observed in Black participants (0.0872%), followed closely by White participants (0.0844%). While our findings align with existing literature on CTCL incidence, limitations such as the exclusion of individuals under 18 and racial disparities within the AURP cohort must be considered. Additionally, socioeconomic factors, including differing poverty rates across racial and ethnic groups, could influence healthcare access and impact the prevalence rates observed. Despite these limitations, the results suggest that CTCL is prevalent across all racial groups in the United States, with some indications of a narrowing prevalence gap between Black and White populations. Further research is needed to confirm these findings and assess the potential impact of racial and socioeconomic factors on CTCL prevalence.

EVALUATING THE IMPACTS OF BODY MASS INDEX ON FLUID RESUSCITATION AND OUTCOMES IN BURN INJURIES

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INTRODUCTION In the management of burn injuries, accurate fluid resuscitation restores intravascular volume and avoids fluid overload complications, which can escalate mortality. Protocols such as the Parkland formula have reduced such complications, yet differing body mass indices (BMI) pose physiological impacts that may not be accounted for by these formulas. This study investigates the influence of BMI on the volume of fluids administered in the first 24 hours of burn treatment, addressing the paucity of literature on optimal fluid resuscitation for obese burn patients. **METHODS** A retrospective chart review was conducted at a level I trauma center with a dedicated burn unit. The study reviewed records from January 2010 to January 2022 to identify patients aged 18 to 75 years who received treatment for burns >20% total body surface area (TBSA). **RESULTS** This 12-year retrospective study evaluated 312 burn patients categorized by BMI. Age, gender, and TBSA across BMI groups showed no significant differences ($p = 0.982$, $p = 0.827$, $p = 0.6091$). Fluid resuscitation showed significant variations across BMI groups. Both total fluids administered and total urine output in the first 24 hours increased as weight groups increased ($p = 0.003$, $p = 0.037$). Fluid given per TBSA (cc/TBSA) increased with higher BMI ($p = 0.001$), and fluid given per TBSA/kg (cc/TBSA/kg) decreased with higher BMI ($p = 0.038$). Administered fluid volumes were significantly less than those predicted by the Parkland formula in overweight, obese, and especially morbidly obese patients, and deviations increased with higher BMI ($p = 0.012$). Mortality significantly differed across BMI groups, with highest rates found in morbidly obese patients ($p = 0.020$). **CONCLUSIONS** These findings suggest a multifaceted impact of weight on fluid resuscitation, first shown by the increase in fluids required per TBSA as BMI increases. Administered fluid volumes were lower than those predicted by the Parkland formula in overweight, obese, and morbidly obese patients, overestimated by 1.2L, 2.4L, and 6.2L, respectively. This suggests that the use of body weight may result in over-resuscitation in higher BMIs, and rates must be adjusted frequently to respond to fluid responsiveness.

UNMASKING DISPARITIES: RACIAL DIFFERENCES IN POSTOPERATIVE OUTCOMES FOLLOWING GENDER-AFFIRMING TOP SURGERY

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Introduction

Gender-affirming top surgery is a critical component for the care of transgender individuals seeking congruence between their gender identity and physical appearance. Despite increasing utilization of procedures such as chest feminization and masculinization in the United States⁶, there is still a gap in understanding racial disparities in access to care and postoperative outcomes in gender-affirming top surgery. Recent evidence indicates that racial minority groups such as black and hispanic patients experience higher rates of complications and less favorable surgical trajectories following gender-affirming procedures.

Methods

Using the TriNetX United States Collaborative Research Network, we performed a retrospective cohort analysis of transgender adults (≥ 18 years) with documented ICD-10 codes for transsexualism (F64.0) who underwent gender-affirming top surgery between January 1, 2000, and December 1, 2024. Patients were stratified into racial categories (White, Black, Asian, Native Hawaiian/Pacific Islander, American Indian/Alaska Native) and underwent propensity score matching for age, sex, comorbidities, relevant social determinants of health, and hormone therapy history. Primary outcomes included mortality, wound dehiscence, postoperative pain, surgical site infection, and mental health conditions within 30 days, 3 months, and 6 months postoperatively.

Results

Significant differences were found between the cohorts. Minority transgender patients had elevated risk of

mortality (RR = 2.000, $p < 0.0001$), postoperative pain (RR = 1.241, $p = 0.0078$), wound dehiscence (RR = 1.063, $p = 0.0042$), mental health outcomes (RR = 1.257, $p = 0.0024$), and infection (RR = 1.361, $p < 0.00$).

Conclusion

Minority transgender patients are associated with elevated rates of postoperative complications following gender-affirming top surgery. These findings highlight the need for enhanced postoperative surgery care to minimize risks and improve patient outcomes.

ONE-YEAR OUTCOMES IN SUBJECTS DEVELOPING MACULAR NEOVASCULARIZATION WHILE UNDERGOING AVACINCAPTAD PEGOL THERAPY FOR GEOGRAPHIC ATROPHY

Westin Klein; Sloan W Rush MD; Robert Reinauer MD; Ryan B Rush MD

Purpose: To assess the 12-month outcomes in subjects developing macular neovascularization (MNV) during intravitreal avacincaptad pegol (IVA) treatment for geographic atrophy (GA) secondary to age-related macular degeneration (AMD).

Methods: This research was conducted as a case-controlled, retrospective study of AMD subjects undergoing IVA treatment for GA from two private practice institutions. Subjects were divided into 1) a Study Group of patients who developed MNV and then underwent anti-vascular endothelial growth factor (VEGF) therapy during the study period, and 2) a Control Group of patients who were complication-free during the study period. Both cohorts had a baseline Snellen visual acuity of $\geq 20/200$, a baseline GA total area of $\geq 1 \text{ mm}^2$ and $\leq 17.5 \text{ mm}^2$, and 12 months of follow-up after initiation of IVA for GA.

Results: There were 56 patients analyzed. There were no significant differences in baseline features between cohorts. The Study Group had a greater decrease in visual acuity [-0.22 logMAR (-0.27 to -0.17) versus -0.06 logMAR (-0.12 to 0.00); $p < 0.0001$], and greater GA total lesion growth [1.78 mm^2 (1.53 – 2.03) versus 0.78 mm^2 (0.54 – 1.02); $p < 0.0001$] during the 12-month study period compared to the Control Group.

Conclusion: Patients developing MNV while undergoing IVA treatment for GA secondary to AMD have worse clinical outcomes despite undergoing anti-VEGF therapy compared to patients who were complication-free at 12-months. This highlights the seriousness of MNV in this patient population and may help specialists counsel patients when considering treatment for GA secondary to AMD.

REAL-WORLD OUTCOMES IN PRE-EXISTING NEOVASCULAR AGE-RELATED MACULAR DEGENERATION SUBJECTS UNDERGOING AVACINCAPTAD THERAPY FOR GEOGRAPHIC ATROPHY

Westin Klein; Sloan W Rush MD; Robert M Reinauer MD; Ryan B Rush MD

Purpose: To evaluate real-world outcomes in subjects with pre-existing neovascular age-related macular degeneration (AMD) undergoing intravitreal avacincaptad pegol (IVA) treatment for geographic atrophy (GA).

Methods: This study was undertaken as a retrospective, case-controlled assessment of patients undergoing IVA treatment for GA from 2 community-based retina practices. Patients were separated into 1) a Study Group consisting of subjects with pre-existing neovascular AMD prior to initiation of IVA for GA, and 2) a Control Group consisting of AMD subjects without neovascularization prior to initiation of IVA for GA. Study and Control Group subjects had a baseline visual acuity of $\geq 20/200$, a total GA lesion area of $\geq 1 \text{ mm}^2$ and $\leq 17.5 \text{ mm}^2$, and follow-up of 12-months following IVA commencement.

Results: A total of 64 patients were analyzed. No significant differences in baseline characteristics were found between cohorts. The Study Group had a greater decrease in visual acuity [-0.2 (-0.24 to -0.16) logMAR versus -0.04 (-0.06 to 0.02) logMAR ; $p < 0.0001$], a greater increase in GA lesion growth [1.36 (1.09 – 1.63) mm^2 versus 0.52 (0.34 – 0.70) mm^2 ; $p < 0.0001$], and a higher incidence of exudation ($p = 0.0002$) compared to the Control Group during the study period.

Conclusion: This study suggests that patients undergoing IVA therapy for GA with pre-existing neovascular AMD have worse visual and anatomic outcomes at 12-months compared to a matched control group.

without pre-existing neovascularization; such patients therefore should be carefully counseled prior to initiation of IVA for the management of GA.

EVALUATION OF SMOKING ON REVASCLARIZATION OF HEPATOCELLULAR CARCINOMA FOLLOWING ADMINISTRATION OF DRUG-ELUTING BEADS

Benjamin Lasota, BS; Matthew Mahek, OD; Chip Shaw, EdD; Niska Blevins, DO; Daoud Arif, MD

Introduction: Primary liver cancer was the third leading cause of cancer associated death in 2020, and hepatocellular carcinoma (HCC) accounted for about 75-85% of those diagnoses. Previous studies have evaluated the risk factors associated with the initial HCC diagnosis, which most notably included smoking and diabetes mellitus. As for management, the Barcelona Clinic Liver Cancer (BCLC) system indicates that intermediate and late-stage HCC can be treated using transarterial chemoembolization (TACE) to decrease circulation to the lesion. One common form of the TACE method utilizes drug-eluting beads (DEB) coated with antineoplastics for local chemotherapeutic release. There is a risk of incomplete response to the DEB-TACE procedure, with previous studies analyzing physiological, demographic, and laboratory values corresponding to local recurrence and revascularization. One overlooked factor from these studies is the influence of smoking, which has been shown in previous reviews to be positively correlated with pathological angiogenesis in other conditions. **Methods:** Patient information from the Electronic Medical Record was accessed for patients between the ages of 18 to 89 who had been diagnosed with HCC and had undergone treatment with DEB-TACE between January 1, 2013 and December 31, 2023 in the Interventional Radiology Department at University Medical Center (UMC) in Lubbock, Texas. Patient demographic information, particularly their smoking status, was compared against the rates of revascularization of the HCC lesion following DEB-TACE. **Results:** The results are pending at this time. **Conclusions:** While the results are still pending at this time, the consequences of this study would help inform physicians about recommendations regarding smoking for the management of HCC by TACE-DEB and can ultimately help improve outcomes.

INCORPORATING THE GAD-7 INTO PERINATAL MENTAL HEALTH SCREENING

Danita Mathew; Dr. Gray-Wlazlo, MD; Dr. Lindsay Penrose, PhD; Dr. Esther Ogunjimi, MD

Introduction: Perinatal anxiety is highly comorbid with postpartum depression, yet treatment and interventions are not well-researched. The GAD-7 is a highly effective screening tool for perinatal anxiety, but the implementation of the GAD-7 in a clinical setting to detect perinatal anxiety has not been studied. In 2023, the GAD-7 was added to routine third trimester perinatal mental health screening (with the PHQ-9) at the University Medical Center. We hypothesize that the addition of the GAD-7 improved the detection and treatment of perinatal mental health disorders. **Methods:** Patients will be divided into 3 groups based on the years of the third trimester visit, April 1, 2018 - March 31, 2020, April 1, 2020 - March 31, 2022 (to account for years affected by COVID-19 that might show increased anxiety and confound study results), and April 1, 2023 - April 30, 2025 (the initiation of the GAD-7 in this clinic). Analysis of the EMR will be performed to determine whether patients were experiencing anxiety during pregnancy, indicated by screening using the GAD-9 and PHQ-9. For patients diagnosed with a mental health disorder in the third trimester, analysis of PHQ-9 and GAD-7 screening results will determine whether the patient was experiencing perinatal anxiety. EMR will also be analyzed to determine interventions taken by healthcare providers, including rates of referral to psychiatry, referral to counseling resources, and prescriptions sent. **Results:** Data collection is ongoing until April 2025. However, preliminary analysis demonstrates that the results of screening from the GAD-7 and PHQ-9 are actively utilized by providers to enhance patient assessment. **Conclusions:** This study will be used to assess the efficacy of the GAD-7 in a clinical setting for the detection of perinatal anxiety in eliciting provider intervention, and also further characterize the comorbidities associated with perinatal anxiety detected at the third trimester visit.

UPFRONT SURGERY AND TIMELY COMPLETION OF RADIATION THERAPY FOR EARLY-STAGE OROPHARYNGEAL SQUAMOUS CELL CARCINOMA IN THE ERA OF TRANSORAL ROBOTIC SURGERY

Megan Nguyen; Megan Mai; Yusuf Dundar, MD; Vivie Tran; Duke Appiah, PhD MPH; Zheng Shi, MD

Introduction: Initial management of early-stage oropharyngeal squamous cell carcinoma (OPSCC) typically involves definitive radiation therapy or upfront surgery followed by adjuvant radiation. Transoral robotic surgery (TORS) is a diagnostic and therapeutic procedure for OPSCC. Some patients struggle to complete the prescribed radiation regimens on time, regardless of the treatment strategy. The objective was to evaluate differences in early discontinuation of radiation and prolonged radiation duration (PRD) between those who received definitive radiation vs. upfront surgery and adjuvant radiation.

Methods: Data were from patients aged ≥ 18 years diagnosed with primary AJCC 8 clinical stage I-II OPSCC treated with definitive radiation or upfront surgery followed by adjuvant radiation from the National Cancer Database (2018-2021). Logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) for the association between baseline characteristics, type of treatment, and PRD.

Results: The overall proportion of early discontinuation of radiation was 4.5% with no difference among patients who underwent definitive radiation, TORS, minimally invasive approach, and open/unspecified/converted to open approach. The TORS group completed radiation within one week of the expected duration at the highest rate (88.4%, $p < 0.001$) compared to all other surgical approaches and definitive radiation (78.2%). There was a significant difference in average PRD between those with definitive radiation and those with upfront surgery and adjuvant radiation ($p < 0.001$).

Conclusion: Among early-stage OPSCC patients, initial treatment choice was not associated with early discontinuation of radiation. However, patients who underwent TORS had the highest rates of completing their prescribed radiation within one week of the anticipated schedule. These findings emphasize the value of personalized and multidisciplinary treatment planning in OPSCC.

GENDER, AGE, RACIAL, AND PSYCHIATRIC COMORBIDITIES AFFECTING THE RATE OF ATTRITION IN THE PATIENTS ATTENDING THE CHEMICAL DEPENDENCE INTENSIVE OUTPATIENT PROGRAM

Joy O Osaji, Elliott Norman, Duke Appiah, Regina Baronia

Introduction: Substance Use Disorder is a global problem affecting all genders, races, ages, and psychiatric comorbidities. This paper explores the influence of gender, race, ethnicity, and psychiatric comorbidities on the rate of attrition from Substance Use Disorder (SUD) treatment, especially in an intensive outpatient program in a resource-limited and underserved setting. **Methods:** This retrospective cohort study analyzed medical records of 177 patients aged 18 and older diagnosed with SUD who attended Chemical Dependence Intensive Outpatient Program in a 977-bed large urban medical center located in West Texas (COV IOP) from January 1 to December 31, 2022, and had at least one psychiatric comorbidity. **Results:** Attrition was highest within the first 30 days among the participants 67 (37.9%). In the bivariate analysis, participants with Anxiety Related Disorders had significantly higher odds of completing the study, with an odds ratio (OR) of 12.5 (95% CI: 1.52–102.7). Attrition at ten weeks was higher among those with Marijuana Use Disorder (OR: 10.16, 95% CI: 1.02–101.20) and Stimulant Use Disorder (specifically Cocaine) with an OR of 22.50 (95% CI: 2.21–229.48). There was no statistically significant association between race, gender, age, and psychiatry comorbidity and attrition from the program using a bivariate analysis. **Conclusion:** In conclusion, like most other studies, this population's attrition rate was high, especially in the first 30 days. However, there was no association between race, gender, age, and psychiatry comorbidity and attrition. Therefore, further investigations with a larger sample size are needed to understand the interplay between these factors and attrition from the intensive outpatient program.

AN OUTCOMES STUDY OF THE REVERSE SURAL FLAP TECHNIQUE FOR LOWER LIMB RESTORATION

Caroline Cushman, Andrew Ibrahim, Brennon Henderson, Dylan Parry, Naveen Sakthiyendran, Evan Hernandez, Brendan MacKay MD

Introduction

Historically, the opinion of the reverse sural artery flap (RSAF) has been colored by complications including venous congestion (VC), with recent interest in RSAF utility with improved technique. Given our center's complex limb trauma and paucity of plastic surgery resources, we have employed use of the RSAF, evaluating our experiences through this study.

Methods

A retrospective chart review was performed on patients who underwent RSAF procedures between 2017 and 2023. Data was collected on demographics and outcomes.

Results

The study included 25 patients with average age of 37.5 years. A history of smoking was present in 14 patients (56%), and trauma was the major etiology (96%), barring one cancer reconstruction. Average flap length and width was 12.88cm and 7.16cm, respectively, with average surface area of 112.59 cm². 11 flaps were on the leg (44%), 8 on the ankle (32%), 2 on the heel (8%), and 4 on the foot (16%), with 11 tunneled (44%).

VC was noted in 10 patients (40%), all treated with elevation therapy. Infection occurred in 11 patients (44%), with 6 cases of deep infection (24%), treated with intravenous antibiotics and irrigation & debridements, and 5 cases of superficial infection, treated with oral antibiotics (20%). Necrosis was observed in 9 patients (36%), all of which were partial- 5 treated with superficial wound care, and 4 requiring surgical intervention. Of the flaps, 15 achieved complete survival, 9 showed partial survival, and there were no total flap failures.

Conclusions

Like recent RSAF literature, our population was trauma-dominated. Complication rates were marginally higher; however, our patients did not experience any cases of complete necrosis and had overall higher survival rate. RSAFs demonstrate a reliable option for managing soft-tissue defects in the lower extremities, particularly in trauma cases, presenting as a viable, less complex, alternative to other reconstructive options.

THE EFFICACY OF USING ZIP CODES AS A PROXY FOR SOCIOECONOMIC STATUS AS IT RELATES TO COMPREHENSIVE SURGEON RANKINGS

Ashley Price; Karter Morris; Andrew Ibrahim; Kailin Opella; Michael Steward; Brennon Henderson; Evan J. Hernandez; Paul Gaschen, M.D.; Brendan Mackay, M.D.

Introduction

With a recent emphasis on patient-centered care, various resources seek to provide patients with the ability to compare local physician costs and quality of services. However, when comparing surgical outcomes for individual physicians, it is important to note the multifactorial element of socioeconomic status (SES) and its role in complications. In this retrospective study, we seek to determine if residential zip codes are accurate reflections of patient SES.

Method

We performed a retrospective chart review of 165 Lubbock County residents who received a total knee arthroplasty (TKA) at University Medical Center in Lubbock, TX. Data collected from the electronic medical records included each patient's residential address. Property values were then collected from the Lubbock County Central Appraisal District (CAD) website. Average property values for each zip code were calculated

using data from the Lubbock County CAD.

Results

In this sample, the mean home value calculated was \$181,385 (standard deviation [SD] \$104,265.54), whereas the mean value across each zip code was \$213,882 (SD \$78,505). Treating these as independent distributions, there was a significant difference in means between the two predictors ($P < 0.0015$, 95% confidence interval \$12,509-\$52,486). This study finds that using average zip code property values as a predictor overestimated individual home values by \$32,497, or roughly 20%, on average. Zip code estimates versus individual holdings values ($R^2 = 0.21$) show that zip code averages explain only 21% of the variance in the individual home values.

Conclusion

In this study, we conclude that zip codes alone do not sufficiently estimate socioeconomic status (SES). With the evidence from this study, the zip codes served by an individual surgeon or institution are not enough to perform accurate risk adjustments regarding the ranking of surgeons. Therefore, other factors that contribute to SES must be considered when attempting to create a reliable physician ranking system.

IMPACT OF SOCIOECONOMIC AND GEOGRAPHIC DISPARITIES ON DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF SLIPPED CAPITAL FEMORAL EPIPHYSIS PATIENTS

Caroline Cushman, Maryam Salimi, Valeria Mucharraz-Rodriguez, Karter Morris, Evan Hernandez, Travis Winston, MD, Michel Diab MD

Introduction

Slipped Capital Femoral Epiphysis (SCFE) is a common orthopedic issue in the pediatric population where the femoral head slips at the growth plate, causing hip pain and limping. It's often linked to obesity and rapid growth during puberty. However, the impact of socioeconomic and geographic factors, such as food access and rural-urban locality, on SCFE is not well understood. This study explores how these disparities affect the characteristics of SCFE patients, aiming to provide insights that can lead to more effective, targeted interventions.

Methods

A retrospective review of 28 SCFE patients' charts was conducted. Patients were categorized based on dwelling in food deserts ($n=10$) versus non-food deserts ($n=18$), low-food access areas ($n=13$), low-income areas ($n=17$), and rural ($n=11$) versus urban ($n=17$) localities. Variables included age at diagnosis, SCFE grade, poverty rate, and median family income (2020 and 2024). Independent t-tests and Fisher's exact tests were used for statistical analysis, with $p < 0.05$ as the significance threshold.

Results/Conclusions

No significant differences between food desert and non-food desert groups regarding clinical or socioeconomic variables were observed. Low-food access areas had significantly lower 2024 median family incomes (\$72,783 vs. \$95,473; $p=0.030$). Patients from high-poverty areas were predominantly nonwhite, with a significant income disparity in both 2020 and 2024 ($p < 0.001$). Rural and urban groups showed no significant clinical or socioeconomic differences. Universal obesity (BMI > 95th percentile) was noted in all groups. These findings highlight the impact of socioeconomic disparities, especially concerning income and poverty, emphasizing the need for higher-level interventions targeting obesity and its determinants.

Significance

Addressing socioeconomic and geographic disparities is essential for improving outcomes in SCFE patients. Targeted interventions that focus on obesity and its contributing factors could significantly reduce the impact of this condition.

CLINICAL OUTCOMES OF SELECTIVE LASER TRABECULOPLASTY (SLT) FOLLOWING MICROINVASIVE GLAUCOMA SURGERY (MIGS) WITH ISTENT, HYDRUS MICROSTENT, OR AB-INTERNO CANALOPLASTY: A RETROSPECTIVE COHORT STUDY

Emma Schmidt; Zeid Nawas; Melissa Porter; Megan Murchison MS MBA; Cynthia M. Guerin MD, Matt Porter MD

Intro: This retrospective cohort study assessed the clinical efficacy of SLT as a postoperative intervention following MIGS (iStent, Hydrus, Canaloplasty), focusing on changes in IOP, VA, drop burden, and complications. We seek to improve insights into the efficacy of SLT after MIGS, refining glaucoma post-op management strategies.

Methods: This study included adult patients (18+) who underwent MIGS with iStent, Hydrus Microstent, or Canaloplasty and subsequently received SLT. Patients with other procedures between the MIGS surgery and SLT were excluded. Electronic medical records were systematically reviewed to collect demographic information, IOP measurements, VA, number and type of medications, and complications pre-/post-SLT. The primary clinical outcomes of interest were IOP, VA, medication number/type, and complications pre- and post-SLT. Post-SLT data were collected between 1-3 months post-op. Statistical significance was set at $p < 0.05$.

Results: In this study, 14 patients qualified for analysis. IOP decreased by 0.36 mmHg (SED ± 1.04 , $p = 0.736$) from pre- to post-SLT. Canaloplasty patients had a mean IOP decrease 2.00 mmHg greater than iStent patients (SED ± 2.10 , $p = 0.360$), whose mean IOP increased by 0.50 mmHg (SD ± 2.00). Among 8 patients not on topical medications pre-SLT, 6 remained off, 1 was lost to follow-up, and 1 was started on timolol. Patients on topical medications pre-SLT ($n=6$) had a 1.13 mmHg greater IOP decrease (SED ± 2.15 , $p = 0.611$), but none of them came off their medications post-SLT.

Conclusions: In this study of 14 patients, SLT after MIGS did not significantly reduce IOP, improve VA, or lessen medication use, and no complications were observed. These findings suggest SLT may have limited efficacy in further lowering IOP in patients who have already undergone MIGS. Larger studies are needed to confirm these results.

EVALUATING PARENTAL CONSENT FOR EPIDEMIOLOGICAL STUDIES ON PEDIATRIC CANCERS AND HEMATOLOGICAL CONDITIONS IN THE WEST TEXAS POPULATION

Ramya Yedatore; Dr. Mohamad Al-Rahawan, MD

Background: Although adult cancers are widely researched and certain risk factors have been identified, many pediatric patients and families are left wondering what could have predisposed their family to be affected by cancer. The data used in this research project was extracted from the Adolescent and Childhood Cancer Epidemiology and Susceptibility Service for Texas (ACCESS) database, which collects information that could be utilized to determine environmental or genetic risk factors to pediatric cancers, spanning numerous sites across Texas and California. Hypothesis: We hypothesize that less than 50% of patients enrolled in the Lubbock site for the ACCESS epidemiological study will have parents who opted in to research participation. Summary of Data & Results: With a sample of 94 pediatric patients from West Texas extracted from the ACCESS database, over two-thirds of patients did not have parents who consented to sample collection for research of possible predispositions and environmental risk factors for pediatric cancers. Of the remaining patients whose parent(s) consented and enrolled, mothers were more likely to enroll than fathers or both parents. Several patients did not indicate either consent or decline of their parents' participation, suggesting discrepancies in the process of consenting and enrolling parent participants. Conclusions & Future Directions: This data indicates that there is an opportunity for the process of consenting and sample collections to be improved. Although the data presented applies to the Lubbock site and the conclusions may differ from other ACCESS sites, parents of pediatric cancer patients can benefit from equal inclusion in furthering research in the field of pediatric cancers and more consistent data can be obtained through their participation.

GRADUATE/ORIGINAL RESEARCH

TARGETING GLUTAMINE METABOLISM AND DNA DAMAGE CHECKPOINT INDUCES EXCESSIVE DNA DAMAGE AND CAUSES SYNERGISTIC LETHALITY IN GLSHIGH CHEMORESISTANT OVARIAN CANCER CELLS

Ganesh Acharya; Damienus Ochola; Naresh Sah; Dr. Chinnadurai Mani, PhD; Dr. Mark B. Reedy, MD; Dr. Komaraiah Palle, PhD

Ovarian cancer (OC) is one of the leading causes of cancer-related deaths in women in the United States. Although the majority of patients respond to chemotherapeutics, >70% of the patients relapse and die of chemoresistance. Altered DNA damage repair and metabolic signaling are implicated in mediating therapeutic resistance; however, the precise mechanistic details underlying this chemoresistance are not well-established. Cancer cells depend on Glutamine as a major carbon source and these cells have high Glutaminase (GLS) expression, an enzyme that converts Glutamine to Glutamate. Interestingly, chemoresistant OC cells have elevated GLS levels, confirming their increased dependency on glutamine metabolism. GLS inhibition using a clinical stage drug CB839 caused replication stress and activated CHK1-mediated cell cycle arrest. These novel findings suggested a role for CHK1 in protecting GLS inhibition-induced DNA damage by facilitating timely repair of DNA breaks. Therefore, we hypothesized that GLS inhibition in combination with CHK1 inhibition causes synergistic lethality in GLShigh chemoresistant OC cells. Our results demonstrated that CHK1-inhibitor, Prexasertib attenuates GLS inhibition-induced CHK1 phosphorylation. Additionally, CB839 + Prexasertib combination treatment showed synergistic killing in a panel of OC cells, including isogenic chemoresistant models and 3D organoid models of patient-derived primary OC cells. As predicted, combination treatment increased DNA strand breaks, increased pan-nuclear γ H2AX, pRPA32 foci, perturbed S/G2 phase arrest, and replication stress-mediated DNA damage responses. Furthermore, combination treatment showed more synergy in GLShigh cells compared to GLSlow OC cells indicating the specificity of the combination therapy. Our studies identified a novel mechanistic correlation between metabolic and DNA damage checkpoint pathways and provided a novel therapeutic strategy to treat chemoresistant OC.

UNCLOGGING THE CLOGGED PROTEIN TRANSLOCATION CHANNEL

Sade Adeniran; Dr. Malaiyalam Mariappan, PhD

The endoplasmic reticulum (ER) is essential for folding secretory and membrane proteins, which are synthesized on cytosolic ribosomes and targeted to the ER-associated SEC61 translocon for translocation. Approximately 30% of all human proteins destined for the secretory pathway rely on the SEC61 translocon. Defects in protein translocation disrupt cellular homeostasis and are implicated in diseases such as polycystic liver disease, type 2 diabetes, and neurodegenerative disorders. However, the mechanisms by which cells clear non-translocated polypeptides (NTPs) clogging the SEC61 translocon remain unclear. UBXN4, an integral membrane protein of the ER, has been implicated in protein degradation pathways, suggesting its functional role in regulation when induced by ER stress. Here, we hypothesize that the elimination of NTPs obstructing the translocon channel is dependent upon UBXN4 activity. To investigate this, we immunoprecipitated SEC61 α and identified UBXN4 as a novel interacting protein via mass spectrometry. Reverse pull-down assays confirmed interactions between UBXN4 and the SEC61 translocon. Functional studies revealed that UBXN4's UBX domain is required for p97 ATPase binding, while its hydrophobic region mediates SEC61 interaction. UBXN4 protein depletion significantly impaired NTP degradation, suggesting its critical role in clearing clogged translocons. This work identifies UBXN4 as a key regulator of SEC61 translocon clearance and highlights a novel pathway for managing toxic, aggregation-prone proteins that are implicated in human diseases. Structural modeling with AlphaFold3 predicts that

UBXN4's conserved C-terminus interacts with the SEC61 channel mouth, potentially displacing signal sequences. Ongoing studies will examine the role of this C-terminal region in translocon clearance and determine whether NTP degradation occurs via the proteasome or autophagy-lysosomal pathways.

THE MANY FACES OF BUTYL ETHER MINOCYCLINE (BEM): A POLYPHARMACOLOGICAL TREATMENT OPTION FOR ALCOHOL USE DISORDER

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Alcohol Use Disorder (AUD) is a prevalent and complex neuroimmune condition, characterized by a range of symptoms and underlying mechanisms, presenting challenges for drug target selection. We previously used bioinformatics approaches to identify immune function as a potential target to treat AUD. 10-Butyl Ether Minocycline (BEM), a non-antibiotic analog of minocycline, was identified as our lead compound. BEM demonstrated robust efficacy in preclinical studies, reducing alcohol consumption in both porcine and murine models. We hypothesized BEM would exhibit polypharmacological properties, comparable to minocycline, its parent molecule, including enhanced neuroprotection. Specifically, we showed that BEM's mechanisms included anti-inflammatory effects in N9 microglial cells, as indicated by reduced activity of Iba1, significant dose-dependent inhibition of MMP-9, and attenuation of ethanol-induced potentiation of the GABAA receptor. BEM had anti-migration activity of vascular endothelial growth factor (VEGF) treated human umbilical vein endothelial cells (HUVEC). It also reduced oxidative stress induced by menadione, where it exhibited increased antioxidant properties compared to minocycline. In addition to these pharmacological effects, BEM demonstrated a favorable safety profile, with high solubility and permeability. Its lipophilic structure facilitates crossing of the blood brain barrier (BBB). As further studies advance BEM towards FDA Investigational New Drug (IND) status, its promising pharmacological profile positions it as a potential therapeutic agent for AUD and other neuroimmune disorders.

THE INFLUENCE OF CYP450 ENZYME INDUCERS ON PSILOCYBIN'S EFFECTIVENESS AS A NEUROPSYCHIATRIC DISORDER TREATMENT

Mahfuz A. Sakib, Jenny L. Wilkerson, Lance R. McMahon, and Samuel Obeng

The National Survey on Drug Use and Health (NSDUH) estimates that in 2023, 4.5 million people (18.1%) experienced a major depressive episode in the previous year, and 48.5 million people (17.1%) aged 12 or older had a substance use disorder. Finding any possible connections between psilocybin and other treatments for neuropsychiatric illnesses that could have a negative impact on health is therefore necessary. Here, we examine psilocybin and carbamazepine interactions using the drug discrimination approach. Sprague Dawley rats, both male and female (N = 4), were trained to distinguish between saline and 0.32 mg/kg DOI (2,5-dimethoxy-4-iodoamphetamine). While carbamazepine and M100907 were given 30 and 60 minutes before sessions; DOI, saline, and psilocybin were given 15 minutes beforehand. On test days, rectal temperatures, response rates, and the percentage of drug lever responding were measured. Both DOI ED₅₀ = 0.133 [0.09873 – 0.1665] and psilocybin ED₅₀ = 0.449 [0.2939 – 0.6126] produced dose-dependent increases in drug-appropriate lever responding with DOI being 3.4-fold more potent than psilocybin. While M100907 did not produce drug lever responding up to 0.32 mg/kg, carbamazepine alone caused 32.8% drug lever responding. M100907 also produced a rightward shift in dose effect function of psilocybin while carbamazepine produced a leftward shift. Here we show that psilocybin may raise plasma concentrations when used in conjunction with other medications for neuropsychiatric disorders, such as carbamazepine, which are metabolized by CYP450 enzymes. This could have a negative impact on health. However, there may be pharmacodynamic interactions between psilocybin and carbamazepine; more research is being done to ascertain if these interactions are pharmacokinetic or pharmacodynamic.

ANALYZING THE EFFECTS OF CANNABINOID RECEPTOR 2 AGONIST JWH-133 ON OVARIAN TUMOR GROWTH

America Alanis; Robert Barnes; Satish Banjara; Sharilyn Almodovar; Amanda Garcia; Josee Guindon, DVM PhD

Introduction: Ovarian cancer is one of the most prevalent cancers and the 5th leading cause of cancer death in women. As screening for ovarian cancer is limited, it often goes undetected until symptoms appear. While cannabis has been used to manage certain cancer symptoms, there have been relatively few studies assessing the effect of cannabis and cannabinoids on tumor growth. In this study, we established the efficacy of this ovarian tumor model and assessed the effect of cannabinoid receptor 2 (CB2) agonist JWH-133 on ovarian tumor growth. Methods: ID8 ovarian cancer cells were injected subcutaneously into the right flank of female C57BL/6J mice. Cells were injected at a concentration of 1, 3, or 10 million cells (per 0.2 mL solution) and tumor growth was measured for 41 days. Beginning on day 42, mice who had been injected with 10 million cells received daily injections of either vehicle solution or JWH-133 (1 mg/kg) for another 30 days, with tumor growth being assessed during this period. Results: The injection of ID8 cells at a concentration of 10 million (per 0.2 mL solution) led to significantly greater tumor growth relative to either the 1 million or 3 million cell groups. Daily administration of JWH-133 produced no significant change in tumor growth, relative to vehicle control. Conclusions: These results demonstrate a concentration-dependent effect on tumor growth in the ID-8 ectopic ovarian cancer model while further demonstrating the importance of evaluating cannabinoid compounds for their effects on established tumor growth. Further research will be conducted to evaluate the plasma of these mice for changes in cannabinoid receptors, estrogen receptors, and inflammatory markers, in order to better understand the downstream pathways involved in CB2 receptor activation.

INHIBITION OF FATTY ACID AMIDE HYDROLASE AND MONOGLYCERIDE LIPASE PRODUCES ANTINOCICEPTION WITH SEX DIFFERENCES IN TOLERANCE FORMATION IN A CHEMOTHERAPY-INDUCED PERIPHERAL NEUROPATHY MOUSE MODEL

Mikaela Aleman, Robert C Barnes, Henry Blanton, America Alanis, Boyd R. Rorabaugh, Daniel J Morgan, Dr. Josee Guindon, DVM PhD

Background: Chemotherapy-induced peripheral neuropathy (CIPN) is a common side effect of cancer treatment that currently lacks adequate treatment options. Due to the chronic nature of CIPN, antinociceptive tolerance is a key consideration when evaluating possible therapeutics. Previous research has shown that inhibition of endocannabinoid degradation enzymes fatty acid amide hydrolase (FAAH) and monoglyceride lipase (MGL) can decrease or reverse tolerance to the antinociceptive effects of opioids, but few studies have evaluated their efficacy in isolation. Methods: Neuropathic pain was established in male and female wild-type (C57BL/6J) via weekly cisplatin injections. Mechanical hypersensitivity was assessed using the Von Frey test and cold allodynia was assessed via the acetone test. The estrous cycle of female mice was further tracked via vaginal lavage and subsequent microscopy. Beginning on day 8, mice received daily injections of vehicle, MGL inhibitor JZL-184, or FAAH inhibitor URB-937. Results: Both JZL-184 and URB-937 significantly reduced allodynia in both the Von Frey and acetone tests. Similarly, both drugs produced significant estrous cycle alterations. While male mice did not develop tolerance to the effects of either drugs, female mice developed tolerance to both the antinociceptive effects and to the estrous cycle altering effects. Notably, the antinociceptive effects of URB-937 were recovered in female mice, suggesting complex drug metabolism. Ongoing analysis of a second FAAH inhibitor aims to further investigate these sex-specific differences. Conclusions: Significant sex differences in antinociception due to FAAH and MGL inhibition were observed in our CIPN model. While both URB-937 and JZL-184 effectively reduced allodynia, tolerance development occurred in female mice. The onset of both URB-937 and JZL-184 antinociceptive tolerance coincided with tolerance developing to estrous cycle changes. Further investigation, including the analysis of a second FAAH inhibitor, is needed to confirm the role of hormonal and metabolic factors in sex-specific drug tolerance.

COMPARING ACTIVE AND PASSIVE DISPERSAL AGENTS IN PSEUDOMONAS AERUGINOSA BIOFILMS

Sofia Altamirano; Dr. Kendra Rumbaugh, Ph.D

Biofilms are bacterial communities residing within a matrix of extracellular polymeric substances. Infections involving biofilms are particularly resilient to treatment and contribute to the persistence of chronic wounds. Passive dispersal agents, such as surgical debridement or glycoside hydrolases (GHs), are exogenous interventions that act to disperse biofilms. Active dispersal agents such as S-nitrosoglutathione (GSNO) and cis-2-decenoic acid (CDA) are signaling molecules produced by bacteria to promote biofilm dispersal by decreasing intracellular cyclic-di-GMP levels. This study aimed to investigate the effectiveness of the active dispersal agents GSNO and CDA and compare their efficacy to the passive method of dispersal (GHs) that we have long studied in our lab. *Pseudomonas aeruginosa* was used as a model organism and biofilms were grown both in vitro and in a murine chronic wound model. Biofilms were treated with GHs, GSNO, and CDA and dispersal was assessed through colony counts and crystal violet absorption. Results indicate that CDA and GSNO are typically just as effective as GHs in vitro but GHs are more effective dispersal agents ex vivo. These findings provide insight into the mechanisms of biofilm dispersal and eradication.

CHARACTERIZING THE ROLE OF SPECIFIC RHOGEF AND RHOGAP GENES IN CEPHALIC FURROW FORMATION DURING EARLY DROSOPHILA MELANOGASTER EMBRYOGENESIS

Lauren Anderson; Dr. Jeffrey Thomas, PhD

The cephalic furrow (CF) is a key morphological structure formed during early *Drosophila melanogaster* embryogenesis, requiring precise cytoskeletal regulation. Rho family GTPases, modulated by Rho guanine nucleotide exchange factors (RhoGEFs) and Rho GTPase-activating proteins (RhoGAPs), play a significant role in actin-myosin dynamics. This study aimed to identify the function of specific RhoGEFs and RhoGAPs involved in CF formation. We hypothesized that specific RhoGEFs and RhoGAPs are critical for proper CF development. To test this, we employed RNA interference (RNAi) to knock down candidate genes and observed CF development through immunostaining with Zipper (myosin II), Neurotactin and Hoechst. Our results revealed that knockdown of certain RhoGEFs and RhoGAPs led to aberrant CF morphology, suggesting their involvement in furrow formation. These findings enhance our understanding of the molecular mechanisms governing embryonic morphogenesis and underscore the importance of Rho GTPase regulation in developmental processes. Future work will focus on investigating the downstream signaling pathways and exploring potential interactions with other cytoskeletal regulators.

INFANTS ARE CHRONICALLY EXPOSED TO TOXIC LEVELS OF ARSENIC ACROSS DEVELOPMENT: IMPLICATIONS FOR PATHOLOGICAL HEALTH OUTCOMES

Aarthi Annamalai; Shubhra Bhattacharjee; Cade Holland; Zarifa Mosaddeque; Dr. Jeremy D. Bailoo, M.A PhD; Dr. Amrika Deonaraine, PhD

Multiple epidemiological studies have found associations between early-life arsenic exposure and deleterious health outcomes including impaired cognitive and behavioral development, as well as increased risk of neurodevelopmental disorders such as autism and attention deficit hyperactivity disorder (ADHD). Exposure to arsenic from food is expected to be about three times higher for infants and young children than for adults, in part because their intake per unit body mass is higher and their dietary diversity (i.e., the kinds of foods that they eat) is lower than adults. Using inductively coupled plasma mass spectrometry (ICPMS), we evaluated the total arsenic concentration of commonly consumed infant products (formula, rice cereals, and teething rings) across representative brands (e.g., Similac, Gerber, Enfamil, Kirkland, and Earth's Best) and lots of production. Arsenic content was generally consistent within brands and across manufacturing lots. The total arsenic content in infant formula ranged from 2.8-15 ppb, in rice

cereals 11-116 ppb, and in teethers from 42-314 ppb. These foods largely exceeded the 10-ppb regulatory level of arsenic in water set by the United States Environmental Protection Agency (EPA). However, no such regulation currently exists for total arsenic in foods and only limited speciation data is available for arsenic contamination in foods. Using high performance liquid chromatography (HPLC)-ICPMS, we found that the majority of arsenic in these foods was inorganic As(III), and As(V), which are highly toxic and are associated with hypomethylation, DNA damage, neurotoxicity, and chronic inflammation. Our results therefore highlight that infants are likely chronically exposed to arsenic during sensitive periods of organ development and the subsequent bioaccumulation in critical organ systems may disrupt normal physiological functioning and may consequentially lead to deleterious health outcomes.

EFFECTS OF TLR3 ACTIVATION ON TEMPORAL IMMUNE PROFILES OF BRAIN AND BLOOD IN MALE AND FEMALE FVB/B6 F1 HYBRID MICE.

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Introduction: Alcohol use disorder (AUD) is associated with increased inflammation. Alcohol activates toll-like receptors leading to inflammation, which contributes to changes in AUD-related behaviors. Chronic activation of toll-like receptor 3 (TLR3) in FVB/ B6 F1 mice increases ethanol consumption in males while females do not change or decrease ethanol consumption. We investigated the relationship between blood and brain levels of proinflammatory cytokines/chemokines in the male and female and how this could regulate alcohol consumption after TLR3 activation. We hypothesized that the differences in immune profiles may offer a partial explanation for the sex-related differences in drinking behavior. Methods: Male (n=7-9) and female (n=8-10) FVB/B6 F1 mice were treated intraperitoneally with Poly(I:C) (10 mg/kg) or saline. Blood and perfused brain tissues from prefrontal cortex (PFC) and striatum were collected at 6-, 24-, and 48-hour post-injection. Gene mRNA expressions of Ccl2, Ccl5, Tnf- α , Il-6, Il-1 β were analyzed using qPCR. Protein levels of these genes and Mmp-9, Il-17r/a, Il-4, Il-10, and Ifn- γ were measured using ELISA. Summary: Activation of TLR3 by PIC produced tissue- and sex-specific time course responses in immune genes and their proteins. Time course responses for Ccl2 and Ccl5 genes in PFC and striatum were different between males and females, suggesting sex-specific effects of these molecules on behavior. Protein levels of pro-inflammatory cytokines/chemokines like Ccl2, Ccl5 and Il-6 were elevated in the striatum of both sexes and correlated strongly with gene expression with females showing higher fold changes. Mmp-9 also showed elevated protein levels in the striatum of both sexes. Conclusion: Our results showed distinct profiles of TLR3-dependent expression of immune genes in blood and brain in males and females and suggested disparate roles of these molecules in regulation of alcohol consumption.

RANDOM FOREST PROGNOSTICATION OF SURVIVAL AND 6-MONTH OUTCOME IN PEDIATRIC PATIENTS FOLLOWING DECOMPRESSIVE CRANIECTOMY FOR TRAUMATIC BRAIN INJURY

Niyati Babaria

Decompressive craniectomies (DC) have been commonly used as a second-line treatment option in patients suffering from traumatic brain injuries (TBI), and the number of patients undergoing DC is expected to steadily increase. Models have been created to improve prognostication of TBI but they have not been tailored toward the subset of pediatric patients undergoing DC. The objective of this study was to build on this previous literature by developing a random forest machine learning algorithm to predict outcomes following DC in pediatric patients. This study analyzed 6-month postoperative outcomes in pediatric patients undergoing decompressive craniectomy (DC) using machine learning models (CRF and SRF). Classification and survival random forest algorithms predicted mortality and outcomes based on clinical, radiographic, and laboratory data. The Glasgow Outcome Scale (GOS) was used to classify outcomes, with a score of ≥ 4 indicating a good prognosis. The study included 40 pediatric patients, with a hospital mortality rate of 27.5% and 75.8% of survivors achieving a good outcome at 6 months. The CRF

model showed high accuracy, with a receiver operating characteristic area (AUC) of 0.984 for mortality prediction and 0.873 for good vs. bad outcomes. The SRF model, trained for 6-month mortality, achieved an AUC of 0.921. The CRF and SRF models were able to successfully predict 6-month outcomes and mortality following DC in pediatric patients with TBI. Machine learning is proving to be a key determinant of potential outcomes, complications and risks of medical procedures. Having an apt amount of knowledge of the features leading to poor outcomes and the ability to predict favorable neurological outcomes postoperatively can guide the neurosurgeon's decision-making.

HIV INCREASES EXPRESSION OF PDIA4 UPON EXPOSURE TO OXYCODONE AND NICOTINE IN 4-CELL BLOOD-BRAIN BARRIER MODEL

Javaria Baig; Preston J. Campbell; Zhang Yong; Thomas Abbruscato; Sharilyn Almodovar

Around 1:2 people living with Human Immunodeficiency Virus (HIV) develop HIV- associated neurocognitive disorder (HAND). Also, these individuals are more likely to abuse drugs such as nicotine and/or oxycodone (Oxy) compared to the general population. This may damage the blood-brain barrier (BBB) and increase HIV pathogenesis in the brain resulting in HAND, particularly when used in combination. How combinations of HIV, Oxy and/or nicotine effects on BBB integrity and function remain poorly understood. We hypothesize that HIV combined with nicotine and/or Oxy exacerbates the expression of neurotoxicity genes at the BBB, compared to HIV alone. We adapted a 4-cell BBB model (Stone et al., 2019) to include primary human endothelial cells, astrocytes, and pericytes, with immortalized microglia treated with combinations of HIV and/or Oxy and/or nicotine. We then analyzed expressions of 84 genes related to neurotoxicity using a Neurotoxicity PCR Array (Qiagen). Compared to the untreated control, our results show that initial exposure of BBB cells to HIV alone or HIV than Oxy+nicotine, downregulated the expression of GUCY1A1 (-2.28) and TXNIP (-3.65). However, initial exposure of BBB cells to Oxy+nicotine then HIV, downregulated GALC (-2.03) and TXNIP (-7.20), and upregulated MMP9 (3.34) and PDIA4 (23.08). PDIA4 regulates endoplasmic reticulum (ER) stress, which leads to inflammation in HAND, but the potential role of PDIA4 in substance use disorders remains unknown. Our data suggests that initial exposure of BBB cells to nicotine+Oxy then HIV exhibited significantly more detrimental effects on BBB integrity than exposure to drugs after HIV. Based on the striking fold change in PDIA4 expression, we think that this ER stress protein may have a unique role in BBB injury in HIV people facing nicotine and oxycodone addiction. Future studies will further dissect the signaling pathways affecting the BBB in people living with HIV and substance use disorders.

BEHAVIORAL AND CELLULAR EFFECTS OF VITAMIN A DEFICIENCY IN A J20:RARE-LACZ MOUSE MODEL OF ALZHEIMER'S DISEASE

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Background: All-trans retinoic acid (ATRA), a metabolite of vitamin A (VA), has been shown to upregulate ADAM10, an α -secretase enzyme responsible for non-amyloidogenic APP cleavage by binding to promoter retinoic acid response elements (RARE). This finding has led to investigations into VA derivatives as potential therapies for Alzheimer's Disease (AD), but it is unclear whether nutritional VA deficiency exacerbates AD pathology. In this pilot study, RARE-LacZ mice were crossed with the J20 mouse model of AD to study the effects of chronic dietary VA deficiency on learning and memory, as well as ATRA signaling within the hippocampal dentate gyrus (DG). Methods: Dietary manipulation of VA was achieved using standard AIN-93M diet (4 IU/g VA) and a modified VA-deficient (0.4 IU/g) AIN-93M diet. Mice were weaned onto experimental diets and behaviorally tested at 9-10 months of age using open-field, novel object location/recognition, water T-maze, and rotarod tests. Mice were sacrificed within 24 hours following the last day of testing. Brain hemispheres were preserved in PFA for immunohistochemical analyses. Results: Immunohistochemical findings suggest $A\beta$ plaques within the hippocampus disrupt DG integrity and may interfere with ATRA signaling in DG granule cells. In the water T-maze, wild-type sibling littermates J20-/-

:LacZ[±] mice (n=21) displayed an accelerated learning ability and stronger memory of the platform location compared to J20[±]:LacZ[±] mice (n=24), as measured by mean latency to platform and time spent in the original platform arm location after the platform was moved. Conclusions: J20[±]:LacZ[±] mice aged 9-10 months display A β aggregation throughout the hippocampus and cortex, which may be responsible for local changes in ATRA signaling in the DG. Ongoing behavioral data analysis will give us additional information about the correlation between diet, behavioral performance, and AD pathology in the DG.

ASSESSING SELECTIVE AND MIXED CANNABINOID AGONISTS FOR DIFFERENCES IN ANALGESIA, TOLERANCE, AND SEX HORMONES IN A CHEMOTHERAPY-INDUCED PERIPHERAL NEUROPATHY MURINE MODEL

Robert C Barnes, Henry Blanton, Canice Lei Dancel, Isabel Castro-Piedras, America Alanis, Mikaela Aleman, Margaret Coulter, Boyd R. Rorabaugh, Daniel J. Morgan, Josée Guindon

Background: Chemotherapy treatment is frequently limited by the development of chemotherapy-induced peripheral neuropathy (CIPN), a side effect that is associated with decreased quality of life and increased suicidality in cancer survivors. Despite its prevalence, treatment options are currently limited and there has been renewed interest in the utility of cannabinoids in managing this condition. Methods: The antinociceptive effects of a CB1-selective (ACEA), CB2-selective (AM1241), and mixed CB1/CB2 (CP55,940) agonists were evaluated in male and female C57BL6/J mice within a cisplatin-induced murine model of CIPN, with neuropathic pain being assessed via the Von Frey and Acetone tests of mechanical and cold allodynia. Further tests were conducted for locomotion (open field), sex hormone expression (enzyme-linked immunosorbent assay/ELISA), and estrous cycle changes (vaginal lavage with crystal violet staining). Results: CB1-selective and mixed CB1/CB2 agonism produced significant antinociception that was limited by the development of tolerance to its effects prior to completion of the study. Sex differences were noted in the development of this tolerance, with males taking significantly longer to develop tolerance. CB2-selective agonism produced antinociception without any significant tolerance development. All compounds produced changes in the estrous cycle and altered plasma estradiol levels, with CB1 acting compounds producing a decrease in estradiol while CB2-selective agonism resulted in increased estradiol. Conclusion: While all assessed compounds produced antinociceptive effects, only the CB2-selective agonist produced significant antinociception without the development of tolerance. These results suggest a need for further investigation into the utility of CB2-selective agonists in relieving CIPN and into the possible role of sex hormones and estrous cycle phase changes in promoting these effects.

IMPROVING DISCHARGE PREDICTIONS FOR BURN PATIENTS: RANDOM FOREST ANALYSIS WITH OVERSAMPLING OF AM-PAC SIX-CLICKS SCORES

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Effective discharge planning is essential for burn patients, particularly those with large total body surface area (TBSA) injuries, to optimize recovery, allocate resources, and improve long-term outcomes. This study aimed to evaluate whether integrating the Activity Measure for Post-Acute Care (AM-PAC) Six-Clicks scores, a functional screening tool used by physical therapists, improves discharge predictions when combined with clinical variables such as TBSA, intubation status, and inpatient surgeries.

Methods: Data were collected from 238 burn patients and oversampled to 580 cases using Synthetic Minority Oversampling Technique (SMOTE) to address class imbalance across four discharge categories: home discharge, skilled nursing facility/long-term care, transfers to other institutions, and expired/hospice. Logistic regression and Random Forest models were developed to compare two groups: Group 4, which included Six-Clicks scores, and Group 8, which excluded them. Model performance was assessed using accuracy, ROC AUC, and confusion matrices.

Results: Models incorporating Six-Clicks scores (Group 4) showed significantly improved predictive accuracy and better classification across all discharge categories compared to models without Six-Clicks scores (Group 8). Notably, Group 4 demonstrated enhanced performance in predicting outcomes for patients with higher mobility impairments, as evidenced by more accurate confusion matrices.

Conclusions: The integration of Six-Clicks scores into discharge prediction models significantly enhances accuracy and provides a more comprehensive assessment of patient needs. These findings support the routine use of Six-Clicks as part of discharge planning to improve patient outcomes, resource allocation, and family preparedness in burn care settings.

ENHANCEMENT OF CELL SURVIVAL DURING TEMPORARY PRESERVATION OF LARGE SPLIT THICKNESS SKIN GRAFTS

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Introduction Split-thickness skin grafts (STSGs) are commonly used to treat large skin defects, such as burns and traumatic injuries. However, these grafts must be used immediately after harvest to maintain cell viability. Delays in recipient availability or limited donor tissue often require temporary storage, typically in saline at 4°C. This method, however, leads to rapid cell viability decline, limiting the storage period to just a few days. Previous studies suggest that Roswell Park Memorial Institute Medium (RPMI) improves cell survival in vitro. This study aims to evaluate whether RPMI can extend the viable storage window for STSGs compared to saline. Methods Excess donor tissue from grafting procedures was stored in RPMI or saline at 4°C for seven days. Cell viability was assessed on day seven using the Trypan Blue Dye Exclusion Test. Two key metrics were measured: percent viable cells (percentage of living cells) and total viable cells (calculated by multiplying total cell count by percent viable cells). Paired t-tests were used to compare the viability between the two storage methods. Results The analysis showed significant differences between storage methods. RPMI-stored grafts had 24.2% more viable cells than saline-stored grafts ($t = 7.62, p < 0.0001$). Total viable cells were also significantly higher for RPMI-stored grafts, with a mean difference of 1.7 million more cells ($t = 3.85, p = 0.0005$). Conclusion Storing STSGs in RPMI significantly improves cell viability compared to saline, extending the grafts' viable storage window. This could reduce the need for repeated graft harvesting and improve clinical outcomes, particularly for burn patients with limited donor tissue. RPMI offers a superior preservation method, potentially enhancing resource allocation and patient care in clinical settings.

EVALUATING THE IMPACT OF VITAMIN D DEFICIENCY ON SKIN CANCER RISK: A RETROSPECTIVE COHORT STUDY

Katie Chen, Casey Brusen

Melanoma is a skin cancer that originates in melanocytes, the pigment-producing cells of the epidermis. It is driven by genetic mutations or environmental factors like ultraviolet radiation. Vitamin D has been linked to various health outcomes, including its role in skin cancer, though this association remains debated. This retrospective cohort study aims to evaluate the relationship between vitamin D status and melanoma and non-melanoma skin cancer. Data was collected using the TriNetX US Collaborative Network, which includes health records from 68 healthcare organizations. Two cohorts were defined as vitamin D deficient or sufficient, determined by two vitamin D measurements one year apart. The cohorts were 1:1 propensity score matched and analysis assessed melanoma development risk using survival analysis, measures of association, and risk ratios. We looked at melanoma and NMSC diagnoses among both cohorts at 6 months and 1 year following diagnosis of vitamin D deficiency or sufficiency. The results showed no significant difference among the cohorts in skin cancer risk for 6 months: malignant melanoma (HR [95% CI] = 0.950 [0.866, 1.041]), BCC of the skin (HR [95% CI] = 0.790 [0.694, 0.900]) and SCC of the skin (HR [95% CI] = 1.024

[0.869, 1.206]); and 1 year: malignant melanoma (HR [95% CI] = 0.870 [0.802, 0.945]), BCC of the skin (HR [95% CI] = 0.710 [0.640, 0.787]) and SCC of the skin (HR [95% CI] = 0.936 [0.821, 1.067]). These findings suggest that vitamin D deficiency does not significantly affect melanoma and NMSC risk. While adequate vitamin D is important for health, sun exposure may act as a confounding factor in melanoma risk. Future studies should adjust for UV exposure, skin type, sunscreen use, and genetics to clarify vitamin D's role in skin cancer aggression.

CHANGING THE PERCEPTIONS OF MEDICAL STUDENTS IN THE USAGE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) IN TREATING TYPE II DIABETES MELLITUS: IMPLICATIONS FOR FUTURE MEDICAL EDUCATION

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Introduction: Complementary and Alternative Medicine (CAM) encompasses a diverse range of medical systems, methods, and practices, which are increasingly sought out for their potential to complement conventional treatments and promote holistic well-being. The current research study aims to evaluate the knowledge, attitudes, personal usage, and potential integration of select CAM modalities in the management of type 2 diabetes mellitus among first and second-year medical students at Texas Tech University Health Sciences Center. The goal of this study is to understand if these future physicians might integrate CAM into their clinical practice to address type 2 diabetes in patients if they are given knowledge of the efficacy of such treatments. **Methods:** This study utilizes a cross-sectional, pre-post study design with quantitative data analysis. Data collection is derived from a population of health professions students recruited via emails within the university setting. The participants then used a validated questionnaire that collected quantitative data regarding the domains, including but not limited to: "Familiarity" and "Attitudes" and "Knowledge" on a scale of 1-10; these domains were then applied to the overall concept of CAM as well as its sub modalities of: (1) dietary supplements, (2) mind-body therapies, (3) acupuncture, (4) chiropractic, (5) homeopathy. These scores were then again taken after the exposure of the participants to CAM education in the form of an infographic pamphlet and website that summarizes current meta-analyses on the efficacy of modalities of dietary supplements and acupuncture. The analysis consists of descriptive, inferential, and paired-T tests (and/or Wilcoxon Signed-Rank test) using the STATA software. **Results and Conclusion:** The data for this project is still being collected, and the final results and conclusion for this project will be done before Student Research Week 2025.

EXPRESSION AND FUNCTION OF SLC43A2, AN AMINO ACID TRANSPORTER INVOLVED IN EPIGENETIC CONTROL VIA DNA AND PROTEIN-LYS/ARG METHYLATION, IN COLON CANCER CELLS

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Background: Cancer cells reprogram the expression of amino acid transporters to optimize their proliferation and evade immunosurveillance. SLC43A2 mediates cellular uptake of methionine necessary for S-adenosylmethionine-mediated DNA/histone methylation. A recent study showed that robust expression of SLC43A2 in colon cancer cells depletes methionine in tumor microenvironment such that cytotoxic T cells suffer from methionine deficiency and are unable to proliferate and kill tumor cells. **Introduction:** The original cloning studies showed that SLC43A2 (LAT4) transports Phe, Met, Leu and Ile. Latter studies identified this transporter as a methionine transporter, but with no direct evidence. LAT1, a related transporter, is being investigated as an anticancer target using JPH203 as a selective inhibitor. Here we determined the expression/function of SLC43A2 in colon cancer cells, established its substrate selectivity, and determined its susceptibility to inhibition by JPH203. **Results:** Publicly available RNA-seq databases show SLC43A2 expression in several normal tissues with higher expression in most cancers. We monitored SLC43A2 expression in two pairs of isogenic colon cancer cell lines (HCT116 with and without p53;

SW48 with and without G12D mutation in KRAS) by RT-PCR and western blot. The function of SLC43A2 was monitored by cellular uptake of ³⁵S-methionine. Substrate selectivity was evaluated by competition experiments. The inhibitory potency of JPH203 was determined by measuring methionine uptake with increasing JPH203 concentrations. These studies showed: SLC43A2 is expressed in colon cancer cells; absence of p53 decreases its expression whereas KRAS mutation has minimal effect; the transporter is selective for methionine; JPH203 is a potent inhibitor of SLC43A2 with an IC50 value of ~1 uM. Conclusion: SLC43A2 is expressed in normal colon and is modestly increased in colon cancer. Colon cancer cells express SLC43A2 and its expression is controlled by p53. It is selective for methionine and it is inhibited by the LAT1 inhibitor JPH203.

BREAST CANCER'S EFFECTS ON TACTILE AND TEMPERATURE SENSATION VIA ESTROUS CYCLE INFLAMMATORY CHANGES IN WILD-TYPE FEMALE MICE

Margaret Coulter, Robert C. Barnes, Satish Banjara, Ava G. Oliver, Isabel Castro-Piedras, Igor Ponomarev, Saba Javed, Sharilyn Almodovar, Josée Guindon

Background/Research Question: Although breast cancer is the most commonly diagnosed and the highest cause of cancer mortality among women, little is known about the effects of breast cancer alone, notwithstanding the side effects of chemotherapy, on quality of life and factors such as tactile and temperature sensitivity. Methods: AT-3 and E0771 breast cancer cell lines were examined using the Von Frey and acetone tests to assess the rate of tumor growth in female C57BL/6J wild type mice. Changes in estrous cycle as well as mRNA expression in tumor cells and whole brain tissue were later examined and evaluated. Results: Tumor growth was induced to a greater degree in the AT-3 cell line than in the E0771 cell line, although both cell lines induced significant tumor growth. While the AT-3 cell line markedly diminished cold and tactile sensation and altered the estrous cycle, resulting in more time spent in a low estrogen state, the E0771 cell line only had a significant impact on cold and tactile sensation with no change to the estrous cycle. Furthermore, the E0771 cell line demonstrated increased gene expression of fatty acid amide hydrolase and calcineurin-like receptors. Conclusion: Breast cancer has a significant effect on impairment of cold and tactile sensation. However, further investigation is needed into the interactions between cancer and chemotherapy and their cumulative effect on diminishing sensory modalities.

BRIDGING THE LAYERS: ADVANCING MEDICAL STUDENTS' UNDERSTANDING OF MALE AND FEMALE PERINEAL ANATOMY

Garrett Davis B.S, Gurvinder Kaur PhD

Introduction:

First-year medical students often find Pelvis and Perineum (P&P) anatomy the most challenging part of the Anatomy, Histology, and Embryology (AHE) block. A needs analysis revealed that 80% (n=128) identified P&P as the most difficult section of AHE. We hypothesize that integrating a P&P review session and updated cadaveric prosections will improve students' understanding and performance on P&P-related questions on summative assessments.

Methods:

A cadaveric male and female pelvis were dissected to expose key anatomical structures, which were made available for student exploration. A comprehensive P&P review was also provided. To evaluate baseline knowledge, a pre-quiz featuring cadaveric dissection images and clinical vignette-style questions was administered 15 minutes before the review session. A post-quiz was given 15 minutes after to assess knowledge retention and understanding.

Results:

Student performance on the post-quiz (n=115) significantly improved compared to the pre-quiz (n=124; 58% vs. 46%; p<0.0001). However, the average score on summative assessments for attendees (n=116) and non-attendees (n=68) showed no significant difference on P&P questions (79% vs. 78%; p=0.6). After the review

session, 90% of the students (n=120) felt confident in the material compared to 54% (n=129) before. Furthermore, the proportion of students who felt unconfident decreased from 46% to 14% after the session. Conclusion:

The P&P review session and updated cadaveric dissections boosted student confidence in understanding P&P anatomy and improved immediate knowledge retention, as reflected in pre- and post-quiz scores. However, it had minimal impact on long-term summative exam performance. Despite this, the session offered a valuable supplementary learning experience, potentially reducing student anxiety. Future studies with larger sample sizes and alternative learning strategies may be needed to explore sustaining improvements in student performance.

EVALUATION OF HASPIN AS A NOVEL TARGET FOR TREATING RENAL CELL CARCINOMA

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Advanced renal cell carcinoma (RCC) is one of the most lethal malignancies and claims the lives of about 15,000 people in the United States. Despite improved screening and advanced surgical and systemic therapeutic regimens, the five-year survival rate for metastatic RCC patients is merely 12%. This is due to the fact that RCC is resistant to conventional cancer therapies such as chemotherapy and radiation. Multiple randomized trials of adjuvant radiation therapy for RCC have failed. Although several drugs that target angiogenesis, different kinases, and mammalian target of rapamycin (mTOR) signaling has been approved as first line therapies for advanced stage RCC, durable responses are not achieved and no overall survival benefit has been demonstrated. With this grim outlook, strategies in enhancing radiation and systemic therapy response in RCC is clearly an unmet clinical need. Towards this goal, our studies identified haploid germ cell-specific gene 2 (GSG2) derived nuclear protein kinase, also called Haspin, which is highly upregulated in clear cell RCC (ccRCC), the most common subtype of kidney cancer. Its expression correlates with severity of the disease in terms of both tumor grade and stage and was identified as a poor prognostic marker. Our studies identified Haspin as an essential cell cycle and immune modulator in RCC. Additionally, our preliminary studies using different cancer cell and xenograft models, establish that Haspin plays a central role in tumor growth and progression and therapeutic resistance, highlighting it as a potential therapeutic target either as a single agent or in combination with radiation therapy.

EGR1 DRIVES PROSTATIC HYPERPLASIA VIA PROMOTING CELL PROLIFERATION AND EPITHELIAL BUDDING AND BRANCHING

Michael Dominguez; Hamed Khedmatgozar; Sayanika Dutta; Dr. Girijesh Patel, PhD; Mosharaf Mahmud Syed; Annie Woh, Raaghav Nandana; Dr. Luis Brandi, MD; Dr. Robert Matusik, PhD; Dr. Srinivas Nandana, PhD; Dr. Manisha Tripathi, PhD

Benign Prostatic Hyperplasia (BPH) is a widely prevalent urologic disease in men aged >50 years. In addition to morbidity due to lower urinary tract symptoms, the healthcare costs associated with BPH are estimated at over US \$4 billion annually. BPH is associated with the augmented proliferation of the epithelial and stromal compartments of the prostatic transition zone. Clinically, BPH manifests as lower urinary tract symptoms (LUTS) leading to obstructive symptoms (patients experiencing a weak urine stream and inability to fully empty the bladder) and irritative symptoms (increased frequency and urgency of urination, nocturia). As reported by a multi-center NIH Medical Therapy of Prostatic Symptoms (MTOPS) clinical trial, the current treatment options i.e. leave nearly a third of patients at high risk for progressive BPH disease. Further, the MTOPS trial showed that some patients initially responded to medical therapy but progressed to fail therapy. Surgical treatment is the only remaining option for these patients. Thus, comprehending the molecular mechanisms underlying BPH is pivotal to identifying novel molecular based therapies for the disease. We identified that EGR1 is elevated in BPH. Further, we found that shRNA-based knockdown of EGR1 in non-tumorigenic human benign prostatic epithelial cells led to decreased proliferation and a reduction in the size and number of spheroids in 3D cultures. Additionally, EGR1

knockdown in prostatic stromal cells resulted in decreased cell proliferation and, in a paracrine manner, reduced EGR1 expression in epithelial cells in 3D culture and organoid budding and branching phenotypes in co-culture experiments.

ATORVASTATIN, A POTENTIAL OTOTOXICITY PROTECTOR, DOES NOT ALTER CYTOTOXIC RESPONSE TO CHEMOTHERAPY IN NEUROBLASTOMA PATIENT-DERIVED MODELS

Manikantha Dunna; Hannah Floyd; Charles Zhu; Tenley Lehman; Kristyn Mccoy; Jennifer H. Foster; Mallory R. Taylor; C. Patrick Reynolds

BACKGROUND:Ototoxicity caused by cisplatin and carboplatin is a common adverse event associated with therapy for high-risk neuroblastoma (HRNB). Statins (inhibitors of HMG-CoA reductase) are widely used for lowering low-density lipoprotein cholesterol to prevent cardiovascular disease. Heat shock proteins (HSP) are known to protect the inner ear from stress and statins are known to induce HSPs. Clinical and pre-clinical data suggest that atorvastatin, a widely prescribed statin, can protect against cisplatin-induced ototoxicity.

AIMS:To determine if atorvastatin antagonizes the cytotoxic effects of chemotherapy agents used for induction therapy of neuroblastoma in patient-derived cell lines.

METHODS:The DIMSCAN cytotoxicity assay was used to evaluate the effects of atorvastatin [0.0391 μ M – 10 μ M] in combination with cisplatin [0.0547 μ M – 14 μ M], carboplatin [0.117 μ M – 30 μ M], doxorubicin [0.00391 μ M – 1 μ M], vincristine [0.078nM – 20nM], etoposide [0.0195 μ M – 5 μ M], or 4-hydroperoxycyclophosphamide (4-HC, active metabolite of cyclophosphamide) [0.0195 μ M – 5 μ M] across 9 different drug concentrations starting at clinically achievable maximum concentrations under three oxygen conditions (pO₂ = 2%, 5%, and 20%). Six patient-derived neuroblastoma cell lines were tested: MYCN-amplified [CHLA-136 (Progressive Disease: PD), COG-N-519 (PD, Postmortem: PM), COG-N-561 (PD, PM), COG-N-732 (Pre-therapy at Diagnosis: DX), and COG-N-765 (DX)] and MYCN non-amplified [CHLA-15 (DX)]. Assessing activity of cisplatin +/- atorvastatin in neuroblastoma patient-derived xenografts is ongoing. Antagonism/synergy was assessed using Combination Index (CIdx); CIdx > 1 indicates antagonism.

RESULTS:Treatment with chemotherapy drugs alone demonstrated approximately 1–4 logs of cytotoxicity under all tested oxygen conditions. There was no evidence of antagonism with the addition of atorvastatin to the tested chemotherapy agents. For all chemotherapy agents tested, CIdx values were <1 for all cell lines at all oxygen conditions.

CONCLUSIONS:Atorvastatin did not antagonize the cytotoxic effects of standard neuroblastoma chemotherapeutic drugs tested in vitro. This supports the safety of evaluating atorvastatin as an otoprotectant without the likelihood of compromising anti-cancer efficacy.

A TBX2-DRIVEN SIGNALING SWITCH FROM ANDROGEN RECEPTOR TO GLUCOCORTICOID RECEPTOR CONFERS THERAPEUTIC RESISTANCE IN PROSTATE CANCER

Sayanika Dutta, Hamed Khedmatgozar, Girijesh Kumar Patel, Daniel Latour, Jonathan Welsh, Mainak Mustafi, Antonina Mitrofanova, Manisha Tripathi & Srinivas Nandana

Background: Recent research reveals that glucocorticoid receptor (GR) activation induces enzalutamide resistance in advanced prostate cancer (PCa) by bypassing androgen receptor (AR) signaling, yet the underlying molecular mechanisms remain elusive. Our previous findings identified TBX2, a T-box transcription factor, as overexpressed in castration-resistant PCa (CRPC). Recent reports confirm TBX2 and GR as key drivers of enzalutamide resistance. Our study elucidates TBX2's role as a molecular switch, repressing AR levels while activating GR expression, thus substituting AR signaling and promoting tumor growth.

Methods: We genetically modulated TBX2 using multiple approaches: a) dominant negative, DN, to block

TBX2 (TBX2DN), and b) overexpression, OE, to increase TBX2 expression (TBX2OE), c) shRNA mediated knockdown (shTBX2). RNA-seq, qRT-PCR, Western blot and IHC were performed. Further, we used ChIP, SDM and Co-IP was used.

Results: TBX2 binds to AR and GATA2 promoters, exerting bimodal repression on AR expression. Conversely, TBX2 upregulated GR via direct GR promoter binding and protein-protein interaction. Together, concurrent repression of the AR and activation of GR resulted in enzalutamide resistance. Notably, SP2509, an LSD1 inhibitor, disrupts TBX2-LSD1 and TBX2-GR interactions, revealing a novel mechanism for SP2509 in CRPC. Our findings support a model where TBX2, LSD1 and GR proteins interact, and pharmacological inhibition of LSD1 impedes the TBX2-driven AR-to-GR switch by disrupting TBX2-GR interaction.

Conclusions: In summary, our study identifies TBX2 as the molecular switch that drives the AR to GR signaling bypass thereby conferring enzalutamide resistance. Further, our study provides key insights into a potential therapeutic modality for targeting the AR to GR signaling switch via disruption of the TBX2-LSD1 and TBX2-GR protein-protein interactions

IMPAIRED 26S PROTEASOME ACTIVATES THE CGAS-STING SIGNALING PATHWAY AND INDUCES NECROPTOSIS IN MOUSE BRAIN

Abena Dwamena, Yasin Asadi, Erin Gilstrap, Anand Chakroborty, Oluwagbemisola Adeniji, and Hongmin Wang

Impaired proteasome function is consistently associated with many neurodegenerative disorders, including Alzheimer's disease (AD), Parkinson's disease, and Huntington's disease that show neuroinflammation and neurodegeneration; however, how impaired proteasome causes neuroinflammation and neuronal death remains less understood. In this project, we studied the effect of impaired 26S proteasome on neuroinflammation and neuronal death in the Psmc1 knockout (KO) mice deficient of a 19S proteasome subunit selectively in the forebrain region. We determined whether impaired 26S proteasome leads to the release of mitochondrial dsDNA into the cytosol and activates the cGAS-STING signaling pathway in the KO mouse brain. We also determined the neuropathology of the KO brain by examining whether neuroinflammation and necroptosis occur in the KO mouse brain compared to the control brain. The project enabled us to assess whether neuroinflammation and necroptosis are generalized factors causative for reduced proteasome activity observed in diverse neurodegenerative disorders.

EFFECT OF CHRONIC SPONTANEOUS URTICARIA ON QUALITY OF LIFE IN RURAL POPULATIONS

Bradley Engel; Aashay Kotheri; Dharak Patel; Joshua Varghese; Dr. Natasha Shah MD; Dr. Oluwaseun Olaiya MD

Introduction

Healthcare disparities between rural and urban populations significantly affect access to specialized care. Chronic Spontaneous Urticaria (CSU), an autoimmune condition driven by mast cell activation, can severely impact patients' quality of life (QoL). Although tools like the Chronic Urticaria Quality of Life Questionnaire (CU-Q2oL) exist, none specifically evaluate the disparities in QoL perceptions between rural and urban populations with CSU. This study aims to identify these differences and assess the mitigating effects of treatment and social support.

Methods

This cross-sectional study recruited 63 adults aged 18–65 diagnosed with CSU through social media support groups. Participants completed the CU-Q2oL, a 23-item qualitative self-reported assessment scored on a 9-point Likert scale. Demographic data were collected to explore potential influences on QoL. Preliminary data shows a rural-urban split of 17 and 46 participants, respectively, with additional recruitment ongoing.

Results

Initial analysis indicates that before treatment, rural participants reported significantly worse QoL compared to urban counterparts. Following treatment, these differences diminished, with CU-Q2oL scores

showing no statistical disparity. Participants engaging with social media support groups reported a greater positive change in QoL. Preliminary findings highlight a significant relationship ($p=0.049$) between specialist distance and changes in CU-Q2oL scores.

Discussion

Rural populations face amplified CSU challenges due to specialist shortages and socioeconomic barriers. Treatment bridges QoL disparities, while social media support enhances outcomes. Identifying underlying factors is crucial for targeted interventions and improved patient-centered care in underserved areas.

Conclusion

Addressing rural healthcare inequities and leveraging social support systems are essential to enhancing QoL for CSU patients. This study highlights the need for tailored strategies to reduce barriers and promote equitable healthcare access across populations.

EFFECTS OF HUMAN IMMUNODEFICIENCY VIRUS NEF PROTEIN VARIANTS ON PULMONARY VASCULAR ENDOTHELIAL CELL DYSFUNCTION

Amanda K. Garcia; Eli Heath; Minh Nguyen; Preston Campbell; Sharilyn Almodovar, Ph.D.

The risk of developing severe pulmonary vascular diseases heightens upon infection with Human Immunodeficiency Virus (HIV). How HIV specifically exacerbates pulmonary vascular remodeling is unknown. Previous studies demonstrated the association between HIV Nef variants and severe pulmonary vascular disease. We investigated the differential impact of HIV Nef variants from HIV-positive pulmonary normotensive and hypertensive donors on endothelial cell dysfunction. HIV nef isolates cloned into HaloTag vectors (Promega) were used to transfect primary arterial endothelial cells co-cultured with arterial smooth muscle cells (Lonza). Cell cultures were maintained at 37°C, 5% CO₂ prior to lysis 24-, 48-, or 72-hours post-Nef transfection. The expression of BAX (BCL2 associated X apoptosis regulator), ICAM-1 (Intercellular adhesion molecule-1), and EDN1 (Endothelin-1) genes were measured by qPCR. Nef samples from two HIV-positive pulmonary hypertensive patients had no statistically significant changes in ICAM-1 expression, contrary to the expected increase in cell adhesion molecules, implying that Nef variants alter typical vascular response to injury. Two HIV-positive hypertensive samples demonstrated statistically significant decreases in BAX expression from 24-72 hours, agreeing with the concept that vascular cells undergo initial apoptosis after injury. Contrary to what is expected in severe pulmonary vascular remodeling, we observed decreased EDN-1 expression at later time points in several HIV Nef variants, implying that vasoconstriction was not promoted, at least in our Nef culture model. A better understanding of HIV-mediated vascular disease may require knowledge on how HIV variants alter host genes. Future efforts may include challenging the pulmonary vasculature in vivo, using our HIV-infected humanized mouse model followed by assessments of differential vascular hemodynamics induced by Nef variants present in patients with/without pulmonary vascular disease.

EPIGENETIC MODIFYING GERM GRANULES ARE PRESENT IN MAMMALIAN SPERMATOZOA.

Kimberly Garza, Uyen Tran, Gail Cornwall

Environmental exposures throughout a father's life can cause epigenetic changes in the germline which can be propagated to his children, changing their phenotype and potentially causing disease across multiple generations. Although changes in classical epigenetic marks such as DNA methylation have been observed in sperm DNA, the epigenetic carrier remains unknown. Cytosolic, instead of nuclear, epigenetic inheritance has been documented in *C. elegans*' sperm, where phase-transitioning/amyloid germ granules (GG) function as paternal epigenetic carriers that transmit phenotype to embryos during fertilization. Germ

granules are dynamic cytosolic hubs of epigenetic modifying and gene expression regulating proteins bound to their corresponding small RNAs (miRNA, piRNA, etc). However, although GG, known as the chromatoid body in mammals, are vital for spermatogenesis, they are thought to be absent from mature mammalian sperm. To test the hypothesis that germ granules are present in mammalian spermatozoa, we began by looking for known markers of germ granules in rat sperm. We found multiple markers confirmed by LC-MS, such as DDX4 and PIWIL1 (in the piRNA pathway), by immunofluorescence and western blot in the sperm cytosol in three main sites: perforatorium, centrosome, perifossal zone. These proteins and GMCL1, a protein also found in humans that closely resembles a key *C. elegans* GG component that is required for paternal epigenetic inheritance, were found in punctate structures in the perforatorium suggesting presence of GG. Small noncoding RNA sequencing have determined the presence of piRNA and miRNA in the perforatorium granules, suggesting the sperm granules are active and capable of changing phenotype. Our studies reveal that GG are present in mammalian spermatozoa and provide a viable mode by which cytosolic inheritance is possible. Further research is necessary to understand whether they are epigenetic carriers of a transgenerationally inherited phenotype.

ENHANCING AWARENESS OF MENTAL HEALTH RESOURCES AND WELLNESS INITIATIVES FOR MEDICAL STUDENTS

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Introduction: A variety of wellness resources are provided to the School of Medicine students at TTUHSC. Our initial study looked at both demographics and student utilization of resources to understand how students are taking advantage of the provided resources to improve their overall health and wellness. From the data collected, we found that many of the first and second year students were simply not aware of several of the resources provided. The question then became, how can we increase the awareness of mental health and wellness initiatives at TTUHSC?

Method: We put together a video showcasing the resources offered, the individuals involved with those resources, and how to find the resources. After watching the video, students were then given a survey encompassing the video's effectiveness in increasing resource awareness.

Results: We found that 95% of the students agree or strongly agree that the video increased their overall awareness of mental health resources available to students at TTUHSC SOM, and that 95.7% of the students feel more confident about assessing the resources.

Conclusion: We conclude that although there are a variety of resources aimed at supporting students' health and wellness, many students are unaware of the resources offered and thus are unable to fully take part in the wellness initiatives offered free by the school. Having a comprehensive resource, like our video and handout, that has all of the major wellness resources provided by the school in one place is an effective means to increase both student awareness and utilization of wellness resources. Further research could look at the impact of the increased awareness and utilization of wellness resources on various parameters of student mental health and wellness.

IMPACT OF ZERO-BALANCE ULTRAFILTRATION OF PRIMING BLOOD ON TOTAL ANTIOXIDANT CAPACITY AND CLINICAL OUTCOMES IN PEDIATRIC CARDIAC SURGERY UNDERGOING CARDIOPULMONARY BYPASS

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Background: The cardiopulmonary bypass (CPB) related systematic inflammatory response is occurred due to multiple factors and then affects the whole of their body. Infant patients undergoing an open cardiac operation more susceptible to CPB induced adverse effects such as body fluids regulation, and volume overload can cause hypothermia, stress oxidative, inflammatory and metabolic mediators' release, and hemodilution within cardiopulmonary bypass and tissue edema. **Methods:** The recent single-blinded clinical trial was performed with a randomized method on sixty less than 10 kilograms paediatric patients who met study inclusion criteria and inferred cardiac operation at Shahid Rajaie Cardiovascular, medical,

and research centre in 2020. Study participants were randomly allocated to trial and control groups (30 patients in each group). In the trial group, patients received traditional ultrafiltration with zero balance ultrafiltration, and in the control group, patients received only traditional ultrafiltration during cardiopulmonary bypass. Stress oxidative (TAC) markers were measured before and after the operation and entering to intensive care unit (ICU). Results: Although the level of blood product usage in patients in the control group was higher than in the trial group, but difference was not significant statistically ($P>0.05$). Inotrope agent usage, blood electrolytes, arterial blood parameters, and total antioxidant capacity had no significant difference between the trial and control groups ($P>0.05$). Intensive care unit time was significantly higher in intervention group ($P<0.003$). Conclusion: Study findings showed that CPB prime zero balance ultrafiltration can keep arterial blood gasses variables and electrolytes in the normal range among pediatric patients undergoing cardiac operation. Moreover, we did not find any significant difference in the total antioxidant capacity between two groups and control group showed a better clinical outcome in term of intensive care unit time. So, our study demonstrated that there is no priority of using priming zero balance ultrafiltration.

WHAMY: ROLE OF A WISKOTT-ALDRICH SYNDROME PROTEIN FAMILY MEMBER IN EARLY DROSOPHILA EMBRYOGENESIS

Kushal Gupta; Dr. Jeffrey Thomas

The Whamy gene, part of the Wiskott-Aldrich Syndrome Protein (WASP) family, is key for cytoskeletal dynamics. It originated from a WASP gene duplication, gaining roles in cell motility and actin filament elongation. Whamy's structure includes CRIB domains for Rac1 binding and WH2 domains for actin elongation. Unlike other WASP proteins, it doesn't activate the Arp2/3 complex. This study explores Whamy's role in actomyosin ring formation and constriction during *Drosophila* embryogenesis by comparing Wild Type (OreR) and Whamy mutant embryos. Embryos were fixed using heat-methanol fixation and immunostained with Zipper antibodies to analyze myosin II in the actomyosin ring. Ring formation and constriction were quantified with ImageJ, QuPath, and Circularity Index (C.I.) calculations. The Circularity Index, $C = 4\pi A/P^2$ (where A is area and P is perimeter), measures how close a shape is to a perfect circle (C.I. = 1). Lower values indicate irregular rings, while higher values reflect intact rings. Results showed reduced circularity in Whamy mutant embryos, suggesting disrupted actomyosin ring formation and constriction. Mutant embryos exhibited abnormalities, including a two-fold increase in microfilament ring counts, earlier actomyosin ring constriction, and irregular, polygonal ring shapes with lower circularity (Whamy C.I. = 0.69214 vs. OreR C.I. = 0.85265). These findings highlight Whamy's critical role in actomyosin ring integrity and cytoskeletal development. Mutations in Whamy disrupt actomyosin dynamics, leading to irregular ring morphology and misregulated cellularization. Future studies will investigate Whamy's interactions with Src64 and Tec29 and its role in ventral and cephalic furrow formation and germ band extension, essential for morphogenesis and gastrulation.

TREATMENT OF OBESITY BY TEXAS PEDIATRICIANS: TRAINING, GUIDELINES, IMPLEMENTATION, BARRIERS

Megan Hafen; Azlan Tubbs*; Caylor Hafen*; Dr. Elisabeth Conser, MD; Dr. Tammy Camp, MD; (*indicates co-first authors)*

I: Obesity rates of Texas residents are above the national average. Rates of prescribing pharmacologic and surgical interventions in Texas pediatric patients are suspected to be low, contrary to American Academy of Pediatrics guidelines. This study surveyed pediatricians in Texas to evaluate factors such as understanding/implementation of the guidelines, perceived medical training preparedness to treat obesity, and barriers to guideline implementation.

M: A survey was sent to pediatricians in Texas via email.

R: We received 68 included responses from 49 Texas zip codes. 61.8% reported reading the "Clinical Practice Guideline for Evaluation and Treatment of Children and Adolescents With Obesity." 53.8% responded that they were "not at all trained" or "slightly trained" in treating obesity in residency. Reported training quality and comfortability treating obesity in the first year after residency were linked to a physician's

comfortability treating obesity. Reported comfortability treating obesity is independent of working in several settings. Physicians reported barriers including time, intra-institutional, patient factors, access to care, financial, personal/professional hesitations, and lack of community resources. Responses demonstrating application of guidelines to cases varied.

C: Physicians face several challenges implementing current guidelines. Comfortability treating obesity is independent of working in several county factors. Analysis suggests that a physician's comfortability treating obesity comes from residency training and not from additional years of practice. Physician responses demonstrating application of the guidelines to relevant cases varied. Results suggest that pediatric residency programs could benefit from increased focus on treatment of obesity. Further, treatment may be enhanced by increased access to specialists, less burden on pediatrician schedules, and education on application of the guidelines to practicing pediatricians.

DIMETHYL FUMARATE CAUSES DNA REPAIR DEFICIENCY AND SYNERGISTICALLY KILLS BRCA-PROFICIENT OVARIAN CANCER CELLS IN COMBINATION WITH OLAPARIB

Jacob Hall; Hithardha Palle; Naresh Sah; Ganesh Acharya; Chinnadurai Mani; Dr. Mark Reedy, MD; Dr. Komaraiah Palle, PHD

Dimethyl fumarate (DMF) is currently recommended for treating adults with relapsing multiple sclerosis and as first-line systemic therapy for plaque psoriasis. Recent studies indicate that DMF treatment suppresses the homologous recombination (HR) DNA repair and synergistically kills hereditary Leiomyomatosis and kidney cancer cells when combined with olaparib. Given Olaparib's FDA approval for ovarian cancer (OC) treatment, we further investigated the combination of DMF and olaparib in OC cells. Treatment of BRCA-proficient OC cells with DMF or siRNA mediated knockdown of fumarate hydratase caused significant downregulation of DNA repair protein FANCD2. Consistently, these cells also showed HR deficiency and S-phase-specific cell cycle arrest, as evidenced by Dr-GFP reporter assays and cell cycle analysis using flow cytometry, respectively. Additionally, combined treatment of DMF and olaparib resulted in elevated DNA lesions and more pronounced S-phase specific cell cycle arrest compared to control and single- drug treated OC cells, as assessed by COMET assay and cell cycle analysis. Importantly, the combination of DMF and Olaparib demonstrated synergistic cell death in OC cells in the majority of the drug combinations performed in Bliss synergy assays and clonogenic survival assays. These findings collectively suggest that DMF treatment could cause HR deficiency in ovarian cancer patients with wild-type BRCA genes, potentially enhancing their response to Olaparib therapy. Given that both drugs are FDA-approved, this approach holds promise for translation into clinical settings for OC patients.

INCIDENCE OF WORKPLACE VIOLENCE AGAINST US MEDICAL STUDENTS: A STEP TOWARDS CHANGE

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Background: Workplace violence (WPV) against healthcare workers is a longstanding issue, yet insufficient data exists on WPV experienced by medical students during clinical training. Although the Association of American Medical Colleges (AAMC) gathers survey data including workplace violence from graduating medical students, aggregate data has not been published. To facilitate systematic improvements, it is crucial to identify primary sources of WPV. This is a multi-institutional mixed methods study aimed to quantify WPV encountered by medical students and describe experiences via qualitative interviews.

Methods: An anonymous survey was distributed to medical students engaged in clinical training at participating United States medical schools. Details about WPV experiences, using multiple-choice questions, drop-down boxes, and free text responses were collected. Data was extracted from RedCap and analyzed using Excel. Double-blind interviews were conducted with volunteer participants.

Results: The study included 128 participants, primarily third-year students (50%) (Figure 1). 66.4% of students reported having zero experiences with WPV. The most reported type of WPV was sexual innuendo (41.4%),

followed by verbal abuse (32.9%), threats (17.1%), and physical violence (8.6%) (Figure 2). Surgery was perceived as the specialty most likely to experience WPV, while family medicine was seen as the least likely (Figure 3). Qualitative interview data provided anecdotal experiences with insight into common themes such as physical safety, verbal/emotional violence, preparedness for such encounters, and the cultural environment.

Conclusion: The findings echo trends seen in the AAMC Graduation Questionnaire. This preliminary data underscores the need to address WPV to enhance student learning and patient care. This study provides foundational insights necessary for addressing WPV in medical education and improving the clinical training environment. Future stages of this study aim to deepen understanding and inform broader, systemic interventions the first of which will test the impact of Trauma Informed care and Deescalation training on the perceived preparedness of medical students to start their clinical rotations.

KRUPPEL-LIKE FACTOR 2 (KLF2) REDUCES PARAMETERS OF CORONAVIRUS DISEASE-RELATED PATHOGENESIS

Md Sariful Islam Howlader

The coronavirus disease 2019 (COVID-19), caused by SARS-CoV-2, remains a critical global health challenge characterized by high mortality rates and severe outcomes. Dysregulated immune responses and cytokine storms, hallmark features of the disease, often lead to multi-organ dysfunction, fibrosis, and death. The lack of effective targeted therapies underscores the urgent need for novel molecular approaches. This study investigates the role of Krüppel-like factor 2 (KLF2), an anti-inflammatory transcription factor, in mitigating COVID-19-associated pathogenesis. To model COVID-19 pathogenesis, lymphoid cells (K-562) were transfected with SARS-CoV-2 spike (S) and nucleocapsid (N) proteins, resulting in increased inflammation, oxidative stress, and mitochondrial dysfunction. Inflammatory markers, oxidative stress, and mitochondrial activity were measured pre- and post-treatment with GGTI298, a chemical inducer of KLF2. An induced lung fibrosis model was used to evaluate KLF2's impact on fibrosis-associated markers in lung fibroblast cells. Additionally, in silico analysis assessed interactions between GGTI298 and SARS-CoV-2 proteins. Results demonstrated that SARS-CoV-2 protein transfection significantly heightened inflammation, oxidative stress, and mitochondrial dysfunction, coupled with reduced KLF2 expression. Treatment with GGTI298 reversed these effects, reducing inflammatory markers, oxidative stress, and restoring mitochondrial function. KLF2 induction also reduced fibrosis markers in the lung fibrosis model. In silico analysis revealed strong interactions between GGTI298 and SARS-CoV-2 proteins, supporting its therapeutic potential. In conclusion, KLF2 induction offers a promising therapeutic strategy for COVID-19 by reducing inflammation, oxidative stress, and fibrosis. These findings provide a foundation for targeted therapeutic development to improve patient outcomes.

ANALYSIS OF MEDICARE REIMBURSEMENT TRENDS FOR PROCEDURES IN ALLERGY AND IMMUNOLOGY FROM 2013-2022

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We analyzed Medicare reimbursement patterns from 2013– 2022 for procedures in the field of Allergy & Immunology across all U.S. States and Territories. We analyzed Current Procedural Terminology (CPT) code utilization by "Allergy/Immunology" in 2020 to identify the top 50 codes based on gross revenue. On average, we observed a yearly, inflation-adjusted change in Medicare reimbursement for all U.S. states/territories of -0.67% over ten years. Variations in reimbursement rates may incentivize physicians to practice in states with higher reimbursement rates, as we observed.

EXOGENOUS BDNF MODULATES ELECTROPHYSIOLOGIC CHANGES IN NEURONS OF THE AMYGDALA

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Neuropathic pain has a strong emotional component and is often comorbid with anxiety-depressive disorders. The amygdala, a limbic brain region, has been shown to play critical roles in the modulation of pain, fear, and anxiety behaviors. Neuroplastic changes in the amygdala have been linked to pain behaviors, but the specific mechanisms are not fully understood. Brain derived neurotrophic factor (BDNF) plays an important role in neuroplasticity and there is evidence for downregulation of BDNF in neuropsychiatric diseases such as anxiety-depressive disorders while increasing BDNF has been implicated as a mechanism of antidepressant therapeutic interventions. The role of BDNF signaling in the brain, and the amygdala in particular, in pain modulation is not yet known, but expression of the TrkB receptor, a known target of BDNF, has been shown in the amygdala. The goal of this study is to examine the effects of exogenously delivered BDNF on amygdala plasticity in neuropathic pain, using brain slice physiology. Chronic pain model was induced in CRF+/tdTomato+ mice through spinal nerve ligation surgery (SNL). Whole-cell patch-clamp recordings were made from neurons in the capsular division of the central amygdala. The application of BDNF decreased excitability measured as action potential firing in response to depolarizing current injection. BDNF also decreased excitatory synaptic transmission of parabrachial inputs. These results would suggest that in chronic pain, exogenous BDNF delivery can inhibit amygdala neuronal activity.

BDNF EXPRESSION ASSOCIATED WITH NEUROPATHIC PAIN

Razan Hussein B.S; Olga Ponomareva MS; Volker Neugebauer PhD

Background: Chronic pain is an important health care issue and therapies are often ineffective with adverse side effects. Better understanding of pain mechanisms in the brain is needed, including the amygdala that plays a critical role in the modulation of pain, fear, and anxiety behaviors. Brain Derived Neurotrophic Factor (BDNF) is known to play a role in neuroplasticity but its pain-related expression and function in the amygdala in pain processing are not known. This project will determine expression of BDNF in the amygdala and any changes in a chronic neuropathic pain model in rats (spinal nerve ligation, SNL).

Research Methods: Immunohistochemistry, Western blotting and if needed ELISA. Brain tissue will be obtained from naïve rats (Aim 1) and from behaviorally tested rats with sham or SNL surgery (Aim 2). For Aim 1, SNL and sham rats may be included to determine cell type-specific changes if Western blot analysis suggests changes in the pain condition.

Expected Outcomes and Significance:

Analysis was conducted for the stains corresponding to Total Protein, Actin, and BDNF protein expression, with normalization to total protein followed by T-tests for differences between the SNL and Sham group in both the left and right central amygdala. There seemed to be no significant difference between the SNL and Sham groups four weeks post-surgery on all BDNF bands in the right central amygdala. T-tests showed significant difference on one of the 14kd BDNF band in the left central amygdala with the SNL group showing greater expression of the BDNF protein as compared to the Sham group. This is befitting to the observation that BDNF is increasing expressed in setting of chronic pain caused by trauma, especially when nerve ligation is involved. All other bands of the left central amygdala showed no significant difference. While these are not definitive conclusions as more data and trials need to be collected, these results show possibility of a novel finding of difference in BDNF expression in the left and right brain/central amygdala in the setting of chronic pain. Determining the localization of BDNF in the brain and targeting the amygdala can be a novel strategy to regulate pain.

EVALUATION OF THE EFFECT OF DUAL USE OF COMBUSTIBLE CIGARETTES (C-CIG) AND ELECTRONIC CIGARETTES (E-CIG) ON BLOOD-BRAIN BARRIER

Sejal Rajesh Jadhav; Khondker Ayesha Akter; and Thomas J. Abbruscato.

Background: Tobacco product use remains the leading cause of preventable disease and death in the United States, with approximately 49.2 million adults using some form of tobacco. The dual use of C-cig and E-cig is increasingly common and often perceived as a less harmful alternative to smoking alone. However, the potential impact of this dual-use on the blood-brain barrier (BBB) remains poorly understood. Method: This study investigates the effects of dual C-cig and E-cig exposure using an in-vitro BBB model. Brain endothelial cells (bEnd3) were exposed to three dual combinations with C-cig: E-cig ratios of 1:1, 3:1, and 1:3, for both short 24 hours and prolong 5 days durations. Assessments included cell viability (MTS assay), barrier permeability (sodium fluorescein assay; NaF), oxidative stress markers, and tight junction protein expression (Western blot). Hypothesis: Dual use of C-cig and E-cig may increase oxidative stress, potentially damaging the BBB integrity, similar to or higher than either product alone. Results: Increased NaF permeability following 24 hours exposure in C-cig, E-cig, Dual groups. Prolong 5 days exposure, particularly in the 1:1 dual group, observed significant decrease of claudin expression, suggesting progressive tight junction disruption. Additionally, increased levels of NQO-1 and HO-1 in C-cig and all dual-use groups indicates alteration in oxidative stress. Conclusion: Dual use of C-cig and E-cig is often misconstrued as a safer alternative due to the perceived reduction in C-cig use. However, our preliminary in-vitro data suggest that this combination may not actually provide a safer alternative. Future directions: We plan to investigate alterations in BBB permeability using a co-culture bEnd3-astrocyte model, which more closely mimics the in-vivo environment. Additionally, in-vivo studies with dual exposure will be conducted to validate our in-vitro findings.

ADRM1 INHIBITOR UP284 INDUCES REPLICATION STRESS AND SUPPRESSES CELL PROLIFERATION IN TRIPLE-NEGATIVE BREAST CANCER

Iffat Jahan; Shacoya Mack; Ravi Anchoori; Balasubramanyam Karanam; Komaraiah Palle

Triple-negative breast cancer stands as the most aggressive and deadliest subtype of breast cancer associated with poor prognosis and limited treatment options due to the lack of hormonal receptors; used for targeted therapy. Relying exclusively on chemotherapy enhances the chances of resistance and recurrence. Thus, it mandates the need for novel drug compounds and combination therapies. Adhesion-regulating molecule 1 (ADRM1), a ubiquitin receptor of 26S proteasome that supports recognition of polyubiquitinated substrates and their subsequent deubiquitination and degradation by unique deubiquitinase UCH37. Its inhibition causes a rapid and toxic accumulation of its substrate polyubiquitinated proteins in very high molecular weight aggregate; disrupting the protein homeostasis. In response to that, the cancer cells halt the cell cycle and induce replication stress. Consequently, cells signal the survival mechanism by activating the DNA damage repair pathway. Using the Cancer Gene Genome Atlas, our primary analysis demonstrated that ADRM1 is overexpressed in all types of breast cancer including TNBC. Higher expression in tumor cells compared to normal cells strengthens the stands for ADRM1 as a potent target for therapy. In vitro analysis has been performed in TNBC cells. The dose dependency assay demonstrated that the UP284 compound showed activation of CHK1 (Checkpoint kinase1) mediated DNA damage response and γ H2AX foci formation confirms the double-stranded DNA breakage. Clonogenic assay confirms the suppression of cell proliferation and colony formation in a concentration-dependent manner. Up284 treated cells also showed cell cycle arrest at the G2/M phase. Altogether, the ADRM1 inhibitor, Up284, has the potential for clinical application in treating TNBC. Our

analysis will unravel the novel mechanistic insight into this compound's therapeutic potential and provide preclinical evidence to develop further combination therapy.

VITAMIN D AND METABOLIC HEALTH: INSIGHTS FROM POPULATION AND GENETIC DATA

Dongming Jiang, Zheyun Niu, Nishtha Khanna, John J Lawrence

Background:

Diabetes is a complex, multifactorial disease with profound effects on glucose and lipid metabolism. While vitamin D (VD) has been associated with metabolic health, its role remains debated, especially in the context of body mass index (BMI) and racial disparities.

Hypothesis: VD influences metabolic health by regulating BMI and insulin levels via its impact on metabolic genes.

Data and Results:

Analysis of the NHANES dataset (2007-2018, n = 17,443 participants) revealed significant racial disparities in VD levels. Black participants had the lowest average VD levels, while White participants had the highest (P < 0.001). Among Mexican American (R = -0.11, P < 0.001) and White populations (R = -0.10, P < 0.001), VD levels showed a significant negative correlation with insulin levels. Across all racial groups, VD levels were negatively correlated with BMI (P < 0.001), with the strongest correlations observed in Mexican American (R = -0.12) and White populations (R = -0.17). Obese individuals exhibited significantly lower VD levels compared to normal-weight individuals (P < 0.001). Multinomial logistic regression analysis identified VD as a significant factor influencing obesity (Coefficient = -0.011, P < 0.05), indicating that higher VD levels reduce the likelihood of obesity. Further analysis of GEO dataset (GSE129604, n = 18 participants) demonstrated that VD supplementation significantly downregulated the expression of key metabolic genes, including PDK4 (logFC = -1.041, adj. P = 0.031) and FKBP5 (logFC = -0.607, adj. P = 0.021). Additionally, Enrichr database analysis revealed that VDR directly binds to the promoter of FKBP5, while genetic perturbation of VDR significantly alters PDK4 expression, further supporting the regulatory role of VD in metabolic pathways.

Conclusions:

VD plays a vital role in metabolic health, particularly by regulating BMI and lipid metabolism. The observed downregulation of PDK4 and FKBP5 suggests a potential molecular pathway through which VD improves glucose metabolism and reduces inflammation.

LENGTH OF STAY PREDICTION ENHANCED BY ADMISSION AM-PAC 6-CLICKS SCORE

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Background/Objective:

Predicting burn patient length of stay (LOS) is challenging due to recovery variability. The AM-PAC 6-clicks tool, scoring mobility from 6 to 24, may improve LOS predictions when combined with clinical features. This study evaluates its role in burn care models.

Methods:

Data was collected from 211 burn patients, aged 18 - 89, admitted January 1, 2021 - May 31, 2023. Mobility was assessed using the 6-clicks score upon admission, alongside TBSA, age, gender, number of surgeries, LOS, and intubation status. Eight regression models were created: Groups 1-4 included the 6-clicks score, while Groups 5-8 excluded it. Groups 1 and 4 used TBSA, Groups 2 and 5 assessed burn severity and TBSA separately, Groups 3 and 6 added age and intubation, and Groups 4 and 8 included inpatient surgeries. Models were evaluated with MSE and R², trained on 80% of data, and tested on 20%.

Results:

The 6-clicks score on admission consistently emerged as a significant predictor of LOS across all models, showing a strong negative correlation with LOS. In Group 1 ($B = -0.810$, $p < 0.001$, CI [-1.225, -0.394]), where TBSA and LOS were the only predictors, and Group 4 ($B = -0.432$, $p = 0.004$, CI [-0.726, -0.138]), where all the features were included, the 6-clicks score retained its significance even with the additional clinical factors. In comparison, models excluding the score, like Group 8, had reduced predictive capability. These results highlight the 6-clicks score as a key factor in predicting LOS, reinforcing its value in clinical models.

Conclusion:

Incorporating the 6-clicks score significantly enhances LOS prediction models. Group 4, which combined 6-clicks with TBSA and other clinical factors, proved the most reliable. These findings underscore the value of integrating mobility assessment tools into interprofessional clinical models for burn care.

THE CONTRIBUTION OF ASTROCYTES IN THE AMYGDALA TO PAIN INHIBITING EFFECTS OF AN MGLUR3 AGONIST

Krishna Varsha Kanneganti; Mariacristina Mazzitelli, Ph.D.; Volker Neugebauer, M.D., Ph.D.

mGluR receptors are metabotropic glutamate receptors which play a role in the pathophysiology of chronic pain. mGluR3 is part of group II mGluRs that couple negatively to adenylyl cyclase, resulting in inhibitory effects in pain conditions. Previous data collected from the lab had shown that mGluR3 activation in the amygdala decreased pain responses in rats. Whole-cell patch clamp recordings suggested that the beneficial effects of mGluR3 activation were mediated by non-neuronal effects. Accordingly, we decided to investigate the contributions of neuroimmune signaling, specifically astrocytes. We hypothesized that the pharmacological inhibition of astrocytes in the amygdala would abolish the effect of mGluR3 activation in an arthritis pain model. All groups of rats underwent cannula implantation and monoarthritis was induced in the left knee. To determine the contribution of astrocytes to mGluR3 signaling fluorocitric acid (FCA), a selective astrocytic inhibitor, or vehicle control was injected 5-6 hours after arthritis induction. To achieve mGluR3 activation, the combination of a group II mGluR agonist (LY379268) with an mGluR2 negative allosteric modulator (VU6001966) was injected 16 hours after FCA and 30 minutes before the behavioral experiments. Inhibition of the astrocytes using FCA did not affect the evoked pain responses measured as audible and ultrasonic vocalizations, spontaneous (facial grimace score) pain behaviors, and anxiety-like (elevated-plus maze) behaviors in arthritic rats. In contrast the combination of FCA with mGluR3 activation decreased the evoked pain responses, improved the facial grimace score, and had a trend towards anxiolytic effects compared to the vehicle group, suggesting that astrocytes did not mediate the effects of mGluR3 activation. These results indicated that astrocytes are not critically involved in the pain inhibitory effects of mGluR3 agonists and that potentially other neuroimmune signaling entities might be significant.

CHRONIC ARSENOBETAINE EXPOSURE IN MICE IMPACTS COGNITIVE FUNCTION AND ALTERS BRAIN GENE EXPRESSION.

Simranjeet Kaur; Praneetha Panthagani; Julian Cardenas; Dr. Shubhra Bhattacharjee, PhD; Phillip Adjei; Brent Kisby; Sambantham Shanmugam; Dr. Susan Bergeson, PhD; Dr. Amrika Deonaraine, PhD; Dr. Jeremy Bailoo, PhD; Dr. Igor Ponomarev, PhD

Arsenic exposure is a significant public health concern. We have found that arsenobetaine (AsB), an organoarsenic species, bioaccumulates in the brain. We hypothesize that exposure to AsB during early development affects the brain and may contribute to neurodevelopmental disorders. We investigated the effects of chronic AsB exposure on behaviors associated with anxiety as well as learning and memory and gene expression changes in the brain of J:ARC male and female mice. Mice received either 1000 ppb AsB in water or water alone from weaning. At P70-80, animals were tested in the light-dark box, elevated plus-maze, and the water T-maze. Animals were euthanized at P83, brains were harvested, and the amygdala,

prefrontal cortex, and hippocampus were dissected for RNA sequencing to assess gene expression. Animals exposed to AsB displayed higher levels of anxiety and cognitive impairment, with the effects of AsB on anxiety behaviors being more prominent in females. Differential gene expression analysis revealed global changes in gene expression following AsB exposure, with the amygdala being more affected in females, while the hippocampus being more affected in males. Several genes implicated in synaptic plasticity and regulation of fear/anxiety (e.g., Crh, Drd1) as well as learning and memory (e.g., Ppp1r1b, Egr1) were downregulated by AsB exposure. Cell type enrichment analysis of differentially expressed genes suggested that neurons in the female amygdala and male dentate gyrus were vulnerable to arsenic exposure. These findings suggest that chronic AsB exposure affects brain processes in a sex- and region-specific manner, indicating potential long-term neurological risks.

ASSOCIATION OF RNA EXPRESSION FOR GD2-SYNTHETIC ENZYMES GD3 AND GD2 SYNTHASE WITH GD2 EXPRESSION IN NEUROBLASTOMA CELL LINES

Caezaan Keshvani; Dr. Michelle Keyel, PhD; Dr. Noureen Nighat, PhD; Dr. Patrick Reynolds, MD-PhD

Background: Low GD2 expression may result in resistance to anti-GD2 therapies. Defining mechanisms of high and low GD2 expression in multiple patient-derived models is necessary for robust studies seeking to enhance GD2 expression on neuroblastomas. We compared GD2 cell surface expression to RNA expression of genes encoding enzymes involved in GD2 synthesis in neuroblastoma patient-derived cell lines (PDCLs). **Aim:** GD2 expression has mechanisms independent of GD3 synthase in neuroblastomas. **Methods:** We analyzed 40 PDCLs for GD2 expression, measured by median fluorescence intensity (MFI) and percentage of GD2-positive cells using dinutuximab via flow cytometry. A subset of samples was further examined for gene expression using qRT-PCR was performed on 16 PDCLs to assess genes involved in GD2 synthesis. **Results:** Cohorts of PDCLs with of low GD2 expression (n = 7) and high GD2 expression (n = 7) based on dinutuximab MFI were identified. RNA expression for GD3 synthase (ST8S1A1) was significantly (p = 0.0006) lower for GD2 low compared to GD2 high. There was no significant difference between GD2-low and GD2-high for GD2 synthase RNA expression. Two low GD2 PDCLs had GD3 synthase expression comparable to GD2-high PDCLs and one low GD2-PDCL had GD2 synthase RNA expression that was 10-fold higher than observed in high GD2 PDCLs. **Conclusion:** Our data support previous reports by others for a key role for GD3 synthase in regulating GD2 expression in neuroblastoma. However, some GD2-low PDCLs do not have low RNA expression of GD3 synthase indicating multiple mechanisms exist for low GD2 in neuroblastoma. The low-GD2 PDCLs described here provide models for preclinical studies to enhance GD2 expression. With the multiple enzymatic steps in GD2 synthesis and with anti-GD2 selection pressure now combined with cytotoxic (mutagenic) therapy, future studies need to assess PDCLs and PDXs from patients treated with chemoimmunotherapy for all GD2 synthetic steps.

KCNIP1 AT THE CONVERGENCE OF NUTRITIONAL DEFICIENCY, ION CHANNEL DYSFUNCTION, AND ALZHEIMER'S DISEASE

Nishtha Khanna; Fernando Tsurukawa; Cesar Augusto Sanchez-Villalobos; Isabel Castro; Emily Reed; Igor Ponomarev; Chhanda Bose; Andrew C. Shin; R. Bryan Sutton; Chiquito Crasto; Randip Pal; and J. Josh Lawrence.

BACKGROUND: -

Hippocampal dentate gyrus (DG) hyperexcitability is linked to early Alzheimer's disease (AD) learning deficits. The Mitochondrial Free Radical Theory of Aging implicates oxidative stress in AD pathogenesis. All-trans retinoic acid (ATRA) functions as an antioxidant and RAR agonist, regulating α - and β -secretase activities, which become imbalanced in AD, causing amyloid β accumulation. Recent research emphasizes potassium channels, especially Kv4.1, in early AD development

METHODOLOGY: -

We used bioinformatics and literature review to explore KCNIP1's role in vitamin A sensitivity and its

potential as a transcription factor. Enrichr analysis revealed a Retinoic Acid Response Element (RARE) in KCNIP1's promoter, suggesting vitamin A regulation. JASPAR quantified the RARE-KCNIP1 association strength. Using the same approach, we then investigated KCNIP1's potential regulatory targets, focusing on its interaction with Kv4.1.

RESULT: -

Our machine learning analysis of three post-mortem human AD RNA-seq datasets identified KCNIP1 as the top-ranked gene of interest in Alzheimer's disease. Subsequent JASPAR analysis revealed a strong potential regulatory relationship between KCNIP1 and Kv4.1, with a high score of 0.8 out of 1. This finding provides a compelling link between our bioinformatic results and the previously observed downregulation of Kv4.1 in AD models, suggesting that KCNIP1 may play a crucial role in modulating Kv4.1 expression or function in the context of Alzheimer's disease.

CONCLUSION: - We propose a novel hypothesis of AD pathogenesis: ATRA depletion leads to KCNIP1 downregulation, impairing Kv4.1 trafficking to DG granule cells and altering gene expression. This ultimately results in early DG learning disruption. The dual role of KCNIP1 as both a channel regulator and transcription factor highlights its potential significance in AD pathogenesis. Validation and targeting of the KCNIP1/Kv4.1 pathway may present translational opportunities for AD prevention and treatment strategies.

TIAM1 IS A DRIVER OF THE PROSTATIC BRANCHING PHENOTYPE AND A POTENTIAL THERAPEUTIC TARGET FOR BENIGN PROSTATIC HYPERPLASIA

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Benign prostatic hyperplasia (BPH), a common urologic dysfunction in older men, is characterized by the reactivation of developmental programs such as prostatic budding and branching. However, the molecular mechanisms behind this reactivation in BPH remain unclear. In this study, we identify the guanine nucleotide exchange factor, T-lymphoma invasion and metastasis-inducing protein-1 (TIAM-1), an activator of the small GTPase RAC1, as critical to the BPH budding and branching phenotype. From an unbiased BPH transcriptomic signature generated using a combination of patient datasets, we identified TIAM1 mRNA upregulation and confirmed increased expression at the protein level. Genetic knockdown of TIAM1 in human prostatic cell lines and organoid cultures in vitro markedly reduced organoid budding and branching. Additionally, exposure of cell lines and patient-derived organoid models to NSC23766, a small molecule inhibitor of TIAM1-RAC1 signaling, mirrored the effects of genetic knockdown underscoring the translational relevance of these findings. In conclusion, our findings identify TIAM1 as a key driver of prostatic branching and growth and suggest targeted TIAM1-RAC1 signaling inhibition as a potential treatment strategy in BPH.

THE EFFECTS OF MITRAGYNE ON METHAMPHETAMINE SELF-ADMINISTRATION IN RATS UNDER A PROGRESSIVE RATIO SCHEDULE

Lida Khodavirdilou; Dr. Julio D. Zuarth Gonzalez, PhD; Dr. Sushobhan Mukhopadhyay, PhD; Nicholas Guadagnoli, MSc; Dr. Christopher R. McCurdy, PhD; Dr. Lance R. McMahon, PhD; Dr. Jenny L. Wilkerson, PhD

In recent years, *Mitragyna speciosa* (kratom) has gained attention for its potential as an alternative medicine for substance use disorders (SUD). This study evaluated the effects of mitragynine on methamphetamine self-administration using a progressive ratio (PR) schedule of reinforcement. This study builds upon a previous experiment where mitragynine showed no significant impact on food reinforcement under PR schedule. In the current study, male and female Sprague Dawley rats were implanted with jugular catheters and trained to self-administer methamphetamine (0.032 mg/kg/infusion) intravenously under a fixed ratio (FR) 1 schedule, with the ratio gradually increasing to FR5. Once stable responding was established, rats were transitioned to a PR schedule to measure motivation, with the

breakpoint serving as the primary outcome. Afterward, rats were pretreated with either vehicle or mitragynine (10, 17.8, 32, 56 mg/kg, i.p.), with the order of doses counterbalanced. Results showed that methamphetamine self-administration led to significant lever pressing on the active lever. Mitragynine significantly reduced the breakpoint, indicating an attenuation in motivation for methamphetamine. These findings suggest that mitragynine may reduce methamphetamine self-administration. Unlike the food reinforcement experiment, where no significant effects were observed, mitragynine demonstrated an ability to attenuate motivation for methamphetamine self-administration.

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CHARACTERIZING THE RELATIONSHIP BETWEEN SEVERITY OF BLEPHAROPTOSIS AND ASTIGMATISM USING SECTOR AREA INDEX AND CORNEAL TOPOGRAPHY

Jocelyn Kim; Dr. Coby Ray, MD

Background Blepharoptosis, drooping of the upper eyelid, can impair vision and has been linked to astigmatism, possibly due to corneal pressure. Ptosis severity is typically assessed using Marginal Reflex Distance 1 (MRD1), but no objective grading method exists. Additionally, astigmatism lacks a universal classification system. Recent literature introduced Sector Area Index (SAI), a mathematical approach that relies on ratios rather than scale-dependent measurements, providing a more objective and scalable assessment. This research would use the mathematical model of SAI to grade the ptosis severity and computed corneal topography to assess severity of astigmatism. The objective is to compare the results from the mathematical model for ptosis and empirical results from the topographer to determine if combining both models improves sensitivity and accuracy in astigmatism screening based on ptosis severity. **Methods** The study population consists of at least 100 patients from Lubbock Eye Clinic at TTUHSC. We recruited patients with upper eyelid ptosis and no coexisting eye conditions. Baseline exams included visual acuity, slit lamp, levator function and measurements of marginal reflex distances, and vertical fissure height. Corneal topography was used to assess corneal curvature. Standardized photographs were taken for surgical evaluation, while corneal topography is for research only. **Results** The results indicate a significant negative correlation (-0.661 , $p = 0.0015$) between MRD1 and corneal astigmatism (CYL), suggesting that as MRD1 decreases, corneal astigmatism increases. The linear regression model explains 43.7% of the variance ($R^2 = 0.437$), indicating a moderate association. The ANOVA confirms the model's significance ($p = 0.0015$), while the lack-of-fit test ($p = 0.612$) suggests that the model adequately fits the data. **Conclusion** These findings support the hypothesis that ptosis severity, as measured by MRD1, is associated with increased corneal astigmatism. Future research will explore SAI measurements as data collection is still ongoing.

GLOBAL CHANGES IN GENE EXPRESSION IN BRAIN MICRO-VESSELS IN A MOUSE MODEL OF ALCOHOL DEPENDENCE

Brent Kisby; Julian Cardenas-Toro; Praneetha Panthagani; Sambantham Shanmugam; Susan Bergeson; Igor Ponomarev

Introduction: Alcohol (ethanol) use disorder (AUD) is a chronic, relapsing brain disease. Recent evidence suggests that brain microvasculature cells may contribute to the development of AUD. Our hypothesis is that chronic exposure to ethanol results in changes in micro-vessel gene expression, BBB permeability, and EC-associated neuroimmune functions, which contribute to escalated ethanol consumption and the development of AUD. **Methods:** We used a high voluntary ethanol drinking mouse model by crossing ethanol-naïve FVB/NJ females with C57BL/6J males, generating FVB/B6J F1 hybrid progeny. Animals were exposed to chronic intermittent ethanol (CIE) vapor, a model of ethanol dependence, by exposing them to either air or ethanol vapor for 16 hours for four days for four weeks interspaced with five days of voluntary ethanol drinking. Seventy-two hours post-final vapor exposure, brain micro-vessels were enriched from the frontal cortex. **Results:** We performed bioinformatics analysis to identify differentially expressed genes

(DEGs) as well as over-represented functional groups and cell types. Initial analysis revealed that in females, micro-vessels were more responsive to ethanol exposure than in males (1,062 and 112 DEGs, respectively). This analysis revealed immune-related DEGs downregulated in females including Ccl5, Cd8a, and H2-T23. In contrast, male microvessel DEGs demonstrated an up-regulation of several antiviral-related genes, including Irf7 and Oas2. Cell type-specific over-representation analysis utilized molecular markers from human single-nucleus RNA-Seq databases for both human brain vasculature and Peripheral Blood Mononuclear layer cells (PBMCs). For example, in females, we observed a significant over-representation of venous ECs and venous, capillary, and arterial ECs in males. Within the PBMC analysis, we identified several over-represented T cell populations, including Cd8+ effector memory (TEM), Regulatory T cells (Tregs), and Mucosal-associated invariant T cells among downregulated DEGs in females. Conclusions: Taken together, these data further our understanding of the neuroimmune mechanisms of the brain vasculature potentially contributing to excessive ethanol consumption.

INTERPROFESSIONAL COLLABORATION ENHANCES THE MAINTENANCE OF EMERGENT CENTRAL LINES

Madison Kranz; Dr. Stephanie Stroeve, PhD MPH

Introduction When a patient is crashing, seconds can determine survival and sterile placement of central lines are not always achievable. Patient survival rightfully takes precedent over infection prevention. However, proper maintenance and replacement of these lines can vastly improve a patient's course. A critical aspect of proper care of an emergent central line is effective communication. Interprofessional collaboration is essential to the effective management of emergent central lines and the achievement of positive patient outcomes. **Methods** After obtaining IRB approval, we recruited participants through the Society for Healthcare Epidemiology of America's Research Network starting August 2024. We conducted semi structured interviews with professionals from infectious disease, critical care, emergency medicine, and related fields. We completed these interviews in October 2024. We used thematic content analysis of qualitative data for all analyses. **Results** We identified practice norms and challenges associated with the maintenance of emergently placed central lines. Nursing staff and designated infection control champions arose as pivotal drivers of line care and adherence to established policy. Continuous monitoring, documentation, and regular discussion during handoffs or rounds were emphasized as critical strategies to maintain focus on these lines, facilitating timely removal and reducing infection risk. **Conclusion** Our findings emphasize the importance of interprofessional collaboration in prioritizing central line care, ultimately mitigating infection risks and improving the standard of care.

DESCRIPTIVE STUDY OF CONGENITAL SYPHILIS IN WEST TEXAS

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Introduction. Congenital syphilis (CS) has emerged as a growing public health crisis, particularly in Texas, which reported the highest number of cases in the U.S. in 2022. Syphilis transmission from mother to fetus during pregnancy can lead to severe outcomes for infants, including stillbirth, low birth weight, and developmental delays. This study aims to describe the screening and treatment care cascade for CS and identify opportunities for prevention. **Methods.** This is a retrospective descriptive study of CS in West Texas. A chart review of CS babies and associated mothers was performed for Jan 2015 - Dec 2023. Incidence, demographics, social history, trimester at diagnosis, and penicillin G shot series completion was collected. IRB-FY2023-76. **Results.** A total of 93 CS cases were included. The incidence of CS increased by 1700% from 2015 to 2023, with a sharp rise beginning in 2020. Among affected mothers, 48.4% were White Hispanic, 22.6% White Non-Hispanic, and 7.5% Black Non-Hispanic. Most (72%) were covered by Medicaid or Medicare. Maternal syphilis was diagnosed in 9.7% of cases during the first trimester, 25.8% in the second, 26.9% in the third, and 35.5% at delivery. Treatment with Penicillin G was either not started (16.1%), inadequately completed (51.6%), or adequately completed (19.4%). Neonatal outcomes included one fetal death, 25.8%

preterm births, and 18.2% low birth weight deliveries. Conclusions. The alarming increase in CS cases in West Texas underscores the need for targeted public health interventions to improve prenatal care and syphilis treatment. Addressing barriers to care, enhancing treatment protocols, and expanding screening efforts are critical steps in reducing congenital syphilis incidence and improving maternal and neonatal health outcomes in the region.

BIDIRECTIONAL ASSOCIATIONS AMONG SLEEP DISTURBANCES AND EMOTIONAL AND BEHAVIORAL FUNCTIONING IN ELEMENTARY SCHOOL-AGE YOUTH

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Introduction: Research has shown an association between sleep problems and emotional and behavioral functioning in youth (Bai et al., 2020; Becker et al., 2015; Gregory et al., 2012; Schochat et al., 2014). However, it is unclear if poor sleep results in worse emotional and behavioral functioning or if emotional and behavioral symptoms cause worse sleep (Bai et al., 2020; Gregory et al., 2002; Gregory et al., 2009; Liu et al., 2021). The current study examined the longitudinal, bidirectional associations among sleep and emotional and behavioral functioning in elementary school-age youth. Method: Participants included 539 students (51.7% boys, 51.3% Hispanic/Latino) in grades 3-5, as well as their homeroom teachers. Children provided self-reports of sleep disturbances, anxiety, anger, and depression at baseline (T1) and approximately 6 months later (T2). Teachers provided reports of internalizing, attention, and conduct problems at each time point. A series of cross-lagged panel models were estimated within Mplus, and gender and grade level were included as covariates in all analyses. Results: Bidirectional associations between anxiety, anger, and internalizing problems and sleep disturbances were observed. Specifically, T1 anxiety ($\beta=.18, p<.05$), anger ($\beta=.15, p<.05$), and internalizing problems ($\beta=.14, p<.05$) predicted increases in sleep disturbances at T2, and T1 sleep disturbances predicted increases in anxiety ($\beta=.24, p<.05$), anger ($\beta=.15, p<.05$), and internalizing concerns ($\beta=.10, p<.05$) at Time 1. In contrast, unidirectional effects were found for depression ($\beta=.21, p<.05$), conduct problems ($\beta=.12, p<.05$) and attention problems ($\beta=.11, p<.05$), such that they predicted increases in sleep disturbances over time. Discussion: Results suggest anxiety, anger, and teacher-reported internalizing problems have longitudinal, bidirectional associations with sleep disturbances in youth; however, the same effects are not observed for depression, conduct problems, and attention problems. Findings elucidate clinical implications related to intervention targets for youth with sleep disturbances and emotional and behavioral symptoms.

THE CONTRIBUTION OF THE AMYGDALA ENDOCANNABINOID SYSTEM TO MGLU5 FUNCTIONS IN PAIN

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We investigated the specific role of the metabotropic glutamate receptor 5 (mGlu5) and interactions with anandamide (AEA) in the central nucleus of amygdala (CeA) in a neuropathic pain model. In our previous study, we investigated the brain sites of action of systemically injected alloswitch-1, a mGlu5 negative allosteric modulator (NAM) showing that mGlu5 blockade in thalamic and cortical regions had inhibitory effects on neuropathic pain behavior whereas the basolateral nucleus of the amygdala (BLA) surprisingly had pro-nociceptive effects. To explain this effect, we proposed that mGlu5 blockade would inhibit BLA-driven feedforward inhibition of amygdala output from the CeA.

We addressed another hypothesis, namely that mGlu5 blockade would impair activation of the endogenous cannabinoid system that is known to inhibit synaptic transmission. Using mass spectrometry (LC-MS/MS) of endocannabinoid factors in the amygdala after systemic alloswitch-1 in a neuropathic pain model (Spared Nerve Injury, SNI) we found that AEA, but not 2-AG, levels decreased in the CeA, but not BLA. We then explored the relationship between mGlu5 inhibition and AEA metabolism, using intra-CeA injection of alloswitch-1 and URB597, a fatty acid amide hydrolase (FAAH) inhibitor to increase AEA, and their combination in the neuropathic rats. Von Frey tests, vocalizations, grimace test, light-dark box, and

elevated plus maze measured pain-like behaviors.

Mechanical thresholds increased and vocalizations decreased with the treatment of alloswitch-1, while URB597 or their combination had no effects compared to the vehicle control group. Alloswitch-1 has anti-nociceptive effects when administered into the CeA in neuropathic condition and this effect is blocked by increasing AEA with URB597, suggesting that the endocannabinoid system is involved in mGlu5 functions. Further investigation is required to understand the synaptic and cellular interaction between mGlu5 and AEA in the two amygdala regions.

DEFINING MOLECULAR MECHANISMS OF GD2 EXPRESSION VARIABILITY IN NEUROBLASTOMA USING PATIENT-DERIVED CELL LINES

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Abstract: Neuroblastoma is a pediatric malignancy originating from the sympathetic nervous system. GD2, a cell surface glycolipid, is a validated immunotherapy target for the treatment of neuroblastoma. Dinutuximab, a chimeric monoclonal antibody that binds to GD2 is used in treating patients with neuroblastoma (1). Some patients benefit from dinutuximab therapy while others do not, thus incurring therapy-related toxicity without benefit and recent data suggest that the emergence of GD2-negative neuroblastoma cells is a major mechanism of resistance to dinutuximab therapy. In assaying neuroblastoma patient tumor samples and patient-derived cell lines for GD2 expression we have observed varying levels of GD2 expression, some negative, others highly positive, and some with a mixed population of positive + negative tumor cells. We sought to determine if low and high GD2-expressing tumors in mixed populations are stable or if GD2 expression of those tumors may fluctuate in response to dinutuximab therapy. We hypothesized that the GD2 negative populations would remain stable for low GD2 expression over time enabling analysis of the molecular mechanism of GD2 down regulation. Using neuroblastoma patient-derived cell lines (PDCLs) and fluorescence activated cell sorting (FACS) we sorted PDCLs into high and low GD2 expression cohorts, expanded in culture the sorted cell populations, and assessed GD2 expression by flow cytometry over time. Sorting of the PDCL, 765, with mixed populations based on GD2 expression enabled growing of the PDCL with stable and distinct GD2-high and GD2-low expression over multiple weeks in culture. Comparison of the molecular features of these isogenic cultures sorted into high and low GD2 expression from PDCLs with mixed GD2 expression will enable defining molecular mechanisms underlying low GD2 expression in neuroblastoma.

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CDK4 REGULATES TLS IN OVARIAN CANCER BY STABILIZING RAD18 E3 UBIQUITIN LIGASE

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Background: Ovarian cancer (OC) is the most lethal gynaecological malignancy which ranks 5th to cause cancer-related death (in women) in the United States. Despite initial responses, over 70% of OC patients develop recurrent disease. Therefore, it is important to ascertain the molecular mechanisms that are differentially regulated in recurrent tumors contributing to the aggressive phenotype. RAD18 is a member of the zinc and RING finger family of E3 ubiquitin ligases, and its role in the post-replication repair pathway, also known as translesion synthesis (TLS), is well understood. Rad18 controls TLS by mono-ubiquitinating PCNA (Ub-PCNA), initiating a polymerase switch that allows the bulky adduct-type of DNA lesion to be bypassed, which makes chemotherapy less effective and results in chemoresistance.

Objective: An aberrant increase in CDK4, an oncogenic activity leads to uncontrolled proliferation that gives rise to cancers and perpetuate malignant progression in multiple cancer types including OC. Preliminary

results show that inhibition of CDK4/6 (using small molecule inhibitors) in OC cells results in attenuated expression of RAD18 and its substrate Ub-PCNA. Based on this observation, our objective is to identify the mechanism behind the regulation of RAD18 by CDK.

Research methods: Western blot, immunofluorescence, siRNA/Plasmid transfection, RT-PCR, proteasomal degradation and bioinformatics experiments will be performed.

Conclusions: Overall the project will help us to understand a novel mechanism behind the oncogenic CDK4 mediated regulation of RAD18 stability. Our study will also help us to overcome abnormal CDK4 activation induced TLS pathway by stabilizing RAD18, which might bypass the chemotherapeutic agents induced DNA damage and ultimately results in chemoresistance.

GENDER AS A MODERATOR OF THE ASSOCIATION BETWEEN SLEEP AND DISORDERED EATING IN ELEMENTARY SCHOOL-AGE YOUTH

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Introduction: Sleep disturbances in children, such as trouble falling asleep and frequent awakenings, are linked to cognitive, behavioral, and emotional issues (Gregory & Sadeh, 2012). Eating concerns, such as body image issues and disordered eating, can develop in childhood and are associated with psychological distress (Loth et al., 2016). Research in children suggests that sleep disturbances and impairment may contribute to emotional dysregulation and unhealthy eating behaviors, with a small but significant link between sleep problems and disordered eating (Reutrakul et al., 2016). The current study examined the relationship between sleep and disordered eating, with gender as a moderator. Methods: Participants included 116 students (50.9% boys, 41.4% Hispanic/Latino) in grades 3-5 recruited from two elementary schools in the West South-Central region of the United States as well as their parents. Parents provided self-reports of sleep disturbances and sleep impairment using the parent-proxy version of Patient-Reported Outcomes Measurement Information System (PROMIS). Parents also provided self-reports of child disordered eating using the Eating Disorder Examination Questionnaire Parent Version (EDE-Q-PV). Analyses were conducted within SPSS. Robust maximum likelihood estimation was used for moderation analyses. Results: Sleep disturbance and sleep impairment demonstrated a large, positive relationship with one another ($r = .70, p < .05$). Sleep disturbance concerns demonstrated a small, positive relationship with disordered eating ($r = .30, p < .05$). Both gender and sleep impairment demonstrated no relationship with eating concerns ($p < .05$). Gender did not moderate the relationship between sleep disturbance and eating concerns ($\chi^2[1] = .55, p = .46$), or sleep impairment and eating concerns ($\chi^2[1] = .65, p = .42$). Discussion: Results indicated that while sleep and disordered eating were associated the relationship did not vary based on gender. Future research could benefit from a longitudinal design to examine if early sleep disturbances lead to disordered eating over time, or if there are additional moderators.

THE ROLE OF METTL1 IN CELL PROLIFERATION VIA M7G METHYLATION IN NEUROBLASTOMA

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Background Patient-derived xenografts (PDX) established from neuroblastoma (NBL) cells obtained pre-therapy and at the time of progressive disease (PD) can be phenotypically and molecularly characterized to potentially identify biomarkers predictive of treatment outcomes in high-risk NBL patients. Preliminary findings indicated that METTL1 may contribute to drug resistance and can be a potential therapeutic target in NBL. Methods Thirty-five high-risk patient PDXs were classified by the response to chemotherapy (cyclophosphamide, 30mg/kg+topotecan, 0.6 mg/kg daily for 5 days every 21 days, a total of 3 cycles) as non-responders (NR) and responders (R). The differential expression of METTL1 between NR and R was analyzed using Western blot. The function of METTL1 was characterized by RNA dot blot and puromycin intake assay. Cell proliferation assays evaluated METTL1-mediated phenotypic changes. The changes in cell proliferation

and the response to chemo were evaluated after RNAi and overexpression of METTL1. Results NR PDXs have significantly higher expression of METTL1 compared to R PDXs. Furthermore, therapy phase classification of 35 PDX models demonstrated that METTL1 was highly expressed in PD post-mortem; matched paired sample comparisons indicated that elevated expression in PD post-mortem was not a chemotherapy-induced effect. METTL1 knockdown resulted in decreased tRNA m7G modification and global protein translation in cell lines. Consistent with the fact that the proliferation of NR PDX models is significantly higher than that of R PDXs, the cell proliferation assay revealed that METTL1 overexpression enhanced cell proliferation. However, the cytotoxicity experiments showed minimal differences in drug sensitivity to the changes in METTL1 expression. These data indicate that METTL1 affects cancer proliferation rather than drug sensitivity in NBL. Conclusions METTL1 may play a role in NBL proliferation and be potentially a novel target in high-risk patients.

CHANGES IN MEDICAL STUDENT NUTRITIONAL PATTERNS

Megan Mobley; Shravya Yarlagadda; Izabella Hilmi; Lauren Cobbs, MD

Dietary habits are essential to health and are significant contributors to multiple chronic health conditions, including diabetes and hypertension. Medical students represent a unique population that is learning the obstacles predisposing their future patients to poor dietary habits, while also facing many of the very same obstacles themselves. Our study focused on pre-clinical medical students' dietary habits prior to and after starting medical school. The data was collected through an online survey instrument sent to all Texas Tech Health Sciences Center medical students. Responses revealed declines in meal regularity, balanced meal structures, and food access since starting medical school. Further, students reported time and cost as the key obstacles hindering healthy dietary habits. Despite this descent in healthy dietary habits, our respondents believed that their dietary habits did not change for the worse. The disconnect in awareness of their dietary changes exemplifies the difficulty in assessing a healthy diet. These results indicate places where medical schools can support their students, specifically by providing healthy lunches and snack options and streamlining access to information about school and community food resources. Further, integrating education initiatives encourages healthy eating habits, provides meal-prep-friendly and affordable recipes, and connects students to existing financial resources. Facilitating healthy dietary practices in medical students not only aids this vulnerable population but also contributes to better dietary advice for the future patients these students will provide for.

INVESTIGATING THE ROLE OF T FOLLICULAR HELPER AND TH17 CELLS IN SM-P80 VACCINE-INDUCED IMMUNITY AGAINST SCHISTOSOMIASIS

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Schistosomiasis is a helminth infection caused by the parasite *Schistosoma* spp. The disease is primarily limited to the African continent and Southeast Asia. According to the most recent figures, around 250 million individuals in Africa are infected, with an additional 800 million at risk of infection. Currently, there is no vaccination or prophylactic intervention available to protect against the condition, leaving praziquantel as the primary treatment option. In this regard, Sm-p80 has emerged as a possible vaccination candidate and is currently undergoing phase 1 and 1b human clinical studies. The mechanism of Sm-p80 protection has yet to be investigated; nevertheless, previous research findings strongly support humoral or antibody-mediated protection. Antibodies are generated by B cells, which are activated and change into antigen-specific cells that begin secreting the soluble form of Immunoglobulin-G. This transformation is supported by a cytokine milieu produced by helper T cells and other immune cells.

In addition, T follicular helper cells and Th17 cells in the germinal center of lymph nodes play a key role in this transition. T follicular cells are a subset of Helper CD4 T cells that can activate, class switch, mature, and

differentiate B cells into memory and plasma cells via CD40-CD40L interactions, IL-21, and IL-4. Th17 cells, like T_H cells, can activate B cells and switch antibody classes by secreting IL-17.

To investigate the role of T_H and Th17 in Sm-p80 vaccination, we hypothesize that stimulation with Sm-p80 activates T_H and Th17 cells, as well as increases IL-21 and IL-17 levels. To test our hypothesis, we will stimulate naïve human PBMC with Sm-p80 in-vitro and measure T_H and Th17-produced cytokines using RT-PCR and flow cytometry.

EVALUATING ANTIBIOTIC-STERIOD TREATMENTS ON POST-BLEPHAROPLASTY WOUND HEALING THROUGH PATIENT RATINGS

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Post-blepharoplasty care typically involves a combined steroid-antibiotic in the form of a drop or ointment. Three treatments that are established as standard of care are Maxitrol drops (MD), Maxitrol ointment (MO), and Tobradex ointment (TO). This study aimed to evaluate differences in patient ratings between the three treatments to assess differences in patient perception of wound healing. Patients undergoing a blepharoplasty were consented to participate in the study prior to their surgery. The patients were randomly assigned one of the three treatment options to use 4 times a day. At the standard one-week post-surgery follow-up appointment, the patient was asked to rate a series of questions from the Bluebelle Wound Healing Questionnaire evaluating redness, swelling, fluid leaked from the wound, wound separation, swelling, and pain. Patients rated their responses on a Likert scale following 1 (Not at all), 2 (A little), 3 (Quite a bit), and 4 (A lot). The same questionnaire was repeated three months following their blepharoplasty. Data was analyzed using a homoscedastic one-tailed distribution t-test. We found significant differences between Maxitrol ointment and Maxitrol drops, with Maxitrol drops having fewer negative responses ($p=0.015$). No significant differences were observed between Maxitrol ointment compared to Tobradex ointment ($p=0.138$), Tobradex ointment compared to Maxitrol drops ($p=0.421$), or combined Tobradex and Maxitrol ointments compared to Maxitrol drops ($p=0.052$). Our results suggest that there are potential differences between the three treatment groups, however only the difference between MO and MD was statistically significant. We plan to continue collecting data to determine what differences might be present between in a larger sample size. Additionally, we hope to collect enough data at the three-month mark to determine if there are differences at this increased time. Ultimately, we hope to determine if one treatment might prove to be superior in wound healing and patient satisfaction.

ELLAGIC ACID-INDUCED OSTEOGENIC DIFFERENTIATION OF DENTAL PULP-DERIVED STEM CELLS VIA BMP2 PATHWAY MODULATION

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Objective: To determine the role of a polyphenolic flavonoid compound ellagic acid (EA) in promoting osteoblastic differentiation of dental pulp-derived stem cells (DPSC), elucidating in-depth molecular mechanisms for developing a regenerative therapy. **Background:** Osteoporosis damages the structure of the bone, and an effective regenerative therapy can revert the pathogenesis. Polyphenolic compounds have antioxidant properties, and numerous fruits contain EA. We are focusing on defining mechanisms to develop effective regenerative therapeutics. **Methods:** We have isolated and expanded human DPSC from 3rd molar teeth and cultured them in the presence of EA (5 mM) for 7 days for osteoblastic differentiation. Then, we determined the calcium deposition and the expression of osteoblastic-specific markers, autophagy, mitophagy, and KLF2 molecules using qRT-PCR, western blot, and immunocytochemistry methods. **Results:** We found that the EA induced the osteoblastic-specific markers such as Runx2, SPP1, and SPARC along with BMP2/SMAD1/5/8 pathway molecules and induced the expression of KLF2 at both mRNA and protein levels after the addition of EA to DPSC compared to the controls. In addition, we observed that the autophagy molecules such as BECN1, ATG3, ATG5, and ATG7, and mitophagy molecules such as PARKIN, DRP1, and FIS1 were significantly increased at both mRNA and protein levels after the addition of

EA to DPSC compared to the controls. Conclusion: These data indicate that EA facilitates osteogenic differentiation of DPSC by upregulating canonical BMP2 signaling molecules, modulating autophagy and mitophagy molecules, and inducing KLF2. It is well established that BMP2 enhances osteogenic differentiation, and an established relationship between KLF2 and autophagy also exists; in this study, we found that EA induced the osteoblastic-specific markers along with autophagy and mitophagy markers and induced the expression of KLF2, so, there might be a direct link between those molecules, which is under investigation.

SIGNIFICANCE OF HOBBIES FOR MEDICAL STUDENTS TO MAINTAIN A HEALTHY SCHOOL-LIFE BALANCE

Amanda Nguyen; Pia Schilling; Jean Schneider; Aimee Hwang; Christopher Trinh

Medical students often find it challenging to maintain a healthy school-life balance. Maintaining hobbies is an aspect of wellness that is related to overall satisfaction in life, both academically and personally. This study aims to investigate the role of hobbies in enhancing mental health and reducing stress among medical students, examining the impact of hobbies on academic performance and evaluating how medical students perceive the influence of hobbies on their work-life balance and overall quality of life. Using the Omnibus Survey system, a link to the survey will be sent out to the relevant MS1 and MS2 populations at the TTUHSC SOM using official school communication methods such as email or TTUHSC SOM Class of 2027/2028 Discords. After data collection, the results from the study will be compiled and analyzed to determine if there are correlations between types of hobbies, time spent on hobbies, and students' overall well-being. Expected findings for this study are that students who are able to maintain their hobbies in their schedule are more likely to exhibit a positive outlook on their current lifestyle. In addition, students who actively engage in their hobbies suggest greater levels of satisfaction with their academic performance in school. One possible explanation behind these findings is how an individual's emotional state contributes to their living in the form of eustress and distress. By engaging in personally meaningful activities, the individual is able to manage the amount of distress and prevent burnout. Understanding these relationships could provide recommendations for medical schools to integrate more hobbies or leisure activities into their curriculum.

SHOULD THERE BE REGULATION ON ALPHA-5 REDUCTASE INHIBITOR SUPPLEMENTS FOR ANDROGENIC ALOPECIA?

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Introduction As finasteride prescriptions may be harder to obtain for patients suffering from androgenic-related alopecia, the market for over-the-counter (OTC) saw palmetto (SP) supplements has rapidly expanded. SP-containing products, with the same but slightly less potent mechanism of finasteride, both alpha-5 reductase inhibitors, decrease dihydrotestosterone (DHT) and minimize the effects of androgenic alopecia. Patients taking SP supplements may be at risk of experiencing the same adverse effects as finasteride, which include erectile dysfunction and libido problems. Since there is no regulation on this less potent derivative of finasteride, supplement companies selling these products do not advertise this claim, and in our analysis, we examine the safety and adverse effects of SP as advertised by these companies. **Methods** A search was conducted to identify OTC saw palmetto oral supplements across several online retailers, including Amazon, CVS Pharmacy, Target, Walgreens, and Walmart. After removing duplicates and non-relevant products from searches, 39 total products were identified and analyzed for any addressed safety information and adverse effects profile. **Results** While 36 products (92.3%) reported safety information regarding the use of the products, most advised customers to consult a physician before using the supplement. Only five (12.8%) of the products reported adverse effects. Ten products (25.6%) were advertised for hair loss but did not provide supporting evidence for their claims. Many of the brands did not mention or explain any adverse effects profile of the products. Of the five brands that mentioned adverse effects, none mentioned decreased libido or erectile dysfunction. **Conclusions** Companies advertising SP supplements should highlight the possible overlapping clinical manifestations with finasteride, such as

decreased libido, impotence, and erectile dysfunction. Limitations include ineffective communication, missed screening of the product pages, and a lack of awareness of potential adverse effects. Future research should focus on evaluating the efficacy of SP supplements in causing these adverse effects.

THE BARRIERS TO CARE ENCOUNTER: PREPARING PRECLINICAL STUDENTS TO FACE HEALTH DISPARITIES BY AMPLIFYING THE VOICES OF REPRESENTATIVE PATIENT POPULATIONS IN SIMULATED SCENARIOS

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Introduction: Cultural competence is imperative for preparing students to recognize how cultural barriers and disparities affect patient care. However, cultural competence acquisition in medical education is often limited to perceptions by faculty, preceptors, students, and standardized patient (SP) actors rather than affected patients. This project aims to innovate a reproducible learning model that empowers stakeholders to give students feedback. We hypothesize that students who participate in this intervention will gain confidence in cross-cultural preparedness.

Methods: The Barriers to Care Encounter was a non-graded simulated clinical encounter focused on nonadherence due to a financial, social, or cultural barrier. School SPs and local volunteers who had experience with the represented barriers participated as patients and provided immediate feedback to students. Changes in students' knowledge, skills, and attitudes were measured via pre- and post-surveys with Likert scales of 1 to 5 and analyzed using one-tailed t-tests.

Results: Forty-five first- and second-year medical students participated voluntarily through an elective course or optional experience in a class-wide course. After intervention, there was a significant increase in participants' confidence to describe systemic issues, elicit a holistic history, enhance patient adherence, and understand the impact of their biases ($p < 0.05$). However, the increase in confidence to identify historical impact of racism and to value education on social determinants of health (SDoH) was not significant.

Conclusions: This encounter effectively increased cross-cultural preparedness overall and encouraged community partnership. Though students had difficulty recognizing historical factors, high interest in SDoH at baseline suggests students were motivated to practice cultural humility but needed more debrief discussion to connect clinical realities to historical events. Finally, patients felt satisfied after having the opportunity to impart wisdom.

EVALUATING BLOOD-BRAIN BARRIER INTEGRITY IN AN ALZHEIMER'S MOUSE MODEL: IMPLICATIONS FOR DRUG DELIVERY

Ehsan Nozohouri; Behnam Noorani; Dhavalkumar Patel; Yeseul Ahn; Sumaih Zoubi, Ulrich Bickel

Alzheimer's disease (AD), the leading cause of dementia, is characterized by amyloid-beta ($A\beta$) plaques, tau tangles, and cerebral amyloid angiopathy (CAA), which raises concerns about blood-brain barrier (BBB) integrity. The BBB, essential for CNS homeostasis, is debated in terms of disruption in AD, especially with CAA involvement. This study examined BBB integrity in Tg2576 mice, a model of $A\beta$ pathology, using [^{13}C 12]sucrose, a stable isotope-labeled paracellular marker, to assess permeability. Pharmacokinetic analyses, including plasma concentration time-course and brain uptake measurements, were conducted in young and aged Tg2576 mice and their wild-type controls. Results demonstrated minimal sucrose passage across the BBB, indicating preserved permeability regardless of $A\beta$ plaque burden or age. Regional clearance rates were comparable in the hippocampus, cortex, and cerebellum, with slightly elevated uptake observed only in the olfactory bulbs, consistent with known regional variations in BBB permeability. Immunohistochemical analysis of tight junction proteins (claudin-5, occludin, ZO-1) showed no significant differences between AD and control mice. High-resolution imaging identified localized disruptions in tight junction staining near $A\beta$ plaques, but subsequent laser microdissection and LC-MS/MS analysis revealed

no increased sucrose concentrations in these areas. These findings suggest that localized phenotypic changes in BBB structure near plaques do not result in meaningful permeability alterations. Our findings challenge the assumption of widespread BBB disruption in AD models, highlighting the importance of combining pharmacokinetic and imaging approaches for accurate assessment. Preserved BBB integrity in Tg2576 mice underscores the need for effective drug delivery strategies and supports the value of multi-method evaluations in advancing AD therapeutics.

A PD-L1 X CD3 BISPECIFIC ANTIBODY ENHANCES THE ANTI-TUMOR EFFICACY OF REGORAFENIB IN PRE-CLINICAL COLON CANCER MODELS

Okpalanwaka IF, Daugherty EA, McCormick AL, Anderson TS, Smith SL, Lawrence C, Lowe DB

Background

Colorectal cancer (CRC) is a leading cause of cancer-related deaths worldwide, with late-stage disease often resistant to current treatments, including surgery, chemotherapy, and immune checkpoint inhibitors (ICIs). Regorafenib (REG), an FDA-approved tyrosine kinase inhibitor, shows limited long-term success as a monotherapy despite its immunomodulating properties, like inducing immunogenic cell death (ICD). This study hypothesizes that combining REG with immunotherapeutic agents that enhance T cell infiltration and activation in the tumor microenvironment (TME) could yield better outcomes.

Methods

REG's ability to induce ICD was evaluated by assessing calreticulin expression by flow cytometry and ATP release through luminescence from MC38 and CT26 CRC cells in vitro. A PD-L1 x CD3 bsAb was next engineered, transiently expressed in Expi293 cells, purified through affinity chromatography, and tested for binding cognate ligands and stimulating T cell function through flow cytometry and ELISA. Lastly, the anti-tumor and immune-driven roles of REG + bsAb therapy were explored in MC38 and CT26 in vivo models using a compilation of IHC, IF, qPCR, and ELISA techniques.

Results

Our in vitro data overall confirm ICD-induction by REG and demonstrate selective binding and T cell stimulation using a newly designed PD-L1 x CD3 bsAb. Combined REG + bsAb therapy also safely initiated and sustained inhibition against MC38 and CT26 progression in vivo, and these effects correlated to improved CD8+ T cell infiltration and activity within a Type-1-prone TME. Additionally, cytotoxic CD8+ T cells from REG + bsAb-sensitized mice more readily engaged tumor cells than animals treated with either agent alone.

Conclusions

We provide evidence that the immunomodulatory benefits of REG can be effectively paired with a bsAb that works to anchor to CRC cells, diminish immunosuppression (through PD-L1 blockade), and activate/sustain antigen-specific CD8+ T cells within the TME. This newly described REG + bsAb regimen led to improved anti-tumor outcomes pre-clinically, and may represent a promising future approach for CRC patients.

DEFECTIVE PROGRANULIN SIGNAL PEPTIDE IS RESPONSIBLE FOR DEMENTIA ONSET

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Frontotemporal Lobar Degeneration (FTLD) is a neurological disorder and one of the most common type of dementia. FTLD pathology is associated with various proteins, including granulin. Granulin is synthesized as a precursor form, progranulin, and it has to be secreted outside of the cell as a part of its biogenesis. As common for many secretory proteins, progranulin contains N-terminal signal sequence which is recognized by Signal Recognition Particle (SRP) for co-translational targeting to the endoplasmic reticulum (ER) and proper biogenesis. If mutations in the signal sequence change hydrophobicity of this region, the interaction between a nascent chain and SRP can be compromised. The loss of SRP interaction leads to

Regulation of Aberrant Protein Production (RAPP) pathway linked to mRNA degradation and protein loss. Based on bioinformatic analysis on the whole human genome level we identified novel granulin mutations which can play a role in FTLN pathogenesis. We hypothesize that RAPP activation is triggered by mutations in progranulin signal sequence when SRP binding is compromised. Utilizing RT-qPCR and Western blotting, we evaluated granulin mRNA and protein levels for described clinical mutants. We found that hydrophobicity reduction of the h-domain of the signal sequence due to mutations S6R, A9T, G13R, G13E leads to decrease of progranulin mRNA and protein level due to the loss of interaction with SRP. Via computer modeling we obtained data demonstrating mechanical basis for observed changes. These findings decipher the role of the signal peptide alterations in the onset of FTLN.

PHARMACOKINETIC AND TOXICOLOGICAL PROFILING OF 10-BUTYL ETHER MINOCYCLINE (BEM) FOR USE IN ALCOHOL USE DISORDER

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Understanding the pharmacokinetics and toxicity of a drug is critical during early development, as poor pharmacokinetics or unacceptable toxicity are primary reasons for drug failure in the initial stages. The Food and Drug Administration prioritizes evaluating pharmacokinetic and toxicity profiles over efficacy when considering drug approval. Minocycline, an antibiotic, reduced alcohol consumption preclinically, was modified into 10-Butyl Ether Minocycline (BEM), a non-antibacterial derivative, as a potential treatment for AUD. In this study, BEM's pharmacokinetic and safety profile was characterized using *in vitro*, and *in vivo* approaches. The bidirectional Caco-2 permeability study showed that BEM exhibited good permeability ($P_{app} = 27.9 \times 10^{-6}$ cm/sec), albeit with some P-glycoprotein efflux. Microsomal metabolism studies indicated limited Phase I metabolism. *In vivo* pharmacokinetic studies in mice revealed a shorter plasma half-life than the brain (4-9 hr vs 12-14 hr), with some observed sex-based differences. The Ames test demonstrated that BEM is not mutagenic up to 5 mg/ml, and reduced the occurrence of random mutations in a dose-dependent manner. Cell viability studies showed that BEM is safer than its parent molecule minocycline (~50 μ M vs ~125 μ M). A 10-day repeat dosing toxicology study in rats revealed 100 mg/kg/day was well-tolerated, while the side-effects of the drug were observed only at clinically irrelevant high doses (>500 mg/kg/day). Similar findings were observed during subchronic dosing for 28 days with 100 mg/kg/day of BEM determined to be the No Observed Adverse Effect Level. Toxicokinetics of BEM in both sub-chronic studies showed no sex-based differences, suggesting the sex-effects observed in mice pharmacokinetics were species-specific. In conclusion, BEM was found to have a favorable toxicological profile with safety margins better than its parent molecule, minocycline, while exhibiting good blood-brain barrier permeability, with a prolonged residence time in the brain. These attributes make BEM a good candidate as a treatment for AUD in humans.

REGIONAL AND EPIDURAL ANESTHESIA INCREASES LENGTH OF STAY IN PATIENTS UNDERGOING RADICAL CYSTECTOMY

Devki Patel, MS2; Young Son, DO; Morgan Stewart; Iman Elkhashab; Balaji Reddy; Fabio Greco; Ryan Wong; Jacob Thatcher; Julia Scali; Lance Earnshaw; Edward Wu; Gordon Brown; Virgil Kevin DeMario; Thomas Mueller, MD

Introduction Radical cystectomy (RC) is the standard treatment for muscle-invasive bladder cancer (MIBC) and high-risk non-muscle invasive bladder cancer (NMIBC). Despite improvements in cancer-specific survival, RC is underutilized, partly due to significant postoperative morbidity and prolonged hospitalization. Length of stay (LOS) is a critical metric for evaluating recovery and healthcare costs, with prolonged LOS linked to worse survival outcomes. The Enhanced Recovery After Surgery (ERAS) protocol aims to improve recovery through multimodal strategies, including anesthesia optimization. However, the impact of different anesthesia techniques on LOS and postoperative outcomes remains unclear. Methods A retrospective analysis of the National Surgical Quality Improvement Program (NSQIP) database (2019–2020) was conducted to assess the influence of additional anesthesia techniques—epidural, regional, or local

block—on LOS and complications in RC patients. Patients were stratified based on anesthesia type, and multivariate analyses were performed to evaluate associations with LOS and postoperative outcomes. Results A total of 1,866 RC patients were included, with epidural used in 50.2%, regional in 29.4%, and local block in 20.5%. Patients receiving local block had significantly shorter LOS (6.7 days) compared to regional (7.4 days, $P=0.042$) and epidural (8.1 days, $P=0.019$). Local block was also associated with lower readmission rates ($P<0.001$) and fewer complications, including unplanned conversion to open surgery, blood transfusions, and rectal injury. Factors such as race, blood transfusion, and postoperative complications (e.g., pneumonia, sepsis, urinary leak) were also linked to prolonged LOS. Conclusion Local block anesthesia may offer advantages over epidural and regional techniques in RC by reducing LOS and complication rates. These findings support further research on optimizing anesthesia selection within ERAS protocols to enhance recovery, reduce healthcare costs, and improve patient outcomes.

THE IMPACT OF SUNGLASSES USE ON UPPER EYELID ELASTOSIS: ANALYSIS OF TISSUE FROM BLEPHAROPLASTY PROCEDURES

Stephanie Piel, BS; Shravya Yarlagadda, BSA; Claudia Morris, BSA; and Coby Ray, MD, MS, MBA.

Purpose: Blepharoplasty procedures offer a valuable opportunity to study upper eyelid tissue. This study aimed to evaluate the presence and extent of solar elastosis in upper eyelid tissue. We hypothesized that solar elastosis severity would vary between the right and left upper eyelids based on sunglasses use. Methods: Sun exposure in 41 participants was assessed using the BRAT tool and a questionnaire on sunglasses and sunscreen use. Upper eyelid tissue removed during blepharoplasty was analyzed with the TTUHSC Department of Pathology. A pathologist rated elastosis and inflammation as minimal, mild, moderate, or significant, with evaluation via a chi-squared test. Elastosis density was compared using an unpaired homoscedastic t-test. Results: No statistically significant correlation was found between sunglasses use and solar elastosis in the left ($p = 0.6661$, $\alpha=0.05$) or right upper eyelid ($p = 0.4809$, $\alpha=0.05$). However, a trend of decreased solar elastosis severity in the left upper eyelid was observed in sunglasses users. On a 1-4 severity scale, non-users averaged 1.62, while users averaged 1.27. Conclusion: Overall, our findings indicate no significant correlation between sunglasses use and solar elastosis in the right and left upper eyelids. Though we did not identify a statistically significant difference, we observed a trend towards greater solar elastosis in the left upper eyelids of patients who did not wear sunglasses. These results are specific to our small, predominantly West Texas population. Despite high levels of sun exposure in our region, the wide variation in solar elastosis severity suggests a multifactorial mechanism behind its formation in upper eyelid tissue. Additionally, the lack of a strong association between solar elastosis and established risk factors highlights the unique complexity of this tissue. Thus, further research into upper eyelid histological changes is warranted to better protect eyelid tissue and mitigate dermatochalasis development.

ROLE OF LIPIDS IN THE DEVELOPMENT OF CLEAR CELL RENAL CELL CARCINOMA

Jean Pizano; Subash Kairamkonda; Sabiha Khatoon; Ion Alex Bobulescu; Komaraiah Palle, PhD

Background: Kidney cancer is one of the most common cancers in the United States. It is estimated that in 2024 ~81,000 new cases of kidney cancer will be diagnosed and ~14,000 patients will die from this disease. Among different histological subtypes of kidney cancer, clear cell Renal Cell Carcinoma (ccRCC) is the most common one, corresponding to ~80% of all the kidney cancer cases. Obesity is the most common risk factor for development of ccRCC. Notably, ccRCC kidney tumor samples are uniquely characterized by the presence of excess lipid droplets in the cytoplasm, indicating the important role of lipids in ccRCC.

Hypothesis: In this work we hypothesize that accumulation of lipid droplets in kidney cells drive preneoplastic changes that could lead to ccRCC development.

Results: We show that treatment of human kidney cells (HK-2 cells) with lipids (Oleic acid and Palmitic acid) leads to DNA damage and activation of DNA damage response pathways like phosphorylation of proteins Histone2AX and ATR, and formation of 53BP1 foci in the nucleus. These DNA damages lead to the formation

of micronuclei, a hallmark of preneoplastic lesions causing genomic instability.

Conclusions: Our findings imply the role of lipids in kidney cancer development through genome instability. We propose that lipid accumulation drives DNA damage and genome instability to contribute to kidney cancer development.

COMA RECOVERY SCALE-REVISED IS BETTER TO BE PERFORMED IN AN UPRIGHT POSITION RATHER THAN A LYING POSITION IN PATIENTS WITH DISORDERS OF CONSCIOUSNESS

Neha Prathivadi, Aya Bou Fakhreddine, MSc; Stephanie Stroeveer, PhD, MPH; Katherine O'Brien, PhD; Bei Zhang MD, MSc

It is unclear whether the assessment position of patients with Disorders of Consciousness (DoC) affects the result of Coma Recovery Scale-Revised (CRS-R), besides their arousal levels. This study investigated the impact of positioning on the CRS-R total score. This retrospective study analyzed 1470 CRS-Rs performed on 232 patients in four different positions, i.e., lying in bed (Bed), sitting at the edge of a mat (Mat), sitting in a wheelchair (Wheelchair), and standing (Standing), in an acute inpatient rehabilitation setting. A conditional random coefficients multi-level model was used to examine the changes of CRS-R based on position, accounting for repeated measurements within subjects and the variability introduced by different raters. The cohort contained 65.1% male, age 37.4 ± 16.2 , and included primarily traumatic brain injury (47.0%) and hypoxic-ischemic brain injury (26.7%). Each patient underwent an average of 10.3 ± 6.8 CRS-Rs. The mean CRS-R total score was 7.4 ± 4.1 . The average arousal protocol used was 3.0 ± 2.1 per session. The CRS-R total score was found to be significantly associated with the assessment position. Using the Bed as reference, patients assessed in the Mat, Wheelchair, and Standing had 1.3-, 1.1-, and 1.5-point increases in the CRS-R total score, respectively ($P = 0.002$, 0.008 , and 0.050 ; overall, upright vs. lying, 1.2-point increase, $P = 0.003$). The number of arousal protocol administrations was not associated with the assessment position. With every additional administration of the arousal protocol, the CRS-R total score in fact decreased by 0.8-point ($P < 0.001$), suggesting lower arousal level at baseline and possibly corresponding poorer assessment performance. In conclusion, CRS-R is better performed in an upright position than a lying position in patients with DoC. This finding may be related to generally improved physical and cognitive functionality in an upright position, rather than to arousal only.

EPIGENETIC MODULATION BY MIRNA-221-5P TARGETS DNA REPAIR PATHWAYS TO COMBAT CHEMORESISTANCE IN OVARIAN CANCER

Tasmin Rahman Omy, Subash Kairamkonda, Mark Reedy, Komaraiah Palle

Epithelial ovarian cancer (EOC) is a highly aggressive malignancy and remains the leading cause of gynecological cancer-related deaths. Most patients present with advanced-stage disease (III-IV), where treatment typically involves surgical debulking followed by platinum-based chemotherapy. While initial responses are often favorable, over 70% of advanced-stage patients experience recurrence, frequently accompanied by chemoresistance. This persistent issue highlights the critical need to uncover molecular mechanisms driving resistance and to develop novel therapeutic strategies.

MicroRNAs (miRNAs) are small non-coding RNAs known to regulate gene expression and play vital roles in cancer progression and therapy resistance. In this study, we investigated miRNA-221-5p and its role in modulating chemoresistance in ovarian cancer through the regulation of DNA repair pathways, specifically targeting RAD18 and RAD51, which are key mediators of DNA damage tolerance and homologous recombination repair.

Analysis of miRNA expression profiles in ovarian cancer cell lines revealed significantly reduced levels of miRNA-221-5p, coupled with increased expression of RAD18 and RAD51, both of which are associated with enhanced DNA repair and resistance to platinum-based drugs. Functional assays confirmed that miRNA-221-5p binds to the 3'-UTR of RAD18 and RAD51 mRNAs, suppressing their expression. Reintroducing

miRNA-221-5p in resistant ovarian cancer cells impaired DNA repair mechanisms, restoring sensitivity to platinum-based chemotherapy.

Mechanistic studies showed that miRNA-221-5p exerts epigenetic control over RAD18- and RAD51-driven DNA repair pathways, effectively reversing chemoresistance.

Overall, these results underscore the potential of miRNA-221-5p-based approaches to disrupt key DNA repair processes and enhance treatment outcomes, paving the way for innovative strategies to tackle chemoresistance in EOC.

THE EFFECT OF THE E-CULINARY MEDICINE UTILIZING THE PCOS DIET ON PATIENT EMPOWERMENT FOR DISEASE MANAGEMENT AND HEALTH QUALITY OF LIFE OF WOMEN WITH PCOS

Reina Raj, BS; Dr. Shannon Galyean, PhD; Dr. Michelle Alcorn, PhD; Dr. Allison Childress, PhD

Introduction:

Polycystic Ovary Syndrome (PCOS) significantly impacts the physical, mental, and social well-being of affected individuals. While dietary interventions have been shown to improve PCOS symptoms, limited attention has been given to empowering patients through education and self-management strategies. This study investigated the efficacy of an e-Culinary Medicine platform integrating the PCOS diet to enhance patient empowerment, disease management, and quality of life.

Methods:

A single-blind randomized controlled trial was conducted with 15 participants aged 18-45 years, recruited from Texas Tech University and a reproductive endocrinology clinic. Participants were randomized to receive either static or video-based media containing 16 recipes and eight educational modules over an 8-week period. Data were collected using validated questionnaires, including the CDC's Core Healthy Days Health-Related Quality of Life Questionnaire, Long-Term Empowerment Questionnaire, PCOS Questionnaire (PCOSQ), Bowel Disease Questionnaire, and Migraine Screening Questionnaire. Anthropometric measurements, dietary adherence, and participant-reported outcomes were also assessed.

Results:

Results demonstrated no statistically significant differences in patient empowerment, health-related quality of life, or symptom management between the intervention and control groups. While this may suggest that the interventions did not have the intended impact within the timeframe of the study, it is important to view these findings as preliminary and exploratory. Limitations included a small sample size, geographic restriction, and short study duration, which likely impacted the statistical power and generalizability of the findings.

Conclusions:

This study found no significant effects of the e-Culinary Medicine intervention on empowerment or quality of life in women with PCOS. Future research should focus on larger, more diverse populations and longer-term interventions to evaluate the sustained impact of e-Culinary Medicine programs on PCOS management. This study highlights the need for innovative and accessible approaches to empower individuals with PCOS and enhance their quality of life.

ROLE OF TBX2 IN THE ESTABLISHMENT OF THE PROSTATE CANCER PREMETASTATIC NICHE IN THE BONE

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Background: Bone metastasis is the predominant cause of death and morbidity in advanced prostate cancer (PCa) patients. It has been shown that extracellular vesicles (EVs), particularly exosomes, secreted by the primary PCa preferentially localize to bone in an organotropic manner and create a conducive microenvironment (i.e. 'education', or the pre-metastatic niche, PMN) resulting in bone remodeling or disruption of the homeostatic balance between bone formation and bone resorption. The PMN/bone

remodeling in turn facilitates subsequent establishment of metastases by circulating tumor cells. However, the molecular mechanism(s) that drive bone remodeling/PMN establishment remain poorly understood. Identifying key molecular drivers of exosome-induced, bone remodeling may facilitate the therapeutic targeting/disruption of PMN formation or maintenance and prevent/delay PCa bone metastasis.

Methods: In this study, we genetically modulated TBX2 in PC3 human CRPC cells and examined the expression of intracellular Notch3 and exosomal NICD3 by Western blotting and immunohistochemical analyses.

Results: The data from our recent experiments revealed that: 1) Orthotopic murine xenografts of human CRPC cell line, PC3, using dominant-negative (DN) based activity disruption of TBX2 demonstrated abrogated bone and lymph node metastases concurrent with a decrease of PC3 intracellular NICD3 protein; 2) Notably, exosomes derived from PC3 TBX2-DN cells also contained a pronounced decrease in NICD3 protein. Further, these exosomes lost the ability to: a) induce differentiation of THP1 human monocytes to osteoclasts, and of human fetal osteoblasts (hFOB) to mature osteoblasts, and b) induce the expression of transcription factor, HES1, a downstream target of NOTCH signaling in THP1 and hFOB cells.

Conclusion: Our data reveals the criticality of TBX2/NOTCH3 signaling to CRPC establishment of the bone Pre-metastatic Niche (PMN) via organotropic exosome targeting by the primary tumor lesion, and the colonization of the PMN by circulating cancer cells.

LIGAND INDUCED CRYSTALLOGRAPHIC B-FACTORS CHANGES AS A PREDICTOR OF PROTEIN STRUCTURAL CHANGES TO BE ASSESSED BY MICROSCALE THERMOPHORESIS.

André Rey-Cibati and Luis G. Cuello

Understanding the ligand induced structural dynamics of K⁺ channels gave us a unique insight into their biological function. This study investigates the ion induced B-factors (temperature factors) changes of KcsA structure as a predictive parameter to assess the alkali metal ion series dissociation constants by MicroScale Thermophoresis (MST). We evaluated the alpha carbons (C α 's) B-factors of the pore helix and turret regions of the pore domain. Utilizing available high-resolution X-ray crystallography data of KcsA in the presence of K⁺, Rb⁺, Cs⁺, Tl⁺, and Na⁺ (collapsed state). Our results evidenced a significant correlation between the changes of B-factors for some positions and the channel's selectivity filter conformational states, suggesting that those positions within the channel structure with significant changes of B-factors can serve as reporter position to label with fluorophores and measured the ion dissociation constants of K⁺ channels by MST in the future.

IDENTIFYING NOVEL FACTORS UPREGULATED DURING ER STRESS IN MAMMALIAN CELLS.

Lesley Rico, BS ; Malaiyalam Mariappan, PhD

The endoplasmic reticulum (ER) is a critical organelle where secretory and membrane proteins are synthesized and folded. However, protein folding in the ER is susceptible to misfolding, exacerbated by nutrient fluctuations and genetic mutations. This accumulation of misfolded proteins triggers ER stress, activating the unfolded protein response (UPR) to restore homeostasis. The UPR upregulates transcriptional programs that enhance ER chaperone production and other factors. Failure to mitigate ER stress leads to cell death, implicated in diseases like type 2 diabetes and neurodegeneration. While the UPR is crucial, our understanding of its complete transcriptional output remains incomplete. This project aims to validate novel factors identified through RNA sequencing via Western blotting and characterize their localization and function in alleviating ER stress. These studies may uncover novel therapeutic avenues for mitigating ER stress-related diseases.

HIV NEF VARIANTS ASSOCIATED WITH PULMONARY HYPERTENSION INDUCE DIFFERENTIAL PRODUCTION OF INFLAMMATORY CYTOKINE IN PULMONARY VASCULAR ENDOTHELIAL CELLS IN VITRO.

Mario Rodriguez ; Eli Heath ; Minh Nguyen ; Javaria Baig ; Preston Campbell ; Amanda Garcia ; Sharilyn Almodovar, PhD

Current antiretroviral therapy (ART) has improved the clinical management of Human Immunodeficiency Virus (HIV) infections, reducing the all-cause mortality by suppressing viral replication. This allows for the immune system reconstitution and reduces progression to AIDS. However, people living with HIV (PLWH) are currently challenged with chronic inflammation, which play roles in the onset of comorbidities, like cardiovascular and severe pulmonary diseases such as pulmonary hypertension (PH). Previous studies reported specific mutations in HIV Nef functional motifs that were over-represented in PLWH with PH. Nef is a potent molecular adaptor that disrupts cell signaling to avoid immune surveillance. In this study, we investigated the impact of the different HIV Nef variants in the production of pro-inflammatory cytokines in the pulmonary vasculature. Briefly, primary pulmonary vascular endothelial and smooth muscle cells were grown in mixed cultures. The cells were transfected with HIVnef molecular constructs previously generated using HIV-PH isolates, followed by analyses of secreted pro-inflammatory cytokines (IFN- γ , IL-1 β , IL-2, IL-4, IL-6, IL-8, IL-10, IL-12p70, IL-13, and TNF- α) using the Meso Scale Discovery V-PLEX Pro-Inflammatory Panel and the QuickPlex SQ120 imager. Our results show significant changes in IL-2, IL-4, IL-10, IL-12p70, and IFN- γ at 48 hours. Notably, HIV-PH Nef variants induced sustained increases in IL-2, IL-4, IL-13, IFN- γ , and TNF- α , which are key mediators of vascular inflammation. These findings highlight the variability of inflammatory responses in the pulmonary vasculature according to the Nef variant. Further studies will focus on the impact of Nef variants in actual recruitment of inflammatory cells in vivo.

SERTOLI CELL REGULATION OF THE COMPLEMENT SYSTEM

Alexis R. Rodriguez, Rachel L. Washburn, João Pedro Tôres Guimarães, Gurvinder Kaur, Jannette M. Dufour

Transplantation, an effective treatment for many diseases, is limited by the availability of transplantable tissue. Xenotransplantation has been proposed as an alternative solution to provide a greater supply of organs. Xenotransplanted tissues must overcome antibody-dependent complement-mediated acute rejection, a major factor leading to organ rejection. The complement system protects the body by activating immune processes, opsonizing foreign pathogens, and lysing target cells. Because Sertoli cells (SCs) have been shown to evade complement-mediated destruction, the goal of this study was to determine how SCs regulate complement and create an immune-protective environment. Neonatal pig SCs (NPSCs) and pig aortic endothelial cells (PAECs) were cultured with human serum containing complement (NHS). NPSCs exhibited significantly higher survival rates compared to PAECs, which showed substantial cell death. After complement exposure, NPSCs showed no lysis or membrane attack complex formation, while PAECs were lysed. When PAECs were cultured in NPSC-conditioned media, their survival increased by 200% in the presence of NHS, suggesting that NPSCs secrete complement-regulation factors. Bioinformatics and molecular analyses identified 21 complement inhibitors expressed by NPSCs, many of which were significantly upregulated compared to PAECs. This study also assessed how complement exposure affects gene expression in NPSCs. RNA sequencing identified 62 differentially expressed genes (DEGs) related to immune regulation, including cytokine signaling, innate immune responses, and T-cell regulation. Notably, genes like CCL2 and A20, linked to immune modulation and transplant tolerance, were upregulated in response to complement. As complement-mediated rejection continues to be an obstacle in the chronic survival of xenotransplanted organs, understanding how NPSC regulate the complement system may elucidate mechanisms to improve the survival of xenotransplanted organs.

INTERPROFESSIONAL ANALYSIS OF STUDENT ATTITUDES TOWARD ACCOMMODATIONS FOR DISABILITY

Kaitlyn Perez, Rebekah Rodriguez, Azlan Tubbs, Tamara Mancini, M.Ed.

This study investigates the impact of knowledge and stigma on healthcare students' decisions to seek disability accommodations in higher education. Despite the accommodations made available through legal acts, such as the Americans with Disabilities Act (ADA) in 1990 and the redefinition of disability in the 2008 amendment, many healthcare students remain apprehensive about requesting and utilizing these accommodations due to stigma, misunderstandings, outside influences, and other factors. Despite legislative strides to accommodate people with disabilities, bias and misunderstanding persists on individual and systemic levels. Stigma associated with having a disability may deter students from requesting accommodations due to the fear of discrimination, social isolation, or being perceived as inferior to their peers. Reputation is a powerful foundation for healthcare workers' careers as they seek to garner patient trust and coworker faith. Students feel a piece of this burden as they build this foundation and rapport. Requesting accommodations for a disability as a healthcare student presents its own challenges and barriers. This project elucidates the barriers students at the Texas Tech University Health Sciences Center (TTUHSC) perceive in gaining accommodations for disabilities, and this project evaluates self-reported student academic performance, wellness, and growth as a result of accommodations. Using an online survey questionnaire, we will gather data from TTUHSC students. The survey assesses students' perceptions of disability stigma, their willingness to request accommodations, and perceived impact on academic experiences. Participants provided demographic information and completed a disability stigma scale to measure the perceived societal attitudes toward disabilities. Preliminary data suggests stigma plays a significant role in students' reluctance to seek accommodations. Additionally, students who use accommodations indicate a positive impact on academic performance and well-being. Findings suggest the need for better awareness and education regarding disability accommodations and the importance of fostering an inclusive environment in healthcare education.

INTERKINGDOM BIOFILM FORMATION AND GROWTH BETWEEN CANDIDA ALBICANS, STAPHYLOCOCCUS AUREUS, AND PSEUDOMONAS AERUGINOSA IN CHRONIC WOUND MODELS

Anthony Rudd; Kendra Rumbaugh, PhD

Polymicrobial infections and the biofilms formed are major contributors to delayed healing in chronic wounds. Chronic wounds play host to a diverse array of microorganisms identified through both culturing and non-culturing techniques, including bacteria like *Staphylococcus* spp. or *Pseudomonas* spp., which can cause life-threatening infections. Although not present in all chronic wounds, fungi, such as *Candida albicans*, are one kingdom of organisms that have been identified to be present as part of the chronic wound environment in at least 27% of studied diabetic foot ulcers (DFUs), according to one study, and their role is underexplored in the chronic wound environment. We hypothesize that *Candida albicans* contributes to chronic wound infections by both supporting bacterial growth and enhancing biofilm formation through interkingdom interactions, with these effects being influenced by environmental factors like glucose concentration, similar to conditions found in diabetic patients with chronic wounds. To test this hypothesis, fungal-bacterial interactions were investigated in two models. First, using the Lubbock Chronic Wound biofilm model, colony-forming unit (CFU) counts showed that *Candida albicans* can grow alongside *Staphylococcus aureus* and *Pseudomonas aeruginosa* at non-negligible levels. The effect of varying dextrose concentrations in the dynamics of the organisms was also explored, mimicking the conditions found in diabetic wounds. Second, crystal violet assays quantified biofilm biomass in brain-heart infusion media, revealing that *Candida albicans* increases the overall biofilm biomass when grown with the same bacterial species compared to the fungus alone, confirming previous studies and supporting its potential role in infection severity. These insights are the groundwork for future studies that will utilize our chronic

wound in vivo mouse model to study interkingdom infection and molecular biology techniques to study the genetic expression of the fungi in vivo, in vitro, and potentially, in clinical samples.

NALOXONE AWARENESS AMONG FIRST YEAR MEDICAL STUDENTS AT TTUHSC

Lizabelle Russell, Joel P. White, Claudia Morris, Alexandra Munson, Elisabeth Conser, MD

Previous studies have shown the significance and effectiveness of providing training and naloxone kits for timely and successful opioid overdose reversals. This study aimed to determine the awareness of naloxone use for opioid overdose reversal among first year medical students (MS1s) at TTUHSC. We administered a 10-question survey to gather data on the MS1s knowledge and perception of opioid overdoses, naloxone use, and naloxone accessibility within their community. The responses were recorded on a scale of 1 (being least confident) to 5 (being most confident). Data showed only 23% of MS1s had previous coursework or training regarding opioid use. Only 20% of MS1s would recognize an opioid overdose. However, 71% of MS1s would feel confident administering naloxone for an emergent opioid overdose after receiving special training. Our findings demonstrate a need for Naloxone education and training among MS1 students at TTUHSC. We have created a training course and scheduled times to train and distribute naloxone to the former MS1s to whom this survey was administered as well as the new class of MS1s.

ENHANCED EFFICACY AND REDUCED TOXICITY OF CF10: A NOVEL CANDIDATE FOR COLORECTAL CANCER THERAPY

Naresh Sah; Robert Young; Chinnadurai Mani; Ganesh Acharya¹; Subash Kairamkonda; Pamela Luna; Mark Reedy; William Gmeiner; and Komaraiah Palle

Introduction:

Colorectal cancer (CRC) is the 3rd leading cause of cancer-related deaths with over 53,000 fatalities in 2024 in the U.S. While 5-fluorouracil (5-FU)-based regimens, such as FOLFOX and FOLFIRI, remain primary treatments for advanced CRC, their efficacy is limited by systemic toxicities, dose constraints, and poor conversion (~5%) to the active form. These challenges necessitate the development of more potent and safer fluoropyrimidines. CF10, a nanoscale fluoropyrimidine polymer with FdUMP repeats, targets thymidylate synthase (TS) and topoisomerase-1 (Top1), enhancing efficacy while reducing toxicity.

Methods:

Cytotoxicity (IC50) and replication stress markers were assessed in CRC cell lines. Xenograft and orthotopic CRC models evaluated CF10's effects on tumor growth, survival, and toxicity. Histology and serum markers analyzed gastrointestinal and systemic toxicities, while CF10's effects on patient-derived organoids and CDX models were studied.

Results:

CF10 induced TS-FdUMP and Top1-DNA complexes, increasing replication stress markers (FANCD2, CHK1, CHK2, and H2AX) and exhibited an IC50 of 0.05 μ M in CRC cells—over 100-fold more potent than 5-FU. In xenograft models, CF10 selectively targeted malignant cells, sparing healthy tissues and reducing intestinal toxicity. Unlike 5-FU, CF10 preserved intestinal villus integrity and maintained normal serum ALT, AST, and BUN levels. Improved tumor localization with CF10 reduced tumors and extended survival (84.5 vs 32 days; $P < 0.0001$) in the orthotopic HCT-116-luc CRC mice model. In rat models, CF10 caused no weight loss at 50 mg/kg, unlike 5-FU, even with co-administration of ethynyl uracil (EU), a dihydropyrimidine dehydrogenase (DPD) inhibitor. CF10 showed concentration-dependent inhibition of patient-derived organoids, reduced tumor burden in CDX models, and improved survival without toxicity.

Conclusion:

CF10 is over 1,000 times more potent than 5-FU, with superior efficacy in vitro and in vivo and a significantly improved toxicity profile, making it a promising treatment for metastatic CRC.

IT'S ALL ABOUT TIME... CRYOABLATION OF TRIPLE-NEGATIVE BREAST CANCER INDUCES THE ABCOPAL EFFECT ALTERING THE TUMOR IMMUNE MICROENVIRONMENT IN DISTANT TUMORS

Flavia Sardela de Miranda, MS; Rachel L. Babcock, PhD; Dalia Martinez-Marin, PhD; Geetha Pryia Boligala, PharmD; Nicholas Wagner MS3; Elizabeth Jeffery; Prrishti J. Gukhool, BS; Maria F. Mahecha, MS; Chhanda Bose, PhD; Karla Daniele, MD; Kevin Pruitt, PhD; Sharda P. Singh, PhD; Michael W. Melkus: PhD; Rakhshanda Layeequr Rahman, MD.

Triple-negative breast cancer (TNBC) has high recurrence/metastasis rates, underscoring the need for innovative therapies to enhance patient outcomes. Cryoablation is a promising approach, capable of inducing tumor necrosis via freeze/thaw cycles, which results in release of inflammatory signals and preserved tumor antigens that may potentially boost the anti-tumor immune response. Our pre-clinical data with a murine model of TNBC shows cryoablation results in lower rates of tumor recurrence/metastasis with increased immune infiltration at distant tumors. However, the early drivers of the improved outcomes are still unknown. We hypothesized cryoablation enhances the anti-tumor response by increasing the frequency and activation of anti-tumor cells systemically, resulting in superior distant tumor targeting. 4T1-12B TNBC cells were bilaterally transplanted in the mammary fat-pad of BALB/c mice. At two weeks, left (primary) tumors were either resected or cryoablated. A week later, right (distant) tumors, spleen, lymph node and blood were collected and processed for flow cytometry and RNA-sequencing. Cryoablation resulted in smaller distant tumors with increased frequencies of anti-tumor cells [e.g., natural killer (NK) cells], alongside a systemic increase in the frequency of migratory conventional type 1 dendritic cells (cDC1) compared to resection. These changes were mirrored by the immune gene signature of the distant tumors, with cryoablation inducing genes involved with NK cell activation and leukocyte-mediated toxicity (e.g., *IL1ra1* and *Pfr1*). These results reveal the early mechanism through which cryoablation improves tumor elimination, by increasing the frequency of migratory cDC1 systemically, which are potent antigen presenting cells critical for effective T and NK cell anti-tumor activity in the tumor immune microenvironment (TIME). Identifying key immune cell populations will enable designing combinational therapies for improved anti-tumor immunity.

EFFICACY OF MINOCYCLINE AND ITS ANALOGS IN MOUSE MODELS OF ALZHEIMER'S DISEASE

Neha Sawant; Joshua O Willms; Xiaobo Liu; Praneetha Panthagani; Abdul A Shaik; Monica G Aguilera; Ted W Reid; Jeremy D Bailoo; Susan E Bergeson

Background: Although Alzheimer's disease (AD) has become a significant global concern, effective therapies remain largely elusive, as knowledge about its complex pathophysiology and early diagnosis is still evolving. The antibiotic minocycline has demonstrated therapeutic potential in preclinical AD mouse models by reducing neuroinflammation, amyloid-beta ($A\beta$) plaques, neurofibrillary tangles (NFTs), and neurodegeneration. However, long-term administration of minocycline is associated with gut dysbiosis due to its antimicrobial properties. To address this limitation, we developed minocycline analogs that retain anti-inflammatory and other positive activity while eliminating antimicrobial effects.

Hypothesis: Modified minocycline analogs will reverse, delay, or prevent the progression of AD by targeting neuroinflammation and associated pathological features.

Methods and Results: To evaluate the efficacy of modified minocyclines in AD, we treated a genetic mouse model of the disease with a minocycline analog, diacetyl minocycline (DAM). DAM, which retains its anti-inflammatory activity but lacks antimicrobial properties, yielded promising results in AD mice by attenuating cognitive decline, as determined by the T-water maze following a three-week administration. Building on these findings, we developed a second analog, 10-butyl ether minocycline (BEM), which exhibits enhanced pharmacokinetics, increased safety margins, and improved intestinal and brain permeability.

Significance: In future studies, we will evaluate the efficacy of BEM in the 5XFAD Alzheimer's mouse model. We hypothesize that BEM will improve neuronal pathology and lead to better cognitive and behavioral outcomes. This work highlights the potential of modified minocycline derivatives as promising therapeutic agents for AD.

Hypothesis: Modified minocycline analogs will reverse, delay, or prevent the progression of AD by targeting neuroinflammation and associated pathological features.

Results: To evaluate efficacy of modified minocyclines in Alzheimer's, we treated a genetic mouse model of AD with a minocycline analog, diacetyl minocycline (DAM). DAM which has retained its anti-inflammatory activity but lost its antimicrobial properties, yielded promising results in the AD mice by stopping cognitive decline. Building on these findings, we developed a second analog, 10-butylether minocycline (BEM), which exhibits enhanced pharmacokinetics, increased safety margins, and improved intestinal and brain permeability.

Significance: For future studies, we will evaluate the efficacy of BEM in the 5xFAD Alzheimer's mouse model. We predict that it will improve neuronal pathology and lead to healthier cognitive and behavioral outcomes through the reduction of inflammation. This work highlights the potential of modified minocycline derivatives as promising therapeutic agents for AD.

PATHOPHYSIOLOGICAL MECHANISMS OF HYPOMAGNESEMIA WITH SEIZURES AND COGNITIVE DELAY CAUSED BY NA,K-ATPASE MUTATIONS

Daniel Self, Kerri Spontarelli, Nicolas G. Colmano, Jaroslava Seflova, Pablo Artigas

Hypomagnesemia with seizures and cognitive delay (HASCD) is a rare condition which alters two systems, causing magnesium wasting in the kidney and magnesium-resistant seizures in the CNS. It is caused by mutations L302R, G303R, M859R, and W931R in the Na⁺,K⁺-ATPase (NKA) α 1 subunit. Previous reports indicate that all but M859R present an aberrant channel-like function and differing degrees of NKA dysfunction. We expressed human α 1 with β 1 in *Xenopus* oocytes to compare the function of wildtype and HASCD-mutant α 1 using two-electrode voltage clamp. Oocytes expressing wildtype NKA showed robust outward 4.5 mM-K⁺-induced currents, while mutant-injected ones had much smaller (L302R, M859R and W931R) or absent (G303R) K⁺-induced currents. Experiments in HEK293 transfected with N-terminally fused YFP NKA suggest that reduced currents in oocytes reflect lower plasmalemma density as well as previously described loss of function. In Na solutions, oocytes expressing L302R and G303R (but not those M859R or W931R) had ouabain-sensitive inward currents at negative voltages. M859R- or W931R-injected oocytes that survived until clamped we observed that larger K⁺-induced currents were accompanied by larger inward currents in Na⁺, that were insensitive to ouabain but abolished when external Na was substituted with NMG. A mutation, G41R, in FXYP2, the renal, regulatory, NKA γ -subunit (absent in the CNS) also causes hypomagnesemia. We evaluated wildtype- and G41R-FXYP2 co-expressed with α 1 β 1 in oocytes. Ouabain-insensitive inward currents in Na⁺ solutions were measured in G41R-FXYP2 expressing oocytes but not in wildtype-expressing ones, despite the presence of robust K⁺-induced outward currents in both oocyte types. Taken together, our data suggest that both renal hypomagnesemia and CNS phenotypes are caused by leaky NKAs, which probably increase neuronal excitability by depolarizing the resting potential. NSF-MCB-2003251 & NHLBI-1R01HL158649-01A1

UNDERSTANDING THE REASONS BEHIND NO-SHOW RATES: STRATEGIES FOR INCREASING EFFICIENCY AND IMPROVING PATIENT CARE

Hannah Seo, MBA(HOM); Jad F. Zeitouni, BBA; Justin D. Wyrick, MBA(HOM), MSBA, CMPE; Brent D. Magers, EdD, MHA, LFACHE

The no-show rate significantly impacts the efficiency of various industries that rely on scheduled appointments, including healthcare. However, limited research exists on the reasons behind these no-shows.

We utilized a mixed-methods approach. We retrospectively analyzed 4,169 no-show visits from January 2023 to June 2024 and conducted a focused survey of 484 no-show patients within our study population. Preliminary analysis of 4,169 no-show visits examined patterns across time of day, weekday, clinic location, appointment type, and insurance provider. One-way ANOVA was used to compare the means of the

morning (8:00AM – 11:45AM) and afternoon (12:00PM – 4:00PM) no-shows, assessing whether the time of day influenced attendance. The ANOVA F-statistic measured variability between morning and afternoon groups, with $p \leq 0.05$ indicating statistical significance. A follow-up survey was distributed to 484 no-show patients identified during a 2-month period within our study range to further examine potential solutions to decrease no-show appointments.

Survey responses revealed that the most common reasons for missed appointments were work or family conflicts (31.3%), forgetfulness (20.8%), and miscommunication or relocation (16.7%). Text message reminders were preferred by 43 respondents, and 37.5% indicated that 1-2 days' notice was sufficient to adjust their schedules.

The findings suggest that personal barriers, such as scheduling conflicts and communication issues, play a more significant role in no-shows than time- or location-based factors. Strategies such as timed reminders and attaching appointment details to reminders can help minimize no-show appointments. Future studies should explore patient-specific factors to further optimize appointment adherence and clinic operations.

BUTYL ETHER MINOCYCLINE SHOWED IMPROVED INDUCTION IN THE TET-ON GENE EXPRESSION SYSTEM OVER DOXYCYCLINE.

Abdul Shaik, Naresh Sah, Sambandham Shanmugam Ph.D, Kushal Gupta, Monica Augilerra, Jeffrey H. Thomas Ph.D, Komaraiah Palle Ph.D, Susan E Bergeson Ph.D

The prototypical tetracycline, doxycycline (DOX), has been extensively utilized in healthcare, animal husbandry, and for overexpression of proteins of interest in Tet-On conditional transgene expression systems. However, while the use of DOX in experimental animal models modified to include the Tet-ON/OFF system disrupts the gut microbiome and mitochondrial function. To address these issues, a modified minocycline analog, Butyl Ether Minocycline (BEM), devoid of antibacterial activity, was synthesized in our lab. This study evaluates the induction efficacy of BEM in both in vitro and in vivo Tet-On systems. Fluorescence binding studies were used to assay the binding affinities between purified TetR and tetracyclines, revealing dissociation constants (K_d) for MINO (1–2 μM), DOX (3 μM), and BEM (10 μM). BEM's in vitro induction efficacy was tested in HCT 116-Tet On-TS (HCT-TS) cells, showing higher induction at lower concentrations (10 $\mu\text{g}/\text{mL}$) compared to DOX. Additionally, HCT-TS cells showed higher cell viability with BEM at 10 $\mu\text{g}/\text{mL}$ (110%), compared to DOX (80%). in vivo induction efficacy was assessed using the *Drosophila melanogaster* Tet-On system ($P\{w[+mC]=UAS-rtTA-M2-alt\}901$, $P\{w[+mC]=tetO-PTX.C\}20f/CyO$) using immunofluorescence microscopy and Western blot analysis. BEM demonstrated higher induction efficacy compared to DOX (at 5 $\mu\text{g}/\text{mL}$). With its high water solubility and permeability via the oral route, BEM is potentially a more desirable and safer alternative to DOX for inducing Tet-On conditional transgene expression systems.

TAG FIRST, DECIDE LATER: MEMBRANE PROTEIN QUALITY CONTROL

Syeda Ridita Sharif; Mariappan Malaiyalam

As cells age, their ability to eliminate aberrant proteins declines, leading to disrupted protein homeostasis and the onset of neurodegenerative diseases. Identifying pathways that selectively remove these proteins could reveal therapeutic strategies to promote healthy aging.

This study investigates a novel autophagy pathway that targets aggregation-prone hydrophobic tail-anchored (TA) proteins for degradation, thereby preserving protein homeostasis in mammalian cells. Our previous studies showed that newly synthesized TA proteins are initially polyubiquitinated in the cytosol but are still captured by the GET3 chaperone, which delivers them to the ER membrane for insertion. Our findings demonstrate that un-inserted TA proteins bound to GET3 are rapidly degraded via selective autophagy. We identified a chaperone-E3 ligase complex essential for routing un-inserted TA proteins to the autophagy pathway. We are now investigating the role of specific ubiquitin modifications in this process and aim to characterize the autophagy machinery responsible for recognizing these proteins. Our

work provides critical insights into the interplay between GET3 and the autophagy pathway, with implications for understanding why GET3 mutations are linked to Parkinson's disease. These findings pave the way for novel strategies to combat protein aggregation and neurodegeneration.

SLC7A5 IS A DRUG TARGET FOR PANCREATIC DUCTAL ADENOCARCINOMA

Tanima Sharker, Devaraja Rajasekaran, Souad Sennoune and Yangzom D. Bhutia

Pancreatic ductal adenocarcinoma (PDAC) is lethal with a five-year survival rate only in single digits. Hence, there is a dire need to identify better therapeutics or drug targets to combat this deadly disease. Amino acid transporters (AATs) are known to be significantly upregulated in PDAC. In fact, our laboratory has identified SLC6A14 and SLC38A5 as tumor promoters and thereby viable drug targets for PDAC. Apart from SLC6A14 and SLC38A5, other AATs like SLC1A5, SLC7A5, and SLC7A11 are also well-established tumor promoters. The goal of this study is to characterize the expression and functionality of SLC7A5/LAT1, a sodium-independent AAT and to further determine its tumor promoting role in PDAC. Using 5 human PDAC organoids (hM19B, hT1, hT105, hF23, and hM1A), 21 PDX samples and 10 PDAC cell lines, we show SLC7A5 to be consistently upregulated across all the samples tested. Using radiolabeled leucine uptake, we further establish that SLC7A5 is not only expressed but is also functional in the PDAC cell lines. By orthotopically implanting PANC-1/Luc2 cells in the athymic nude mice and then treating them with JPH203/nanvuranlat (SLC7A5 inhibitor), either singly or in combination with gemcitabine, we demonstrate the tumor promoting role of SLC7A5. Taken together, our study shows that SLC7A5 is upregulated in PDAC and is a tumor promoter. Our future study involves investigating the metastatic potential of SLC7A5 as well as understanding the molecular mechanisms leading to its upregulation in PDAC. We will look into the possible cross-talk between Wnt/beta-catenin signaling pathway and pancreatic stellate cells (PSCs) or the role of mutant KRAS in upregulating SLC7A5.

A REVAMPED PROTOCOL THAT IMPROVES THE EXPRESSION AND PURIFICATION OF MEMBRANE SCAFFOLD PROTEIN (MSP) AND OFFERS A FASTER AND MORE EFFICIENT RECONSTITUTION OF MEMBRANE PROTEINS IN LIPID NANODISCS.

Megan Marie Skains, D. Marien Cortes, and Luis G. Cuello

Nanodiscs technology has been developed to study membrane proteins in a controlled lipid environment. However, the membrane scaffold protein (MSP) used to assemble nanodiscs often displays severe proteolysis and aggregation that can hinder the efficient assembly of nanodiscs. Additionally, mainstream traditional methods for membrane protein reconstitution are time-consuming and produce a low yield. These challenges have limited the use of certain biophysical techniques that require large quantities of protein. In this study, we present an optimized protocol for the expression and purification of MSPs, minimizing proteolysis and aggregation, and introduce an alternative faster and more efficient reconstitution method using PD-10 columns. This method facilitates the production of nanodiscs in large quantities. By applying this protocol, we significantly improve the quality and yield of MSP, enabling the use of a variety of biophysical techniques to explore the reconstituted protein that were previously inaccessible. We demonstrate the feasibility of this protocol with three different MSPs (MSP1D1, MSP1E3D1, MSP2N2) and two target proteins (KcsA and Kv1.1).

POWER OF PEERS: CAN NEAR-PEER LED REVIEWS ENHANCE LEARNING OF CARDIOVASCULAR PHYSIOLOGY AND REDUCE STUDENT STRESS?

Dorian-David M. Smith, BS and Alice R. Villalobos, PhD

Integrative cardiovascular (CV) physiology, taught in Organ Systems-1 (OS1) is challenging for Year-1 medical students (MS1). Preceding blocks, Anatomy, Embryology & Histology (AHE) and General Principles (GPX),

support learning through near-peer reviews led by Year-2 students in Graduate Medical Education Sciences (GMES2) who completed AHE, GPX and OSI. Thus, in the spring 2025 iteration of OSI we aim to 1) pilot in-person GMES2-led reviews of difficult CV physiology topics and 2) evaluate whether reviews enhance learning, increase confidence, and reduce stress regarding the CV physiology exam. To assess student perception of GMES2-led reviews and identify challenging CV physiology topics, MS1, MS2, GMES1 and GMES2 completed a Google Form survey. Students rated the benefits of GMES2-led reviews on a 7-point Likert scale (1: Extremely not beneficial; 7: Extremely beneficial). MS2 and GMES2, who completed OSI in spring 2024, also identified CV topics they found most difficult to learn. Ninety-seven MS1, MS2, GMES1 and GMES2 completed the survey. Students rated reviews as beneficial to learning in AHE and GPX ($\bar{x}=6.1/7$), a good use of study time ($\bar{x}=6.2/7$), and beneficial in reducing stress related to the respective unit exam ($\bar{x}=5.8/7$). 84% expressed interest in attending GMES2-led CV physiology reviews. MS2 and GMES2 (n=32) identified several CV topics as difficult to learn: autonomic regulation of CV function (64%), blood pressure regulation (54%), and action potentials (32%). Class performance on individual questions on the spring 2024 OSI CV physiology exam also indicated these topics were challenging. Per these survey data, a GMES2 student is developing review sessions that will address student-selected CV topics. Based on survey data and reported findings for efficacy of near-peer teaching in medical education, we predict attending review sessions will facilitate learning, boost confidence and reduce stress associated with the CV physiology exam.

NEUROPROTECTIVE EFFECTS OF HISTONE DEACETYLASE INHIBITORS AND RETINOIC ACID IN IN VIVO AND IN VITRO MODELS OF ALZHEIMER'S DISEASE

Shane C. Smith; Shadt Skawratananond; Ashly Hindle; Jake Strickland; Adam Baker; Isabel Guzman; Sharda P. Singh; J. Josh Lawrence; Chhanda Bose

Introduction In Alzheimer's disease (AD), histone acetylation is disrupted, suggesting impaired transcriptional control. Moreover, evidence suggests an AD-dependent loss of transcription controlled by all-trans-retinoic acid (ATRA), a bioactive metabolite of vitamin A (VA). Antioxidant depletion causes oxidative stress (OS), triggering Nrf2-mediated antioxidant defenses. Here, we investigated roles of VA, histone acetylation, Nrf2, and OS in vitro. Finally, we established a dietary vorinostat dose that promotes histone acetylation in AD mouse brain. **Methods** For in vitro studies, mouse HT22 cells were treated with vorinostat (up to 40 μM), ATRA, and/or H₂O₂. MTT and lipid peroxidation assays were performed. Acetyl-histone H3 and Nrf2 levels were examined via western blot (WB) and immunocytochemistry (ICC). For in vivo studies, humanized amyloid beta knock-in (hA β -loxP-KI) AD mice were fed purified diet with 0.18 or 0.36 mg vorinostat/gram of diet for 2 weeks. HDAC enzyme activity in brain tissue was examined via colorimetric ELISA and acetyl-histone H3 level. **Results** Vorinostat and ATRA treatment (up to 20 μM) caused no significant cytotoxicity to HT22 cells. H₂O₂ alone (25-50 μM) caused ~30-40% cell death ($p<0.0001$). ATRA (5 μM), in combination with vorinostat (0.5 μM), protected against H₂O₂ up to 150 μM . Vorinostat increased acetylation of histone H3 with 0.5-3.0 μM treatment for 24h ($p<0.001$). ROS was significantly reduced. Nuclear translocation of Nrf2 was induced by H₂O₂ and reduced after ATRA and vorinostat treatment. Both vorinostat diets increased acetyl-histone H3, inhibited HDAC activity, and reduced peroxidation ($p<0.05$). **Conclusions** Doses of vorinostat used in vitro and in vivo increased histone acetylation without cytotoxicity/toxicity. In vivo, 0.18 mg/g vorinostat diet delivered a tolerable and bioactive dose. VA, alone and in combination with vorinostat, may protect neuronal cells from oxidative stress. Together, our study provides a possible link between oxidative stress, Nrf2 and HDACs as potential contributors to AD progression.

OPTIMIZING VIABILITY OF LARGE SPLIT THICKNESS SKIN GRAFTS DURING TEMPORARY PRESERVATION

Sadie Sudduth, BS; Jonathan Chavira, BS; Andrew Ibrahim, BS; Adam Yesin, BS; Farhood Salehi, BS; Mariana Fiori, PhD; Michael Melkus, PhD; Alan Pang, MD; Sharda Singh, PhD; John Griswold, MD

Introduction

Autologous split-thickness skin grafts (STSGs) are widely used in burn treatment to promote wound healing. However, immediate use may be limited due to donor site availability or surgical complications, necessitating temporary storage. Current preservation methods, such as saline storage at 4°C, lead to rapid tissue viability loss, often requiring early discard. A previous study from our team demonstrated that Roswell Park Memorial Institute (RPMI) Medium improves cell viability and increases total cell count in STSGs compared to saline. Building on this, the present study reduces the storage duration from 7 to 4 days to further explore RPMI's effectiveness in preserving grafts while increasing clinical relevance.

Hypothesis

We hypothesize that RPMI Medium will maintain or improve cell viability in STSGs compared to sterile saline. Furthermore, reducing the storage duration from 7 to 4 days will enhance graft viability, making this method more practical in clinical settings. This study aims to confirm whether RPMI can preserve STSG viability after 4 days of storage.

Methods

Excess skin samples (2 cm² to 10 cm²) from burn surgeries were stored in either RPMI or saline at 4°C for 4 days. Keratinocyte viability was assessed using the Trypan Blue Dye Exclusion Test, a standard method to evaluate cell survival and apoptosis levels.

Results:

Preliminary results from tested samples show RPMI-stored grafts averaging 93% cell viability, significantly outperforming saline in preserving keratinocyte viability. A 4-day storage period in RPMI better maintained viable cells, supporting our hypothesis that shorter storage enhances graft quality. These findings suggest RPMI is a more effective solution for preserving STSGs.

Conclusion:

RPMI improves STSG viability compared to saline, extending graft shelf life and reducing donor site harvesting. This approach could enhance clinical outcomes and optimize STSG preservation.

COMBINATION THERAPY TARGETING BOTH SLC6A14 AND AUTOPHAGY AND/MACROPINOCYTOSIS LEADS TO A BETTER THERAPEUTIC OUTCOME IN PANCREATIC DUCTAL ADENOCARCINOMA

MOSHARAF MAHMUD SYED, M.S.; DEVARAJA RAJASEKARAN, Ph.D.; SOUAD SENNOUNE, Ph.D.; YANGZOM D. BHUTIA, D.V.M., Ph.D.

Our laboratory has established SLC6A14, an amino acid transporter as a novel drug target for pancreatic ductal adenocarcinoma (PDAC). While this is good, we have also observed that inactivation of SLC6A14 leads to upregulation of autophagy and macropinocytosis, which are nutrient scavenging mechanisms. If this is true, these mechanisms can partly compensate for the loss of amino acids caused by SLC6A14 loss and thereby undermine the anticancer efficacy of SLC6A14 blockade. Here we aim to characterize the induction of autophagy and macropinocytosis following SLC6A14 blockade and further test whether combination therapy targeting both SLC6A14 and autophagy and/macropinocytosis will lead to a better therapeutic outcome in PDAC. Using SLC6A14-positive PDAC cell lines, CFPAC-1 and HPAF-II, either in the presence or absence of alpha-methyl-L-tryptophan (α -MLT; SLC6A14 blocker), we have confirmed that indeed SLC6A14 blockade induces autophagy as demonstrated by the increase in LC3 protein (Western blotting & immunofluorescence), changes in the phosphorylation status of mTORC1, AMPK and Beclin-1 (Western blotting), as well as macropinocytosis as evidenced by the increased uptake of TMR dextran, in the α -MLT treated cells. Furthermore, our in vitro assays (MTT & colony formation) demonstrate that a combination of α -MLT and hydroxychloroquine (HCQ; autophagy & macropinocytosis inhibitor) significantly

reduced the proliferation capacity and the clonogenic ability of these cells, respectively as opposed to monotherapy. Additionally, our in vivo study in athymic nude mice demonstrated that the combination therapy was superior in reducing the tumor burden as opposed to monotherapy. Overall, our study demonstrates that SLC6A14 blockade induces autophagy and macropinocytosis in PDAC however, targeting both with a combination therapy leads to a better therapeutic outcome in these mice. Our future study involves extrapolating the study in the KPC spontaneous model of PDAC.

LIPOSOMAL NANOPARTICLE MEDIATED GENE MODULATION FOR THE TREATMENT OF MELANOMA IN MURINE MODELS

Bill Tang BSA; Poonam Yadav PhD; Rahul A. Sheth M.D., F.S.I.R.

This study evaluated the efficacy of liposomal nanoparticles (LNPs) in delivering Wnt/ β -catenin-inhibiting miR-124 plasmids to melanomas. In vitro, LNPs with miR-124 were applied to B16N2 melanoma cells. In vivo, LNPs were injected into B16N2 tumors in mice. Delivery success was confirmed via flow cytometry and RT-PCR, assessing GFP expression, tumor transition markers, and Wnt/ β -catenin signaling. Overall, the findings suggested that LNP-mediated delivery of Wnt/ β -catenin inhibitors holds promise as a therapeutic strategy for melanoma, with trends indicating a reversal of epithelial-mesenchymal transition (EMT) and slowed melanoma progression.

DECODING THE ARCHITECTURE OF A STRESS-SENSING COMPLEX

Sikha Thoduvayil PhD; Malaiyalam Mariappan PhD

Abstract: The endoplasmic reticulum (ER) is a hub for synthesizing secretory and membrane proteins, playing a critical role in cellular homeostasis. Disruptions in protein folding within the ER lead to the accumulation of misfolded proteins and trigger ER stress, activating the unfolded protein response (UPR). Among the three branches of the UPR, IRE1 α is the most conserved ER-localized transmembrane kinase/RNase. Upon ER stress, IRE1 α oligomerizes and undergoes autophosphorylation, activating its RNase domain. This leads to the production of a transcription factor that enhances ER chaperone expression, mitigating stress. Paradoxically, prolonged or severe ER stress shifts IRE1 α 's role from pro-survival to pro-apoptotic by promoting the promiscuous cleavage of ER-localized mRNAs, a process linked to diseases such as type 2 diabetes and cancer. Our lab discovered that IRE1 α forms a functional complex with the Sec61 translocon complex, which plays a central role in translocating nascent polypeptides into the ER. This interaction is crucial for regulating IRE1 α oligomerization and RNase activity during ER stress. However, the molecular mechanism underlying this regulation remains elusive. To address this, we have developed a novel recombinant system capable of co-expressing and purifying all membrane components of the Sec61 translocon complex in Expi293F suspension cells. This system enables us to reconstitute and study the IRE1 α -Sec61 complex in vitro. Using cryo-electron microscopy (cryo-EM), we will resolve the active and inactive IRE1 α structures bound to the Sec61 complex, providing critical insights into its regulation. Understanding the structural basis of IRE1 α regulation by the Sec61 complex can inform therapeutic strategies for diseases associated with ER stress, including diabetes, cancer, and polycystic liver diseases.

PRE-CLINICAL EVALUATION OF BUTYL ETHER MINOCYCLINE IN DIFFERENT CANCER CELL MODELS.

Jabali Tottaramudi; Subash Kairamkonda; Susan E Bergeson and Komaraiah Palle

Minocycline, a well-known tetracycline antibiotic, has shown potential in oncology due to its ability to modulate key signaling pathways, inhibit matrix metalloproteinases (MMPs), and suppress angiogenesis. These properties lead to reduced cancer cell proliferation, induction of apoptosis, and modulation of the tumor microenvironment. Despite its promising anti-cancer capabilities, the antibiotic activity of Minocycline limits its therapeutic use. To overcome this, 10-Butyl Ether Minocycline (BEM) was developed as a modified derivative of Minocycline without antibiotic activity. This study focused on evaluating BEM's

efficacy in different cancer cell lines, particularly its ability to inhibit cell proliferation. Preliminary findings demonstrated that BEM significantly outperformed Minocycline in suppressing breast and colorectal cancer cell growth as evidenced by colony formation assay. Also, BEM treatment reduced cyclin B and Cyclin D expression and inhibited the cell cycle better than Minocycline. These results suggest that BEM is more effective than Minocycline in inhibiting cancer cell proliferation. Future directions for this project include signaling pathway analysis, spheroid growth analyses, and cell cycle studies to elucidate further the mechanisms underlying BEM's anti-cancer activity and its potential for clinical applications in treating various cancers. This work highlights the importance of chemical modifications in drug development to improve therapeutic outcomes.

WHAT PATIENT AND SURGEON FACTORS ARE ASSOCIATED WITH FIXATION OF THE POSTERIOR MALLEOLUS IN TRIMALLEOLAR ANKLE FRACTURES?

Patrick Udenyi; Alexander Hayek; Saad Majeed; Dr. Malik Morgan, MD; Dr. Kristopher Stockton, MD

Introduction:

Posterior malleolus (PM) involvement in trimalleolar ankle fractures increase the risk of posttraumatic ankle osteoarthritis. Discussions about whether to fixate the PM are based on fragment size, with the conventional threshold being 25% involvement of the tibial plafond. Some postulate that PM fixation should be based on posterior inferior tibiofibular ligament (PITFL) involvement, citing its significant role in stabilizing the syndesmosis. Gardner et al showed that fixating the PM, despite fragment size, restores ligamentous stability via the PITFL, securing the syndesmosis. Accurate reduction of the syndesmosis after traumatic injury has been linked to improved clinical outcomes. Regardless of this evidence, there are still disputes on indications for fixating the PM.

Methods:

This cross-sectional study assesses factors influencing surgeon decision-making on fixating the PM in trimalleolar ankle fractures. We will query the electronic medical records of Foot and Ankle specialists for patients with <25% or >25% of the tibial plafond involvement as measured on sagittal cuts of pre-fixation CT scan. Furthermore, we will record patient factors such as activity level, comorbidity, and days between injury and surgery.

Members of the Science of Variation Group will be randomly presented with radiographs and CT scans of 7 out of 20 pre-selected patients. For each fracture, they will be asked if they would fixate the PM. Subsequent questioning will include additional factors to assess if a surgeon's decision for PM fixation has changed.

Results:

Data collection is currently ongoing with an insufficient amount of data to conduct reliable statistical analysis.

Conclusion:

There is a lack of consensus on whether to fixate the PM in trimalleolar ankle fractures. By studying patient and surgeon factors associated with repairing the PM, we may discover areas where more evidence would assist the surgeon's decision on operative management of PM fractures.

A DENOVO ENHANCING EXPRESSION PROTEIN DRIVES THE BACTERIAL PRODUCTION OF PROPERLY FOLDED AND FUNCTIONAL HUMAN KV1.3 CHANNEL

Mariana I. Valladares and Luis G. Cuello, PhD

Over the years, membrane proteins have been expressed in mammalian cells for different studies. However, this process is expensive and time-consuming. Additionally, it is well known that the basal expression of membrane proteins in native tissues is very low, which precludes their purification in large quantities for functional and structural studies. Kv1.3 (KCNA3) is a voltage-gated K⁺ channel belonging to the Shaker-related (Kv1, KCNA) subfamily. Kv1.3 has a crucial role in the generation of an efficient immune response by being involved in the activation of T-cells in the human body. Additionally, Kv1.3 has been implicated in multiple pathological conditions, including autoimmune diseases, chronic inflammation, and cancer progression. In this study, we present a system for overexpression of the human Kv1.3 channel in *E. coli* BL21 Gold pLEMO, that allowed us to purify large quantities of properly folded and fully functional protein, capable of binding AgTx2, a scorpion toxin, with nanomolar affinity. With this expression system, we can produce a significantly larger amount of protein for further structure-function correlation studies.

IMIPRAMINE ATTENUATES TUMOR GROWTH IN KPC MOUSE MODEL OF PANCREATIC CANCER

Sanjana Verma BS; Mahmud-Syed Mosharaf BS MS; Tanima Sharker BS MS; Dr. Tyler Sniegowski PhD; Dr. Devaraja Rajasekaran PhD, Dr. Souad Sennoune PhD; and Dr. Yangzom D. Bhutia DVM MVSc PhD

Pancreatic ductal adenocarcinoma (PDAC) is lethal. There is a dire need to identify better therapies to combat this deadly disease. Repurposing FDA-approved drugs as anticancer agents is a promising strategy. Imipramine, an FDA-approved antidepressant, has shown potential in cancer treatment. More interestingly, it is shown that imipramine is a highly potent inhibitor of macropinocytosis, a nutrient scavenging mechanism upregulated in PDAC. This study aimed to determine if imipramine could attenuate tumor growth in KPC (LSL-KrasG12D/+; LSL-p53R172H/+; Pdx-1 Cre) mouse model of PDAC and whether this reduction is due to macropinocytosis inhibition. To test this, we performed TMR-dextran study in the HPAF-II PDAC cell line. The ability of imipramine to inhibit the macropinocytosis-mediated cellular entry of TMR-dextran was studied. Following this, *in vivo* studies were performed in KPC mice, both with and without imipramine treatment. It was interesting to observe that while 100% (10/10) of the untreated KPC mice developed adenocarcinoma, only about 44.44% (4/9) of the imipramine-treated group had adenocarcinoma, while 55.55% (5/9) had chronic pancreatitis (CP). These results clearly indicate the ability of imipramine to attenuate PDAC growth in KPC mice. Our future work involves elucidating whether the observed anticancer effect in KPC mice is due to macropinocytosis inhibition or other molecular mechanisms.

CHRONIC EXPOSURE TO DIMETHYLARSINIC ACID DURING DISCRETE SENSITIVE PERIODS OF DEVELOPMENT AND ITS POTENTIAL ASSOCIATION WITH BENIGN PROSTATE HYPERPLASIA IN MICE

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Arsenic is a ubiquitous naturally occurring trace metal. It is ranked #1 in the Substance Priority List by the Agency for Toxic Substances and Disease Registry (ASTDR) and poses a significant threat to human health. Previous research has found that chronic exposure to inorganic arsenic in rodents can induce histological and oxidative stress-related changes typical of benign prostate hyperplasia (BPH). BPH, prostate enlargement due to noncancerous growth, is a condition that affects 60-70% of the male population with its prevalence increasing with age. Men with BPH are typically afflicted with symptoms such as, frequent urination, weak urine stream, and loss of bladder control.

Dimethylarsinic acid, DMA(V), is a primary exogenous source of arsenic to humans from foods at part-per-billion (ppb) concentration levels and is the primary metabolite formed after the ingestion of inorganic arsenic. It is unknown whether chronic low-level exposure to 100 ppb DMA(V), typical of human exposure, is associated with indications of BPH and whether the consequences of such exposure vary across discrete periods of development. To address this knowledge gap, male J:ARC(S) mice were exposed to 100 ppb DMA(V) across all combination of three discrete developmental periods: (1) gestation–weaning; (2) weaning–sexual maturity; (3) sexual maturity–adulthood; 7 groups in total, 10 males per group. An additional group of 10 male mice received no DMA(V) for the duration of the experiment and served as a control group. Mice were euthanized at 200 days of age and their prostates harvested. Prostates were then stained with hematoxylin and eosin to histologically analyze BPH-related pathophysiological and morphological effects. The histological analyses of the tissues is currently in progress. These results will guide future experiments aimed at elucidating the molecular mechanism of chronic exposure to dimethylarsinic acid during prostatic development and its potential association with BPH in mice.

RAPID MOLECULAR EVOLUTION OF THE NEURONAL GLYCINE TRANSPORTER SLC6A5 SUGGESTS A MOONLIGHTING FUNCTION IN MALE GERM CELLS

Asha E. Worsham, Emily A. Wright, Megan N. Ashton, Kinsey A. Rich, Lindsey Penrose, Daniel M. Hardy.

Spermatozoa receive multiple extracellular inputs that collectively assure the cell will fulfill its unique destiny, which is to deliver the paternal genetic component to the egg and thereby propagate the species. Many fertilization genes expressed solely in male germ cells have evolved rapidly by positive selection, and are known or suspected to have contributed to processes that drive species diversification. In comparing the molecular evolution of positively selected genes, we observed pervasive and intense positive selection acting upon SLC6A5, a neuronal glycine transporter (aka GLYT2) associated with hyperekplexia (exaggerated startle response) in human patients and in mice. Here, we tested the hypothesis that cryptic expression and, accordingly, an uncharacterized function of SLC6A5 in spermatozoa, underlie the otherwise unexplainable rapid evolution of a transporter with conserved neuronal function. Query of the Human Protein Atlas whole tissue and single cell data sets retrieved RNA-seq data showing, in addition to expected strong brain/neuronal expression, a significant abundance of SLC6A5 mRNA in testis that was notably restricted to haploid/late spermatids. By RT-PCR we confirmed presence of SLC6A5 mRNA in human testis and amplified and sequenced exons 10 through 15 and the upstream 144 exon 16 nt of the SLC6A5 Variant 1 cDNA, G541 through D790. Amplification and sequencing of 5'-end mRNA, and characterization of protein content and transport activity in human spermatozoa are ongoing. Expression in human testis, combined with the gene's rapid evolution by positive selection, suggest a testis variant of SLC6A confers a unique and previously uncharacterized glycine transport function that may modulate sperm-specific membrane events required for successful fertilization.

ASSOCIATIONS BETWEEN THE HACHINSKI ISCHEMIC SCALE (HIS) AND COGNITIVE FUNCTIONING AND ETHNICITY: A PROJECT FRONTIER STUDY

Jeanne Yang; Dr. John Lawrence PhD

Introduction: Cardiovascular risk factors, such as hypertension and obesity, are known to contribute to cognitive decline and dementia, with Alzheimer's disease (AD) and vascular dementia being common outcomes. Mexican Americans face higher rates of cardiovascular risk, which may increase their susceptibility to cognitive impairment. The Hachinski Ischemic Scale (HIS) is used to assess vascular dementia, but its effectiveness in diverse populations, particularly Mexican Americans, remains underexplored. This study examines the relationship between HIS scores, cognitive function, and cardiovascular risk factors, including nicotine use and alcohol use, in Mexican Americans and non-Hispanic Whites from Project FRONTIER. Methods: We analyzed data from 516 participants, using non-parametric

tests to account for non-normal distribution. Spearman's rank correlation was used for continuous variables, while Mann-Whitney U tests were employed for binary comparisons. HIS scores were compared with cognitive measures (MMSE, EXIT25, and RBANS) and cardiovascular risk factors such as nicotine use and alcohol consumption. Results: Significant positive correlations were found between HIS scores and EXIT25 in both non-Hispanic Whites and Mexican Americans ($p < 0.05$). In non-Hispanic Whites, significant negative correlations were found between HIS scores and MMSE, as well as all RBANS subscales ($p < 0.05$). In Mexican Americans, significant negative correlations were observed between HIS scores and the RBANS attention subscale and MMSE ($p < 0.05$). Mann-Whitney U tests revealed significant associations between HIS scores and nicotine use and alcohol consumption in both groups ($p < 0.0001$). Conclusions: Our results suggest that HIS scores are strongly associated with cognitive dysfunction, especially in non-Hispanic Whites. In Mexican Americans, HIS is also related to cognitive impairment. However, certain subscales of RBANS were not significantly correlated. The findings highlight the potential role of cardiovascular risk factors like alcohol and nicotine use in cognitive decline, emphasizing the need to address these disparities and investigate targeted interventions for diverse populations.

ASSESSING SEX-BASED DIFFERENCES IN CSI PREOPERATIVE QUESTIONNAIRES IN PATIENTS WITH PERIPHERAL NEUROPATHY OF THE UPPER EXTREMITIES USING QUICKDASH

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Central sensitization (CS) is an increased responsiveness of the central nervous system with heightened sensitivity. The Central Sensitization Inventory (CSI) is a self-assessment tool for evaluating CS-related symptoms. Research suggests women experience greater pain severity than men. CSI has not been used to assess upper extremity peripheral neuropathy. This study explores whether CSI can predict patient outcomes and if women exhibit greater sensitivity. From 2023 to 2024, administration of CSI was part of the standard of care for patients at an orthopedic hand surgery clinic electing surgery for carpal tunnel syndrome, cubital tunnel syndrome, Guyon canal syndrome. Functional outcomes were assessed using the QuickDASH at preoperative baseline and postoperatively at 1 week, 1 month, 3 months, and 6 months. This study measured 39 surgery patients with peripheral neuropathy. 1 week post-op, men had greater improvement in functionality based on QuickDASH ($p=0.0134$). There was no significant difference between sexes in QuickDASH after 1 week as well as CSI versus QuickDASH. CSI was associated with pre-op QuickDASH scores when given at the same time ($p \leq 0.0001$). QuickDASH scores improved in patients with a CSI score ≤ 30 1 week ($p = 0.0033$), 1 month ($p = 0.0075$), and 3 months ($p = 0.0322$) post-op. Levels of QuickDASH values 6 months post-op reach baseline and are similar to 3 months. Results suggest CSI associates with QuickDASH pre-operatively, revealed by the increase in CSI score as QuickDASH increases. Additionally, there is greater improvement in patients with a CSI score ≤ 30 than patients ≥ 30 1 week, 1 month, and 3 months post-op but levels of QuickDASH begin to level off at 3 months and beyond. This may indicate patients with peripheral neuropathy, regardless of CSI scores, will balance at 1 month. Findings reveal no significant difference in patient functionality between sexes.

VALIDATION OF A MINIMALLY INVASIVE, RAPID, AND SENSITIVE BIOMARKER-BASED TEST FOR ANTE-MORTEM DETECTION OF PRION INFECTION IN FARMED CERVIDS

Savannah Zen; Olivia Torrez; Asha Worsham; Kinsey Rich; Rozenn Kenny Moundounga; and Daniel M. Hardy, PhD

Animal populations serve as reservoirs for zoonotic agents, including prions that cause Transmissible Spongiform Encephalopathies (TSE's). In TSE's, pathological prion induces alternative folding of host prion protein (PrPC) into a pathogenic conformation (PrPSC) that spontaneously aggregates to form highly stable non-covalent oligomers that serve as infectious templates for propagating the disease. TSEs are inevitably fatal, so disease management must focus on preventing transmission, both within and between

species, which in turn requires vigilant surveillance and monitoring. Chronic wasting disease (CWD) is a TSE of cervids (deer species) that is spreading between and among wild and captive populations. Existing ante-mortem tests for CWD require invasive sampling (e.g., excision of lymph nodes) and often yield false positive results, with devastating consequences for farmed herds (all animals destroyed). To overcome this limitation, we are developing a non-invasive test for CWD pathology in white-tailed deer (WTD) that exploits differences in the abundance of serum miRNA biomarkers. Initial analyses revealed sensitivity to interference by hemolysis, requiring exclusion of excessively hemolyzed specimens. Quantification of six potentially diagnostic elk serum miRNAs by digital PCR (dPCR) proved not to be sufficiently informative for CWD detection in WTD. To identify new candidate markers, miRNA-Seq on freshly acquired sera from 50 WTD (25 CWD+, 25 CWD-non-detect) detected 504 of 1028 known miRNAs, including 75 potentially diagnostic targets that discriminated between positive and non-detect animals at $P < 0.05$. We are now quantifying the candidate diagnostic miRNAs by dPCR, and conducting a new round of miRNA-Seq on sera from unexposed WTD sera, to determine whether the test can discriminate between pre-clinical CWD exposed and unexposed animals. This antemortem biomarker-based test may provide capability for rapid, sensitive, and non-invasive monitoring and management of transmission of CWD that is amenable to high throughput scaling.

THE IMPACT OF HORMONAL CONTRACEPTION ON COGNITIVE FLEXIBILITY IN GONADALLY-INTACT FEMALE RATS

Emily Zoorob BS, BA; Megan Kelly BS; Dr. Leah Truckenbrod PhD; Dr. Caitlin A. Orsini PhD

The World Health Organization reports that roughly 850 million people worldwide utilize a modern contraceptive method (2020). Oral contraceptives are one of the most widely used forms of birth control, with an estimated 151 million people on them worldwide (United Nations, 2019). Though they are extremely effective at preventing pregnancy, oral contraceptives also influence levels of endogenous ovarian hormones, which play a role in cognition. Past research has demonstrated that hormonal contraception differentially impacts many cognitive processes including working memory, spatial memory, and place and response memory. Many of these processes are primarily mediated by the hippocampus. However, estradiol affects structural and functional aspects of the prefrontal cortex as well, such as its spine density, volume, and gray matter. The effects of synthetic hormones, such as those found with hormonal contraception, on forms of cognition mediated by the prefrontal cortex (e.g., behavioral flexibility, working memory) are relatively unknown. The goal of this project is to isolate the influence of hormonal contraception on prefrontal cortical mediated cognitive flexibility using the Attentional Set Shifting Task (AST) in rat models.

This objective of this experiment was two-fold: 1) determine the optimal and/or effective dose of synthetic estradiol and progestin to suppress the HPG system (Experiment 1) and 2) identify the effects of this dose on cognitive flexibility, as assessed in the attentional set-shifting task (Experiment 2).

The dose of hormonal contraception used in Experiments 1 and 2 was shown to significantly inhibit serum levels of LH and cause acyclicity. In Experiment 2, there was no significant difference in the visual discrimination task regarding trials to criterion or number of errors made. There was also no significant difference in performance during the set shifting task in trials to criterion, number, or type of errors made.

LITERATURE REVIEWS

THE GUT-BRAIN AXIS IN COGNITIVE DECLINE: A SYSTEMATIC REVIEW OF MICROBIOME IMPACTS ON DEMENTIA

Mohamad Altabaa, Saadeddine Habbal, Musa Imam, Maamoon Mian, Ernesto Ponce-Cruz, Quratulain Shekoh

Emerging evidence highlights the gut-brain axis (GBA) as a critical interface in cognitive decline and dementia pathogenesis. This systematic review synthesizes current research on the role of gut microbiota dysbiosis in neurodegenerative processes, examining underlying mechanisms and therapeutic interventions. Following PRISMA guidelines, we analyzed peer-reviewed studies from PubMed over the past decade, focusing on gut microbiota's impact on Alzheimer's disease (AD), vascular dementia, and related subtypes. Key findings reveal that gut dysbiosis disrupts gut barrier integrity and blood-brain barrier function, facilitating neuroinflammation via pathways such as NLRP3 inflammasome activation and systemic endotoxin leakage. Microbial metabolite imbalances, including reduced short-chain fatty acid (SCFA) production, exacerbate amyloid- β deposition and synaptic dysfunction, while altered neurotransmitter signaling links gut microbiota to cognitive impairment. Interventions such as probiotics and fecal microbiota transplantation (FMT) demonstrate promise in restoring microbial balance, attenuating inflammation, and improving cognitive outcomes, particularly in early-stage dementia. Dietary and lifestyle modifications, notably high-fiber and Mediterranean diets, emerge as effective strategies for enhancing microbial diversity and SCFA synthesis. Importantly, microbiome composition varies across dementia subtypes, with distinct microbial signatures observed in AD versus vascular dementia, suggesting tailored therapeutic approaches. Despite compelling evidence linking dysbiosis to neurodegeneration, gaps remain in understanding causal relationships and long-term efficacy of microbiome-based interventions. This review underscores the gut microbiome as a modifiable risk factor and therapeutic target, advocating for longitudinal human studies and personalized, multidomain strategies to optimize cognitive health in aging populations. Harnessing the GBA offers transformative potential for dementia prevention and management, bridging microbial science, lifestyle medicine, and clinical neurology.

HARNESSING AI FOR TRANSFORMING DEMENTIA CARE: INNOVATIONS IN EARLY DETECTION AND TREATMENT

Adam Amor; Saadeddine Habbal; Maamoon Mian; Musa Imam; Jihane Tahiri; Adam Kacem; Saad Majeed; Farees Syed; Dr. Hemachandra Reddy

Dementia, particularly Alzheimer's Disease, continues to be a significant global health concern, driven by increasing prevalence as the population ages. Early detection and accurate diagnosis are essential for improving patient outcomes and mitigating the associated healthcare burden. Artificial intelligence (AI) has emerged as a powerful tool in dementia care, providing innovative approaches to the early detection, diagnosis, and management of these neurodegenerative conditions. This review examines the role of AI in revolutionizing dementia care by focusing on its application in neuroimaging, biomarker identification, predictive modeling, and therapeutic interventions. The review systematically analyzes literature on AI methodologies, including machine learning, deep learning, and neural networks, for their effectiveness in detecting and managing dementia. Emphasis is placed on AI's integration of multimodal data, such as neuroimaging, genomics, and clinical records, to enhance diagnostic accuracy and predict disease progression. The review also evaluates AI-driven tools for non-invasive screening, personalized treatment planning, and patient monitoring. Findings indicate that AI significantly improves the accuracy and timeliness of dementia diagnoses, often detecting early-stage disease with greater precision than conventional methods. AI's capacity to analyze complex datasets enables earlier interventions, which are critical for slowing the progression of AD. In the realm of treatment, AI-driven approaches are optimizing personalized care, predicting patient responses to therapies, and advancing drug discovery. The integration

of AI into clinical practice is enhancing real-time decision-making and improving overall disease management. In conclusion, AI holds immense potential to transform the future of dementia care. While challenges such as ethical considerations, data privacy, and the need for widespread clinical validation remain, the benefits of AI in early detection, personalized treatment, and improved patient outcomes are substantial. Continued research and cross-disciplinary collaboration will be vital in fully realizing AI's capabilities in addressing the global dementia epidemic.

LITERATURE REVIEW OF MILD COGNITIVE IMPAIRMENT ASSESSMENT TOOLS

Olivia Banister; Stephanie Kopanski, M.D.; Michael Rayel, M.D.

Mild neurocognitive impairment (MCI), defined as an early transitional stage to dementia from healthy aging, is noted as an area of concern for our aging population in the United States. Screening in the primary care setting presents an opportunity for early identification and intervention to delay progression of impairment in patients at risk of dementia. In patients with MCI, factors that predict the development of Major Neurocognitive Disorder is an ongoing area of research. Cognitive screening tools are beneficial but vary in implementation, time required for evaluation, and skills needed for assessment. Due to time constraints in evaluation, screening tools should be brief and accurate. Identification of Minor Cognitive Impairment is crucial for early intervention, family education, and potentially slowing cognitive decline in patients before the onset of dementia. We have conducted a literature review using peer-reviewed articles containing meta-analysis and systematic reviews from PubMed from 2019-2024 to identify available alternative screening tests to the Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA), which are the two most conventionally utilized screening tools. Alternative tests may prove more efficient and accessible for MCI patients, whose principal interactions with the healthcare system are through primary care. We have separated the tests into categories by modality of administration, including in-person, via computer, or over the phone. We then compare the advantages and limitations of the different modalities. Additionally, we compare the ability of each screening to assess cognitive domains (memory, language, orientation, executive functions, praxis, visuospatial abilities, and attention).

CD70-TARGETED CHIMERIC ANTIGEN T-CELL THERAPY FOR CLEAR CELL RENAL CELL CARCINOMA: THE PAST, PRESENT, AND FUTURE, A LITERATURE REVIEW

R. Luke Bradley, BS; Edwin Paul, BS, MPH; Dr. Thomas E. Hutson, DO, PharmD, PHD, FACP

While chimeric antigen receptor T-cell (CAR T-cell) therapy has been used to treat hematologic cancers, the treatment of solid tumors using CAR T-cell therapy remains underexplored. Renal cell carcinoma (RCC) is the most common type of kidney cancer, and was responsible for about 3% of US cancer diagnoses in 2023 and 2024. Clear cell renal cell carcinoma (ccRCC) accounts for about 70% of RCC diagnoses. There are positive outcomes for localized ccRCC, but metastatic, refractory, or relapsed disease eludes efficacious treatment. Further, current regimens do not result in complete responses in a majority of patients. Allogenic CAR T-cell therapy is a promising systemic treatment for ccRCC, as it is patient non-specific and may avoid the toxicities of prolonged, diffuse treatment. Cluster of Differentiation protein 70 (CD70) in particular is an attractive immunotherapy target, due to its high expression in ccRCC and low expression in normal body tissues. Therefore, we performed a comprehensive medical literature review of the safety, efficacy, and future potential of CD70-targeted CAR T-cell therapy for ccRCC, using the PubMed database. CD70-targeted CAR T-cell therapies have shown efficacy during in vitro and early-phase trials for ccRCC. The studies have demonstrated strong cytotoxic activity against RCC cell lines and patient-derived xenograft models, including complete tumor regression. The construct CTX130 exhibits favorable expansion, persistence, and anti-tumor effects, and the first documented complete response in a patient

with RCC. CRX130 achieved a disease control rate of 81.3% with one patient maintaining a durable complete response three years later. Some challenges need to be addressed such as advancements in CAR design, such as CD70 masking strategies and gene-editing techniques (e.g., TALEN-mediated T-cell receptor elimination), enhanced cell production, and mitigated fratricide. Future research should focus on refining CAR constructs to expand clinical trials and to validate long-term efficacy.

A SILENT REVOLUTION: THE TRANSFORMATIVE JOURNEY OF ANESTHESIOLOGY THROUGHOUT HISTORY

Jeremy Buhler, Dr. Cooper Phillips MD

Introduction: Anesthesiology has become an integral part of medical practices within hospitals around the world. Among other responsibilities, anesthesiologists primarily administer anesthetic agents, maintain airways during surgery, and monitor patient vital signs. Beginning with a dentist in the early 1800s administering nitrous oxide, anesthesiology has drastically transformed into the essential specialty it is today. The changes in anesthetic practices throughout history have been highlighted in this literature review.

Methods: Information for this literature review was collected through peer-reviewed resources such as the PubMed database. A total of 35 peer-reviewed sources were identified and used to create a comprehensive literature review regarding the history of anesthesiology.

Results: Many changes have occurred throughout history related to anesthesiology which has drastically altered anesthetic practices. Specifically, changes in anesthetic agents, neuromuscular blockers, technology use associated with anesthesiology, the mechanism of administration of anesthetics, and the medical specialty itself have made large impacts on how anesthesiology is practiced.

Conclusions: In summary, the evolution of anesthesiology throughout the past 200 years has drastically affected patient healthcare outcomes. Understanding the history of anesthesiology provides insights into the importance of continued research and innovation for the specialty.

DEMOGRAPHICS AND FACTORS INFLUENCING MORTALITY AMONG CARDIAC ANGIOSARCOMA PATIENTS: AN ANALYSIS OF THE SEER DATABASE

Nooran Fadhil; Rozi Khan; Aman Goyal; Agha Wali; Abdul Qahar Khan Yasinzai; Bisma Tareen; Marjan Khan; Hafeez Ullah.; Asif Iqbal; Sayed Ab Reshad Ghafouri; Ahmed M. Mahmood; Amir Sohail; Sethi Pooja; Wael AlJaroudi; Asad Ullah

Background and Aims: Cardiac angiosarcoma is a rare and highly aggressive cancer originating from the endothelial cells lining the heart. It accounts for approximately 30% of all primary cardiac tumors. Given its aggressive nature and poor prognosis, enhancing our understanding of its epidemiology and the factor's influencing mortality is critical. **Methods:** The Surveillance, Epidemiology, and End Results (SEER) database was utilized to gather data spanning from 2000 to 2021. **Results:** We identified 194 patients with cardiac angiosarcoma, of which 102 were males and 92 were females. The majority of patients were aged 50 years or younger (59%) with a slightly higher incidence in blacks (18%). Mortality data showed that 91% of the diagnosed patients died (n=176), with a mean survival period of 15 months after diagnosis. The overall survival rate at 1 year was 0.461 with 95% confidence interval (95% CI: 0.39-0.53). Larger tumor size (>10 cm) (p=0.273), and grade III and IV tumors (p=0.682), were associated with increase in mortality. Advanced age (51-70 years) (Hazard ratio (HR): 0.57; 95% CI: 0.003-1.14; p=0.049), distant stage (HR: 0.91; 95% CI: 0.01-1.83; p=0.047), patients who did not receive therapeutic radiation therapy (HR: 2.69; 95% CI: 0.10-5.28; p=0.042), and patients who did not undergo surgical resection (HR=1.232; 95% CI: 0.69-1.77; p<0.001) were factors also associated with increased mortality. **Conclusions:** Cardiac angiosarcoma is associated with a high mortality rate. Factors contributing to increased mortality include advanced age, distant stage of disease at diagnosis, not receiving radiation therapy, and not undergoing surgical resection.

DISPARITIES IN REPERFUSION THERAPY IN CAUCASIAN WOMEN, AFRICAN AMERICANS, AND HISPANICS FOR ST-ELEVATION MYOCARDIAL INFARCTION PRECIPITATED CARIOGENIC SHOCK IN THE USA

Mark Gao, Brenden Burkholder, Mohammad Ansari, MD

Background: Cardiogenic shock (CS) complicating ST-elevation myocardial infarction (STEMI) remains a leading cause of mortality despite advances in reperfusion therapy and mechanical circulatory support (MCS). Previous studies have identified racial, ethnic, and gender disparities in the treatment of STEMI-CS. This literature review examines recent data to assess the current state of these disparities in Caucasian women, African Americans, and Hispanic patients in the United States.

Objectives: To review disparities in the treatment of CS complicating STEMI with a focus on PCI and MCS utilization across different racial and gender groups. The study also aims to identify gaps in the literature and suggest areas for future research.

Methods: A comprehensive search of electronic databases, including PubMed, CINAHL, Scopus, and others, was conducted to identify relevant studies published between January 2013 and December 2023. The review focused on national data from the United States, examining disparities in the use of PCI, CABG, thrombolytics, and MCS, as well as mortality outcomes and prehospital care metrics.

Results: Black patients with STEMI-CS were found to have lower rates of PCI, CABG, and MCS compared to white patients, along with delayed prehospital care and higher in-hospital mortality. Hispanic patients showed mixed outcomes, with white Hispanics receiving PCI at comparable or higher rates than non-Hispanic whites but facing longer times to treatment. White females had lower rates of STEMI-CS and better mortality outcomes but were less likely to undergo invasive procedures.

Conclusion: Significant disparities persist in the treatment of STEMI-CS among different racial and gender groups in the United States. These findings highlight the need for further research to address these disparities and improve outcomes for all patients. Future studies should focus on understanding the mechanisms behind these disparities and developing interventions to ensure equitable care.

THE IMPACT OF NEURODEGENERATIVE DISEASES ON BONE HEALTH MECHANISMS, CLINICAL IMPLICATIONS, AND FUTURE DIRECTIONS

Saadeddine Habbal; Musa Imam; Mohamad Altabaa; Ernesto Ponce-Cruz; Quratulain Shekoh; Jihane Tahiri

Neurodegenerative diseases, including Alzheimer's disease (AD), Parkinson's disease (PD), Huntington's disease (HD), and multiple sclerosis (MS), are associated with progressive neuronal dysfunction and cognitive or motor impairments. While their neurological impacts are well-documented, the effects on bone health remain underrecognized. This review explores the mechanisms linking neurodegeneration to skeletal deterioration, emphasizing the role of systemic inflammation, oxidative stress, hormonal imbalances, and metabolic dysfunction in bone loss. A comprehensive literature review was conducted to analyze studies investigating the relationship between neurodegenerative diseases and bone mineral density (BMD). Research highlights that chronic neuroinflammation, driven by pro-inflammatory cytokines, promotes osteoclast-mediated bone resorption while suppressing osteoblast activity. Oxidative stress further contributes by inducing osteoblast apoptosis and prolonging osteoclast survival. Additionally, metabolic dysfunction in neurodegenerative conditions disrupts calcium homeostasis, impairing bone remodeling. Findings reveal disease-specific skeletal effects, with AD-associated bone loss linked to amyloid-beta pathology and decreased physical activity, while PD-related BMD reductions result from endocrine changes and motor dysfunction. Similarly, HD and MS increase osteoporosis risk through neurohormonal dysregulation and systemic inflammation. Given these associations, integrating bone health assessments into routine neurodegenerative disease care is crucial for preventing skeletal complications. Advancements in artificial intelligence (AI) and biomarker-based detection strategies could facilitate early identification of at-risk individuals. Moreover, targeted interventions, including resistance training, vitamin D supplementation, and pharmacological therapies, may help preserve skeletal integrity.

Addressing the interplay between neurology, endocrinology, and musculoskeletal health is essential to reducing fracture risk, enhancing mobility, and improving overall quality of life in affected populations.

HYALURONIC ACID-BASED BIOMATERIALS IN PERIPHERAL NERVE REGENERATION: A SYSTEMATIC REVIEW

Caroline Cushman BS, Maryam Salimi MD, Evan Hernandez MS, Ruthvik Allala MD, Anceslo Idicula MD, Tammam Hanna MD, Brendan MacKay MD

Introduction: Hyaluronic acid (HA)-based biomaterials enhance peripheral nerve regeneration by reducing scarring, promoting axonal growth, and improving functional recovery, potentially surpassing autografts in efficacy.

Methods: A systematic review was conducted following PRISMA guidelines, examining studies published between January 2000 and August 2024. The inclusion criteria were studies evaluating HA in peripheral nerve injury models or repair. Data was extracted on study design, sample size, type of intervention (HA-based materials), and outcome measures (e.g., sciatic functional index, compound muscle action potentials, histological analysis). Statistical analysis involved comparing the efficacy of HA treatments in various models, including crush and transection injuries, with control groups and autograft outcomes.

Results: A total of 48 studies met the inclusion criteria. Functional outcomes, including sciatic functional index (SFI), compound muscle action potentials (CMAP), and nerve conduction velocity (NCV), showed HA-based materials significantly improved nerve function, with results comparable to or exceeding autografts. Histological evaluations demonstrated enhanced axonal regeneration, myelination, and reduced scar formation. Novel HA formulations, such as HA-loaded exosome scaffolds and magnetically stimulated hydrogels, yielded promising results. Studies involving long-gap nerve defects showed improved structural support and recovery with HA-based conduits.

Conclusion: HA-based biomaterials demonstrate significant potential in improving peripheral nerve repair, offering advantages over traditional methods such as autografts. Functional recovery metrics (SFI, CMAP, NCV) and histological analysis consistently showed enhanced nerve regeneration and reduced fibrosis with HA interventions. Future clinical trials and standardized methodologies are needed to fully translate these findings into clinical practice.

ADVANCING ULCERATIVE COLITIS MANAGEMENT: THE ROLE OF ARTIFICIAL INTELLIGENCE IN DIAGNOSIS, PROGNOSIS, AND TREATMENT

Musa Imam; Mohamad Altabaa; Saadeddine Habbal; Maamoon Mian; Quratulain Shekoh; Ernesto Ponce-Cruz, Mohammed Alhabib, Dr. P. Hemachandra Reddy, PhD

Introduction Ulcerative colitis (UC) is a chronic inflammatory bowel disease characterized by relapsing-remitting inflammation of the colon. Despite advancements in diagnostics and treatment, challenges remain in disease assessment, prognosis, and therapeutic decision-making. Artificial intelligence (AI) has emerged as a powerful tool to enhance diagnostic accuracy, predict outcomes, and personalize treatment. This review examines AI applications in UC, focusing on endoscopic and histological evaluation, biomarker discovery, and treatment optimization. **Methods** This literature review draws insights from a comprehensive analysis of 55 recently published articles concentrating on the role of artificial intelligence in UC. A systematic search was conducted using PubMed with search terms related to ulcerative colitis and artificial intelligence. Studies were selected based on relevance, quality, and contributions to AI-driven advancements in UC management. **Result** AI-based endoscopic evaluation, including convolutional neural networks and the PICaSSO scoring system, has improved disease severity assessment and mucosal healing prediction. Histological AI applications have demonstrated high accuracy in distinguishing active from

quiescent UC and predicting clinical outcomes. AI-driven biomarker analysis has identified novel genetic markers, enhancing patient stratification and treatment response prediction. Machine learning models have shown promise in forecasting therapeutic efficacy, while AI-assisted robotic surgery is emerging as a tool for optimizing surgical outcomes. Conclusion AI is transforming UC management by refining diagnostics, standardizing assessments, and enabling personalized treatment. While significant progress has been made, further validation and clinical integration are needed to maximize its potential. Future advancements should focus on improving AI model generalizability, minimizing biases, and ensuring ethical implementation to enhance patient outcomes.

PREPARING EMERGENCY MEDICINE RESIDENTS TO LEAD LEVEL 1 MULTISYSTEM TRAUMA TEAMS: A SCOPING REVIEW

Aliya Khan, BSA; Caroline Cushman, BS; Stephanie Stroeve, PhD, MPH; Trey Morris, MD

Emergency Medicine (EM) physicians in many U.S. hospitals, particularly rural or critical access settings, often lead trauma resuscitations in the absence of surgeons. However, current training opportunities for EM residents to act as trauma team leaders during Level 1 trauma scenarios are inconsistent across programs. This scoping review evaluates available evidence-based training methodologies to identify strategies that enhance EM residents' competence and confidence in leading trauma teams. A systematic search was conducted in PubMed and Embase on March 27, 2024, selecting studies published after January 1, 2000. The search included original research studies regarding Level 1 trauma training for EM residents and excluded systematic reviews, non-English articles, and studies unrelated to trauma leadership. Data extraction followed a double-blind process using Covidence, with discrepancies resolved by an arbiter. Study designs, training curriculum, participant characteristics, and outcomes were analyzed. Of the 914 studies, 23 articles met inclusion criteria. Combined training models integrating simulation with didactic sessions, mental practice, or video analysis showed superior outcomes, improving leadership, non-technical skills, and clinical competence. One study demonstrated that mental practice enhanced team-based skills with a significant effect size ($r = 0.67$, $p < 0.01$). Junior residents benefitted most from early, immersive interventions. Challenges included translating simulation improvements to real-world scenarios and ensuring skill retention. Simulation and combined training methods effectively enhance EM residents' readiness to lead Level 1 trauma teams. EM residency programs have several options available to enhance trauma readiness, though further evaluation of specific programs is necessary. Future research should emphasize standardizing curricula and exploring innovative, sustainable training approaches to bridge this critical preparedness gap.

SIDE EFFECTS OF KETAMINE 2 WEEKS POST TREATMENT IN PATIENTS WITH TREATMENT RESISTANT DEPRESSION

Nga Le; Raluchukwu Onejeme; Julie Sang; Dr. Regina Baronia MD M.Ed

Introduction: Treatment-resistant depression (TRD) affects approximately 30% of individuals who fail to achieve remission after two or more first-line antidepressant treatments. Ketamine, an N-methyl-d-aspartate (NMDA) receptor antagonist, has emerged as a promising intervention for TRD due to its rapid antidepressant effects. While existing research has focused on short-term outcomes, the long-term safety, efficacy, and subgroup-specific effects of ketamine remain underexplored. This review aims to assess current evidence on ketamine's side effects, long-term outcomes, and potential pre-existing psychological condition interactions.

Methods: A literature review was conducted using Google Scholar and Pubmed, and the search terms "ketamine," "side effects," and "depression." Inclusion criteria focused on systematic reviews and meta-analyses examining adult patients with TRD related to major depressive disorder (MDD).

Results: Ketamine demonstrates rapid antidepressant effects for treatment-resistant depression (TRD) but

is associated with transient side effects, including dissociation, dizziness, and blurred vision, which resolve within hours. Repeated or higher-dose infusions extend therapeutic benefits but carry increased risks of hemodynamic instability (e.g., hypertension, tachycardia) and cognitive impairments. The most common reasons for treatment withdrawal include worsening mood, anxiety, and suicidal ideation. Pre-existing conditions potentially influence outcomes but are considered safe; bipolar disorder patients experience transient mania, while PTSD patients show varied responses, with military veterans often improving.

Conclusions: Ketamine is a promising treatment for TRD, offering rapid symptom relief and extended benefits with repeated dosing. Side effects are generally mild and transient, risks increase with higher doses and pre-existing conditions. However, long-term safety data remain limited, and further research with systemic side effect monitoring and extended follow-up is needed. In summary, the findings of this review highlight the importance of following up long term, and the need for further studies to recruit participants based on pre-existing comorbidities.

EFFICACY AND SIDE EFFECTS OF GTE ON FACIAL SKIN AGING: A SYSTEMATIC REVIEW

Taryn Lubbers, BS; Cyrus W. Abrahamson, BA; Paavali A. Hannikainen, MD; and James C. Wang, MD, PhD

There has been an increasing demand for natural cosmeceuticals that can be used for their anti-aging effects. Green tea extract (GTE) is known as a powerful antioxidant which makes it a promising candidate for combating photodamage and skin aging. PubMed, Ovid MEDLINE, CENTRAL, and Embase were utilized to conduct a systematic review according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines. Studies were excluded if they did not utilize the epigallocatechin gallate (EGCG) component of GTE, did not focus on facial skin aging, were not controlled trials, used a green tea beverage exclusively, or if the full text was unavailable. 387 studies were found, from which eight studies about the effects of GTE on facial skin aging were extracted. Five of the studies measured skin elasticity which all found some degree of improvement after treatment with GTE. The appearance of wrinkles was also measured by five studies. Through the use of skin topography instruments, physician assessments, and patient self assessments, four of the five studies reported a decrease in fine line wrinkles. One study found no significant changes in wrinkle depth or appearance. The effect of GTE on skin irritability (erythema, inflammation, and dryness) was debated. Other notable effects include an improvement in skin tone, texture, radiance, scavenging ability, firmness and density. Supplemental GTE shows potential as an anti-aging compound for facial skin but more studies are needed as the literature is varying and sparse.

THE IMPACT OF SLEEP AND EXERCISE ON BRAIN ATROPHY IN MILD COGNITIVE IMPAIRMENT

Maamoon Mian; Jihane Tahiri; Ali Alhaque; Saadeddine Habbal; Mohamad Altabaa

Chronic sleep deprivation and lack of physical exercise may have detrimental effects on overall health, particularly in terms of brain health, with significant implications for cognitive function and well-being. This review explores the impact of chronic sleep deprivation and physical exercise on brain atrophy in mild cognitive impairment (MCI) and Alzheimer's disease (AD). Drawing insights from 40 selected studies, the review synthesizes evidence on these lifestyle factors' correlations with neurodegenerative changes. Chronic sleep deprivation disrupts circadian rhythms and neurochemical pathways, potentially accelerating brain atrophy, while physical exercise preserves brain structure by enhancing vascular health, reducing inflammation, and supporting synaptic plasticity, particularly in regions like the hippocampus. Results highlight distinct patterns of brain atrophy in AD and MCI, underscoring the potential for targeted interventions to mitigate cognitive decline. Understanding the relationship between sleep disruption and brain health provides insights into strategies for possibly delaying neurodegenerative diseases like MCI, which represents a milder form of Alzheimer's, and AD. The findings underscore the potential utility of

integrating sleep therapy and physical exercise interventions in clinical practice for early detection of mild cognitive impairment and potentially delaying disease progression. This integrated approach has been found to promote healthy aging, reduce atrophy rates, and enhance cognitive resilience across aging populations.

EFFECTIVENESS OF PROPHYLACTIC TRANEXAMIC ACID FOR PREVENTION OF INTRAOPERATIVE, PRIMARY, AND SECONDARY TONSILLECTOMY BLEEDS: A REVIEW OF THE LITERATURE

Jolee Nguyen; Megan Nguyen; Nathan Tran; Zach Salter; Winslo Idicula, MD

Introduction: Tonsillectomy is a common surgical procedure indicated for recurrent tonsillitis, obstructive sleep apnea, and more. It is commonly associated with intraoperative and post-operative bleeding. Tranexamic acid (TXA), known for its antifibrinolytic effects, has been suggested as a prophylactic treatment to reduce the risk of bleeding events, though its effectiveness remains unclear due to conflicting evidence in existing data. This literature review aims to better define TXA's efficacy in preventing intraoperative, primary, and secondary bleeding after tonsillectomy. **Methods:** We performed a conventional literature search on Pubmed and Google Scholar without restrictions on publication date. Search terms included: "perioperative tranexamic acid", "post-tonsillectomy hemorrhage", and "post-operative hemorrhage". The selected articles identified intraoperative, primary, or secondary hemorrhages as the outcome variable. Furthermore, studies were included if they administered intravenous or topical TXA before patients underwent tonsillectomy. **Results:** A total of 16 articles were used in our literature review. TXA was commonly administered intravenously at a weight-based dose, often 10 mg/kg body weight. 10 studies revealed that prophylactic TXA yielded reductions in post-tonsillectomy bleeding. Furthermore, TXA reduced the average duration of bleeding in patients. While some studies did not reveal a significant beneficial effect of TXA for hemorrhage, some found that it reduced operation duration. **Conclusion:** TXA may reduce blood loss and frequency of tonsillectomy-related bleeds. Further clinical trials with larger sample sizes are required to determine its clinical significance with more certainty. Defining TXA's use as therapy for tonsillectomy-related bleeds may allow for an increase in its use in the field of otolaryngology.

THE IMPACT OF THE HOUSING FIRST INITIATIVE ON SUBSTANCE USE DISORDER AMONG YOUTHS IN THE UNITED STATES. A CRITICAL REVIEW OF THE LITERATURE.

Joy Osaji, MD, MPH; Heidi Pargas, MD; Elliott Norman; Regina Baronia, MD, M.Ed; Duke Appiah, Ph.D., MPH

Introduction

Housing First (HF), a model prioritizing stable housing without preconditions for sobriety or treatment, has become an effective strategy for addressing homelessness and related issues. This critical review examined the impact of the HF initiative on substance use disorder (SUD) among youths in the United States.

Methods

To critically appraise existing literature on this topic, a search was conducted through seven databases: PubMed, OVID, ClinicalKey, CINAHL, Cochrane, ScienceDirect, and Scopus, and used search terms: HF, Juvenile, youths, substance use disorder, drug abuse, adolescents, mental illness, substance abuse, homelessness, and treatment outcomes. The initial search yielded 2,081 articles; after screening the titles, 50 articles were selected, and then 20 articles after removing duplicate articles. Five articles met the inclusion criteria (Studies that looked at the impact of housing first on youths with SUD, published between 2014 and 2024, conducted in the United States) and exclusion criteria (conference papers, editorials, and notes). The five articles were critically appraised using the Johns Hopkins Nursing Evidence-Based Practice, Evidence Level, and Quality Guide.

Results

Most of the literature found that youths were less likely to use illicit/recreational drugs when the HF

initiative was combined with other support services like substance use treatment and social services than if it was the only initiative. However, most of the studies looked only at short-term outcomes for substance use disorders.

Conclusion

In conclusion, While the HF initiative shows great promise in improving the mental health and substance use of youths experiencing homelessness, a long-term, large-size, multicentered RCT will shed more light on its sustainability and efficacy in supporting this vulnerable population toward sustained abstinence from substance use.

THE IMPACT OF AI ON BRIDGING THE GAP IN HEALTH DISPARITIES

Bridget C. Ogbuagu

Introduction With the significant advancements in technology society has made with artificial intelligence, the value it has in the healthcare field has become a topic of growing discussion. The potential impact AI has, lies not only in the advancement of medical practices, but in addressing the various health disparities that exist. The revolutionary means in which AI can provide to exacerbate these disparities is worth examining. This paper will present a review of the implementation of AI in healthcare as a means to mitigate health inequities and explore the ethical considerations of its widespread adoption in bridging the gap in patient outcomes caused by health disparities. **Methods** A literature review was conducted using peer-reviewed articles from PubMed and Google Scholar. Selected publications focused on AI's role in mitigating health disparities, examining its benefits, challenges, and ethical concerns related to bias. **Results** Several publications were identified and the findings suggest that AI has the potential to enhance diagnostic accuracy and accessibility. While both positive and negative effects were noted, concerns about bias in AI present a significant challenge to its potential of future widespread implementation. Despite this, research consistently supports AI's role in improving patient outcomes and addressing health disparities. **Conclusion** AI presents a promising outlook in reducing health disparities. Its effectiveness, however, may be clouded due to unaddressed bias which further has ethical implications. Further research is needed to ensure the implementation of AI is done so ethically and responsibly to support the goal of enhancing health equity.

USE OF MIDODRINE TO DISCONTINUE INTRAVENOUS VASOPRESSORS IN PATIENTS IN INTENSIVE CARE UNITS

Ava Oliver; Akash Dev, MBA; Kenneth Nugent, MD

Purpose

Patients in ICUs who require prolonged treatment with intravenous vasopressors are often started on midodrine to discontinue the intravenous medications. Midodrine is an alpha-1 adrenergic agonist used to treat hypotension in acutely and chronically ill patients. The potential benefits during ICU management include the discontinuation of intravenous medications and earlier transfer out of the intensive care unit. There have been conflicting data on the efficacy of midodrine therapy in weaning patients off intravenous vasopressors.

Methods

The PubMed database was searched using the MeSH terms "midodrine" and "vasoconstrictor agents". The search filters included clinical study and adults 19+ years of age. Studies on patients with cirrhosis were not reviewed.

Results

Six clinical studies have investigated the use of midodrine in patients on vasopressors in intensive care units (Table). Two randomized controlled trials (RCT) with 62 and 132 patients who required vasopressors for more than 24 hours reported results with the addition of midodrine and found no differences in the time needed to wean vasopressors or ICU length of stay. One RCT reported a reduced time needed to wean vasopressors and reduced overall costs in patients started on midodrine. Three other studies (one case control and two retrospective) reported the outcomes with midodrine in the reduction of vasopressor support time. These studies concluded that midodrine had limited efficacy, was possibly useful as adjunctive therapy, and might reduce support time. Side effects included significant bradycardia in one case.

Conclusion

In conclusion, midodrine did not have a consistent effect on time required to wean vasopressor medication or ICU length of stay. Only 3 studies have used a randomized controlled trial design, and these studies did not have homogeneous patient populations. Midodrine can be associated with significant bradycardia. Clinicians should rethink the use of this drugs in patients requiring prolonged administration of intravenous vasopressors.

RAPID LITERATURE REVIEW ON MENTAL HEALTHCARE BARRIERS, PERCEPTIONS & CURRENT PRACTICES FOR REFUGEE POPULATIONS IN THE UNITED STATES

Emily M. Ostermaier, MPH Serena Rodriguez, PhD, MA, MPH

Refugees who leave their home countries to move to the United States often struggle with post-traumatic stress disorder (PTSD) or major depressive disorder (MDD) following exposures to war, famine, and other crimes. However, screening and treatment for mental health disorders amongst refugees in the United States remains limited and ineffective. This rapid literature review was completed through PubMed to identify mental healthcare access, perceptions, and practices in the United States from the perspective of refugees. Studies were included if they discussed mental health services and strategies for delivery to care of adult patients with refugee status in the United States. Excluded studies included those published outside the United States, published before 2000, written in a language other than English, lacked full text, or discussed viewpoints that deviated from the main discipline. It was found that perceptions of refugees seeking mental healthcare often did not align with current mental health practices in the US, adding to barriers to care. Additionally, mental health professionals reported a lack of training for caring for this population. The purpose of this study is to guide future practices within mental healthcare to effectively care for this unique population following displacement to the United States.

ASSESSMENT OF MICROBIAL TRANSMISSION BY INSECT VECTORS IN HEALTHCARE SETTINGS: A SYSTEMATIC REVIEW

Rishi Patel; Barrett Meeks; Nicholas Schouten; Dr. Jennifer Hanrahan, DO, MSc; Dr., John Stuart, PhD; Dr. Kendra Rumbaugh, PhD; Dr. Stephen P. Diggle, PhD; Dr. Stephanie Stroever, PhD.

Introduction: Healthcare facilities have a core responsibility to safeguard patients' health and safety. While stringent control measures are in place, controlling insects in healthcare environments remains an area in need of further evaluation. Current guidelines emphasize prevention but fail to address the increased risk of nosocomial pathogen transmission via insect vectors, leaving a gap in protocols for effective management. This study aims to explore knowledge regarding microbial transmission by insects in healthcare settings, quantify the risk to patients, and develop decision-making tools for hospital leadership.

Methods: The systematic literature search used subject headings like "insects," "microbial transmissions," "insect vector," "insecta," and "cross infection" to build a reproducible MEDLINE search within PubMed, later

translated across Embase, CENTRAL, and supplemental resources. Over 1000 studies were retrieved, deduplicated via Covidence, and 655 eligible articles screened. 36 peer-reviewed studies on insects in healthcare settings (e.g., hospitals, clinics, rehabilitation centers) were included for data extraction and analysis. Excluded studies were non-English without translation or unrelated to healthcare. Outcomes included colonizing organisms, microbial transmission, and multidrug-resistant pathogen prevalence. Bias was assessed using LEGEND criteria. Data were synthesized via the Cochrane Review for Systematic Reviews and Joanna Briggs Institute frameworks.

Results: Of the analyzed studies, most were from low- to middle-income countries and included the study of common insects such as cockroaches, ants, and various classes of flies. Evidence-based methods analyzed insect surfaces and contents. Only two studies demonstrated likely bacterial transmission, but all reported robust colonization of insect vectors with pathogenic microbes, including multidrug-resistant bacteria.

Conclusions: This review highlights the potential role of insects in microbial transmission in healthcare settings. However, most studies failed to establish a direct link between insects and pathogen transmission. Further research into areas such as multi-drug resistance transmission via insect vectors is needed.

AI IN DIABETIC RETINOPATHY

Ernesto Ponce-Cruz; Quratulain Shekoh; Mohamad Altabaa; Zahraa Hmood; Musa Imam; Zoya Waheed; Reddy P. Hemachandra, PhD

Diabetic Retinopathy (DR) represents a significant microvascular complication of diabetes mellitus, leading to retinal damage and potential blindness. As the global prevalence of diabetes increases, the burden of DR continues to rise, posing challenges to healthcare systems, particularly in resource-limited settings. Early detection and timely intervention are critical in preventing disease progression and vision loss. This paper explores the role of Artificial Intelligence (AI) in revolutionizing DR detection and management. AI-based tools, including machine learning algorithms, have demonstrated remarkable efficacy in screening, grading, and monitoring DR by analyzing retinal images with high accuracy. These advancements not only augment clinical decision-making but also address gaps in access to specialized care. However, challenges such as data quality, algorithm bias, and integration into clinical workflows remain. This review emphasizes the potential of AI to transform DR care and highlights the need for continued research and collaboration to optimize its implementation globally.

DOES OBESITY INCREASE THE RISK OF POSTMENOPAUSAL ESTROGEN RECEPTOR POSITIVE BREAST CANCER?

Aamrin Rafiq; Dr. P. Hemachandra Reddy, PhD

Abstract

Background

Breast cancer is the leading cause of cancer among women. Obesity is a breast cancer risk factor. The aim of this study is to examine whether obesity can increase the risk of postmenopausal breast cancer. Research has shown that there is a 1.5-2 times higher risk of getting estrogen receptor positive (ER+) breast cancer among obese women who have gone through menopause. The research specifically looked at the estrogen receptor positive breast cancer because estrogen production increases with an increase in body mass index (BMI). Breast cancer risk also increases with the age of the individual.

Methods and Materials

The Breast Cancer Surveillance Consortium showed that ER+ women with a BMI of 25-29.9 kg/m² were at a

greater risk of postmenopausal breast cancer compared to the BMI of 18.5-24.9 kg/m². The 95% CI: (1.21,1.35) and the Relative Risk (RR)=1.28, which was statistically significant (p<0.001). The BMI of 30-34.9 kg/m² was at a greater risk than the BMI of 18.5-24.9 kg/m², RR=1.53, 95% CI: (1.41-1.66). The Women's Health Initiative showed that women with a BMI≥30 kg/m² had a higher chance of being ER+ compared to BMI of 18.5-24.9 kg/m², RR=1.26, 95% CI: (1.13-1.41). A BMI of 25-29.9 kg/m² had a higher chance of being ER+ compared to BMI of 18.5-24.9 kg/m², RR=1.13, 95% CI: (1.05-1.22).

Results

These findings suggest that obesity plays a major role in the increased risk of postmenopausal breast cancer. Having the ER+ receptor makes postmenopausal women more likely to have a higher rate of estrogen production which can increase tumor growth. There is a higher chance of getting breast cancer among Asian, European, African, and North American obese postmenopausal women.

Conclusions

Aromatase inhibitors may help improve the condition of postmenopausal breast cancer by decreasing estrogen levels. Tamoxifen has been shown to be an effective treatment for low-risk postmenopausal breast cancer women. Exercise and diet can help decrease adiposity and estrogen production.

Keywords: breast cancer, postmenopausal, obesity, estrogen, leptin, adiponectin, adipose tissue

CHILD MALTREATMENT IN CHILDREN WITH MEDICAL COMPLEXITY AND DISABILITY

Whitney Reinke, MS-2; Shravya Yarlagadda, MS-2; Samantha Alley, MS-2

Introduction: Child maltreatment is common and pediatric healthcare providers are becoming increasingly aware of risk factors and signs of abuse.¹⁻⁴ Children with disabilities and those with special medical needs are recognized as a population at increased risk of child abuse. Understanding this risk and recognizing that not all disabilities confer the same risks can provide deeper insight for pediatric providers regarding the support these children and their families need to prevent and reduce maltreatment. Methods: Articles from the past 20 years were searched on Pubmed and Google Scholar with search terms: child maltreatment, chronic health conditions, neglect, abuse, and medical neglect. The 38 relevant articles were reviewed and analyzed according to type of abuse and type of disability or chronic condition. Results: Child maltreatment varied based on both the child's type of chronic health condition and the type of abuse the child experienced. These results especially varied based on the amount of healthcare interaction the child's health condition required. Conclusion: We summarized these variations and closed with recommendations for pediatric providers, so they can better recognize risk factors and mitigate possible abuse situations.

THE REALITY OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE: ADDRESSING DISPARITIES AND THE NEED FOR SOLUTIONS

Kiran Sagani MBA/BS; Umisha Khoja, BS; Dr. Ming-Chien Chyu, PhD; Dr. Chwan-Li (Leslie) Shen, PhD

Background: Artificial intelligence is revolutionizing today's world by automating tasks, optimizing decision-making, and fostering innovations. So far, healthcare AI is mainly used in hospitals for improving diagnostics, increasing efficiency, automating surgical procedures, etc. However, a large population in society with common diseases have yet to benefit from AI. For example, osteoarthritis (OA) is a degenerative ailment leading to pain, stiffness and disability, also escalating prevalence. Most OA patients rely on over-the-counter (OTC) treatments for temporary pain relief. Using AI to develop a user decision-making model that can recommend OTC treatment while taking in account demographics and possible risk factors would surpass current medical procedure. The objective of the current research is to search for personalized AI decision-making models that can recommend the best common disease treatments for individuals. Method: Due to rapid progress of AI technology, internet search reveals much more updated information than scientific literature databases. Results: FDA has approved over 900 AI devices, with only

8.42% available for public use. In 2022, 85,739 patents were approved in the United States, only 11,366 were potentially healthcare related. This disparity can be attributed to factors such as cost, return on investment, challenges with data collection and security, and biases in the currently available data. Based on our search, few AI models for personalized treatment of common diseases freely accessible to the public exist at present. There are also few off-the-shelf commercial AI tools available to develop such a model. Conclusion and recommendation: A potential solution for making AI models widely available and useful is crowdsourcing, a form of data collection that could reduce the cost and barriers to obtaining reliable data. Utilizing information directly from individuals can be leveraged to develop AI algorithms and bridge gaps in accessibility, therefore reducing deferred medical services, burden on healthcare professionals, and healthcare disparities.

ADVANCES IN ATRIAL FIBRILLATION ABLATION: A COMPREHENSIVE REVIEW OF TECHNIQUES, OUTCOMES, AND PATIENT CONSIDERATIONS

Farhood Salehi; BS, Rishi Patel; BS, Maamoon Mian; BS, Sameh Girgis; MD

Atrial fibrillation, the most common sustained cardiac arrhythmia, significantly impacts morbidity, mortality, and healthcare costs. Catheter-based ablation is a key intervention for patients with drug-refractory A-fib. This review compares the efficacy, safety, and clinical outcomes of various ablation techniques, focusing on recent advances and the role of comorbidities in determining success. Methods: A literature review of peer-reviewed articles and clinical guidelines examined ablation techniques, including radiofrequency ablation, cryoablation, laser ablation, and pulsed field ablation. Data from clinical trials, meta-analyses, and observational studies were synthesized to evaluate procedural efficacy, recurrence rates, complications, and long-term outcomes. Patient characteristics such as age, comorbidities (heart failure, obstructive sleep apnea, hypertension), and institutional factors were also analyzed. Results: RF ablation and cryoablation remain widely used, with cryoablation often favored for shorter procedure times and lower complication rates in certain studies. However, both methods require further optimization to reduce risks and improve patient outcomes. Emerging techniques like PFA show promise in minimizing collateral tissue damage and reducing complications, particularly in patients with complex comorbidities. Comorbidities such as heart failure and obesity significantly influence ablation outcomes, while operator expertise and high-volume centers are linked to better results. Innovations in 3D electroanatomical mapping and contact force-sensing catheters have further enhanced procedural precision, particularly in persistent A-fib cases. Conclusion: Individualized treatment is essential in A-fib ablation, with technique selection tailored to patient comorbidities, clinical features, and institutional expertise. Further randomized trials are needed to optimize ablation strategies in diverse patient populations.

OUTCOMES OF METHYLENE BLUE TREATMENT IN SEVERE SEPTIC SHOCK

Julie Sang, MPH; Anuhya Alapati, MD; Kenneth Nugent, MD

Introduction: Methylene blue (MB) has been proposed as a therapeutic agent in septic shock due to its vasoconstrictive properties and ability to inhibit nitric oxide synthase. The purpose of this study is to perform a comprehensive review of the physiological and clinical outcomes of MB administration in patients with severe septic shock.

Methods: A literature review was conducted using the PubMed database to identify randomized controlled trials (RCTs) and prospective studies involving patients with septic shock treated with MB. The search terms "methylene blue" and "septic shock" identified 142 unique articles published between 1990 and 2024. Studies were then carefully filtered and selected based on relevance.

Results: A total of 10 studies and 296 patients were included in the review. MB administration was consistently associated with a significant increase in mean arterial pressure. MB was also associated with

increases in mean pulmonary artery pressure, systemic and pulmonary vascular resistances, and left-ventricular stroke work index. Clinical outcomes were less frequently reported, but more recent studies demonstrated reduced time to vasopressor discontinuation and shorter length of ICU stay. Mortality benefits were inconclusive, however, with no significant differences in survival rates. MB was generally well-tolerated, although transient increases in methemoglobin levels were reported in some patients. Conclusions: Methylene blue shows promise in improving hemodynamic parameters in patients with severe septic shock. However, the translation of these physiological improvements into consistent clinical benefits remains uncertain. Further studies are needed to assess clinical outcomes and better define the role of methylene blue in septic shock treatment.

EVALUATING THE EFFICACY OF TOPICAL THERAPIES AGAINST BIOFILM FORMATION BY CARBAPENEM-RESISTANT ACINETOBACTER IN BURN CARE

Lara Shehadeh, BA; Jonathan Chavira, BS; Michael Selby, BA; Andrew Ibrahim, BS; John Griswold MD; Abdul Hamood, PhD; Kendra Rambaugh, PhD; Jeremy Garza, BS

INTRODUCTION Microbial adherence and biofilm development are great impediments to the rapid healing of burn wounds, enabling bacterial resistance to antimicrobial agents. Typical wound care includes repetitive debridement and topical therapies to suppress the biofilm development. Many topical therapies tout antimicrobial capability; however, the evidence-based data on its usage against clinical pathogenic organisms is scarce. This preclinical study assesses the ability of several topical therapies in battling biofilm production by Carbapenem-resistant Acinetobacter isolated from burn patients. **METHODS** The topical gels tested were Triple antibiotic, Silvasorb gel, Plurogel, and Prontosan. For in vitro testing, cellulose discs containing inoculated clinical isolate CRAB were plated on a LB agar plate to establish biofilm. The discs were covered with gauze containing antibiotic treatment immediately and 24 hours post-incubation to assess biofilm disruption and eradication. The in vivo mouse surgical excision model tested the susceptibility of CRAB in mice after they were wounded and infected with it, allowing infection to establish for 96 hours before treatment was applied. The wounds were then treated topically for 24 hours. **RESULTS** In vitro testing showed that Prontosan significantly inhibited biofilm production by CRAB, reducing CFUs from 10^9 in the control group to $10^{1.5}$. However, neither Prontosan nor any of the other therapies were very effective at eradicating CRAB. In vivo testing showed that Triple antibiotic gel performed exceptionally well, completely eradicating CRAB, from $10^{8.5}$ to 0 CFUs. Prontosan was less effective, eradicating it from $10^{8.5}$ CFUs to 10^5 . Silvasorb only reduced CFUs from $10^{8.5}$ to 10^8 and Plurogel unexpectedly showed an increase in CFUs compared to no treatment. **CONCLUSIONS** The efficacy of topical treatments varied significantly, with Triple antibiotic having the best performance, completely eliminating CRAB in vivo. Prontosan, while not as effective in eradication, was the most potent in vitro, reducing biofilm formation.

FIRST EPISODE OF PSYCHIATRIC AND NEUROPSYCHIATRIC DISEASE AMONG PATIENTS INFECTED WITH COVID-19: A SCOPING REVIEW

Riley Shin; Wali Yousufzai MD, MPH; Alex Heo; Kyle Gu, Edward Sun, Gabriel Lopez, Shreya Balamurali, Jennifer Adjei-Mosi, Daniel B. Stuart, Peggy Edwards, Terry McMahon, Wail Amor MD, Regina Baronia MD, M.Ed

The COVID-19 pandemic has led to significant mental and physical health issues globally, with neuropsychiatric symptoms being prevalent. Long COVID, characterized by persistent symptoms weeks to months post-infection, includes psychiatric disorders like PTSD, anxiety, depression, insomnia, and neurocognitive disorders. Electronic database searches were conducted by a reference librarian using PubMed, Ovid Medline, Cochrane Central Register of Controlled Trials, Embase, LitCovid, and PsycInfo. The search covered literature from the pandemic's onset to December 2022. Covidence software was used for screening, deduplication, and data extraction. From 8752 initial studies, 8328 were screened, 7526 were excluded, and 737 full texts were reviewed, resulting in 333 studies included in the review. Studies indicated an elevated risk of neuropsychiatric disorders post-COVID-19, with risks remaining high up to two years

after diagnosis. Incidence rates were higher in patients admitted to intensive care units (ICUs). A significant prevalence of depressive disorders was noted among COVID-19 survivors. Neuroimaging studies showed correlations between depressive symptoms and changes in brain regions. Persistent depressive symptoms were common in long-COVID patients. Generalized anxiety disorder was frequently observed. Post-ICU patients showed a high prevalence of anxiety, which decreased over time. High prevalence of post-traumatic stress symptoms was reported among COVID-19 survivors, especially those with severe symptoms or pre-existing mental health conditions. Increased prevalence of insomnia and other sleep disturbances was noted among COVID-19 survivors, significantly impacting quality of life. Cognitive dysfunction, ranging from mild to severe, was prevalent in COVID-19 survivors, with severity often correlating with the initial infection's severity. Emerging eating disorders, including anorexia nervosa, were observed in children and adolescents post-COVID-19. COVID-19 infection is associated with a significant risk of developing various neuropsychiatric disorders, including schizophrenia, depressive disorders, anxiety, PTSD, and cognitive dysfunction. Long-term monitoring and early interventions are essential to mitigate these risks and improve patient outcomes.

NUTRITIONAL SUFFICIENCY AND FIBER AS A PROTECTIVE MECHANISM OF ALZHEIMER'S DISEASE IN MAINTAINING GUT EPITHELIAL CELL INTEGRITY

Shadt Skawratananond; Shane Smith; Grace McCrea; Nishtha Khanna; Dr. J. Josh Lawrence, PhD

Introduction: Alzheimer's disease (AD) is expected to affect 12.7 million people in the U.S. by 2050. The presence of bacterial lipopolysaccharide (LPS) in the hippocampus of AD patients suggests a role for gastrointestinal (GI) integrity and the gut-brain axis (GBA). Gut microbiota composition influences GBA signaling, and the appearance of LPS in the hippocampus may indicate a breach of the mucosal barrier and tight junctions between GI endothelial cells, altering the GBA. The breakdown of these barriers and immune activation results in gut microbial dysbiosis, further exacerbating neuroinflammation. We propose that tight junction deficiencies in pathologic states arise primarily through preventable environmental causes, namely Vitamin A (VA) deficiency. Methods: A comprehensive literature search, including PubMed, was conducted to identify knowledge gaps and molecular interrelationships between VA and AD. Results: We found that there is evidence of VA dysregulation in AD pathogenesis and progression. Moreover, all-trans retinoic acid (ATRA) is essential for sustained expression of tight junction proteins ZO-1, occludin, and claudin-1. VA deficiency leads to decreased expression of these proteins and compromises tight junctions. VA is also required for the differentiation of regulatory T cells. We propose that VA deficiency compromises tight junctions, which results in pathologic metabolites like LPS penetrating the epithelium and entering the bloodstream. The loss of Treg cells cannot counteract the proinflammatory response, beginning an escalating cycle of inflammation. In addition, through fiber fermentation, gut microbiota produces short-chain fatty acids (SCFAs), including butyrate, increasing retinoic acid synthesis in gut epithelial cells by locally inhibiting histone deacetylases. Conclusion: We provide supporting evidence that VA and SCFA sufficiency protect GBA integrity and may help prevent AD. Our mechanistic insights highlight the importance of a fiber- and VA-rich diet, such as the Mediterranean diet, in maintaining GBA function and reducing the risk of AD onset and progression.

THE AGING SKIN: MECHANISMS, MANIFESTATIONS, AND MODERN INTERVENTIONS

Destiny Ugwa, Colby Wood, Isaiah Garcia, Andres Rios, Wm. Zach Salter, and P Hemachandra Reddy

Aging, a natural and universal phenomenon, is a multifaceted process that manifests prominently on the canvas of our dermatological landscape. An exploratory review of the articles retrieved from the databases MEDLINE (PubMed) and Google Scholar published in the last 20 years connects the various consequential conditions of aging with their dermatological appearances. The prime objectives of this paper are to

highlight the varied world of aging, bring light to the basics of dermatology, and ultimately tie both of these focuses together as they relate to one another.

EFFECT OF EARLY MOBILITY IN POSTOPERATIVE PATIENTS

Sardar Zahid; Saeeda Naz

Introduction:

Postoperative ambulation is an essential part of nursing care. Early mobility after any surgical procedure is an evidence-based practice. It led to enhance recovery and decreased length of hospital stay.

Background:

Bed rest was once thought to be an essential aspect of recovery. In the early 19th century, the physician began to question bed rest. After surgery, a multidisciplinary team should increase awareness and change the culture to promote early mobility. Engaging in physical activity improves vascular endothelial function and blood pressure (Saunders, 2015). Early mobility in the postoperative patient is a complex intervention requiring education to patients and staff (Jakobsen et al., 2021).

Research Question:

Does early mobility, compared to delayed mobility, influence recovery in the earlier postoperative period?

MEDICAL EDUCATION/PUBLIC HEALTH

THE STATE-OF-THE-ART IN STATISTICAL EDUCATION AND ASSESSMENT IN MEDICINE: MULTIPLE-CHOICE STILL GOING STRONG

Stephanie Stroeve, PhD; Issa AbuJeries, MS2; Dan Stuart, PhD; Michael J. Serra, PhD

PURPOSE

Physicians need a strong understanding of statistics to practice modern medicine. They must understand probability to diagnose and treat patients, communicate risk effectively to patients, maximize care quality through outcome data review, critically evaluate new treatments to detect biases, and practice evidence-based medicine. This study considers changes in statistical education and assessment over time and identifies opportunities for innovation in assessment as medical education increasingly emphasizes competency-based models.

METHODS

We performed a state-of-the-art review of peer-reviewed and grey literature to meet our objectives. Relevant sources were identified via a keyword-based search of MEDLINE (e.g., PubMed, EBSCO), Scopus, and Google Scholar. We also used backward citation tracking from articles in our initial search, followed by a review of well-known third-party resources (e.g., ScholarRx). Systematic data extraction tracked changes in teaching and evaluating statistical competency in medical students over time.

RESULTS

Our findings indicate that statistical education in medical schools has shifted from being a stand-alone course with extensive contact hours to an integrated component of the pre-clerkship curriculum, spread across courses, blocks, or topics. However, assessment remains predominantly reliant on multiple-choice questions, with minimal evidence of a transition to performance-based evaluations or clinical demonstrations of statistical knowledge and skills.

CONCLUSIONS

While medical education increasingly adopts a competency-based model for teaching and assessment, the teaching of statistics lags. Physicians must effectively apply statistical concepts in daily practice, yet

demonstrating knowledge is not the same as demonstrating the ability to use statistics in real-world contexts. To ensure the graduation of statistically competent physicians, medical educators must innovate to align statistical training with competency-based education.

PLATEAUS IN STATEWIDE STANDARDIZED INFECTION RATIOS FOR SURGICAL SITE INFECTIONS DESPITE ADVANCEMENTS IN INFECTION CONTROL

Sai Pranathi Bingi, MBA, BS; Stephanie Stroeve, PhD, MPH

Background:

Despite the continued advancements to infection control and evolving evidence-based guidelines, surgical site infections (SSIs) remain a significant cause of morbidity, prolonged hospitalization, and mortality. The National Health and Safety Network (NHSN) monitors SSIs in United States hospitals to increase surgeon accountability while also providing them with feedback to reduce SSI risk. The objective of this study was to determine if there was a reduction in the standardized infection ratios (SIRs) of SSIs nationally from 2015-2022. We hypothesized that increased federal attention on infection prevention would result in the reduction of SIRs for colon surgery SSIs and abdominal hysterectomy SSIs.

Methods:

We collected the SIRs for colon surgery SSIs and abdominal hysterectomy SSIs for each of the 50 states and Washington D.C. from the NHSN database from 2015 to 2022. We included data from acute care hospitals only and used a mixed effect linear regression model with year as a fixed effect and state as a random effect. We also included an indicator variable representing the influence of SARS-CoV-2 (Covid-19). An $\alpha = 0.05$ was used as threshold for statistical significance.

Results:

For both colon surgery SSI SIRs and abdominal hysterectomy SSI SIRs, we included data from 51 states for a resulting 408 observations. After controlling for the influence of Covid-19, there was no statistically significant change over time for both colon surgery SSI SIRs and abdominal hysterectomy SSI SIRs.

Conclusions:

Surgical site infection rates after both colon surgery and abdominal hysterectomy have not changed significantly from 2015-2022 even when accounting for the spike in healthcare-associated infections during Covid-19. Further efforts are needed to understand specific factors that contributed to this stasis. Hospital stakeholders should consider the potential repercussions of this plateau and develop new strategies to combat surgical site infections.

NARRATIVE REVIEW ON BUPRENORPHINE/SUBOXONE MICROINDUCTION FOR OPIOID USE DISORDER

Dhwaani Chaturvedi, Amber Hernandez, Dr. Sara Abdelgawad, Dr. Divyaraj Bavishi, Dr. Regina Baronia, Dr. Daniel Stuart, Dr. Poorvanshi Alag

Introduction

Opioid use disorder (OUD) is a growing public health crisis. Suboxone (Buprenorphine/Naloxone), a combination of Naloxone (a μ -opioid antagonist) and Buprenorphine (a partial μ -opioid agonist), provides a safer treatment option with a lower risk of respiratory depression. This review evaluates the efficacy of Suboxone micro-induction, a gradual dosing method, in mitigating withdrawal symptoms in OUD patients.

Methods

A systematic search of relevant literature was executed using select index terms associated with "Suboxone," "Buprenorphine," "Microdosing," and "Opioid-Use Disorder." Records were retrieved using a reproducible search iterated across several major databases, namely PubMed-MEDLINE, Embase, PsychINFO, and CENTRAL, limited to the past ten years. This was augmented with a supplemental search of

Google Scholar, MedRxiv, Trip Pro, clinicaltrials.gov, ICTRP, and select journals within the discipline. Eligible studies investigated criteria exclusively related to opioid-use disorders and microdosing of suboxone. Studies with incorrect population groups, mismatched interventions, or unsuitable outcomes were excluded. Two investigators independently screened records and reviewed full texts using Covidence, reaching a consensus through discussions. Data was extracted using the same software.

Results

Initially, 204 studies were screened, of which 122 were irrelevant. Of the 71 full-text articles assessed, 41 were excluded, resulting in 30 studies selected for data extraction. Preliminary data extraction reports withdrawal symptoms such as headache, anxiety, and diaphoresis. COWS scores varied amongst articles, ranging from 0-12, indicating mild withdrawal symptoms. Micro-dosing initiation varied, typically beginning at 0.5–2 mg of Suboxone, administered via transdermal or sublingual routes. While the administration methods varied, the starting dose also showed variability across studies, with some beginning at higher or lower doses depending on clinical judgment.

Conclusion

Suboxone micro-induction demonstrates potential in reducing withdrawal symptoms and adverse effects in OUD treatment. However, variations in titration protocols and administration methods highlight the need for further standardized guidelines.

MEDICAL MYTHBUSTERS: ADDRESSING MEDICAL MISINFORMATION IN UNDERSERVED COMMUNITIES

Tressa Reading; Jordan Chenault; José Conde; Noah Kahan; Dr. Jaime Haynes, MD

This study aims to identify and analyze prevalent medical myths and misconceptions among underserved populations and the staff that serve them in Lubbock, and to assess their potential impact on health behaviors and outcomes. Using a cross-sectional survey design, data will be collected anonymously from adults utilizing social services at the Lubbock Dream Center. The survey will include both closed and open-ended questions to assess beliefs about common and community-specific misconceptions. Descriptive statistics and thematic analysis will be used to identify trends and associations between demographic factors and specific myths. The findings will inform the creation of specific question-and-answer sessions at the Dream Center to address misinformation and improve healthcare engagement within these communities. Ethical considerations, including informed consent, and anonymity, will be strictly upheld.

FROM PATHWAYS TO PRACTICE: AN INTERACTIVE APPROACH TO IMPROVE STUDENT COMPREHENSION AND PERFORMANCE IN MEDICAL BIOCHEMISTRY

Ana De-La-Cruz, BS; Vadivel Ganapathy, PhD; Gurvinder Kaur, PhD

Introduction: The biochemistry unit within the General Principles block at Texas Tech University Health Sciences Center-School of Medicine has historically been the highest-failing unit of the preclinical curriculum. Unlike the preceding anatomy block, which incorporates a hands-on teaching approach, biochemistry relies heavily on conceptual instruction with limited interactive study aids. We hypothesized that incorporating an interactive educational tool focused on active learning, utilizing pathway mapping and case-based problem-solving, could enhance student comprehension and performance in mastering biochemistry concepts.

Methods: Faculty-vetted interactive biochemical pathways including pop-up boxes with important facts for each pathway were sent out prior to didactic lectures. To assess baseline knowledge, a pre-quiz with clinical-vignette style questions was also administered. At the unit's conclusion, just prior to the summative exam, a post-quiz with rationales was released. A comprehensive survey to evaluate student utilization and satisfaction of the pathways was conducted with the post-quiz. Based on survey responses, students were categorized into 3 groups: Group A (n=67), who used both the pathways and quizzes; Group B (n=27), who used only the quizzes; and Group C (n=90), who used neither.

Results: Student performance (n=104) on post-quiz significantly improved as compared to pre- quiz (73% vs. 39%; p<0.001). Students who utilized the resource or participated in the quizzes performed significantly better on the biochemistry summative exam than those who did neither (Group A: 87%, Group B: 86% and Group C: 80%, p=0.0014). Additionally, the majority of students (98%, n=104) found the biochemistry flowcharts to be either extremely or moderately useful for understanding complex information, with 54% utilizing these interactive pathways as an active learning resource.

Conclusion: The data suggests that utilizing flowcharts as an active-learning biochemistry resource enhances both student understanding and performance and highlights the value of incorporating interactive learning tools into challenging preclinical courses

INTEGRATING STANDARDIZED PATIENT SCENARIOS WITH ULTRASOUND TO BRIDGE ANATOMY EDUCATION AND CLINICAL PRACTICE

Josue Del-Castillo; Dr. Jennifer Mitchell and Dr. Gurvinder Kaur

Background:

Diagnostic skills are vital for medical students transitioning from foundational sciences to clinical practice. At Texas Tech University Health Sciences Center (TTUHSC) School of Medicine, first-year students in the Anatomy, Histology, and Embryology (AHE) block learn core concepts of health and disease. While anatomy is crucial for understanding pathology, students often struggle to apply this knowledge clinically. Standardized patient encounters (SPE) with bedside ultrasound (US) help students visualize anatomical structures and correlate them with clinical presentations. This study examines the impact of SPE with US as an imaging tool to improve diagnostic performance in anatomy curriculum.

Hypothesis:

Integrating SPEs with ultrasound earlier in the curriculum enhances diagnostic performance in anatomy.

Methods:

Three one-hour sessions on supraspinatus tear (SPE1), thyroglossal duct cyst (SPE2), and appendicitis (SPE3) were conducted during AHE. Each session included a pre-quiz, patient case introduction, and history. Groups of three students spent 30 minutes with SPs to develop differential diagnoses, perform US, and formulate treatment plans, followed by a post-test and faculty-led debrief. This project was approved by the TTUHSC QIRB (#17009).

Results:

Students showed significant improvement in post-quiz scores compared to the pre-quiz scores across all three sessions (SPE1: 76 ± 17 vs 92 ± 11 , $p < 0.001$, SPE2: 74 ± 21 vs 86 ± 14 , $p = 0.001$ and SPE3: 69 ± 20 vs 80 ± 16 , $p = 0.002$). Attendees (n=49-66), 94-100% rated the educational value of the SPEs as extremely or moderately useful, and 96-100% reported that integrating physical exam findings with ultrasound significantly enhanced their understanding of the case study.

Conclusions:

SPEs integrated with ultrasound improved diagnostic skills and clinical reasoning, as shown by significant post-test gains. This approach promotes early application of anatomical concepts and suggests potential benefits for other medical training programs. Future studies should explore long-term knowledge retention.

MEDICAL DEBT IN WEST TEXAS AND ITS EFFECTS ON PATIENT HEALTH OUTCOMES

Andy Do (co-author), Ansh Agarwal (co-author), Courtney Seifer (co-author)

The proposed question is how healthcare coverage, such as Medicaid expansion, impacts health coverage status and medical debt rates and its ramifications on mortality and morbidity rates. Our results showed a higher rate of uninsured people who have medical debt in counties without Medicaid expansion. In two of our cities of focus, which did not have Medicaid expansion, it was also found that the average amount of debt was higher than that of counties with Medicaid expansion. Furthermore, it was found that in colored communities the difference in rates of uninsured and medical debt between expanded and unexpanded

counties was greatly significant. From this, we can conclude that Medicaid expansion can positively correlate with lowered medical debt, lowered rates of uninsured groups, and significantly affects colored communities. Furthermore, it was found that medical debt was associated with worse health outcomes and higher mortality rates on a county level across the U.S.

IMPROVING MEDICAL STUDENT CONFIDENCE AND EXAM PERFORMANCE ON PARTICULAR TOPICS: THE IMPACT OF SHORT USMLE-STYLED FORMATIVE ASSESSMENTS IN A PRE-CLINICAL BLOCK

Grady Edens, BS; Gurvinder Kaur, PhD; Cassie Kruczek, PhD

Purpose: This project aimed to enhance medical students' test-taking skills and confidence during the General Principles Block (GPX) at Texas Tech University Health Sciences Center School of Medicine through USMLE-style formative assessments and rationales focused on historically challenging topics. Six optional, in-person sessions were held outside lecture hours to improve exam performance and confidence.

Background/Rationale: The GPX block bridges anatomical sciences and organ system blocks in the TTUHSC curriculum, providing a critical period to solidify clinical principles and test-taking abilities. Topics were selected based on a needs-analysis poll to address gaps in student performance and confidence.

Methods: A needs analysis pre-survey identified key areas of difficulty, guiding the selection of topics for review. Each session featured timed quizzes with clinical vignettes, question analysis, rationales, and explanations from TTUHSC lectures and USMLE resources. Topics were divided into Units 1 (Glucose, Amino Acid Metabolism), 2 (Protein Trafficking, Medical Genetics, Drug Metabolism), and 3 (Antibiotics). Effectiveness was assessed through exam performance and student feedback.

Results: Exam performance of attendees (Group A) and non-attendees (Group B) showed no significant differences across all units (Unit 1: 86%, n=110 vs 84%, n=72; p=0.2; Unit 2: 91%, n=97, vs 91%, n=86; p=0.8 and Unit 3: 88%, n=55 vs 86%, n=128; p=0.3). However, attendees performed better on topics covered in Units 1 and 2 (Unit 1: 86% vs 81%, p<0.0001; Unit 2: 91% vs 87%, p<0.0001). Feedback showed 92% of attendees felt sessions improved their understanding, and 87% reported increased confidence.

Conclusions: USMLE-style formative assessments improved understanding and performance on targeted topics, with positive feedback supporting broader implementation to enhance medical education at TTUHSC.

EXPLORING PRE-ADMISSION FACTORS: A STATISTICAL ANALYSIS OF THEIR IMPACT ON MEDICAL SCHOOL ANATOMY PERFORMANCE

Amanda L. Ellis, PhD; Stephanie Stroeve, PhD MPH; Keith Bishop, PhD PT

The guide for medical school admissions published by the Association of American Medical Colleges does not currently recommend that students take an anatomy course prior to starting medical school. However, there are conflicting findings in the medical education literature as to the impact of prior anatomy coursework on performance in medical school gross anatomy. This may be due to modifications in curricular content or variations in delivery across schools. This study investigates the association of pre-admission anatomy coursework and performance in the gross anatomy block during the first year of medical school. The study was conducted at a TTUHSC School of Medicine following institutional review board approval. We randomly selected 30 students who scored in the lower one-third of the class on the first exam, as well as 30 students who scored in the upper one-third on the first exam. A second sample was selected using these same methods based on the final course grade. We selected students from 2019-2024 for a total sample size of 300. Multivariable logistic regression assessed the relationship between prior anatomy coursework and placement in the class (lower 1/3 vs. upper 1/3) while controlling for socioeconomic status. Prior anatomy coursework was significantly associated with scores on the first exam and final course grade (p < 0.001). Students who took anatomy prior to starting medical school had significantly lower odds of being in the lower 1/3 of the class on exam 1 or on final course grade compared to the upper 1/3 after controlling for socioeconomic status (adjusted odds ratio = 0.215 and 0.285, respectively). Gross anatomy is often perceived as the most difficult course in the preclinical years, and admission

standards for medical schools may not be keeping up with the curricular changes being implemented. This study illuminates one factor that may be contributing to poor student outcomes during their transition to medical school.

ADAPTING TO CHANGING ATTENTION SPANS: SHORT INSTRUCTIONAL VIDEOS AS AN ADJUNCT TO TRADITIONAL MEDICAL EDUCATION LECTURES

Brandon Fell, BS; Dr. Dan Webster, PhD

PURPOSE: Because of curricular shortening at Texas Tech HSC-Lubbock, supplemental learning tools were developed to help students cope with content density. To enhance the retention and comprehension of instructor taught material, 4–10-minute videos (using a private YouTube channel) that summarized lecture material were made along with quizzes about these videos. Student usage metrics, performance on a summative exam, and satisfaction with the resource will be described. **METHODS:** YouTube videos were made covering the Molecular Biology, Cell Biology, and Medical Genetics topics of Unit 2 in the "General Principles" block and 8 quizzes were made covering the topics discussed in these YouTube videos. The average short video length was 8 minutes (faculty lecture=63 minutes). Metrics of student usage of both faculty and YouTube videos were examined. Also, performance on quiz questions related to those on the unit summative exam were compared. A post-block survey assessing satisfaction for this project was conducted. **RESULTS:** Over the course of the 13-day period, there were a total of 1009 views across the 14 videos resulting in a total watch time of 61.8 hours. The average number of views was 72 (faculty views=109), and the average time per view was about half its total length (3.67 minutes; faculty=30 minutes). In general, faculty videos were viewed at the time of the live presentation while the short videos were used to review for the exam. Students scored an average of 8% higher than the previous year on exam questions covered in the short quizzes. **CONCLUSION:** Post survey results about the use of this project showed above 90% of students were satisfied with the quality of the videos and quizzes, correlating with improved performance on the relevant exam questions. This approach to student retention of condensed lecture material may be useful at other institutions.

ASSESSING PM2.5 IMPACT ON ALZHEIMER'S DISEASE IN WEST TEXAS

Prudhvi Gundupalli, BS; Farhood Salehi, BS; Theodore Sandhu, BS; Rishi Patel, BS; Chinnadurai Mani, PhD; Gurbinder Kaur, PhD

Introduction: Cognitive impairment (CI) has a notable impact on the health of the general public, with 2 out of 3 Americans experiencing some level of CI in their lifetime. CI has been shown to contribute to the progression of multiple neurodegenerative diseases, such as Alzheimer's disease (AD) and dementia. Previous research has revealed that extensive exposure to air pollution can alter the pathophysiology of the central nervous system, and has found a correlation between the incidence of neurodegenerative diseases and Particulate Matter 2.5 (PM2.5). Currently, there is no existing literature in the West Texas region exploring this correlation, therefore warranting further investigation.

Methods: Hourly PM2.5 data from two METAR sensors located in Lubbock, Texas, was obtained from the Iowa Environmental Mesonet and analyzed. We then presented our air quality data, as well as pre-existing literature support for air pollution and Alzheimer's disease, at a community event. Audience members were surveyed for their perception and knowledge of the relationship between AD and air pollution following our discussion.

Results: The initial results of our study indicate that air pollution levels in Lubbock meet the criteria for poor air quality according to WHO standards. Previous literature has demonstrated a correlation between the study variables, suggesting a possible correlation in local data pending further investigation. After presenting our data to the public, responses received demonstrated a heightened understanding of the

correlation between AD and PM2.5.

Conclusion: The impact of air pollution on health has been a major concern for physicians and environmental experts. Our study aims to establish a connection between AD and air pollution. Future steps in our project will involve a retrospective analysis of patient data from Lubbock county to evaluate ambient pollution levels chronologically as they impact possible AD development in local residents.

BEYOND THE DISSECTION: INTEGRATING CLINICAL CORRELATES INTO ANATOMY LABS TO ENHANCE STUDENT LEARNING

Yaizeth Gurrola-Mares; Gurvinder Kaur, PhD; Brandt Schneider, PhD

INTRODUCTION. During cadaveric dissections, first-year medical students were provided with a clinical correlate resource to assess their understanding of clinical presentations involving the structures being dissected. To evaluate the effect of clinical correlate incorporation into the anatomy lab on student learning we followed the performance of students taking anatomy. METHODS. The clinical correlate resource consisted of four questions with four answer choices per question. At the end of the presentation, the correct answer along with rationales for each answer were provided. Additionally, the pre- and post-quizzes focused on clinical correlates and were administered at the start and end of each unit. To compare summative exam performance, students were categorized into three groups: group A (n=51-66; used the resource and the quizzes), group B (n=19-28; only took the quizzes), and group C (n=96-109; used neither). SUMMARY. Student performance on post-quizzes (n=81-95) was statistically better compared to pre-quizzes (n=74-126) throughout the anatomy course (Unit 1: 76% vs. 56%, $p < 0.0001$; Unit 2: 87% vs. 56%, $p < 0.0001$ and Unit 3: 89% vs. 39%, $p < 0.0001$). Group A performed significantly better on the unit one exam when compared to groups B and C. There was no significant difference in the performance on units two and three. CONCLUSIONS. The improved student performance on post-quizzes underscores the value of integrating clinical context into anatomy labs. Students who engaged with both the resource and quizzes performed better on the first summative exam. No significant differences were observed in the Units 2 and 3 exams, suggesting that the first exam may have served as a wakeup call, prompting other students to adapt their learning strategies by integrating clinical correlations more effectively. The data presented provides an insight into student learning, showing a variety of resource usage may provide the needed foundation for student understanding.

ENHANCING EXAM PERFORMANCE THROUGH HIGH YIELD PRESENTATIONS AND FORMATIVE EXAMS: ADDRESSING KNOWLEDGE GAPS IN PRE-CLINICAL MEDICAL EDUCATION

Matthew Hernandez; Cassie Kruczek, PhD

Introduction: In the pre-clinical medical school curriculum at Texas Tech University Health Sciences Center, the Organ Systems 1 (OS1) block introduces the physiology and pathophysiology of the immune, and hematopoietic system. A needs analysis conducted among the Class of 2027 identified key areas requiring supplemental instruction. Specifically, students who were surveyed sought an overview of B- and T- cell development and highlighted the need for a chemotherapy drug chart focusing on toxicities. These self-identified gaps in understanding emphasize the need for the creation of educational interventions to enhance student comprehension in these specific areas.

Objective: Through analysis of formative and summative exam performance, this study aims to determine the impact of supplemental interventions on learning outcomes. The findings will inform strategies for enhancing instructional methods in medical education, ensuring that similar gaps in knowledge can be addressed effectively in future cohorts.

Methods and Results: High-yield review sessions were conducted, focusing on B-cell and T-cell development, along with the creation of a chemotherapy drug chart emphasizing toxicities. Formative assessments, consisting of multiple-choice quizzes, were administered as pre-quizzes before the review sessions and post-quizzes with rationales provided afterward. The review sessions and quizzes were

exclusively available to attending students. For the B-cell and T-cell high-yield review, pre-session exam takers (n=91) averaged a 76%, while post-session exam takers (n=85) averaged an 87%, showing improved formative exam performance. Additionally, summative exam performance, both overall and on selected questions, will be compared between attendees and non-attendees to evaluate the effectiveness of the interventions.

Conclusions: It is important to further investigate the use of targeted interventions in medical education to allow for further optimization of the curriculum, to prepare for national, standardized exams and future clinical practice.

CONCOMITANT CONGENITAL ABNORMALITIES AMONG NEWBORNS WITH HYPOSPADIAS: A POPULATION LEVEL ANALYSIS

Sarah Neal Secrest Horne MPH, MPA; Charles L Secrest M.D.; John Garza Ph.D.

Hypospadias is a common urological congenital abnormality, and maintaining an updated understanding of the characteristics of affected individuals is crucial. Our objective is to assess the congenital abnormalities co-occurring in male newborns with hypospadias. We aim to update the literature on this topic following a 2021 publication that utilized data from 1999-2004. In the context of evidence-based medicine, we strive to strengthen the clinical understanding of this abnormality's epidemiology to promote accurate and comprehensive care for affected individuals. Methods A retrospective population-based cohort study was conducted utilizing the Texas Inpatient Public Use Data File (TIPUDF) from 2016 to 2023. ICD-10 codes identified newborn hospitalizations with a diagnosis of hypospadias and all other congenital abnormalities included in the analysis. Results Out of the 1,482,026 male newborn admissions in the TIPUDF from 2016-2023, 12,5417 had hypospadias. Compared to newborns without hypospadias, newborns with hypospadias were associated with higher rates of atrial septal defects (4.6% vs 1.8%, $p<.0001$), anomalies of the aorta (4.1% vs 1.6%, $p<.0001$), undescended testicles (2.6% vs 0.9%, $p<.0001$), ventricular septal defects (1.9% vs 0.6%, $p<.0001$), congenital deformities of the foot (0.8% vs 0.3%, $p<.0001$), polydactyly (0.6% vs 0.3%, $p<.0001$), renal agenesis and dysgenesis (0.5% vs 0.1%, $p<.0001$), syndactyly (0.4% vs 0.1%, $p<.0001$), atresia/stenosis of the large intestine/rectum (0.4% vs 0%, $p<.001$), cleft lip/palate (0.4% vs 0.1%, $p<.001$), microcephaly (0.3% vs 0.1%, $p<.001$), obstructive defects of renal pelvis and ureter (0.2% vs 0%, $p<.0001$), anomalies of bladder and urethra (0.2% vs 0%, $p<.0001$), and atresia and stenosis of urethra and bladder neck (0.1% vs 0%, $p<.0001$). Conclusions This study enhances the clinical understanding of hypospadias among infants with other congenital abnormalities. As hypospadias continues to ensue life-long ramifications, these results should encourage clinicians to screen for additional birth defects in males with hypospadias in order to allow evidence-based medicine to guide clinical practice.

BATTLING MEDICAL SCHOOL AMNESIA: THE IMPACT OF A HIGH-YIELD FACT SHEET ON IMMUNOLOGY RETENTION

Ty Kaatz, B.S.; Cassie Kruczek, PhD

First-year medical students (MS1s) at Texas Tech University Health Sciences Center School of Medicine are introduced to foundational immunology in Unit 1 of Organ Systems 1 and are tested on this material on the Unit 1 exam. In the following unit (Unit 2), they apply this knowledge to hematology and oncology and are tested further on the Unit 2 exam. Therefore, retention of Unit 1 material is critical for success on the Unit 2 exam, yet a needs-based survey sent to class of 2027 MS1s (n=58) revealed that 55% struggled to recall Unit 1 material on the Unit 2 exam. Additionally, 86% indicated a need for a comprehensive high-yield fact sheet (HYFS) for Unit 1 to enhance retention and preparation for the Unit 2 exam. Our primary aim is to evaluate whether such a HYFS improves retention of Unit 1 immunology content for the Unit 2 exam. Secondary objectives include assessing its impact on stress and confidence regarding the Unit 2 exam. A faculty-approved HYFS summarizing Unit 1 immunology content, created using lecture recordings and PowerPoints, was distributed to class of 2028 MS1s on the first day of Unit 1. Data collection involves: (1) survey responses from the class of 2028 MS1s using a 5-point Likert scale (e.g., "Using the HYFS reduced my stress for the Unit 2 exam") to evaluate perceived stress and confidence, and (2) statistical analysis of Unit 2

exam performance, comparing the retention of Unit 1 concepts on the Unit 2 exam between HYFS users and non-users. Survey responses and Unit 2 exam data collection are ongoing. We hypothesize that HYFS users will outperform non-users on Unit 2 exam questions involving Unit 1 material. Additionally, HYFS users are expected to report reduced stress and increased confidence in reviewing Unit 1 immunology for the Unit 2 exam.

CONNECTING THE DOTS: STANDARDIZED PATIENT ENCOUNTERS AND FIRST YEAR MEDICAL STUDENTS' UNDERSTANDING OF COMPLEX MEDICAL CONCEPTS

Gabriela Santana Lamboy, Cassandra Kruczek, PhD, MS, Alice Villalobos, PhD

Background: Preparing first-year medical students (MS1s) for clinical excellence requires a curriculum that integrates foundational science with clinical application. The Organ Systems-1 (OS1) block, is a critical block in the preclerkship curriculum, focusing on the immune, hematopoietic, and cardiovascular systems. Despite its importance, students often find concepts within OS1 difficult to understand and apply. This highlights the need for targeted educational strategies to bridge the gap between theoretical knowledge and clinical practice.

Objective: We aim to assess whether integrating standardized patient (SP) encounters that address disorders MS1s find particularly challenging in OS1 enhances understanding of the basic sciences while also cultivating practical and clinical reasoning skills.

Methods: To identify topics that MS1s found particularly difficult, a needs analysis survey was administered through Google Forms to MS1s who recently completed the OS1 block. Fifty-eight MS1s completed the survey. Six SP cases were then developed covering topics students identified as challenging: common variable immunodeficiency, Hodgkin's lymphoma, anemia of chronic disease, peripheral vascular disease, rheumatic fever, and atrial fibrillation. Students' understanding of the various disorders will be assessed via pre- versus post-tests, which include Likert-style questions regarding perceptions of learning, and performance on National Board of Medical Examiners (NBME) questions related to these conditions. Also, SPs will provide students immediate feedback following each encounter.

Results: We anticipate that the SP encounters will improve students' understanding of the disorders covered, as reflected in post-test scores and NBME performance related to these conditions. We also expect students will value SP feedback as a tool and guidance to improve practical and clinical reasoning skills.

Conclusion: This study will provide insights into the effectiveness of SP encounters in bridging the gap between foundational science and clinical practice, with potential implications for preclerkship curriculum development.

RELATIVE RISK OF DEATH IN MECHANICALLY VENTILATED COVID-19 AND RESPIRATORY SYNCYTIAL VIRUS HOSPITALIZATIONS

Paige Livingston Lopez, Benjamin Lasota, Jacqui Oropeza, Asley Sanchez, John Garza PhD

RATIONALE

Perception of the COVID-19 virus as nothing more than a common cold has become a common perception among patients. Our paper tests this emerging belief using the diverging outcomes between COVID-19 and RSV infections in hospitalized patients requiring mechanical ventilation.

METHODS

We conducted a population-based cohort study of mechanically ventilated adults admitted to acute care hospitals in Texas with a diagnosis of COVID-19 or RSV during the period 2021Q4 - 2023Q1. Hospitalizations with a diagnosis of RSV were identified using International Classification of Diseases, Ten Revisions, Clinical Modification (ICD-10-CM) code J121, J205, and J210. Hospitalizations with a diagnosis of COVID-19 were identified using ICD-10-CM code U071. Hospitalizations with both COVID-19 and RSV were excluded. Overlap propensity score weighting was applied to measure the association of COVID-19 with in-hospital and short-term mortality. Results are reported as adjusted risk ratio and 95% confidence interval (aRR 95% CI).

RESULTS

A total of 20,269 hospitalizations were identified of which 19,880 had COVID-19 and 389 had RSV. Compared to hospitalizations with RSV, hospitalizations with COVID-19 less often had chronic lung disease (60.4% vs 28.7%), less often had congestive heart failure (53.5% vs 33.8%), had lower mean [standard deviation] Deyo comorbidity index (2.1[2.0] vs 2.8[1.9]), but higher mean number of organ dysfunctions (2.6[1.4] vs 2.1[1.2]). In-hospital mortality was higher in hospitalizations with COVID-19 (40.4% vs 12.6%). COVID-19 remained associated in-hospital mortality in the overlap population aRR 1.8438 (95%CI 1.4136 to 2.4049). Short-term mortality was higher in hospitalizations with COVID-19 (48.9% vs 18.5%). COVID-19 remained associated with short-term mortality in the overlap population aRR 1.5585 (95%CI 1.2612 to 1.9259).

CONCLUSION

Despite lower mean Deyo comorbidity index, mortality was substantially higher in hospitalizations with COVID-19. After risk adjustment, mechanically ventilated COVID-19 patients were at 84% higher risk of in-hospital mortality compared to patients with RSV.

RELATIONSHIPS BETWEEN VITAMIN D DEFICIENCY AND NICOTINE USE IN AN AGING WEST TEXAS POPULATION: A PROJECT FRONTIER STUDY

Garrett Matthews; Dr. Mohammed Pourghaed, MD; Dr. J. Josh Lawrence PhD

Background: Previously, we described health disparities in Vitamin D (VD) status, geriatric depression, and Hispanic ethnicity (HE) in an aging West Texas population from Project FRONTIER (Facing Rural Obstacles to Health Care Now Through Intervention, Education, and Research; PF). We used that same sample to examine the relationship between tobacco (cigarette) usage and VD status. Methods: A cohort of 299 PF participants (mean age 62.6 ± 11.8 years old, 70.9% female, 40.5% HE) was analyzed in which serum 25-hydroxyvitamin-D levels were available. Tobacco use was determined by the Consensus Diagnosis for Nicotine Use (cdx_psy) and the Fangerström Test for Nicotine Dependence (FTND). Association between VD levels, tobacco use, and ethnicity were examined using correlation, logistic regression, and Mann-Whitney U test. Results: Tobacco use was significantly associated with lower VD levels. VD levels were negatively correlated with cdx_psy ($p=0.0002$) and FTND total score ($p=0.0061$). Tobacco users had significantly lower VD levels (20.6 ± 1.5 ng/ml) than non-users (29.2 ± 0.8 ng/ml; $p=0.0002$). Significant negative correlations were also found between VD levels and FTND variables ftnd_1 ($p=0.0076$) and ftnd_3 ($p=0.018$). Additionally, those with Hispanic ethnicity (HE) had higher tobacco use ($p=0.0217$) and lower VD levels, suggesting a greater vulnerability to VD deficiency/insufficiency in the HE sample. Conclusion: Our findings indicate a significant negative association between tobacco use, VD levels, with HE participants showing increased susceptibility. VD has many roles in various health outcomes, including Alzheimer's disease (AD), with focuses on aging, rural, and Hispanic communities, emphasizing the need for personalized interventions for these at-risk populations.

REEL QUICK REVIEWS: FROM DISTRACTION TO DEVELOPMENT

Megan McCoy; Jannette M. Dufour, PhD; Gurvinder Kaur, PhD

Introduction and Objective:

Most students completing the Anatomy course at Texas Tech University Health Science Center School of Medicine fall within the emerging adult age group (18-29 years), a demographic known for frequent social media use. While some studies suggest social media negatively impacts academic performance, a study found that using Twitter (now X) as a classroom tool improved student learning. Our study aims to evaluate the impact of Instagram Reels as an anatomy review tool on student performance and satisfaction.

Materials and Methods:

The study utilized Instagram Reels due to its accessibility and widespread use. A total of 22 short videos, each 1-2 minutes long, were created to cover topics on upper and lower limb nerve supply and associated injuries. Educational impact was evaluated via pre-quizzes, post quizzes, and exam performance data. Personal impact was evaluated via subjective feedback in self-reported surveys. (QIRB # 17009)

Results:

There was no significant difference in exam performance on topics covered by videos between students who used Instagram Reels and those who did not (82% vs 85%, $p=0.056$). Similarly, no significant difference was observed when comparing exam performance of users on topics covered by videos versus those not covered (82% vs 84%, $p=0.095$). However, viewers trended toward improved performance on post-quiz compared to pre-quiz results (64% vs 56%, $p=0.051$). A subjective survey indicated that students felt reviewing videos improved their studying habits and made reviewing more enjoyable.

Discussion:

Although qualitative data was generally positive, no significant differences in exam scores for users versus non-users was observed. However, a trend toward improved post-quiz scores suggests that while the overall impact on exam performance was not statistically significant, the videos may have provided more interactive learning experiences and increased student engagement.

RELATIONSHIPS BETWEEN VITAMIN B12 DEFICIENCY, GERIATRIC DEPRESSION, AND HISPANIC ETHNICITY: A PROJECT FRONTIER STUDY

Riley McCready, BA; Hamza Hashmi; Jonathan Singer, PhD; J. Josh Lawrence, PhD

Background: Previously, we described health disparities in Vitamin D (VD) status, geriatric depression, and Hispanic ethnicity (HE) in an aging West Texas population from Project FRONTIER (Facing Rural Obstacles to Health Care Now Through Intervention, Education, and Research; PF). To further explore the impact of nutritional deficiencies on mood disorders in an aging population, we examined relationships between Vitamin B12 (VB12) status, geriatric depression, and HE. Methods: A cohort of 299 PF participants (mean age 62.6 ± 11.8 years old, 70.9% female, 40.5% HE) was used. We examined relationships between VB12 level, Geriatric Depression Scale (GDS) score, consensus depression diagnosis, and HE status. GDS total score ranged from 0 to 30 points and was further subcategorized into Dysphoria, Meaninglessness, Apathy, and Cognitive Impairment. Standard correlation and regression analyses were performed, and we utilized the Mann-Whitney U test to compare group differences between HE and non-HE subgroups. Results: A significant negative correlation was found between VB12 level and geriatric depression ($p = 0.019$). VB12 level was further significantly negatively correlated with Dysphoria ($p = 0.005$) and Meaninglessness ($p = 0.026$). Additionally, we found a significant negative association between VB12 level and depressive symptoms ($p = 0.0383$). In terms of ethnic disparities, HE participants had lower VB12 levels ($p = 0.0216$) and higher geriatric depression symptoms ($p = 0.0029$) compared to their non-HE counterparts. Conclusion: Our results suggest that VB12 deficiency is associated with geriatric depression in a rural underserved West Texas population, highlighting a potential link between nutritional status and chronic disease. Our study also identifies ethnic disparities in VB12 status and depressive symptoms in a largely understudied rural population. These disparities are important to consider when investigating areas to improve healthcare in West Texas.

ADDRESSING DIABETES EARLY: INTEGRATING COMPREHENSIVE EDUCATION ACROSS PRECLINICAL ORGAN SYSTEMS

Brady Miller, Dr. Gurvinder Kaur, Dr. Jannette Dufour

Diabetes affects 11.6% of the U.S. population, with projections to rise to 13.9% by 2030 and 33% by 2050. Diabetes accounts for \$412.9 billion in total annual costs, comprising 1 in 4 healthcare dollars spent. With diabetes mellitus (DM) affecting the majority of organ systems, it is essential for medical education to

address DM-associated complications comprehensively. At Texas Tech University Health Sciences Center School of Medicine, the two-year preclerkship curriculum includes two foundational blocks and five organ system (OS) blocks. Endocrinology, covering most DM-related instruction, is taught in OS5 block at the end of the second year, limiting integration of diabetes' systemic effects across OS blocks. This study investigates the impact of integrating diabetes-focused resources across all OS blocks on students' understanding and retention of diabetes-related concepts. We hypothesize that these resources will enhance students' confidence in their comprehension of diabetic endocrinology and its effect on various OS. Tailored diabetes resources including a high-yield fact sheet and a case study, were developed and provided to students during each OS block. A qualitative survey was conducted to assess students' confidence in applying their knowledge of diabetes and its organ-specific effects. Results showed an increase in student confidence during the OS5 block, with 50% (n=38) reporting improved comprehension compared to 14% in earlier blocks (n=16-19). Additionally, 66% of OS5 students indicated a preference for earlier diabetes education, and 76% believed it would have positively impacted their academic performance. Initial findings suggest that a longitudinal approach to diabetes education enhances students' understanding of the disease and its systemic effects. By embedding diabetes content throughout the preclinical curriculum, institutions can better prepare future physicians to manage this multifaceted disease.

ASSESSING MEDICAL STUDENTS' AWARENESS OF HUMANITIES OPPORTUNITIES AVAILABLE AT TTUHSC

Zeba Momin; Riley McCready; Kiran Sagani; Vy Do; Julieann Cherukara; Dr. Cheryl Erwin, JD, PhD

Background: Research shows there is a correlation between exposure to humanities activities and reduced burnout in medical students. After conducting a preliminary survey to assess the relationship between engagement with humanities and perceived stress levels in medical students at TTUHSC, we found that students were widely unaware of humanities opportunities available both at TTUHSC and within the Lubbock community. Since previous research has highlighted the benefits of humanities engagement specifically for medical students, we created a presentation to inform students of these benefits and increase awareness of these activities. Hypothesis: We hypothesized that after attending the presentation, we would see an increase in medical students' familiarity with the positive effects of humanities involvement, as well as an increase in awareness and the likelihood of participating in humanities activities as assessed by survey responses. Data/Results: We conducted a pre and post-survey to assess medical students' familiarity with the benefits of engaging with humanities, awareness of opportunities at TTUHSC and in Lubbock, and likelihood to engage in these activities. A Likert scale from 1 to 5 was utilized to evaluate these parameters. 46 students completed the pre-survey, and 29 students completed the post-survey. We found that after the presentation, there was an increase in the percentage of students ranking higher familiarity with the benefits, awareness of opportunities, and likelihood to engage. Conclusion: Based on our results, our presentation successfully increased awareness of humanities opportunities available to medical students in Lubbock. Since medical students tend to have increased workloads and time constraints, it is of utmost importance to encourage students to prioritize activities that promote well-being and reduce burnout. Encouraging students to use humanities as a creative outlet helps to nurture both personal growth and professional development outside of the academic atmosphere.

PREVALENCE OF MELANOMA NATIONALLY: A CROSS-SECTIONAL ANALYSIS

Kim Nguyen, BSA; Kritin K. Verma, BS, MBA; Jean E. Pizano, BS, BSA; Justin Pizano, BS; Merry Mathew, BS; Daniel P. Friedmann, MD; Cameron E. West, MD, MBA; Michelle B. Tarbox, MD; Daniel J. Lewis, MD

Melanoma, a skin cancer originating in melanocytes, has varying prevalence rates across the United States. Data from the All of Us database was used to calculate the national prevalence of melanoma, reported per 100,000 individuals with 95% confidence intervals. A total of 2820 melanoma cases were identified from 459,972 participants with a prevalence of 83.0. Melanoma prevalence increased with age, doubling from

75.0 to 154.0 between age groups 31-35 years and 36-40 years. Melanoma prevalence continued to increase significantly from ages 61 years to 85 years, with the sharpest increase rising from 976.0 to 1450.0 between age groups 71-75 years and 76-80 years. Melanoma prevalence peaked at 2050.0 for age group 86-90 years. Racial disparities in melanoma prevalence were noted, with the highest at 999.0 for White people, 111.0 for Hispanic people, 76.3 for Asian people, and the lowest at 52.3 for Black people. Gender differences were observed with females accounting for higher percentages of melanoma cases in Asian and Hispanic populations, at 100% and 60.4%, respectively. With increasing age, the proportion of melanoma cases among females decreases, from 78.3% in the 31-35 age group to 34% in the 86-90 age group. The study highlighted the importance of skin self-examination, especially among White females, and suggested that underrepresentation of minorities in dermatological care may contribute to observed disparities. Key limitations of the study include potential diagnostic misclassification due to using the keyword 'melanoma' instead of ICD-10 codes to query the All of Us database. The database's racial composition also does not reflect the U.S. population. These findings underscore the need for further research to validate and identify the causes of disparities observed by the study.

ASSESSING NUTRITIONAL HABIT AMONG MEDICAL STUDENTS

Ekundayo Oloworibi, R. Luke Bradley, Alexander Hayek, Patrick Udenyi, Dr, Michael Blanton

Introduction: Maintaining nutrition is critical to fostering a healthy lifestyle. Good eating habits support positive mental and physical health. Medical students may struggle to develop healthy nutritional habits due to limited nutritional education and the high-stress environment of medical school. These challenges can cause negative outcomes such as poor mental health, physical wellbeing, and worsening academic achievement. Moreover, nutritional habits may deteriorate due to increased stress associated with significant milestones within medical education such as major board exams or transitioning to clinical clerkships. This study aims to investigate the impact transitioning to clinical clerkships have on the nutritional habits of medical students and its potential effects on physical and mental wellbeing. Subsequently, we will propose innovative solutions and educational strategies to enhance medical students' nutritional knowledge and overall health. **Method:** We queried the PubMed database in search of related articles. We intend to release a survey to both pre-clinical and clinical medical students examining their current nutritional habits and overall physical and mental wellbeing. Furthermore, third-year medical students will also be asked how these habits changed from preclinical to clinical rotations. With these results, we will look for common problems that students claim that lead to these unhealthy habits and try to elucidate potential educational solutions for these students. **Results:** We are currently in the data-collecting phase of the project and have an insufficient amount of data to conduct research on. **Conclusion:** While there is an abundant amount of information regarding the overall health of medical students, we are examining the specific disparities faced when transitioning from preclinical to clinical rotations. Additionally, more information regarding developing and maintaining healthy habits is imperative to the physical, mental, and academic success of medical students.

EXAMINING THE RELATIONSHIP BETWEEN AEROBIC AND ANAEROBIC EXERCISE LEVELS AND MENTAL HEALTH OUTCOMES FOR MEDICAL STUDENTS

Kailin Opella, BS; Logan Winkelman, PhD, Fernando Hinojosa, PhD, Chwan-Li Shen, PhD. C.C.R.P.; Michele M. Mahr, PhD

Physical exercise has numerous benefits on mental health and well-being. The variability of these benefits by exercise type and population is unclear. This study examines the impact of aerobic and anaerobic exercise on medical students' mental health, hypothesizing greater benefits from aerobic exercise. The study used a cross-sectional survey of 55 participants, assessing demographics, exercise habits, mental health, stress, depression, resilience, and motivation. Data was collected anonymously and analyzed using mixed quantitative and qualitative methods. A descriptive analysis was conducted using the World Health

Organization- Five Well-Being Index (WHO-5), Perceived Stress Scale (PSS), and Patient Health Questionnaire (PHQ-9) scores using the Shapiro-Wilk test. Comparisons between aerobic and anaerobic exercise amount and intensity were made using the Mann-Whitney test, with significance set at $p < 0.05$. For the six qualitative questions, each question was separated into an initial code, a potential theme, and an overall theme. Quantitative results showed sleep positively correlated with WHO-5 scores, inversely correlated with PHQ-9, and not with PSS. Anaerobic exercise yielded significantly higher WHO-5 scores than aerobic exercise at vigorous intensity, while 4-6 hours of aerobic exercise was associated with higher PSS scores than anaerobic exercise. Key themes from the qualitative results included: Self-Care and Self-Awareness (31 responses), Acceptance and Persistence (22 responses), and Physical and Mental Health (18 responses). The qualitative results revealed that self-care and self-awareness emerged as the most prominent themes, highlighting participants' recognition of the importance of overall wellness. In conclusion, our preliminary findings suggest both anaerobic and aerobic exercise improve overall wellness and depressive symptoms, with no significant effect on perceived stress.

EVALUATING THE IMPACT OF THE WEST TEXAS HEALTH DISPARITIES SYMPOSIUM: A COMPREHENSIVE SURVEY ANALYSIS

Anya Pazhoor, MPH; Abdul Almosa; Julia Guido; Jad Zeitouni; Reagan Collins; Amadeus Ramirez; Sergio Saucedo; Erin Toro; Ebtessam Attaya Islam, MD, PhD; John A Griswold, MD; Jessica Chacon, Ph.D.

Introduction

Health disparities in West Texas disproportionately affect rural and underserved communities, contributing to higher chronic disease rates and limited healthcare access. The 2nd Annual West Texas Health Disparities Symposium convened over 100 healthcare professionals, researchers, and students to explore contributing factors such as socioeconomic status, geographic barriers, and cultural influences. This study evaluates the symposium's impact on attendees' knowledge and perceptions of healthcare disparities using pre- and post-symposium survey data.

Methods

This prospective survey study involved registrants of the 2024 symposium in Lubbock, TX. Electronic surveys were distributed before and after the event to assess familiarity with regional health disparities, policy impacts on healthcare, and effective interventions. Pre- and post-survey responses were compared using descriptive statistics and the Wilcoxon rank-sum test.

Results

The pre-survey had a 37.0% response rate, and the post-survey had a 29.0% response rate. Baseline demographics did not differ between pre- and post-survey respondents. Most were female (66%), White (61.0%), or Asian (20.0%), and aged 18-24 (34.0%). Respondents were primarily healthcare professionals (48.5%) or students (42.4%). While 73% had attended a symposium before, only 36% had prior exposure to health disparities-focused events. Key motivations for attending included education on disparities (86.0%), new research (63.0%), and networking (57.0%).

Survey results revealed significant increases in familiarity with policy impacts on healthcare ($p = 0.01$), avenues for policy change ($p < 0.01$), identification of West Texas health disparities ($p = 0.017$), presenting data on healthcare disparities ($p < 0.001$), and proposing preventative strategies ($p < 0.001$). Nearly all respondents (94.0%) reported the symposium met their expectations, and 90.0% would recommend.

Conclusions

The symposium enhanced participants' knowledge of West Texas health disparities, providing valuable strategies to address these issues. Positive feedback underscores the value of educational interventions in shaping public health discussions and guiding future symposium improvements.

SUICIDE PREVENTION BARRIERS FACED BY WEST TEXAS VETERAN ORGANIZATIONS

William Riley, B.S.; Lisa Gittner, PhD.

Introduction: Military veterans have been shown to face disproportionately higher rates of suicide than the general population. This issue may be further confounded in the case of veterans residing in West Texas, whose social and physical environment can heavily influence suicide prevention efforts. To identify the specific barriers faced by the West Texas veteran population, veteran organizations may prove to be a valuable point for data collection and intervention implementation. Methods: Through collaboration with the local mental health authority, key informant interviews were conducted with staff members of five prominent local veterans organizations. Interview scripts were tailored to assess each organization's extant suicide prevention efforts, training requirements for volunteers, and the barriers to suicider prevention efforts faced by both individuals and the organization as a whole. Transcripts of interviews were then qualitatively analyzed via coding process that highlighted pertinent data. Results: Out of five interviews with key informants, four indicated negative stigma of mental health, three indicated a fear of repercussions for admitting suicidal ideation, and three indicated failure to recognize warning signs as significant barriers. Notably, none of the interviewed organizations listed suicide prevention training as a requirement for volunteers. Discussion: Despite a growing awareness of veterans' mental health, veterans organizations continue to face several barriers. Given their role in connecting veterans to a variety of resources, efforts to reduce suicide in this population should aim to reduce the barriers faced by veterans organizations.

AIDING DEVELOPMENT OF HEMATOLOGIC DISORDER DIFFERENTIAL DIAGNOSIS SKILLS

Maxwell Rowley, BS; Cassandra Kruczek, PhD

At Texas Tech University Health Sciences Center, the first-year medical school curriculum is considered to be challenging due in part to the large amount of content in each block. After two foundational blocks, the pre-clinical phase curriculum (Phase 1) is broken down into five organ systems-based blocks each focusing on system-specific normal physiology, pathophysiology, and pharmacology. Within the first organ systems-based block (OS1), hematologic and oncologic disorders are covered. In spring of 2024, a needs analysis of first-year students who had recently completed OS1 was conducted and the Hematology and Oncology unit was identified as being difficult due to the number of pathological disorders discussed and how to differentiate between them.

Based on the needs analysis, five Differential Diagnosis Resources (DDR) were created comparing specific clotting and white and red blood cell disorders. The DDRs compiled information from STEP 1 study resources including Pathoma, Sketchy, and First Aid and presented this information in convenient charts and diagrams. DDRs highlighted important characteristics of diseases that could be used to improve performance on the summative NBME exam. Three accompanying Multiple Choice Quizzes were released to further aid students in exam preparation.

We hypothesize students who take advantage of the DDRs and associated quizzes will exhibit improved performance on related NBME exam questions.

We will analyze NBME performance on questions involving white and red blood cell disorders of self-identifying students who utilized the resources and quizzes compared to those who did not utilize the resources. Qualitative analysis regarding the usefulness and effectiveness of the resources will also be conducted. If results indicate the DDRs and associated quizzes were helpful in preparing students for the NBME exam, availability of these resources should be expanded to include additional blocks within the Phase 1 curriculum.

UTILIZATION OF STANDARDIZED PATIENT SIMULATION TO DEVELOP DIAGNOSTIC AND CLINICAL COMMUNICATION SKILLS

Sathyak Saini, Dr. Cassandra Kruczek PhD, Dr. Alice Villalobos PhD

Introduction: To horizontally integrate basic science coursework with introductory clinical skill training, we introduced standardized patient (SP) case-based simulations to enhance Year 1 medical student's (MS1s) patient interview, physical exam, and diagnostic skills within a restructured organ systems-based course. Developing diagnostic and rapport-building skills is essential to successfully training future physicians. Studies indicate SP encounters augment medical students' learning experiences, building clinical skills and confidence. End-of-course surveys indicate our students find activities where they apply didactic concepts to low-stakes clinical settings highly useful. Methods: In spring 2024, we created and piloted a set of three immunologic and hematologic-oncologic cases and a set of three cardiovascular cases. SPs received notes detailing current presentation, relevant medical and family history, and physical exam findings. Before each encounter, MS1 teams received a summary intake sheet and instructions to perform patient interview and focused exam. Per their interview and exam findings, teams developed a differential diagnosis, ordered and interpreted relevant labs/imaging studies, reached a final diagnosis, and proposed a basic treatment/management plan they discussed directly with the SP. SPs gave immediate formative feedback regarding team performance. Students completed pre- and post-tests containing didactic questions related to each case set. Post-tests also evaluated students' perceptions of learning using a Likert scale (1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree). SPs offered faculty suggestions for improving the encounters. Results/Conclusion: Post-test scores on didactic questions improved vs. pre-test scores [n=26-34]. The majority of participants agreed or strongly agreed these activities helped with application of knowledge (67-71%), identification of areas needing improvement (69-77%), and gaining of confidence in patient interview skills (67-76%). We will use student and SP feedback to improve these encounters for formal implementation in spring 2025.

MEDICAL STUDENT EXPERIENCES WITH SUMMER RESEARCH AND ITS EFFECTS ON WELLBEING AND MOTIVATION TO PARTICIPATE IN FUTURE RESEARCH

Bennett Schackmuth, B.S.; Chwan-Li Shen, Ph.D., CCRP; Stephanie Stroeve, Ph.D., MPH

Introduction

Medical student participation in research has increased significantly over the last decade, with U.S. Seniors averaging 10.2 abstracts, presentations, and publications in 2024, up from 4.2 in 2014. Despite this trend, there is limited understanding of what drives students to pursue research and how it affects their wellbeing. Given shifts in medical education and expectations, more research is needed to assess current student experiences.

Methods

This study explored the impact of research participation on medical students' wellbeing and their motivations for engaging in research during medical school by recruiting first year medical students from a summer research program at Texas Tech University Health Sciences Center. Participants completed weekly reflective journals on their research experiences.

Results

The collected data indicated a dichotomy of experiences: while students expressed pride and a sense of achievement from their research, many reported high levels of stress, primarily related to time management and balancing academic opportunities. Many were motivated by the need to bolster residency applications, though they endorsed greater stress or discouragement than those who pursued research out of genuine scientific interest. Students that expressed contentment and enthusiasm often journaled about strong mentor support and a structured environment.

Conclusions

Research participation offers academic and personal rewards but can negatively impact student wellbeing under certain circumstances. Students in structured environments with strong mentorship had better outcomes both in research and wellbeing. A balanced approach is crucial.

SPECULATION ABOUT SPECULUMS: AN INTERVENTION ON WOMEN'S HEALTH

Katie Seaton; Madison Bachler, MS; Maecy Miller; Archer Nelson; Asha Worsham

Women's health has been trying to compensate for its lack of inclusion since the dawn of medical research, and continues to show signs of indifference amongst the population today. Prior to the 1980s, the majority of health research used men as research subjects, and it wasn't until the NIH Revitalization Act of 1993 that would ensure the inclusion of women and minorities in all clinical research. The current cervical cancer screening guidelines from the American College of Obstetricians and Gynecologists (ACOG) and U.S. Preventive Services Task Force (USPSTF) recommends cervical cancer screening every three years beginning at age 21. Despite confusion regarding gynecological recommendations in recent years, the need to be proactive about gynecologic care is still paramount. A National Center for Health Statistics Data Brief from 2019 found a decreasing trend in pelvic examinations in the past 12 months among women aged 15–44 from 1988 through 2017. We expect to see a similar trend in the local population of sorority women as well as a lack of general gynecological knowledge. A voluntary survey, including approximately 500-600 participants ranging from 18-24 years of age, evaluates the educational background surrounding the Pap smear exam and attitudes towards gynecologic care of this sociodemographic pool. Subsequently, a presentation answers common questions regarding cervical cancer, Pap smears, gynecological clinic visits and provides the participants with the most up to date information and current guidelines.

BALANCING MEDICAL STUDENT IDENTITY WITH PERSONAL LIFE IN THE FIRST AND SECOND YEARS

Sydney Sudduth, B.S.; Taryn Lubbers, B.S., Sadie Sudduth, B.S., Kaylee Niebuhr B.S., Dr. Alice Villalobos, PhD

Introduction: Many medical students choose where to attend medical school based on geographical location, meaning they already live in the city or surrounding area of the medical school chosen. While this has many advantages for students, it also poses a new set of conflicts. Students now must find a way to balance their pre-existing life with their new medical school identity. Our team conducted a previous study looking at medical student well-being and distance from "home" and results showed that overall well-being was worse in students whom Lubbock is 10 miles or less from their perceived home. Our team proposed that this relationship was due largely to the lack of tools for time management/work life balance in very involved lives here in Lubbock. We planned an intervention by creating an electronic pamphlet for time management/work life balance tools and distributed it to first and second year medical students. **Hypothesis:** Our team Hypothesizes that our electronic pamphlet will improve first and second year medical students confidence in their ability of time management and balancing their lives in and outside of medical school. **Methods:** Our team sent an electronic pamphlet to 1st and 2nd year medical students and a post survey to assess feelings about time management and balancing their obligations in and out of medical school. We compared results based on distance from home and previous results. **Results:** Preliminary Results showed that students had increased confidence in their ability to manage their time and obligations in medical school and their family life outside of school after receiving our electronic pamphlet, further data collection with more student participation should yield significant results. **Conclusion:** 1st and 2nd year medical students need tangible tools to balance their identities/obligations inside medical education and outside in their demanding personal lives the closer their "home" is to the medical school they chose to attend.

ACCELERATED TRACK STUDENTS DEVELOP A CLINICAL REASONING AND COMMUNICATION OSCE CASE FOR PRE-CLINICAL PEERS

Keeley Hobart MD, Jennifer Ward MD, Felix Morales MD, Cassie Kruczek PhD, Alice Villalobos PhD, Mohammed Choudhury, Hannah Curtis, Luke Darter, Austin Duersch, Chanel Ericsson, Sal Galindo, Heidi Gonzales, Isis Gordon, Austin Jackson, Natalie Jameson, Griffin Litwin, Kaylee Niebuhr, Rafiki Niyibizi, Sydney Peffer, Bethany Rohrbach, Emily Scott, Emma Taylor, Matthew Tiemann, Zac Tiemann, Martha Windim, Betsy Jones EdD

Objective/Purpose

To involve accelerated track medical students in developing a simulation case that will be implemented for their peers in the M2 class.

Background:

Our institution has a 3-year MD curriculum leading to FM residency. The course also uses a unique Student-Generated Simulated Clinical Encounter, which provides opportunities for real-time teaching for students who generate the patient case, for those who serve as student doctors, and for those who observe. For this project, student-generated OSCE was used to create a case to be used by M2 peers.

Innovation Design:

For this initiative, accelerated track students create and implement OSCE cases throughout their summer course. These same cases are then used for a clinical skills simulation for their entire M2 class. For M2 participants, the case provides facilitated practice in H&P skills, clinical reasoning, and case presentation, all within small groups with students playing all parts, including the patient, doctors, and differential diagnosis team.

Evaluation Plan:

Accelerated track students and their M2 peers participate in pre/post assessments about clinical reasoning, patient communication, and clinical presentations. During the simulations, faculty give feedback on H&P skills, clinical decision-making and case presentations.

Outcomes

Student confidence in their skills shows marked improvement after the simulation, with interesting differences based on the roles that students played in the encounter. Overall, students give extremely high ratings to the value of this experience.

ANATOMY ACADEMY: A CONDENSED EXPANSION OF MEDICAL EDUCATION FOR UNDERSERVED ELEMENTARY SCHOOL STUDENTS

Dr. Jordan Clement, DO; Jonathan Tipo; Jonathan Silander; Laney Osborne; Kara Sprabary; Dr. Elisabeth Conser, MD

Anatomy Academy (AA) started as an initiative between DGSOM, BYU, UUSOM, and UVU to allow students to participate in teaching roles in the anatomical and health sciences early in their educational career. The original format included 6-7 sessions of 30-45 minute lessons and 45 minute activities. AA now educates thousands of children while providing mentoring experience to emerging professionals. We explored whether a condensed format (10-20 minute lessons with 25-35 minute activities) yields comparable experience for the mentees and mentors. Additionally, given stagnating interest in pediatrics, we explored whether mentoring initiatives increase medical students' interest in pediatrics and undergraduates' interest in medicine. 6 AA sessions were held with 5th graders at Bayless Elementary. Mentor groups of one undergraduate and one medical student were matched with 5-6 children. Mentors taught the lesson, then guided the students through an activity. Upon completion of the program, mentors answered a survey with open-ended and Likert scale questions (scaled 1-5). Approval from the TTU IRB office and the TTUHSC QIRB office, with an IRB exemption, was obtained. Likert Scale responses were analyzed using a T-test. Mentors rated the overall program a 4.86/5 with a 4/5 for time limit. Confidence in interacting with children

increased by .79 points ($p=.0003$) and confidence in teaching a medical lesson increased by .97 points ($p=.0001$). Medical students showed a .46 point ($p=.2906$) increase in interest in Pediatrics and Undergraduate students showed a .12 point ($p=.6291$) increase in interest in applying to medical school. The condensed AA format is a viable alternative. The mentors gave the overall program a rating of 4.86/5.0. While it did not increase interest in Pediatrics/Medicine in a significant way, mentors demonstrated a significant increase in soft skills and confidence. Limitations include: response size, recall bias, and selection bias.

STRATEGIES FOR CONFLICT MANAGEMENT IN HEALTHCARE

Azlan Tubbs, BS; Dr. Cheryl Erwin, JD PhD

Introduction Conflict management is a crucial skill in the healthcare workplace. As physicians face medical anomalies, decision fatigue, external pressure, and adaptive technology, they experience medicine beyond the expectations set during training, and these stressors lead to mental, emotional, and physical exhaustion. Conflict only adds to these difficulties. Although conflict is common in all workplaces, techniques to manage and mitigate conflict improve physicians' overall health and well-being. As it originates from many sources, including role strain, interpersonal disagreements, and workload, conflict is a prominent piece of healthcare. **Methods** Conflict management is a learned skill whose success promotes positive patient outcomes and workplace satisfaction. Through study of six facets of conflict management (authentic leadership, diagnosing conflict, problem-solving approach, difficult conversations, negotiation, and mediation), physicians can improve their approach to conflict and enrich the environment of their workplaces. The study of these six qualities occurs through learning, lecture, and practice to refine unique approaches in managing difficult situations. **Results** The results of learning conflict management resound through an individual's life. It is evident that physicians who practice healthy approaches to conflict heal from their career exhaustion and grow moving forward. They become more confident in leadership and selective in their conflict management methods, which propagates improved patient outcomes and team wellness. **Conclusion** Physicians who learn conflict management approaches are well-suited to heal and grow in their careers. A centered mindset about managing complicated scenarios, both colleague- and patient-initiated, has profound impacts on physicians', teams', and patients' lives. Physicians change the world one life at a time, and conflict management only expands this reach and influence to their own selves.

A COMPARISON OF NUTRITIONAL COMPETENCY ATTAINMENT BETWEEN SCHOOLS OF DIFFERING SOCIOECONOMIC STATUS

Saneeva George, Ashna Khare, Lauren Puig, William Riley, Annie Wang, Nolan Watt, Dr. Jill White PhD

Introduction: Nutrition-related knowledge is a vital aspect of health education to improve dietary behaviors, maintain a healthy weight, and prevent chronic diseases in the younger generations. We seek to evaluate the effectiveness of developed nutritional content in an after-school educational program administered in two schools of different socioeconomic status. The two schools will be chosen to better test the program's effectiveness on multiple different baselines of elementary students' nutritional knowledge in the Lubbock community. We predict the impact of the nutritional content will be positive, but that the ending competency level may differ based on location. **Methods:** This pilot study implemented a one-hour after-school nutritional program in two schools of differing socioeconomic status within Lubbock Independent School District (LISD). The program curriculum was created to address state-mandated nutritional competencies on fats, sugar, protein, and nutrition labels. The goal of this program was to educate fourth and fifth grade elementary students, and to record pre- and post- intervention data to evaluate the effectiveness of the curriculum in each school. Nutritional competencies are based on those listed in the Texas Administrative code: Title 19. **Results:** The effectiveness of the program will be investigated through collection of qualitative and quantitative data which gauges student understanding of proteins, fats, sugars,

and nutrition labels following exposure to the developed nutritional curriculum. Discussion: Future application of this pilot program should include additional schools for greater impact within Lubbock ISD. Although the overall impact of the curriculum was positive, additional studies could be developed to further investigate any absolute competency level differences seen at different locations. In conclusion, the after-school nutrition program is an asset to the educational wellbeing of Lubbock ISD students by empowering students to make positive choices about their nutritional health.

ENHANCING MEDICAL STUDENT COMMUNICATION WITH UNDERSERVED POPULATIONS THROUGH STANDARDIZED PATIENTS

Shravya Yarlagadda; Anjali Aaluri; David Lanford; Dr. Fiona Prabhu, MD

Understanding the various social determinants of health represents an increasingly important facet of medical education. Our project aimed to evaluate if pre-clinical medical students felt they improved their confidence and communication skills in working with underserved populations by acting through standardized patient encounters with representatives of these populations. Each encounter focused on a different marginalized population: those with language barriers, abusive experiences, different gender identities, sexual orientations, and/or pronoun preferences. Students were surveyed on specific communication skills and their perceived comfort with those skills before and after each standardized patient encounter. Following each encounter, students reported increased comfort in communicating with patients from the aforementioned populations. Furthermore, students reported improved comfort communicating with patients through an interpreter, identifying patient discomfort, and encouraging patients to open up to them. These findings underscore the critical role of targeted communication training in medical education, particularly in preparing future physicians to address the diverse needs of underserved populations. By fostering these skills early in their careers, medical students will be better equipped to navigate the complexities of social determinants of health, ultimately contributing to more equitable and effective patient care.

META-ANALYSIS

VASOSPASM MANAGEMENT: A META-SYNTHESIS OF CURRENT MODALITIES USED BY DIFFERENT MEDICAL SOCIETIES

Namratha Mohan, MBA; Dr. Cooper Phillips, MD

Background: Cerebral vasospasm is a life-threatening complication of an aneurysmal subarachnoid hemorrhage (aSAH), with approximately 6 to 10 cases per 100,000 patients yearly. Despite the publication of numerous guidelines from various medical societies, there is a lack of standardized consensus on what the optimal management strategies for this severe complication truly are. This meta-synthesis aims to synthesize these endorsed recommendations to ultimately identify standardized care guidelines and improve patient outcomes after aSAH.

Methods: A comprehensive database search of existing guidelines published by major medical societies in the past 10 years was performed.

Results: The analysis included 28 relevant documents from 7 major medical societies. Key findings included: 1) Unanimous endorsement for oral nimodipine administration for 21 days post-aSAH. 2) Varying recommendations for alternative calcium channel blockers and hemodynamic management methods. 3) Targeted hypermagnesemia and routine statin therapy were not universally recommended due to insufficient evidence. 4) Use of antifibrinolytics was considered on a case-by-case basis. 5) Endovascular interventions were recommended for refractory cases, specifically.

Conclusion: This meta-synthesis reveals consistencies and divergences in vasospasm management recommendations across medical societies, highlighting the need for more robust clinical trials, regular guideline updates, and increased medical society collaboration.

COMPARING PRESCRIBING PATTERNS IN TELEMEDICINE AND TRADITIONAL CARE: A META-ANALYSIS

Madelyn Mullinax, PharmD Candidate

The widespread adoption of telemedicine, accelerated by the COVID-19 pandemic, has brought attention to its impact on prescribing practices compared to traditional in-person care. This analysis examines patterns in medication prescribing for acute conditions in telemedicine versus face-to-face treatments. Findings reveal a significant difference in prescribing trends, with telemedicine associated with higher rates of broad-spectrum antibiotic prescriptions and instances of overprescribing for infections not requiring treatment. These trends often correlate with higher patient satisfaction, potentially reflecting the role of patient expectations in driving prescribing decisions.

However, diagnostic limitations, the absence of physical examinations, and a lack of structured follow-up care in telemedicine settings contribute to these prescribing practices. The frequent use of broad-spectrum antibiotics raises concerns about the risk of antibiotic resistance, a critical public health issue. This shows the need for evidence-based interventions and standardized prescribing guidelines to mitigate inappropriate medication use while maintaining high levels of patient satisfaction. Future studies would include the need for standardization of prescribing guidelines and interventions to ensure safe and appropriate medication use. This would also include implementing educational providers to ensure the safety, efficacy, and sustainability of healthcare.

RISK OF BLEEDING FOLLOWING NON-VITAMIN K ANTAGONIST ORAL ANTICOAGULANT USE IN PATIENTS WITH ACUTE ISCHEMIC STROKE TREATED WITH ALTEPLASE

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Objective: To evaluate the risk of bleeding and mortality after alteplase treatment for acute ischemic stroke among patients treated with NOACs compared to those not treated with NOACs.

Methods: This nationwide, population-based cohort study was conducted in Taiwan using data from Taiwan's National Health Insurance Research Database from January 2011 through November 2020 and included 7483 patients treated with alteplase for acute ischemic stroke. A meta-analysis incorporating the results of the study with those of previous studies was performed, and the review protocol was prospectively registered with PROSPERO.

Exposures: NOAC treatment within 2 days prior to stroke, compared to either no anticoagulant treatment or warfarin treatment.

Main outcomes and measures: The primary outcome was intracranial hemorrhage after intravenous alteplase during the index hospitalization (the hospitalization subsequent to alteplase administration).

Secondary outcomes were major bleeding events and mortality during the index hospitalization.

Propensity score matching was used to control potential confounders. Logistic regression was used to estimate the odds ratio (OR) of outcome events. Meta-analysis was performed using a random-effects model.

Results: Of the 7483 included patients, Compared to those who were not treated with anticoagulants, those treated with NOACs did not have significantly higher risks of intracranial hemorrhage, major bleeding, or in-hospital mortality in the propensity score-matched analyses. Furthermore, the risks of bleeding and mortality were not significantly different between patients treated with NOACs and those treated with warfarin. Similar results were obtained in the meta-analysis.

Conclusion: In this cohort study with meta-analysis, compared to no treatment with anticoagulants,

treatment with NOACs prior to stroke was not associated with a higher risk of intracranial hemorrhage, major bleeding, or mortality in patients receiving intravenous alteplase for acute ischemic stroke.

OPTIMIZING ANTIBIOTIC STEWARDSHIP: EVALUATING THE DURATION OF THERAPY TO MITIGATE RESISTANCE

Madelyn Mullinax, PharmD Candidate; Elaine Perez, PharmD Candidate

Antibiotic resistance remains a critical challenge when it comes to global public health, increasingly with the emergence of telemedicine. This is driven by patients being over prescribed antibiotics and prolonged duration of antibiotic therapy. The duration of therapy has been defaulted to about 7, 10, or 14 days. However, these durations do not reflect the minimum time to achieve clinical success. Overuse and prolonged durations can disrupt the natural biome of the body leading to potential more adverse effects. This analysis evaluates studies looking at the duration of antibiotic treatment and the efficacy of treatment. Duration of common bacterial infections is 5-7 days; shorter regimens decrease the likelihood of resistance and lower the chance of adverse effects. Prescribers who have prescribed short term antibiotics such as for sinusitis or pneumonia achieve the clinical care needed for the patient all the while avoiding antibiotic resistance. Within the analysis it showed shorter treatment durations are non-inferior when compared to longer course treatments and are associated with less adverse events. With shorter antibiotic courses this will help the patient to complete the full course and remain adherent versus a longer course runs the risk of non-adherence. These findings can be associated with reduced resistances rates long term. Further research is needed to establish precise guidelines for specific infections and populations.

A SYSTEMATIC REVIEW OF MEDICAL STUDENT RESEARCH PROJECT PUBLICATION RATES

Michael Steward; Jordan Kassab, MS; Werner T.W. de Riese, MD, PhD

Introduction

Changing STEP 1 from scored to pass/fail has caused residency directors to shift their focus onto other metrics, precipitating a felt need by medical students to increase their research experience. Despite this increased need, medical students still face the same difficulty as in previous years of finding mentors and publishing manuscripts. There has not been much investigation on the topic of medical student research opportunities and publication rates. Therefore, this study provides insight into the publication rates of research programs for medical students in the United States.

Methods

A PubMed search was used to identify articles that detailed publication rates of United States medical students since 2000. All articles that arose from the search were systematically screened using the Preferred Reporting Items for Systematic reviews and Meta-Analysis 2020 procedures. The data gathered were analyzed using a forest plot, funnel plot, Egger's test, and ROUT test.

Results

Of the 878 records retrieved from the PubMed search, 9 were included in this analysis. These selected studies contained data from 2002 to 2020 and included 2,214 medical students. Of these, 944 (42.6%) were found to have published their work from a research experience. The Egger's test yielded no statistical significance, confirming the suspected mitigation of bias, and no outliers were detected in the ROUT Test.

Conclusion

With only 42.6% of students found to have published research conducted in a research program, there is an evident need to improve such programs and raise publication rates. Experienced academic physicians play a key role in mentorship and guiding their students to publication. Therefore, medical schools should also seek to attract and support such physicians so that their students are better prepared for competitive residency applications.

UNDERGRADUATE

RELATION OF SOCIAL DETERMINANTS OF HEALTH WITH SURVIVAL OUTCOMES AMONG PATIENTS WITH EYE CANCER IN WEST TEXAS

Abdulkader Almosa; Dr. Duke Appiah, PhD MPH

Ocular cancers, though rare, pose significant health risks, particularly when diagnosed at advanced stages or diagnosed in settings with limited access to specialized care. This study explores the impact of social determinants of health (SDoH) on survival outcomes for patients with ocular cancer in West Texas, a region marked by pronounced rurality and healthcare access challenges. Utilizing the Centers for Disease Control and Prevention's Social Vulnerability Index (SVI) and data from the Texas Cancer Registry, this research examines how factors such as socioeconomic status, race, and geographic isolation correlate with survival among patients diagnosed with primary ocular malignancies, including uveal melanoma, conjunctival melanoma, and retinoblastoma. By stratifying patients based on SVI quintiles, we assess survival differences and highlight critical disparities influenced by social vulnerabilities. This study aims to contribute to the understanding of rural health disparities in oncology and to provide actionable insights for healthcare policy, with the goal of improving outcomes in underserved populations. Results will inform targeted strategies for reducing health inequities and enhancing cancer care access in rural settings.

NOVEL MODEL OF BLOOD-BRAIN BARRIER IN VITRO SUGGESTS DYSREGULATION OF TXNIP AND GUCY1A1 AS KEY MEDIATORS OF HIV-INDUCED NEUROCOGNITIVE DISORDERS

Preston Campbell; Javaria Baig; Dr. Sharilyn Almodovar, PhD

BACKGROUND. The threats of Human Immunodeficiency Virus (HIV) have been potent for 40+ years. HIV-associated neurocognitive disorders range from general loss of physical/mental ability to dementia and have been the most lethal and challenging to combat. HIV causes severe neurotoxicity by eroding the integrity of the blood-brain barrier (BBB), making the brain more vulnerable to injury by exogenous substances. The weakened BBB effectively plays its role as a welcome mat for harmful chemicals and viral particles alike to flood through and invade the brain. As such, neurocognitive diseases are significantly more prevalent in HIV patients, compared to the general population. While the global effects of HIV on BBB are recognized, the local effects of HIV on BBB cellular function, gene expression, and morphology remain understudied. **METHODS.** To address this knowledge gap, we adapted a novel four-cell type BBB model in vitro. Human primary endothelial cells, astrocytes, pericytes, and immortalized HMC3 microglia (ScienCell or ATCC) were assembled onto transwell systems. Cells were exposed to HIV for 48 hours and harvested to analyze the expression of 84 neurotoxicity genes using the RT2 PCR array (Qiagen). **RESULTS.** Compared to untreated cells, BBB cells exposed to HIV exhibited statistically significant downregulation of guanylate cyclase 1 soluble subunit alpha1 (GUCY1A1) expression and thioredoxin-interacting protein (TXNIP). **CONCLUSIONS.** Downregulation of TXNIP is known to reduce reactive oxygen species and activation of inflammasomes, while downregulation of GUCY1A1 impairs nitric oxide production essential for vascular function. Our preliminary data suggest that HIV-induced impairment of cognitive health may be based on the combined downregulation of vascular function and immune responses in the injured brain. We plan to investigate the cell-specific contributions to the dysregulation of GUCY1A1 and TXNIP signaling to dissect their function during HIV infection.

ASSESSING THE ROLE OF POLYSACCHARIDES IN BIOFILM DISPERSAL

Jason Hamdan¹, Rebecca Schneider², and Kendra Rumbaugh², Ph.D.

Background: Chronic wounds have impaired healing processes making them vulnerable to the development of bacterial biofilms. These biofilms are complex microbial communities that adhere to surfaces and are encased in an extracellular polymeric substance (EPS), which comprises both self-produced and scavenged proteins, extracellular nucleic acids, and carbohydrates. The resilience of biofilms, including their tolerance to antibiotics, is largely attributed to the composition and structure of the EPS. This intricate nature of biofilms poses significant hurdles in clinical treatment. Previous studies have suggested enzymatic degradation of the EPS matrix by glycoside hydrolases (GH), which target glycosidic linkages in the EPS polysaccharides, could serve as a potential strategy to combat biofilm formation. However, the role of specific bacterial polysaccharides in biofilm formation and structural integrity remains an area of active investigation. In this study, we hypothesize that knocking out specific polysaccharides in the same bacterial strain (*Pseudomonas aeruginosa*) — Psl and Pel—will impact the dispersal efficacy of GH. By comparing GH dispersal of wild-type and polysaccharide knockout strains, we aim to further our understanding of these polysaccharides to biofilm robustness. **Methods:** This study was done using an in vitro model. The PA01 biofilms with WT, Δ psl, Δ pel, and Δ psl/ Δ pel were grown for 48h in two 24-well-plates. The well plates were then treated with GH or a PBS vehicle for 3 h. Following the treatment, the dispersal efficacy of GH on biofilms made by the wild-type and polysaccharide knockout strains was measured using CFU quantification. **Result:** Our results show no difference in GH dispersal efficacy between the four strains. **Conclusion:** This study highlighted how the production of different polysaccharides may not impact the effectiveness of GHs on biofilm dispersal; however, this could be due to model limitations. The next step is to test GH against in vivo biofilms which are more representative of a clinical biofilm infection.

PREVALENCE OF CARDIOVASCULAR DISEASE AND ASSOCIATED RISK FACTORS AMONG LOW-INCOME AND HOMELESS INDIVIDUALS IN WEST TEXAS

Eli Heath; Abdulkader Almosa; Rebecca Joseph; Dr. Duke Appiah, PhD MPH

BACKGROUND: Cardiovascular disease (CVD) remains the leading cause of death in Texas and the United States, with obesity, age, smoking, hypertension, hyperlipidemia, and type 2 diabetes being among the primary contributing factors. Disparities persist in healthcare accessibility and quality among racial/ethnic minorities, homeless individuals, and people of low socioeconomic status. There remains a scarcity of literature examining CVD risk profiles among these populations in West Texas. Hence, we evaluated the burden of CVD risk factors among homeless individuals and people of low socioeconomic status presenting at a free clinic in Lubbock, Texas.

METHODS: Health records of 201 individuals aged 18 to 89 years who participated in a health screening program from January 1, 2022, to April 31, 2024, were evaluated. Chi-square tests were used to compare CVD risk profiles by age and race/ethnicity.

RESULTS: The study population had a mean age of 56.6 years, with females making up 52.7% of the population. Hispanic individuals comprised the largest racial/ethnic group (62.7%). At the time of the health screening, a large proportion of participants reported tobacco use (41.8%), about half had hypertension (46.8%), more than a third had type 2 diabetes (36.3%) and over two-thirds (67.2%) of participants were obese.

CONCLUSIONS: This cross-sectional health screening revealed the substantial burden of CVD risk profiles among homeless individuals, and people of low socioeconomic status in Lubbock. Racial/ethnic minorities (Hispanic and Black participants) comprised most of the study population (74.6%) and displayed the highest rates of obesity (66.7% and 72.2%), hypertension (58.3% among Black participants), and elevated triglycerides (21.4% and 20.8%). These findings may indicate uncontrolled CVD among the low-income,

homeless, and/or minority patient population. Targeted interventions are needed to reduce the burden of CVD in this largely vulnerable population.

WNT SIGNALING AND IMMUNE REGULATION IN SERTOLI CELLS

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Introduction:

The Wnt/ β -catenin signaling pathway mediates various cellular processes, including immune regulation. For example, Wnt/ β -catenin signaling regulates the development of immunological tolerance via dendritic cells as well as influences the secretion of chemokines and cytokines to promote or inhibit an inflammatory response. Sertoli cells (SC) are somatic cells located within the seminiferous tubules of the male testis and are critical to facilitate spermatogenesis. SCs nurture developing germ cells and provide germ cells with protection from autoimmune destruction by the formation of the blood-testis barrier (BTB) and the secretion of various immunomodulatory factors. However, the exact mechanisms involved in conferring immune-privilege properties to SCs remain largely unknown. Despite the known role of the Wnt/ β -catenin signaling pathway in maintaining tolerance in systemic immune regulation outside of the testis, no studies have reported on its potential immune regulatory role in SCs. Herein, this preliminary study aims to investigate the presence of Wnt-related and immune genes in SC.

Methods:

Primary SCs were isolated from male C57BL/6 \times 129 mice, aged 19-20 days. SC transcriptome data was obtained using the Mouse Expression 430 2.0 microarrays containing 45,101 total probes from primary SCs and the mouse Sertoli cell line (MSC-1). Microarray data was used to identify Wnt-related genes expressed by SCs and MSC-1 cells.

Results:

Analysis of microarray data identified key Wnt-related and immune genes of interest, including *Fzd6*, *Lef1*, *Mapk10*, *Ppp2ca*, *Ppp3cc*, *Prickl2*, *Senp2*, *Wnt4*, *Nfatc1*, *Ppp2r5a*, *Sfrp1*, *Sfrp2*, and *Wif1*. In the future, we will confirm gene and protein expression of these target genes.

Conclusions:

Collectively, our ongoing study has identified several Wnt-related genes. These results suggest that Wnt signaling may not only play a key role in SC development but also in their ability to modulate the immune environment in the testis.

INVESTIGATING MOLECULAR TARGETS OF LENALIDOMIDE USING IN VITRO MODELS OF ALZHEIMER'S DISEASE

Jessica Kennedy; Ellie Reyna; Dr. Boris Decourt, PhD

Alzheimer's disease (AD) is an incurable neurodegenerative disorder that leads to the death of neuronal cells in the brain. Despite recent U.S. Food and Drug Administration medication approvals (anti-amyloid immunotherapies), current treatments show limited clinical efficacy, with a moderate risk of severe adverse events. Therefore, there is an unmet medical need to develop new treatments that could be used either as pleiotropic monotherapies, or as part of combination therapies to slow down the progressive cognitive decline observed in AD. One potential approach is by modulating neuroinflammation.

Our project aims to explore the pharmacodynamic properties of the immunomodulator lenalidomide, an anti-cancer drug and potent TNF α inhibitor, on AD-like pathology in-vitro. Preliminary data from AD-like

transgenic mice treated with lenalidomide showed improvement in cognitive functions and a reduction in brain plaque loads. However, lenalidomide's clinical use is limited by concerns about toxicity. This motivated the current research project, which aims to reduce the toxicity of immunomodulatory drugs by identifying, in-vitro, how lenalidomide alters the expression of molecular targets involved in the amyloid pathology. Specifically, we hypothesize that lenalidomide will decrease the production of cytokines and chemokines in THP-1 monocytic cells, which should result in the reduction of A β synthesis in BE(2)-M17 neuroblastoma cells (note: BE(2)-M17 cells naturally produce detectable amounts of A β peptides). Aim 1 will investigate how potent lenalidomide is on TNF α expression in-vitro. Aim 2 focuses on identifying molecular targets regulated in BE(2)M17 cells via RNA sequencing. Our results will improve knowledge of lenalidomide properties at a cellular level and offer insights for developing new pharmacological compounds with reduced toxicity while maintaining specificity for A β metabolic targets.

AGE-RELATED CHANGES IN ADIPOSE TISSUE HISTOLOGY IN MALE H3C/HEJ MICE FED A HIGH-FAT DIET THAT DEVELOPED HEPATIC CARCINOMA

Rylee Mullen, Benjamin Barr, Hanna Moussa, Mahammad Yosofvand, Lauren Gollahon, and Kembra Albracht-Schult

Aging and obesity are two rising global issues, there is a growing need for novel therapeutic and prevention strategies. Aging is a complex biological process, characterized by a progressive decline in metabolic function. A hallmark of aging is the chronic inflammation of adipose tissue which increases the risk for multiple comorbidities including cancer. The over-expansion of adipose tissue, otherwise known as obesity, also contributes to this tumor microenvironment. Adipose tissue is a diverse endocrine organ responsible for energy storage and homeostasis as well as the production of multiple hormones. All the above leads us to believe that the combined effects of obesity and aging on adipose tissue could further increase the risk of cancer development, specifically in the liver. This research aims to uncover the histological and inflammatory changes in adipose tissue in the presence of increasing age and obesity. We hypothesize that adipocyte size and number will decrease, and macrophage infiltration will increase with age in the white adipose tissue (WAT) of male mice with liver cancer. To investigate this question, I will be obtaining visceral WAT samples from mice provided to us through collaboration with Dr. Lauren Gollahon in the Biology department. These mice were fed high fat (HF) (46% fat, 36% CHO, 18% proteins) and control (11% fat, 71% CHO, 18% proteins) diets and euthanized at ages 6 months, 12 months, and 13+ months. Tissues will be processed and embedded. To observe the changing size and number I will stain slides with H&E. To observe macrophage infiltration, I will be staining them with macrophage marker F4/80. Our research is expected to help improve knowledge of the combined effects of obesity and aging on hepatocarcinoma development.

PULMONARY ARTERY SMOOTH MUSCLE CELL PHENOTYPIC SWITCHING IN RESPONSE TO HUMAN IMMUNODEFICIENCY VIRUS ENVELOPE VARIANTS

Minh Nguyen; Amanda K. Garcia; Dr. Sharilyn Almodovar, PhD

Human Immunodeficiency Virus (HIV) exhibits high genetic variability due to a lack of proofreading during replication and selective pressures from the immune system or antiretroviral therapy. This diversity complicates vaccine development and may contribute to non-AIDS comorbidities such as pulmonary vascular diseases. People with HIV are at increased risks for pulmonary vascular pathologies but the role of HIV in this remains unclear. Previous studies associated HIV-X4 strains with severe pulmonary hypertension. HIV-X4 strains use the host CXCR4 as coreceptor for viral entry, unlike HIV-R5, which uses the CCR5 coreceptor. Here we compared the effects of HIV-R5 vs -X4 in pulmonary vascular responses to HIV. Pulmonary Artery Smooth Muscle Cells (PASMCs) transition from a contractile to a synthetic phenotype characterized by increased proliferation, cell activation/adhesion, and secretion of inflammatory cytokines in response to vascular injury or viral infections. We hypothesized that HIV-X4 induce significantly higher

expression of Intercellular Adhesion Molecule-1 (ICAM1) and inflammatory IL6, compared to R5. In this study, Pulmonary artery endothelial cells and PASMC were co-cultured. Next day, T cells were infected with HIV NL43 (X4 strain) or HIV NLDAD8 (R5 strain) at MOI:1 and added to the vascular cells. Cells were harvested over a 0min-72hrs time course for RNA extraction and gene expression analyses of ICAM1, and IL6 by quantitative RT-PCR. Controls included vasoconstrictive Angiotensin II (100nM), or DMSO (vehicle). Both HIV strains significantly increased ICAM1 and IL6 expression with peak levels at 1-2 hours and again at 24-48 hours post-infection. However, Ang II did not increase IL6 expression. This work highlights the novel role of HIV in the phenotypic transitioning in PAMSC from contractile to synthetic in vitro. Further experiments will examine the effects of HIV Envelope variants in calcium uptake in PAMSCs, which is a hallmark of vasoconstriction.

EXPLORING THE COMBINED IMPACT OF CHRONIC STRESS AND RETINOIC ACID DEFICIENCY ON ALZHEIMER'S DISEASE PATHOLOGY

Rose Marie S. Tijerina, Anthony Rudd, Mosharaf Mahmud Syed, Bovey Liu, and J. Josh Lawrence

Chronic stress, mediated by prolonged glucocorticoid (GC) exposure, disrupts synaptic plasticity and neuronal function in key brain regions such as the hippocampus and prefrontal cortex. These disruptions are linked to hypothalamic-pituitary-adrenal (HPA) axis dysregulation, a hallmark of major depressive disorder (MDD), which increases the risk of Alzheimer's disease (AD). Human evidence suggests that Vitamin A (VA) deficiency in the brain contributes to AD pathology. Rodent studies demonstrate that VA supplementation can lower inflammatory cytokines, reduce the buildup of amyloid- β plaques, and ameliorate AD-related symptoms. We used transcriptomic data from 2 sets of human AD hippocampal postmortem samples to identify glucocorticoid receptor (GR) signaling as the most dysregulated pathway among 527 all-trans retinoic acid (ATRA)-sensitive pathways, with 81 dysregulated genes. These dysregulated genes, including UQCRC2, a mitochondrial complex III subunit, highlight an intersection of GC signaling with mitochondrial dysfunction, neuroinflammation, and synaptic loss—core contributors to AD pathology. Our analysis also connects GR dysfunction to chronic neuroinflammation in AD. This interplay suggests a maladaptive feedback loop where increased cortisol levels fail to suppress inflammatory responses due to impaired GR signaling. Further, NF- κ B, a key regulator of immune responses, is hyperactivated in chronic stress and depression, exacerbating neuroinflammation and contributing to hippocampal atrophy. This study underscores the role of ATRA-sensitive genes in modulating GC signaling and reveals mitochondrial genes as critical nodes of dysregulation. These findings support the hypothesis that stress-induced HPA axis dysregulation synergizes with VA deficiency to accelerate AD pathogenesis. Targeting GR signaling and mitochondrial pathways offers a dual therapeutic strategy to mitigate neurodegenerative processes. Our results provide systems-level insights of interconnected pathways driving AD progression, offering actionable targets for future interventions.

GRSHIFTED PRIMER DESIGN OPTIMIZES SITE-DIRECTED MUTAGENESIS EFFICIENCY

Hannah Weaver, Devin Mangold, Nghi N.B. Tran, Rozenn Kenny Moundounga, Dr. Ina L. Urbatsch

P-glycoprotein (Pgp) is an ATP-binding cassette (ABC) transporter that exports potentially cytotoxic hydrophobic compounds from cells. Among its normal substrates are several chemotherapeutic agents. Since Pgp confers multidrug resistance, thereby influencing the pharmacokinetics of many drugs, the U.S. Food and Drug Administration requires documentation of Pgp-drug interactions during the development of novel pharmaceuticals. Therefore, developing medications that selectively block or avoid detection and subsequent export by Pgp is the goal of many pharmaceutical companies. Since the mechanism utilized by Pgp to transport compounds across the cell membrane is not fully understood, we study the function of specific domains within the protein. By employing Site-Directed Mutagenesis (SDM), we can make controlled amino acid changes in the protein and create mutants whose activity and structure can be analyzed. The most popular method of SDM, QuikChange® by Agilent, uses a fully overlapping primer

design for DNA amplification in polymerase chain reactions (PCR). However, we find QuikChange® unpredictable and generally inefficient for our purposes. Therefore, we have combined a partial overlap (shifted) primer design used in Directed Recombination-Assisted Mutagenesis (DREAM) with the QuikChange® mutagenesis protocol to increase the efficiency of the SDM process. Shifted primers allow for exponential growth of the PCR product, making it easier to screen a large number of samples early on and only proceed with analyzing successfully amplified samples. In the past few years, over 50 different mutants have been created utilizing our shifted primer design with a success rate of nearly 70%. This highly effective protocol allows for quick and efficient creation of mutant versions of Pgp and greatly facilitates mutational analyses that probe structure-function relationships in Pgp. This work was supported by the National Institute of General Medical Sciences R01 GM141216.

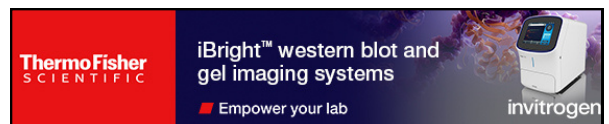
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