35th Annual

EVMS Research Day

Friday, October 20, 2023

Support for research travel and publications for trainees at Eastern Virginia Medical School are made possible by funding mechanisms managed by EVMS Research and Student Affairs. Of special note, we would like to highlight the following resources:

EVMS Community Faculty Designated Student/Resident Research Award Fund
Specifically created as a funding mechanism for student and resident professional travel to present research findings, up to eight $1,000 awards are offered per fiscal year. To qualify for funding, applicants must have a publication-quality manuscript ready for submission to a professional journal within three months of travel. Through this fund, made possible by a Community Faculty donor, over 45 students and residents have been able to present their research at national conferences in a wide variety of specialties and areas of research.

Student Affairs Award-Travel and Publication Fees
Students are able to utilize a new EVMS funding source for travel and publication fees, administered by Student Affairs. Travel awards of up to $1,500 per student are given to support attendance at a conference to present research findings. This travel award can be used to cover the conference registration fee for either virtual or in-person conferences, so actual travel is not required. Additionally, through this mechanism, students are able to apply for separate funds to cover manuscript publication fees for submission to professional journals.

For more information about these awards or the application process, students and residents can email ***EVMSResearch@evms.edu***.

35th Annual EVMS Research Day
October 20, 2023
Timeline of Events

Connection information and more on the Research Day Website:

https://www.evms.edu/research/research_day/

Vendor, EVMS Service Provider, and EVMS Core Facility Exhibition

11:30-5:00 PM **Waitzer Hall lobbies: first and second floor**

Oral Presentations

In person: Waitzer Hall, room 300

Virtual: (***click here to join*** or join directly on the website)

Opening Remarks

12:00-12:10 PM Eva Forgacs-Lonart, PhD, EVMS Research Advisory Committee Co-Chair
Alfred Abuhamad, MD, EVMS President, Provost, and Dean of the School of Medicine

Presentation of Awards

12:10-12:15 PM Early Career Research Excellence Awards
Presented by Dr. Milton Brown, EVMS Vice Dean for Research

Excellence in Research Mentorship Award
Presented by Dr. Eva Forgacs-Lonart, EVMS Research Advisory Committee Co-Chair

Keynote Speaker

12:15-1:15 PM Introduction of Keynote Speaker
Paul Harrell, PhD, EVMS Research Advisory Committee Co-Chair

George Saade, MD
EVMS Foundation Chair for Women's Health
Professor, Internal Medicine
Associate Dean for Women's Health
Professor and Chair, Department of Obstetrics and Gynecology
Subject: ***Pregnancy as a Window to Future Health***

Platform Presentations

1:15-1:29 PM Samantha McGuire, Biomedical Sciences Graduate Student
Title: Prostate Cancer-Associated Glycosylated RNAs: Who are you and where are you hiding?
Mentor: Aurora Kerscher, PhD

1:30-1:44 PM Phyu Chaw, MD Student
Title: Dendritic Cell Contribution to Microvascular Cell Dysfunction in Type 2 Diabetes
Mentor: Khalid Matrougui, PhD

1:45-1:59 PM Nargiza Sadr, MD student
Sunscreen's Metabolite: Unveiling the Impact on White Blood Cells
Mentor: Rehan Qayyum, MD

2:00-2:14 PM Rebecca Fetter, MD student
Title: High sodium diet increases urinary endothelin-1 excretion in women but not in men
Mentor: Eman Gohar, PhD

2:15-2:29 PM Reece W. Hoerle, MD, Resident
Lipid Emulsion Therapy for Lidocaine Toxicity
Mentor: Xian Qiao, MD

Short Break

2:30-2:40 PM

Continued on next page

Poster Presentations

In person: Waitzer Hall, rooms 100 & 200

Refreshments served in the 2nd floor lobby

2:40-3:40 PM	**Poster Session A** Even numbered posters
3:40-4:40	**Poster Session B** Odd numbered posters

Short Break

4:40-4:50 PM

Presentation of Poster Awards and Closing Remarks **Waitzer Hall, room 300**

4:50-5:00 PM

Poster Awards from the Vice Dean for Research & Vice Dean for Academic Affairs
Presented by Dr. Eva Forgacs-Lonart and Dr. Paul Harrell
EVMS Research Advisory Committee Co-Chairs

EVMS Biomedical Sciences Programs Poster Awards
Presented by Dr. David Taylor-Fishwick,
Director, EVMS Biomedical Sciences Graduate Programs

Closing Remarks
Dr. Paul Harrell
EVMS Research Advisory Committee Co-Chair

Save the Date! Research Day 2024 will be h eld on Friday, October 11, 2024.

2023
KEYNOTE LECTURE

Pregnancy as a Window to Future Health

George R. Saade, MD

EVMS Foundation Chair for Women's Health
Professor, Internal Medicine
Associate Dean for Women's Health
Professor and Chair, Obstetrics and Gynecology
Eastern Virginia Medical School
Norfolk, VA

POSTER PARTICIPANTS

Biomedical Sciences

Doctor of Medicine Students

Medical Students (cont.)

Master of Public Health and Other Students

Residents and Clinical Fellows

Abstract Title: Comparing the efficacy of virtually administered and in person cognitive screening tools during the COVID-19 pandemic

Investigator: Bhalle, Shreyas
Co-Investigator(s): Hamid Okhravi, MD EVMS Department of Geriatrics and Gerontology Kanishk Sharma, MD EVMS Department of Geriatrics and Gerontology
Department: Geriatrics and Gerontology

Abstract

Introduction
Because of the COVID-19 pandemic, there were many restrictions placed on in-person elective testing for cognitive assessments. Testing was adapted to be virtually administered. Given the rapid onset of the pandemic, there was a significant increase in telehealth services across healthcare settings. There is a growing practice of delivering clinical neuropsychological services using teleconferencing video technology and is shown to be well accepted by patients. Although virtual administration of testing has improved the feasibility of delivering these tests, there has been expressed concern regarding best practice guidelines for implementation of virtual neuropsychological testing (NPT) in clinical practice.

Administration of several different neuropsychological testing modalities will be analyzed to better understand test accuracy using remote cognitive testing. More than 600 patients were tested virtually from March of 2020 to August of 2021 as a direct result of the COVID-19 pandemic and its social distancing and self-isolation protocols.

Methods
The goal of this project is to compare the diagnostic accuracy of virtual administration of the eleven components of the NPT to in-person administration of NPT in the diagnosis of cognitive impairment. It is also the objective of the study to identify differences in results specific to each component of testing as well as determining the influence of social demographics on virtual versus in-person assessment. Several data points will be collected including scores of the components of the cognitive assessment, social demographics, as well as degree of cognitive impairment as determined by fellowship trained Geriatrician with expertise in neurocognitive disorders: No cognitive impairment, MCI, dementia, Alzheimer's disease, other.

Data collection for the 600 patients will be conducted from patients who were seen between March 2020 and August 2021. This virtual NPT was administered by training staff at the memory clinic. Patients received this testing while at home, at a home of a close friend of family member, or at a nursing facility. Before testing was started, participants were asked to eliminate any distractions and following the testing, the results were reviewed by the clinician.

My role in this project is to conduct retrospective medical record review for those patients who were referred for evaluation at the Glennan Center Memory Consultation Clinic. Those with a complete NPT will be identified from the clinic through AllScripts and from the registry through RedCap. Participants will be identified and those with at least one virtual NPT data will be assigned to a group titled "Virtual NPT" while those with only in-person NPT data will be assigned to "in-person NPT" group. There are currently an estimated 600 patients predicated to have both virtual and in-person NPT data available. Those with either virtual or in-person NPT data from 06/01/2017 to 12/21/2022 will be included in the study. After data collection, data will be extracted and stored in RedCap as deidentified data which will then be used to compare in-person and virtual psychometric assessment. Statistical analysis for this retrospective, cross-sectional study will be conducted using many different modalities. For the demographic compositions of the two samples, a t-test for the continuous variables or a chi-square test for categorical variables will be implemented. Given the modelling or multiple outcomes, a multiple-comparison correction will also be implemented by adjusting the alpha-level in determining statistical significance. A multiple regression model will be used to investigate the relation between test type and test score. Data will be reported in aggregate trends.

Results
You will notice that the methods defined in the previous section is written for what I will be doing rather than what I have done so far. This is because of the limitations associated with the Institutional Review Board (IRB) as well as attaining access for AllScripts. While I had submitted all the necessary paperwork in late May/early June, I only received IRB approval for this study on 07/26/2023 allowing me to start work on this project a month ago. However, despite IRB approval being so late, I am still currently waiting on approval for AllScripts EHR access to begin my retrospective data collection. Once this is completed, I will be able to begin data collection and follow the aforementioned protocol for in-person versus virtual NPT analysis.

Conclusion
There are currently no conclusions from the study given the ongoing nature of approval for AllScripts access as previously mentioned. However, as I will be continuing this research into the academic year, I hope to gain approval, complete data collection, and analyze the results within the next few months with an ideal completion date of 11/2023.

Abstract Title: BRCA1 actions through the estrogen receptor alpha and inhibition of breast cancer stem or stem cell like properties

Investigator: Goyal, Angela
Co-Investigator(s): Worked under Dr. Kan Wang for the Summer Research Experience Program
Department: EVMS Microbiology & Molecular Cell Biology

Abstract

Introduction: Approximately 70% of clinically diagnosed breast cancer cases are estrogen receptor (ER) positive. The interaction between ER, estrogen, and BRCA1 play a significant role in breast cancer prognosis. Mutations in the BRCA1 gene can significantly increase the risk of breast cancer. Tamoxifen, a selective estrogen receptor modulator, is a widely utilized treatment for these cancers; however, 50% of patients with advanced breast cancer do not exhibit a positive response to this medication at the onset of their treatment regimen, and another 40% of patients become resistant during treatment. This study aims to select and enrich cancer stem cells from various breast cancer cell lines and investigate the effects and mechanisms of the novel A7 compound on stem cell proliferation, migration, and differentiation. Stem cells are thought to play an important role in drug resistance.

Methods: In the summer of 2023, MCF-7 and LCC9 cells were cultured, selected, and enriched for stem cells. These cultures were used to create 3-D cultures and treated with varying concentrations of the A7 compound. A Live-Dead Cell Viability Assay was conducted, and data was collected via a microplate reader and visualized with a fluorescence microscope.

Results: The data indicated that A7 did not exhibit significant toxicity to MCF-7 and LCC9 cells in both epithelial and stem cancer cells.

Conclusion: Further trials of A7 testing on cell growth in the presence of estrogen and testing of Tamoxifen as a control are needed to simulate regulation and confirm these findings. Additional investigation of ER+ cell lines with the mutant BRCA1 gene is also required. Further trials of A7 testing on cell growth in the presence of estrogen and testing of Tamoxifen as a control are needed to simulate regulation and confirm these findings. Additional study is required to investigate ER+ cell lines harboring the mutant BRCA1 gene.

Abstract Title: Patient Risk Stratification, Therapy Quantification, Detection of Cancer Racial Disparity, Prediction of Tumor Relapse/Patient Survival by Using SIAH As A Tumor-Specific, Therapy-Responsive, and Prognostic Biomarker in High-Risk and locally advanced Breas

Investigator: Hannah, Ashleigh
Co-Investigator(s): Investigator(s): Ashleigh Hannah 1, B.S., Lauren L Siewertsz van Reesema, M.D. 1, Elizabeth Zhang, B.S. 2, Valentina Robila, M.D. 2, Jennifer Koblinski, Ph.D., 2, Harry D. Bear, M.D., Ph.D., FACS 2, Richard A. Hoefer, M.D., FACS 3,4, Amy H. Tang 1, Ph.D.
Department(s): EVMS and Leroy T. Canoles Jr. Cancer Center, Department of Microbiology and Molecular Cell Biology, Norfolk, VA; Virginia Commonwealth University, Massey Cancer Center, Richmond, VA; Dorothy G. Hoefer Comprehensive Breast Center and Sentara Norfolk General Hospital, Norfolk, VA; Sentara Hospital Systems, Newport News, VA
Department: MMCB/LTCCC

Abstract
INTRODUCTION: Breast cancer is the most commonly diagnosed cancer and the second leading cause of cancer-related deaths in American women. A major unmet clinical need is that Black/African American (AA) women still suffer the highest mortality from breast cancer than any other race or ethnic group in the United States, despite the breakthrough therapy and technology advancement in the last 20 years. Triple-negative breast cancer (TNBC), characterized by the absence of expression of estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor (HER2), is the most aggressive molecular subtype in breast cancer. TNBC accounts for about 15% of breast cancer cases in the U.S. and is known for high relapse rates and poor overall survival (OS). TNBC is nearly twice as common in Black/AA women than in white women. In this study, we aim to risk stratify patients, detect cancer racial disparity, and predict relapse/survival in the clinic, especially among Black/white TNBC patients by comparing their length of disease, age at diagnosis, time between initial diagnosis and treatment given, neoadjuvant response, insurance status, and overall survival at Sentara andVCU.

In this study, we have focused on Seven-in-Absentia Homolog (SIAH), an evolutionary conserved RING-domain E3 ubiquitin ligase that is the most downstream signaling gatekeeper of EGFR/K-RAS signaling pathway. We report that the constitutive activation of the oncogenic EGFR/RAS/SIAH pathway is a major driving force in early tumor relapse, chemo- resistance, and systemic metastasis in human cancers. Our published studies have shown that SIAH expression is highly prognostic in high-risk and locally advanced breast cancer. We reported that SIAH's prognostic value was far superior to these commonly used clinical biomarkers, such as ER, PR, HER2, and Ki67. Importantly, SIAH's prognostic accuracy alone was comparable to the clinical gold standard, i.e., lymph node metastasis, mammary tumor size grade, stage, and molecular subtypes, in NACT/NST-treated breast cancer. We predict that SIAH can be used to further risk stratify patients and predict patient survival in 1st-line neoadjuvant settings. Furthermore, we will determine the clinical utility of SIAH to predict relapse/outcome/survival and detect cancer racial disparity. We predict SIAH expression would be higher in the Black/AA tumors than that of the white/Caucasian tumors by population average.

METHODS: Clinicopathological parameters and survival data were extracted and confirmed at Sentara MD Office and EPIC, de-identified clinical databases were established, and standard treatment regimens were extracted. We have and will conduct statistical analysis on the NACT/NST-treated breast cancer cohort and TNBC patient cohorts of the two major race groups by conducting Kaplan Meier survival curves, COX proportional hazards regression test, ANOVA, Chi Square and/or Fischer's Exact test, and student t-test. In doing so, we aim to delineate the impact of multifactorial contributors, such as age at diagnosis, length of disease, time between initial diagnosis and treatment given, neoadjuvant response, insurance status, and overall survival as well as SIAHHigh/Low expression in residual tumors for patient risk stratification and survival prediction.

RESULTS: At Sentara and VCU, we found that the time lapse between initial diagnosis and 1st treatment administered is significantly longer in Black/AA when compared to their white counterparts. There is similar insurance coverage across both racial groups in our two cohorts. In both cohorts, the average SIAH expression levels seemed to be higher in the Black/AA tumors than that of the white tumors. The SIAH IHC data are incomplete, and the study is still ongoing. Lastly, SIAH has shown clear statistical significance to risk stratify partial responders with residual diseases to predict relapse/survival in two major racial groups at Sentara and VCU.
CONCLUSION: It is important to identify the determinacy of cancer racial disparity, especially in Hampton Roads Virginia and Richmond Virginia, in which breast cancer mortality in our Black/AA patients is 1.7-2.0-fold higher than that of the national average, i.e., a glaring 1.4-fold higher breast cancer mortality rate in Black/AA patients than their white counterparts in the US. We aim to implement the NCCN standard of care and promote treatment adherence, as well as deploy SIAH as a new and precision prognostic biomarker to risk stratify, detect cancer racial disparity, and improve the overall survival of patients diagnosed with high-risk breast cancer, especially Black/AA patients in Virginia.

Abstract Title: Prostate Cancer-Associated Glycosylated RNAs: Who are you and where are you hiding?

Investigator: McGuire, Samantha
Co-Investigator(s): 1. Esther Jones, M.S. 2. Aurora Kerscher, Ph.D
Department: Microbiology & Molecular Cell Biology, Leroy T. Canoles Jr. Cancer Research Center

Abstract

Introduction

Glycosylated RNA (glycoRNA) is an emerging field in molecular biology. Carbohydrate modifications are vital for protein and lipid stability, transport, and localization. Glycosylation influences cell functions like growth, differentiation, apoptosis, and immune response, potentially impacting human disease. Carolyn Bertozzi's lab was the first to show that nucleic acids can also be glycosylated and isolating glycoRNAs from human and mouse cell lines using unbiased bioorthogonal chemistry methods. Yet, the biological significance of glycoRNAs remains unknown. We will investigate glycoRNA in the context of human prostate cancer (PCa). PCa is the 2nd leading cancer- related cause of male deaths. More effective diagnostic and therapeutic options are required to increase patient survivorship. Our goal is to develop glycoRNA as novel PCa clinical tools. We were the first to show that human prostate cells express glycoRNA. We found that glycoRNA of the small (<200 nt) noncoding RNA class correlated with cancer progression. Human prostate cell lines with no (RWPE-1) or low malignancy (LNCaP) expressed higher levels of glycoRNA compared to aggressive/metastatic PCa cell lines. Our glycosidase studies and lectin northern blot analysis indicated that glycoRNA carries both N-linked and O-linked modifications. This project will further characterize this heterogeneous glycoRNA population in the prostate and explore if glycoRNA is evolutionarily conserved using the

C. elegans genetic model. The hypothesis to be tested is that glycosylated RNA function to maintain prostate homeostasis and has cancer protective roles. We predict that glycoRNA dysregulation will correlate with malignancy/androgen sensitivity in prostate cells. We aimed to 1) Test a wider range of metabolic labeling regents to better characterize N-linked and O-linked modifications carried by prostate glycoRNA; 2) Perform subcellular fractionation studies to determine glycoRNA localization; and 3) Develop C. elegans as a new genetic model to study glycoRNA biogenesis.

Methods

LNCaP cells were grown in media with 100 µM azidosugar for 48 hours to label carbohydrate moieties with a reactive azide-group used for downstream ligation click chemistry, and compared to untreated controls. Cells were harvested for RNA isolation using rigorous methods (acid-phenol extraction, silica column purification, DNase I, Proteinase K, Mucinase, LiCl ethanol precipitation) and RNA was separated into large (>200 nt) and small (<200 nt) fractions (mirVana miRNA Isolation Kit). RNA was reacted with DBCO-biotin at 55˚C for 10 min to covalently ligate a biotin tag onto azide-labeled glycans. Biotin-labeled RNA was separated on a denaturing agarose gel, transferred onto a nitrocellulose membrane, and crosslinked. The northern blot was hybridized with a fluorescent-tagged streptavidin for visualization (Odyssey scanner). For subcellular fractionation studies, LNCaP cells were metabolically labeled and fractionated into cytoplasmic, membrane, soluble nuclear, chromatin bound nuclear, and cytoskeletal fractions (Thermo Subcellular Fractionation Kit). RNA was isolated for click chemistry and glycoRNA imaging. Western blot verified subcellular marker expression of the fractions. For C. elegans experiments, mixed-stage wild type N2 nematodes were grown on NGM plates containing 1mM azidosugars for 1 week, lysed in liquid Nitrogen with mortar/pestle, and prepared for glycoRNA visualization.

Results

Northern blot indicated small (but not large) glycoRNA expression when LNCaP cells were metabolically labeled with Ac4GalNAz (predominantly O-linked) and Ac4ManNAz (predominantly N-linked), but no/low glycoRNA expression when treated with Ac4GlcNAz (n=4). Our stringent RNA isolation procedures were confirmed to be free of mucin-contamination. GlycoRNA was predominantly noted in the membrane fraction of LNCaP cells labeled with Ac4GalNAz or Ac4ManNAz. GlycoRNA expression correlated with the plasma membrane marker PSMA (Prostate Specific Membrane Antigen) by western blot. C. elegans were verified to express small glycoRNA when grown on Ac4GalNAz (but not Ac4GlcNAz) plates. As expected, no glycoRNA was detected using Ac4ManNAz (sialic acid precursor) plates, since C. elegans do not make sialic acid.

Conclusion

We verified that glycoRNA is heterogeneous and carries both N-linked and O-linked modifications. Moving forward, we will determine how these sugar motifs change in non-malignant vs metastatic PCa cells and will identity glycoRNA by LC-MS/MS and RNA seq.

Fractionation studies showed that prostate glycoRNA localized to the cell membrane, and suggests external signaling that could influence disease progression. More refined membrane fractionation, lectin array, and J2 antibodies studies are needed. This is the first report showing that C. elegans express glycoRNAs, implying conserved biological significance. This project will provide novel insights into cancer-associated glycoRNA and lead to new PCa clinical targets.

Abstract Title: De novo lipid synthesis in the pathogenesis of benign prostatic hyperplasia.

Investigator: Tucker, Kayah
Co-Investigator(s): 1. Samara Silver-A-1, Department of Microbiology and Molecular Cell Biology, Leroy T. Canoles Jr. Cancer Research Center/EVMS; Nehemiah S. Alvarez-A-2, Department of Physiological Sciences, EVMS, Norfolk, VA
Department: Department of Microbiology and Molecular Cell Biology

Abstract

INTRODUCTION:
Benign prostatic hyperplasia (BPH) is the most prevalent urological condition in older men, affecting ~ 50% of men above the age of 50. As the prostate gland enlarges around the urethra, urine flow is obstructed, driving a collection of deteriorating symptoms known as Lower Urinary Tract Symptoms (LUTS). BPH is known to be driven by an age-related steroid hormone imbalance and inflammation.

Steroid hormone imbalance can be reproduced in mice via testosterone and estradiol treatment (T+E2). In this model, we previously identified foam cell differentiation, a lipid-laden macrophage phenotype, specifically in the lumen. Foam cells indicate lipid dysregulation, but the source of excess lipids in the BPH prostate is unknown. Therefore, in this study, we assessed the gene expression pattern of genes of the de novo lipid synthesis pathway in the T+E2 model.

METHODS:
Male C57BL/6J mice were implanted with pellets containing 25 mg (T) and 2.5 mg (E2), and their ventral prostates were collected two weeks later. Cells were then dissociated with cold protease and loaded on Chromium Next GEM (7000 cells/sample). Each sample was sequenced on NextSeq2000 at 100 million reads/sample. *In situ* hybridization (ISH) was performed to confirm scRNA-seq results using probes for *FASN*. The effect of E2 (0.1-100 nM) *in vitro* was tested on BPH-1 cells.

RESULTS:
The scRNA-seq analysis of T+E2 ventral prostates identified two luminal, a basal, a proliferating and a progenitor epithelial cell cluster. Expressional analysis indicated an increase in the majority of genes of the *de novo* lipid synthesis pathway (i.e., *Fasn, Scd-1, Acly,* and *Acat1/2*) in most epithelial clusters.

Increased *Fasn* expression was confirmed via ISH ($p < 0.01$). Expression of genes of the *de novo* lipid synthesis pathway was also explored in BPH-1 cells in response to E2.

CONCLUSIONS:
Our findings indicate a potential role for lipid dysregulation and an increase in *de novo* lipid synthesis in the pathogenesis of BPH regulated by steroid hormone imbalance. Our future studies aim to determine whether E2-treated epithelial cells can directly stimulate foam cell formation in co-culture models.

Abstract Title: Staphylococcus aureus Growth Phase is Associated with Transcriptional Divergence

Investigator: Yermal, Amanda
Co-Investigator(s): 1. Katelyn D. Cranmer, Department of Microbiology and Molecular Cell Biology 2. Julia A. Sharp, Department of Microbiology and Molecular Cell Biology
Department: Microbiology and Molecular Cell Biology

Abstract

Introduction:
Staphylococcus aureus, an invasive bacterial pathogen, is responsible for a plethora of disease states and a major contributor to both healthcare- and community-associated infections worldwide. *S. aureus* persists as a significant health threat, attributable to antibiotic resistance and immune-evasive strategies. Bacteria grown in biofilms generally exhibit increased antibiotic resistance and greater resistance to the host-immune response. Thus, the aim of the present study was to characterize the expression of select virulence-factor genes in biofilm and identify differences in the expression of these genes in biofilm vs planktonic bacteria.

Methods:
Community-associated *S. aureus* isolates from patients of the Children's Hospital of the King's Daughters were grown overnight for 16 hours. To develop the biofilm, cultures were incubated with 2% normal human plasma and Columbia broth + 2% NaCl in a 96-well plate. Biofilm was washed, then incubated with either ± 10% or ± 20% normal human serum (NHS) in conditions favoring immune activation. Planktonic bacteria were incubated with ± 20% NHS in borosilicate tubes**.** For targeted transcriptomic analysis, RNA was extracted and virulence- factor expression was measured via RT-qPCR, normalizing to a housekeeping gene (*tpi*). The expression fold change was assessed via the $\Delta\Delta C_T$ method. The virulence-factor genes assessed (*sdrE/bbp*, *clfA*, *scn*, *chp*, *spA*) were based on gene carriage previously determined by the lab. Capsule type, phase of growth, and infection type (blood or skin and soft tissue infection), were used as group discriminators.

Results:
In biofilm, 10% NHS promoted a significant increase in the expression of *sdrE* alone and in combination with its allelic variant *bbp*, in isolates with capsule type 5 (CP5) vs capsule type 8 (CP8). Infection type and sensitivity to methicillin did not significantly affect gene expression. In biofilm vs planktonic bacteria, 20% NHS promoted a significant increase in the expression of genes encoding for members of the MSCRAMM adhesin family (*sdrE*, *sdrE* + *bbp*, *clfA*), as well as *scn*, a secreted complement inhibitor. Expression of each of the MSCRAMM- associated genes was increased in biofilm and decreased in planktonic bacteria; *scn* showed increased expression in both phases of growth.

Conclusion:
Increased expression of MSCRAMM-associated genes in biofilm and an associated decreased expression in planktonic bacteria in response to NHS highlights the importance of MSCRAMMs within biofilm and their protective role against host immunity. Overall, these data demonstrate that *S. aureus* exhibits a differential transcriptional dynamic based on growth phase; the characterization of such supports the development of anti- staphylococcal targeted therapies.

Abstract Title: The use of Reverse Phase Protein Arrays (RPPAs) and immunoblotting to investigate a key cancer signaling network vulnerability, SIAH E3 ligase, whose complete inhibition leads to tumor eradication of several of the most aggressive, undruggable, and stage

Investigator: Baker, Jonathan
Co-Investigator(s): 1. Andrew Howell, M.S.,Leroy T. Canoles Jr. Cancer Research Center, Department of Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA 23501 2. Ashleigh Hannah, M.S., Leroy T. Canoles Jr. Cancer Research Center, Department of Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA 23501 3. Julia Wulfkuhle2, Ph.D., Center for Applied Proteomics and Molecular Medicine, School of Systems Biology, George Mason University, Manassas, Virginia 20110
Natalie Stahr, B.S., Leroy T. Canoles Jr. Cancer Research Center, Department of Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA 23501 5. Rosa Gallagher, Ph.D.,Center for Applied Proteomics and Molecular Medicine, School of Systems Biology, George Mason University, Manassas, Virginia 20110 6. Emanuel Petricoin, Ph.D., Center for Applied Proteomics and Molecular Medicine, School of Systems Biology, George Mason University, Manassas, Virginia 20110 7. Amy Tang, Ph.D., Leroy T. Canoles Jr. Cancer Research Center, Department of Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA 23501
Department: Microbiology and Molecular Cell Biology

Abstract
Introduction: RAS proteins are a family of evolutionarily conserved small GTPases that rest in the heart of a central tumor- driving pathway, the EGFR/HER2/RAS/RAF pathway, where they function as molecular switches, critically regulating cellular differentiation, proliferation, and survival. Its hyperactivation is a potent driver of neoplastic transformation and tumorigenesis found in ~40% of all human cancers, and is associated with highly aggressive, multidrug-resistant, recurrent, and metastatic cancers: making oncogenic RAS a major therapeutic target in the treatment of human cancers across multiple pathologies. However, despite 40 years of continued research, the adaptability, dynamic kinetics, and plasticity of downstream oncogenic signaling networks make K-RAS a largely "undruggable" target that has yet to achieve clinical efficacy. Seven in absentia homologues (SIAH1 and SIAH2) are evolutionarily conserved RING-domain E3 ubiquitin ligases that are expressed in proliferating cells; thus far, they have been identified as the most downstream signaling gatekeeper of the EGFR/HER2/RAS/RAF pathway. Our prior studies demonstrated that effective SIAH inhibition abolishes tumor growth in aggressive cancer cell lines, such as MiaPaCa, MDA-MB-231, MDA-MB-468, A459, and HeLa. We propose that SIAH is a major tumor vulnerability and actionable drug target for inhibiting oncogenic EGFR/HER2/RAS/RAF compensatory signaling network activation; we aim to elucidate the molecular mechanisms underpinning the anti-cancer "curative" phenotype of SIAH inhibitors.
Methods: 300 proteins/phospho-proteins were quantitatively measured by Reverse Phase Protein Array (RPPA) platforms to identify compensatory signaling pathway activation/inactivation and systemic cancer network rewiring in response to anti- SIAH blockade. Independent RPPAs were performed in triplicate on doxycycline (DOX)-inducible Tet-ON MiaPaCa, MDA- MB-231, MDA-MB-468, HeLa, and A459 cell lines were generated from a single cell, in which DOX-induced SIAH inhibitor, SIAH PD, expression was confirmed. Each cell line was then subjected to one of four experimental conditions: Tet- ON control cells without DOX induction (**group A**), Tet-ON control cells with DOX induction (**group B**), Tet-ON-SIAH2PD cancer cells without DOX induction (no SIAH PD inhibitor) (**group C**), Tet-ON-SIAH PD cancer cells with DOX induction (SIAH PD inhibitor) (**group D**). RPPAs, in conjunction with Principal Component Analysis (PCA), were conducted to quantify significant fold-changes of proteins/phosphoproteins whose expression was altered in response to SIAH inhibition ($p \leq 0.001$). The ratios of **D/C/B/A, D/C, D/B, C/A,** and **B/A** were calculated after normalization to GAPDH expression as an internal control. Prism was used to compare altered protein expression in a pairwise comparison. Targets that were identified as significantly up- or down-regulated in response to SIAH blockade were then assessed by immunoblotting for validation. Cell lysates of biological quadruplicates for each respective cell line were collected for group C and group D at different time points, 3-, 5-, and 7-days post DOX induction; protein concentration of each lysate was determined by bicinchoninic acid assays, and the proteins of interest were then normalized to β-actin, α-Tubulin, or GAPDH (based on molecular weight), and DOX-induced changes in protein expression were standardized, quantified, and plotted.
Results: Through RPPAs, we identified 6 targets (NFκB, Caspase-7, PARP, Cofilin, PD-L1, and Collagens) whose protein expression showed significant changes in response to SIAH blockade. These proteins play a critical role in regulating cell growth, apoptosis, NFκB signaling, stress response, DNA damage and repair mutants, immune dysfunction, and loss of cell adhesion in SIAH-deficient cancer cells. Immunoblot analyses yielded supporting evidence of our initial RPPA findings, providing independent validation of changes in the aforementioned targets' response to SIAH inhibition.
Conclusion: The identification and validation of differential protein expression induced by SIAH blockade provides valuable molecular insight into the dynamic regulation underpinning SIAH inhibitors' unmatched anti-tumor efficacy against stage IV human tumors. Our emerging data provide clear evidence supporting SIAH as a major tumor vulnerability and an actionable target that can be used to control and eradicate undruggable and incurable human cancers in the future.

Abstract Title: Role of estrogen in utero on baboon postnatal skeletal muscle development important for insulin sensitivity and glucose homeostasis

Investigator: Gauronskas, Phillip
Co-Investigator(s): Gerald Pepe, PhD, Department of Physiological Sciences, EVMS, Norfolk, VA Soon-Ok Kim, PhD, Department of Physiological Sciences, EVMS, Norfolk, VA
Department: Physiological Sciences

Abstract

INTRODUCTION
Insulin resistance typically precedes and ultimately leads to insufficient insulin production and the onset of type II diabetes. Using their non-human primate baboon model and the aromatase inhibitor letrozole, Pepe and colleagues have shown that baboon offspring born to mothers deprived of estradiol (E2) during the second half of gestation develop insulin resistance. Studies also showed that the number of microvessels and the microvessel/skeletal muscle fiber ratio, which is important for delivery of insulin and glucose to myofibers, as well as the size and amount of individual muscle fibers were significantly reduced in near term fetuses deprived of E2. Importantly, all parameters in fetuses and insulin resistance as well as microvessel number in offspring were restored to normal in animals treated with letrozole plus E2. Therefore, we proposed that the elevation in E2 during the second half of primate pregnancy promotes systemic micro-vascularization as well as growth of fetal muscle fibers essential for insulin sensitivity in adulthood. However, it remains to be determined whether the impairment of fetal skeletal muscle fiber growth in E2 deprived baboons is sustained in offspring.

METHODS
Animal – Samples of vastus lateralis skeletal muscle, paraffin embedded were available from pre pubertal baboon offspring (n = 2-3/group) aged 3 years old born to mothers untreated or treated in utero with letrozole ± E2.

Immunohistochemistry – Skeletal muscle sections (5 µm) were deparaffinized, treated for antigen retrieval and incubated overnight at 4C with human monoclonal anti-mouse antibody to slow myosin, washed and then incubated with peroxidase-conjugated goat anti-mouse secondary antibody and a Vector SG peroxidase substrate kit to stain the slow (Type I) fibers black. Sections were washed and then incubated with an alkaline phosphatase-conjugated rabbit monoclonal anti-mouse antibody to fast myosin. After washing, sections were incubated with Vector red alkaline phosphatase substrate solution to stain the fast (Type II) fibers red, washed and cover-slipped with Xylene-based Cytoseal XYL.

Image Analysis – Slides were imaged using an Olympus BX41 fluorescent microscope fitted with a DP70 camera and associated software (Olympus America, Inc.). Initial studies were performed in sections of skeletal muscle from 3 offspring untreated and 2 treated with letrozole and 2 with letrozole ± E2. Approximately 10-30 slow fibers and 25-70 fast fibers within randomly selected regions of myofibrils in each baboon were analyzed using Image J software (NIH). The number and size of each individual fast and slow fiber, the total area occupied by slow and fast fibers was determined in each of the regions analyzed and an overall mean calculated for each animal.

RESULTS
In the 3 groups of offspring, the number of fast fibers was 3-4 fold greater than the number of slow fibers but fiber numbers were not altered by treatment with letrozole. However, size (µm2) of slow (mean ± SE; 2,004 ± 402) and fast fibers (3,696 ± 542) appeared to be reduced in letrozole treated offspring (553 and 901 slow; 1,084 and 1,600 fast) and restored in one of the 2 offspring treated with letrozole
+ E2 (750 and 4,262 slow; 1,261 and 5,600 fast). Thus, the area of myofibers (fiber number x size) comprised of fast fibers exceeded area comprised of slow fibers. However, the area of slow and perhaps fast fibers in untreated offspring (33,875 ± 18,187 slow; 187,875 ± 44,490 fast) appeared to be reduced in letrozole treated offspring (5,530 and 9,911 slow; 42,276 and 144,000 fast) and restored in one offspring treated with letrozole + E2 (63,930 and 10,500 slow; 156,800 and 89,531 fast).

CONCLUSIONS
These very preliminary results which require a more robust analysis using more sections and additional animals indicates that the decrease in slow and fast fiber size and area characteristic of fetal skeletal muscle of animals deprived of estrogen in utero is still apparent in skeletal muscle of prepubertal offspring deprived of estrogen in utero. These findings which are very preliminary and based on a small sampling of tissue regions are nonetheless supportive of the suggestion that impaired skeletal muscle growth seen in the fetus is sustained prior to the onset of puberty in offspring deprived of estrogen in utero. It also remains to be determined whether these preliminary findings are sustained after puberty and induction of secretion of gonadal hormones estrogen (females) or testosterone (males).

Abstract Title: Behavioral Sex Differences in Rats Exposed to Space Radiation and Social Isolation

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Abstract

Introduction: Astronauts will be exposed to space radiation (SR) and undergo periods of social isolation (SI) during lengthy space expeditions like the planned Mars missions. Both stressors have the potential to impact the physical and mental health of astronauts, which could potentially impact mission performance and stress management. We have demonstrated that SR and SI have differential effects on sensorimotor performance, sleep, and fear-conditioned freezing behavior in male rats. It has yet to be determined whether these stressors have differential effects in males and females. In this project, we utilized balance beam (BB) and bilateral tactile adhesive removal (BTAR) tasks to assess potential sex differences in the effects of SR and SI on sensorimotor performance.

Methods: Male and female outbred, Wistar strain rats served as subjects. Both sexes were 8-9 months old at the time of study. Prior to behavioral experiments, rats either received SR (15 cGy GCRsim), SI (visual barriers between cages), dual flight stressors (DFS; SR+SI) or were individually housed (as a control group; SHAM). Ninety days following SR, time and age-matched groups of rats began BB and BTAR tasks to assess gross and fine motor function. The BB task requires the rat to traverse a beam from a start platform to a goal platform within 120 seconds, and consists of five trials over the span of seven consecutive days, with the start platform moving 1 position further from the goal platform if they succeed (all four paws reach the goal platform), or 1 position closer to the goal platform if they fail (time out or fall off). The closest start position is position 1 and the furthest start position is position 4. The BTAR task requires the rat to remove an adhesive sticker applied to their forepaw within 120 seconds and consists of four trials alternating between the right and left paws over the span of four consecutive days. BB and BTAR data were analyzed using a two-way mixed-factor analysis of variance (ANOVA) tests with Treatment (Control, SI, SR, DFS) x Gender (Male or Female). Tukey's post-hoc multiple comparisons test was performed when indicated by a significant ANOVA. We focused on reporting differences between sexes within the same treatment groups, although differences within sexes between treatment groups were also examined.

Results: BB data did not show differences in success rates between sexes. However, females in the SHAM, SI and DFS groups spent more time on the beam than did males, while males in the SHAM, SR, and DFS groups spent more trials in positions 2 and 3 than did females. Of interest, there were no significant differences in the amount of failed BB attempts between sexes. Interestingly, males in the SHAM, SI, and SR groups fell off the beam significantly more than females. BTAR data show similar results. All animals completed the BTAR task; however, males in the SHAM, SR, and DFS groups took longer to notice and to remove the sticker than females. Additionally, SHAM males had longer latency times (the time between noticing and removing the sticker) than females.

Conclusion: This study has identified sex-dependent performance decrements. Both BB and BTAR tasks showed little variation in terms of task success; however, male rats had distinct performance decrements in task efficiency. Not only did they need more trials to succeed in the BB task, but they also fell off the beam more than did females, implying possible sex differences in impairments in sensorimotor and vestibular function. While females did not exhibit deficits in terms of failing the BB task, they did show deficits in efficiency, taking longer to traverse the beam than males. During the BTAR task, males took longer to notice and remove the sticker and had longer latency periods between noticing and removing the sticker than did females, also suggesting possible sex differences in impairments in fine motor function. This research suggests that male and female rats are both impacted by SI and SR, but how these stressors impact performance can be sex-dependent.

Abstract Title: Neutrophil Depletion Improves Atherosclerotic Plaque Stability in Sleep Fragmented Mice

Investigator: Moriarty, Alina
Co-Investigator(s): 1. Shelby Ma, Microbiology and Molecular Cell Biology 2. Casandra Kirk, Microbiology and Molecular Cell Biology 3. Elena Galkina, Microbiology and Molecular Cell Biology
Department: Microbiology and Molecular Cell Biology

Abstract

Introduction
Over 70 million Americans report insufficient sleep due to daily responsibilities and lifestyle choices. Altered duration and poor sleep quality are associated with an increased risk of mortality due to a cardiovascular event, such as myocardial infarction or stroke. Atherosclerosis is the major underlying cause of cardiovascular disease. It is a chronic, inflammatory disease characterized by the formation of lipid laden, atherosclerotic plaques in the vessel walls. As the disease progresses, the composition of advanced atherosclerotic plaques increases in complexity and can become unstable and prone to rupture. Ruptured plaques are the main cause of the severe cardiovascular related events that are more likely to result in death. Previous data has shown fragmented sleep to accelerate atherosclerosis development though increased production of neutrophils from the bone marrow. Our previous experiments have demonstrated SF to alter neutrophils towards an activated phenotype that is associated with plaque instability. Here, we hypothesized that SF results in accelerated atherosclerotic plaque development and destabilization by increased production and activation of circulating neutrophils. Furthermore, the depletion of circulating neutrophils would improve plaque stability of sleep fragmented, atherosclerotic mice.

Methods
Female *Apoe*$^{-/-}$mice were placed on a high fat diet (HFD) and sleep fragmented using a slow-moving mechanical sweeper every 2 minutes during the light period each day. To test the role of neutrophils in SF-associated plaque instability, mice were fed a HFD and SF for 8 weeks, to induce the formation of atherosclerotic plaques throughout the aorta, then neutrophils were depleted while HFD-feeding and SF continued for 4 additional weeks. After a total 12 weeks of HFD-feeding and SF blood was collected to confirm successful depletion of circulating neutrophils and aortas were collected to examine immune cell infiltration via flow cytometry. Finally, hearts were collected and stained with picrosirius red and hematoxylin to examine features of plaque stability via light microscopy.

Results
Following 12 weeks of SF, HFD-fed female *Apoe*$^{-/-}$ mice showed almost a two-fold increase in aortic plaque formation compared to HFD-fed *Apoe*$^{-/-}$ mice who received sufficient sleep. Furthermore, SF resulted in increased necrotic cores and decreased plaque collagen with SF *Apoe*$^{-/-}$ mice having more thin collagen fibers and fewer thick collagen fibers. Importantly, depletion of circulating neutrophils resulted in improved features of plaque stability in SF, HFD-Fed *Apoe*$^{-/-}$ mice, including increased total plaque collagen with a shift towards thicker collagen fibers surrounding smaller necrotic cores.

Conclusion
Our data suggests that sleep fragmentation accelerates the development and destabilization of atherosclerotic plaques towards a rupture prone phenotype through the increased production and activation of circulating neutrophils. Furthermore, the depletion of circulating neutrophil improves the characteristics of advanced atherosclerotic plaques towards a more stable phenotype.

Abstract Title: Permeability modulation in ovarian microvascular endothelial cells in response to neurotensin is mediated by non-VE-cadherin adherens junctions

Investigator: Pearson, Andrew
Co-Investigator(s): Ketan Shrestha, Department of OB-GYN, University of Kentucky Thomas E. Curry Jr, Department of OB- GYN, University of Kentucky Diane M. Duffy, Department of Physiological Sciences, EVMS
Department: Physiological Sciences

Abstract

Introduction
Neurotensin (NTS) is an ovulation-critical paracrine signaling molecule produced in the ovulatory follicle after the luteinizing hormone surge. We have previously demonstrated a 75% reduction in ovulation after NTS neutralization in the ovulatory follicle of the cynomolgus macaque. NTS neutralization also causes dramatic red blood cell extravasation in the granulosa layer of the ovulatory follicle, indicative of disruption of the integrity of newly forming vasculature. We hypothesize that cadherin-based adherens junctions between adjacent ovarian vascular endothelial cells control permeability.

Methods
Monkey ovarian microvascular endothelial cells (mOMECs) were isolated from follicle aspirates of adult female cynomolgus macaques (*Macaca fascicularis*) via CD31 magnetic bead isolation and endothelial cell selective culture conditions. In vitro cultures of >95% mOMECs (n=4) were used to assess the permeability of a ~90% confluent monolayer to the reporter-conjugated macromolecule streptavidin (60 KDa) using both a trans-well permeability assay and a vascular permeability imaging assay. Cells were treated with an NTS dose range of 0, 0.005, 0.05, 0.5, 5, and 50 mM. Thrombin (1 U/mL) and dibutyryl-cAMP (10 mM) served as positive and negative controls, respectively. To identify the cadherin profile of mOMECs, we employed RNA sequencing, qPCR, immunohistochemistry, or western blot (n=3-4). To identify the cadherins involved in the NTS-mediated effect on permeability, siRNA against N-cadherin (CDH2) and K-cadherin (CDH6) were generated. mOMECs were transfected with siRNA against either CDH2, CDH6, or control (siNC) and treated with either 0 or 5 mM NTS prior to assessment of permeability (n=4).

Results
In the trans-well permeability assay, NTS at 0.5, 5, and 50 mM significantly decreased mOMEC permeability while 0.05 and 0.005 mM NTS had no significant effect. In the permeability imaging assay, NTS at 5 mM significantly decreased mOMEC permeability ($p<0.05$). As measured by both RNA sequencing and qPCR, CDH2 and CDH6 were both highly expressed in mOMECs. Surprisingly, mOMEC expression of CDH5, the primary vascular endothelial cadherin, was low to undetectable. Immunodetection confirmed that mOMECs express CDH2 and CDH6 at cell-cell junctions but lack CDH5. siRNA knockdown >65% of both CDH2 and CDH6 in mOMECs was confirmed via qPCR. In control siNC transfected mOMECs, NTS decreased permeability relative to untreated cells ($p<0.05$). However, in siCDH2 and siCDH6 transfected cells, the effect of NTS on permeability was abrogated.

Conclusion
These data implicate CDH2 and CDH6 in the mechanism of NTS-mediated mOMEC permeability changes. In vitro, NTS decreases mOMEC permeability. These data indicate that neurotensin may also decrease vascular permeability in vivo to maintain vascular integrity during ovulatory angiogenesis, during which permeability is increased. mOMECs express high levels of CDH2 and CDH6 mRNA and protein, but little to no CDH5. In some highly migratory and proliferative vasculature, CDH5 expression is decreased and CDH2 expression is increased. The cadherin profile in mOMECs with high CDH2 and low CDH5 is consistent with the highly invasive phenotype of periovulatory follicular vascular endothelial cells. While CDH6 is not commonly associated with vascular endothelial cells, knockdown of CDH2 and CDH6 abrogate the NTS-induced decrease in mOMEC permeability. These data indicate that permeability-regulating adherens junctions of the ovarian follicular microvasculature may utilize CDH2 and CDH6. Supported by NIH grants HD071875 and HD097675 (DMD and TEC) and product donation from Organon, Jersey City, NJ.

Abstract Title: Novel plasma membrane androgen receptor SLC39A9 mediates ovulatory changes in cells of the monkey ovarian follicle.

Investigator: Sage, Megan
Co-Investigator(s): 1. Megan A. G. Sage, M.S., Physiological Sciences 2. Diane M. Duffy, Ph.D., Physiological Sciences
Department: Physiological Sciences

Abstract

Introduction
Follicular androgens are important for oocyte health and fertilization. The classical nuclear androgen receptor (AR) is a transcription factor expressed in the cells of the ovarian follicle. Androgen actions are also mediated via the plasma membrane androgen receptor SLC39A9. First characterized as a zinc transporter, studies in fish ovary demonstrated that androgens bind to SLC39A9, increase intracellular zinc, and stimulate granulosa cell apoptosis. Intracellular zinc in ovarian cells is known to impact ovulation, but expression and function of SLC39A9 have not been investigated in the mammalian ovary to date. We hypothesize that SLC39A9 is expressed in the key cell types of the monkey ovulatory follicle and that androgen activation of SLC39A9 increases intracellular zinc to mediate ovulatory changes in ovarian cells.

Methods
Adult, female cynomolgus macaques experienced ovarian stimulation. Monkey ovaries were harvested across the 40-hour ovulatory window at 0, 12, 24, and 36 hours after hCG stimulation, and ovarian cells were isolated from follicular aspirates (granulosa, vascular endothelial cells) or follicle theca layers (theca cells). AR and SLC39A9 mRNA was quantitated via qPCR. Ovary cells and tissue sections were immunostained for AR and SLC39A9. Effects of androgens on cultured ovarian cells were assessed by in vitro treatment with testosterone (T; 2.5-50 nM), BSA-conjugated testosterone (BSA-T; 10-25 nM), or androstenedione (A4; 100-300 nM). Intracellular zinc levels were assessed via incubation of cells with Zinquin ethyl ester and fluorescence detection via microplate reader. Proliferation was assessed via Ki-67 immunodetection. Vascular endothelial cell migration through a permeable membrane in vitro was assessed by counting migrated cells after hematoxylin and eosin staining of the membrane.

Results
AR and SLC39A9 mRNA was present in granulosa, theca, and vascular endothelial cells. Immunostaining for AR and SLC39A9 demonstrated protein expression in all key cell types of the follicle across the ovulatory window. Treatment with T, BSA-T, and A4 stimulated zinc influx in granulosa, theca, and vascular endothelial cells. Proliferation was increased after 48 hour treatment with T, BSA-T, and A4 in vascular endothelial cells but not in granulosa or theca cells. Vascular endothelial cell migration was increased after 24-hour treatment with T but not with BSA-T or A4.

Conclusion
These results support the hypothesis that the novel membrane androgen receptor SLC39A9 is expressed and functional in cells of the monkey ovulatory follicle. Ovarian granulosa, theca, and vascular endothelial cells express AR and SLC39A9 mRNA and protein. T is the highest affinity ligand for SLC39A9. BSA-T is membrane impermeable and thus only able to interact with plasma membrane receptors, while A4 is the predominant androgen in the primate ovulatory follicle in vivo. Increase of intracellular zinc in response to all three androgens supports the conclusion that SLC39A9 activation via androgen induces zinc influx in ovarian granulosa, theca, and vascular endothelial cells. Activation in response to the A4 concentration present in the ovulatory follicle supports the concept that SLC39A9 could be activated during ovulation.

Increased vascular endothelial cell proliferation in response to all three androgens supports the involvement of SLC39A9 in ovulatory angiogenesis. However, increased migration in response to T alone suggests that androgens stimulate vascular endothelial cell migration through nuclear AR. Activation of SLC39A9 but not nuclear AR by follicular A4 concentrations implies a higher affinity of A4 for SLC39A9, and thus suggests a pathway for A4 action through SLC39A9 in the ovulatory follicle. Future studies will further investigate SLC39A9 mediation of androgen action at granulosa and theca cells during ovulation. Supported by funding from EVMS and product donation from Organon, Jersey City, NJ.

Abstract Title: CSF1R Blockade in Prediabetic Rhesus Macaques

Investigator: Stahr, Natalie
Co-Investigator(s): Natalie Stahr, Microbiology and Molecular Cell Biology Amy Phou, Microbiology, Tulane National Primate Research Center David McGuire, Microbiology and Molecular Cell Biology Julian Hattler, Microbiology and Molecular Cell Biology Woong-Ki Kim, Microbiology, Tulane National Primate Research Center
Department: Microbiology and Molecular Cell Biology

Abstract

Introduction
96 million Americans suffer from prediabetes, but it is currently unclear what factors drive the transition from prediabetes to type 2 diabetes. This study aims to determine whether dysregulated CSF1Rhi monocytes/macrophages drive the progression to diabetes and if their removal and endogenous replacement with fresh macrophages resolves disease. Therefore, we hypothesize that depletion of activated CSF1R+ tissue macrophages using a monoclonal antibody against CSF1R and replacement with freshly differentiated macrophages will alleviate inflammation in tissues and ameliorate diabetes- associated disease in prediabetic rhesus macaques.

Methods
We identified 6 aged Indian rhesus macaques with heightened fasting blood glucose as well as higher area-under-the-curve in an intravenous glucose tolerance test (IVGTT), indicating prediabetes. Three animals were treated with a rhesus IgG1 recombinantanti-CSF1R antibody administered i.v. (15 mg/kg) once every two weeks for 6 weeks. An IgG1 control was administered to the remaining 3 animals.

Clinical parameters such as blood pressure, plasma levels of total cholesterol, glucose, insulin, adiponectin, colony stimulating factor 1 (CSF1), IL1β, monocyte chemoattractant protein 1 (MCP-1) were monitored throughout treatment and up to 8 weeks after the 3rd injection. A 27-color spectral flow cytometry panel was used to monitor changes in immune cell populations throughout the study.

Results
Treatment with anti-CSF1R resulted in decreased total cholesterol, increased adiponectin, increased CSF1, decreased fasting insulin levels and increased IL1β levels in the blood throughout the study. Flow cytometry experiments confirmed the depletion of CD16+ monocytes (known to be CSF1R+) in treated animals.

Conclusion
Treatment with anti-CSF1R resulted in improvement in multiple clinical parameters associated with the progression to type-2 diabetes mellitus.

Abstract Title: Compassionate Release - Balancing the Risks and Benefits: A Case Report

Investigator: Achitoov, Mia
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Department: Glennan Center for Geriatrics and Gerontology and Hospice and Palliative Medicine Fellowship

Abstract

Introduction
As the number of older incarcerated adults and those with progressive chronic illnesses increases, institutional correctional facilities and hospital systems must consider how to address care when people reach the end-stages of disease and end-of-life. Compassionate release is a process available in 49 states and the District of Columbia that allows prisoners facing imminent death, advancing age, or debilitating medical conditions to secure early release.

Case Information
Mr. A is a 48-year-old male with a past medical history of end-stage heart failure. He was brought in from prison due to worsening dyspnea and was admitted to the hospital with acute kidney injury. Mr. A was in prison after conviction of a sexual assault of a minor. He rapidly deteriorated, requiring transfer to the Intensive Care Unit (ICU) due to worsening shock requiring vasopressors. Mr. A's status continued to worsen leading to multiorgan system failure. Since the healthcare team felt he was dying and was unlikely to survive hospitalization, the team initiated a request for compassionate release which was granted by the courts. Mr. A's focus of treatment was on comfort and vasopressors, and medications that were not related to providing comfort were discontinued. In the subsequent days, Mr. A's condition improved. The team felt he no longer required hospital care but instead could be discharged with home health for support. However, due to his previous conviction, he was unable to obtain service from any home health agency. Prior to his discharge, the health care team noted that Mr. A was able to ambulate and the concern was raised that he may have the potential to harm others as there were no further legal constraints due to his compassionate release. He was ultimately discharged home with family members. Mr. A died two months after his hospitalization. There were no reports of criminal activity during the period of Mr. A's release. The healthcare team experienced moral distress upon his discharge, questioning their responsibility to society. Another aspect of the case which merits exploration is the inability for the patient to receive home health services due to his prior conviction and incarceration, which may result in other challenges for receiving end-of- life care.

Discussion/Clinical Findings
This case reminds us that healthcare systems need to consider compassionate end-of-life care for incarcerated patients and its implications on society, as well as address the emotional distress on providers. This case presents the ethical implications for compassionate release of patients who may pose a danger to society. Another aspect of the case is the inability for the patient to receive home health services due to his prior conviction and incarceration, which resulted in challenges for receiving end-of-life care.

Conclusion
The increasing number of incarcerated older adults, as well as incarcerated adults with chronic or terminal illnesses, necessitates the need for continued discussions and policies in institutional correctional facilities, and within hospitals, that address care during the end-of-life. Hospitals should create procedures to address requests for compassionate release utilizing the expertise of the facility ethics committee, medico-legal counsel and the Department of Corrections. Compassionate release may be granted for incarcerated adults who are facing end-of- life; however, there are other factors that need to be considered that affect the patient, the community, and health care professionals.

Abstract Title: Healthy Relationships for Teens - Engaging Youth and Community in Evidence-based Comprehensive Sex Education with a Crowdsourcing Open Call Approach

Investigator: Agrawal, Janvi
Co-Investigator(s): 1. Alex Culver, EVMS MD Class of 2026, Researcher in Dept of Peds
Department: EVMS Dept of PEdiatrics

Abstract

Background:
Hampton Roads and the Eastern Shore have the highest rates of teen pregnancy and sexually transmitted infections (STIs) in Virginia. Teen Health 360 Program at the EVMS Pediatrics Department has partnered with local schools and youth-serving organizations to pilot a comprehensive sex education intervention (CSE) among school-age youth since July 2020. Virtual classroom session delivery during the COVID-19 pandemic faced the challenge of decreased engagement from youth, parents, and the community. Thus, a crowdsourcing open call approach was implemented in 2022 to:

- Evaluate the effectiveness of the open-call strategy in engaging the youth and community
- Support teens as they learn about, build, and improve upon healthy relationships
- Create a safe space to empower teens to prevent and act against bullying, harassment, and violence.

An open call is a structured process of challenging individuals in a community to contribute creative knowledge and generate fresh perspectives to improve public health through a contest. Although the approach has proven effective in developing interventions and facilitating consensus in public health programming, less is known about using open calls to facilitate community engagement in teen pregnancy prevention interventions.
Methods: Various in-person and virtual platforms were used to promote the open call. Submissions were collected online for 20 weeks in May/September 2022 and evaluated by a group of 40 independent judges representing diverse sub-populations. The judging process used a 10-point Likert scale and a standard set of judging criteria, including the relevance to the open call theme and youth, innovation, inclusivity, feasibility for program use, and overall quality. Submissions were quantitatively and qualitatively analyzed to summarize the characteristics and emergent themes about healthy relationship for teens. 32 submissions were identified for awards, receiving prizes of $200, $100, and $50, respectively, and their submissions have been publicly announced and disseminated through various channels (including website, social media, and community- based exhibitions) to generate dialogue about healthy relationships for teens.

Results: We received 102 submissions (mean score: 41.83, Range: 27.71-54.71) among which 75% were from middle school and high-school aged students. A diverse demographic was captured across locations and occupations. Women/Girl (44%) and Man/Boy (45%) gender identities were nearly equally represented. Transgender and non-binary populations were also well represented (7% total) when compared to the national population estimate of 5.1%. While White, African American, and Asian communities were well represented, a gap in engagement with Hispanic and Latinx community was identified.

Analysis of submission media (written, audio/visual) revealed a trend advancing age and preferred media of communication - 60% of 10-14 year olds used A/V mediums for self-expression, whereas only 40% of adults used A/V components in their submission. 14-18 year olds were nearly evenly split with a slight (55%) preference of A/V media.

Thematic analysis of submissions revealed a large focus on: 1) the importance of relationship with self; 2) the importance of communication and support from caring adults; 3) boundaries, shared values, identification of red flags, and 4) effectiveness of social media platforms when engaging teens in information sharing and health communication.

Conclusions: On the whole, open call is an effective educational engagement strategy to empower teens to nurture healthy relationships and take charge of their health and wellbeing. A wide-cast crowdsourcing strategy can increase diversity in location and ethnicity of participants, and accepting a variety of mediums of submission may increase diversity in ages of participants. A strategy to increase engagement in the Latinx populations must be considered -- perhaps delivering the CSE in Spanish could prove beneficial in closing the gap. The use of social media can bolster engagement from teens and community members in information sharing and health communication.

Abstract Title: Denosumab for Fibrous Dysplasia: Results from a Phase 2 Clinical Trial

Investigator: Ahmed, Ramzy
Co-Investigator(s):
Department: NIH NIDCR

Abstract

Introduction: Fibrous dysplasia (FD) is a rare disease in which normal bone and marrow are replaced with expansile fibro-osseous tissue, leading to fractures and disability. FD tissue demonstrates prominent osteoclastogenesis and increased expression of the pro-osteoclastic factor receptor activator of nuclear kappa-B ligand (RANKL). A phase 2 trial of the RANKL inhibitor denosumab (n=8 subjects) demonstrated profound reduction in FD lesion activity and increased lesional bone formation after 6 months of high-dose treatment (standard tumor regimen of 120mg/month with loading doses on weeks 2 and 3). Denosumab was well tolerated, however discontinuation was associated with severe hypercalcemia in 1 subject. These results demonstrated that denosumab can provide substantial clinical benefit in FD; however, dose-related side effects remain a concern. We performed a secondary analysis to evaluate the efficacy of a moderate-dose regimen (120 mg/3 months) in comparison to the standard high-dose regimen.

Methods: Data was analyzed from a phase 2 clinical trial at the NIH (NCT03571191). 8 subjects (mean 31y, range 20-55) received high-dose denosumab (120mg/month with loading doses on weeks 2 and 3) for 6-months followed by an 8-month post-treatment observation period. Given the observed substantial clinical benefits, the protocol was amended to restart a moderate-dose regimen (120 mg/3 months) after the post-treatment observation period if clinically indicated. Serum bone turnover markers and radiographic ^{18}F-NaF PET/CT scans were evaluated at the start of moderate-dose therapy and after 6- months in 6 subjects.

Results: Changes in bone turnover markers were comparable on high vs moderate-dose denosumab (P1NP -82% and -92%, and CTX -86% and -82% for moderate and high-dose, respectively).

Improvement in ^{18}F-NaF PET/CT lesional activity were observed in all subjects on moderate-dose treatment. One subject experienced bone turnover rebound and mild hypercalcemia between 3-month doses, which necessitated discontinuation of denosumab. Of note, this subject had panostotic FD and the highest baseline bone turnover in the cohort.

Conclusions: These findings demonstrate that moderate-dose denosumab may provide clinical benefits comparable to the high-dose regimen in adults with FD, while potentially lowering associated risks.

However, patients with extensive FD and high baseline bone turnover may require more frequent dosing, indicating a need to individualize treatment regimens.

Abstract Title: Neurological Complications after COVID-19

Investigator: Ahuja, Kripa
Co-Investigator(s): 1. Elizabeth Fitch, MD 2024
Department: Anatomy and Pathology

Abstract

Introduction: The 2020 COVID-19 pandemic continues to have lasting effects on survivors. While "long COVID", a term used to describe a constellation of somatic symptoms, has received increasing attention, less is known about the neurological consequences of infection with the SARS-CoV-2 virus.

Goal: To evaluate inflammatory factors related to neurological complications in a population infected with COVID-19.

Methods: A retrospective chart review was performed at a mid-size hospital by identifying patients who had COVID-19 from 2020-2022. Inclusion criterion were developed to describe neurological symptoms. The authors analyzed patients who possibly met the criteria.

Results: From the chart review, 565 patients were extracted and 52 patients were identified as having neurologic complications secondary to COVID-19. The mean age of the patients was 52, with a range of 31 to 63. The majority of the patients were White (61%), followed by African-American (13%), by other races (26%). 57% of the patients were male, followed by 43% females. 4% (23 patients) had neurological complications from COVID-19. The most common neurological complication was the loss of taste and smell: 61% of patients had this complication. After the loss of taste and smell, all of the neurological complications were evenly distributed: new onset seizure 4%; diplopia 4% ; new onset tinnitus 4%; syncope, dizziness, and loss of consciousness 4% ; longitudinally extensive transverse myelitis (LETM) 4%; persistent headache 2 months following initial diagnosis 4%; left-sided weakness/acute transient ischemic attack (TIA) 4%; headache 4% ; and memory loss 4%. Elevated D- dimer and C-reactive protein levels were in those patients.

Conclusion: Exacerbation of unregulated neuroinflammation and possible hypercoagulable state from the SARS-CoV-2 virus is proposed as common mechanism of COVID-19 neurological complication. Identification of key chemokines and cytokines is needed to further understand post-COVID-19 neurological manifestations.

Abstract Title: Utilizing bioorthogonal chemistry to radiolabel pathogenic bacteria with [18F]FB-sulfo-DBCO

Investigator: Alanizi, Aryn
Co-Investigator(s): 1. Alexandre M. Sorlin, PhD, Department of Radiology and Biomedical Imaging/UCSF 2. Matthew F.L. Parker, PhD, Department of Psychiatry and Behavioral Health/Renaissance School of Medicine at Stony Brook University 3. Marina López-Álvarez, PhD, Department of Radiology and Biomedical Imaging/UCSF 4. Hecong Qin, PhD, Department of Radiology and Biomedical Imaging/UCSF 5. Sanghee Lee, PhD, Department of Radiology and Biomedical Imaging/UCSF 6. Joseph Blecha, MS, Department of Radiology and Biomedical Imaging/UCSF 7. Oren Rosenber, MD, PhD, Department of Medicine/UCSF 8. Robert R. Flavell, MD, PhD, Department of Radiology and Biomedical Imaging/UCSF 9. David M. Wilson, MD, PhD, Department of Radiology and Biomedical Imaging/UCSF
Department: Department of Radiology and Biomedical Imaging, UCSF

Abstract

Introduction
Using Positron Emission Tomography (PET) to image bacterial infection is an emerging field that has celebrated several recent successes. Among them is carbon-11 labeled D-amino acids, but their 20 minute half-lives are challenging to work with, thus a major goal is to evolve this into fluorine-18 amino acid derivates.

Due to the costly, inefficient serial design and radiosynthesis of various D-amino acid derived PET tracers, we sought a method to rapidly surveil tolerable changes to the D-amino acid scaffold, including variable side-chain structure and amino acid C-terminal modification. Using a biorthogonal chemistry approach, we delivered an exogenously derived D-amino acid bearing a side-chain azide for incorporation into bacterial peptidoglycan and subsequently ligated a detectable strained cyclooctyne via strained-promoted azide-alkyne cycloaddition (SPAAC). We developed a water-soluble and fluorine-18 labelled strained cyclooctyne ([18F]FB-sulfo-DBCO) that could be used to generate pathogen-specific PET signals. We believe that this strategy could be used to develop a "pre-targeting" infection imaging method for which a patient-delivered D-amino acid would be followed by a PET tracer used to detect it with the advantage of sensing only peptidoglycan-incorporated D-amino acids.

Methods
Radiotracer synthesis: [18F]SFB was prepared using an automated published method and reacted with the commercially available sulfo-DBCO precursor in the presence of DMF and base. [18F]FB-Sulfo-DBCO was purified and isolated using HPLC purification. Identity was confirmed by comparison to the cold standard, which was synthesized using analogous methods.

In Vitro Uptake Assay: Azide metabolites (final conc. 5mM) were added to 1% dilution of overnight cultures of Staphylococcus aureus, Listeria monocytogenes, Pseudomonas aeruginosa, Acinetobacter baumannii, and Escherichia coli and incubated for 1 hour. As biological controls, bacterial cultures were grown under similar conditions and treated with D-alanine following the aforementioned protocol. The cultures were pelleted and washed with washing buffer. 50µCi of [18F]FB- Sulfo-DBCO was added and reacted for 1 hour. The pellets were separated and washed with buffer. The pellets and filtrates were individually analyzed on a gamma counter. SPAAC ligation is reported as % of signal normalized by measured optical densities.

Dynamic PET/CT imaging in healthy mice: Healthy CBA/J mice (female, 9-11 weeks old, 20-24 g) were used for all experiments. 90-minute whole-body dynamic µPET acquisitions of animals (N = 4) were obtained with 34 frames with [18F]-Sulfo-DBCO (200 ± 21 MBq, 100 µL) via tail vein injection, followed by a 10 minute µCT scan. Region of interest (ROI) analysis was used to evaluate organ-specific tracer clearance at early time points, and ex vivo analysis (N = 5) at 90 minutes used to assess tracer retention in organs via harvesting and gamma counting.

Results
In this study, we created a high-throughput assay to assess [18F]FB-sulfo-DBCO labeling of several azido-D amino acid metabolites in an array of pathogens and its biodistribution. From selected azido compounds, D-azido alanine presented the highest accumulation (5 fold to L-azido alanine) into the exposed surface of S. aureus. Increasing methylene moieties on the amino acid side chain negatively impacted the incorporation or presentation of the azide on the cell wall, although overall modification of the side chain length was tolerated. The incorporation of D-azido alanine is highly concentration dependent (65% signal reduction observed across 5 to 0.156mM range) and currently no discernable trend is observed with azide ligation in gram-positive and gram-negative pathogens. [18F]FB-sulfo-DBCO accumulated in the liver and was excreted through the gallbladder, spleen, and gastrointestinal system, suggesting a dominant biliary excretion pathway with excretion through the bladder over time of imaging.

Conclusion
The new PET tracer, [18F]FB-sulfo-DBCO, readily labels azide-modified bacteria. Significant differences in labeling have been observed among the different metabolites and pathogens. The presented data demonstrates the utility of our developed high-throughput method and its promise to being a valuable tool for us in understanding the underlying biology of these metabolic pathways and in the development of new imaging probes for bacterial infection.

Abstract Title: Speech Therapy Outcomes in Bilingual Patients with Non-Syndromic Cleft Lip and/or Palate

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Abstract

Introduction
Cleft lip and/or palate (CL±P) are the most common orofacial congenital anomalies. The incidence is 1 in every 700 births. Cleft lip (CL) and cleft palate (CP) are defined as an incomplete closure in utero of the tissue of the lip or soft palate, respectively. CL and CP are closely related, as it is estimated that 45% of children with the malformation have both CL and CP. Post-repair, children with CL±P can have a long road to recovery. It is estimated that over 50% of children with CL±P will need speech therapy (ST) throughout their childhood. An effective measure of long term speech outcomes is ST attendance compliance rate (CR).

Methods
719 patient charts were reviewed. For demographics; race, ethnicity, preferred language, and bilingualism were recorded. Also recorded were behavioral and/or educational delays, feeding difficulties, any ST attendance and if so, total visits scheduled and total ST visits attended. CR was calculated; [attended ST visits/total scheduled ST visits] *100. ST CR was only tracked for patients attending CHKD ST. Exclusion criteria included patients with submucosal CP, syndromic CL±P, non- congenital CL±P, prematurity, and/or documented medical diagnoses that could affect speech outcomes.

Results
There were a total of 173 patients receiving ST; 81 patients completed their ST through CHKD. 87.7% (n = 71) of those patients spoke English only (EO). The remaining 12.3% (n = 10) were bilingual. The average CR for the EO and bilingual groups was 89.3% and 91.9%, respectively. There was no statistical significance between the CR for the two groups (p value = 0.6496). The bilingual group received an average of 18 more ST visits per child than the EO group.

Conclusion
CL±P is a relatively common congenital abnormality that effects hundreds of families every year. An extensive amount of literature on EO CL±P patients' ST outcomes exists, yet there is a gap in literature on long term speech outcomes for CL±P patients who are bilingual. In this study, we attempt to provide a better understanding of potential additional support bilingual households may need to provide their child with the best quality care possible.

Abstract Title: Fillers Impacting Follicles: The Emerging Complication of Filler-Induced Alopecia

Investigator: Algarin, YancI
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Department: Department of Dermatology and Cutaneous Surgery, University of Miami Leonard M. Miller School of Medicine, Miami, FL, USA

Abstract
Introduction: Filler-induced alopecia is characterized by localized hair loss, often attributed to vascular compromise following dermal filler injections in particular facial regions. Though previously uncommon, the rising incidence of this complication underscores the importance of understanding and managing its intricacies.

Main Body: We conducted a comprehensive literature review using PubMed. Our review included articles reporting filler-induced alopecia, summarizing the implicated filler types, areas of injection, pattern of hair loss, symptom onset, course progression, treatments, and overall prognosis. Among the documented cases of filler-induced alopecia, a majority involved the use of hyaluronic acid, while calcium hydroxylapatite and autologous fat were implicated in a smaller subset. Notably, no cases involving other dermal filler types were identified. Recovery times varied depending on the treatment interventions employed. Hyaluronidase (HAase) injections exhibited rapid restoration, with nearly normal hair density achieved within 3 to 4 months. Adjunctive therapies like minoxidil and platelet-rich plasma, in conjunction with HAase, notably facilitated hair regrowth. One case suggested the potential of recombinant bovine basic fibroblast growth factor gel, however, its efficacy was confounded by co- administration of minoxidil. Additionally, exploring alternative interventions like intralesional triamcinolone, warm compresses, and nitroglycerin are worth exploring due to the lack of robust clinical data supporting their efficacy in addressing this complication.

Conclusion: Our study promotes awareness of filler-induced alopecia and its increasing incidence, while providing practical insights with evidence-based recommendations for effective management. We aim to equip dermatologists with current knowledge to proficiently manage this complication, thereby enhancing patient outcomes and safety standards in cosmetic procedures.

Abstract Title: The Role of Vitamins and Minerals in Rosacea Management

Investigator: Algarin, Yanci
Co-Investigator(s): 1. Anika Pulumati, University of Missouri-Kansas City School of Medicine 2. Dana Jaalouk, Florida State University College of Medicine, Tallahassee, FL, USA 3. Jiali Tan, Albany Medical College, Albany, NY, USA 4. Dr. Keyvan Nouri, Department of Dermatology and Cutaneous Surgery/University of Miami Leonard M. Miller School of Medicine, Miami, FL, USA
Department: Department of Dermatology and Cutaneous Surgery, University of Miami Leonard M. Miller School of Medicine, Miami, FL, USA

Abstract

Introduction:
Rosacea is a common inflammatory skin condition displaying symptoms like flushing, erythema, papules, and pustules. Oral antibiotics, despite long-term adverse effects, are often used due to topical treatment limitations, underscoring the need for cost-effective choices like dietary modifications. Our review investigates the role of vitamins and minerals in rosacea management, and identifies current supplementation recommendations.

Main Body:
An online search was performed on Pubmed from 1998-2023. Included studies were summarized and assessed for quality and relevance in rosacea management. Varied outcomes emerged concerning the impact of essential vitamins and minerals on rosacea treatment. Vitamin A derivatives, specifically oral isotretinoin, demonstrated significant efficacy, with a 90% reduction in lesions, complete remission in 24% of patients, and marked improvement in 57% of patients. Vitamin B3 derivatives, such as topical 1- methylnicotinamide 0.25% and NADH 1%, improved symptoms in 76.4% (26/34) and 80% of patients, respectively. Outcomes for vitamin D, vitamin C, and zinc supplementation varied across studies.

However, zinc sulfate solution 5% significantly reduced acne rosacea severity for patients with 40% and 60% exhibiting a moderate or good response, respectively. Omega-3 fatty acids showed significant improvement in alleviating xerophthalmia in 64% of patients with ocular rosacea.

Conclusions:
Vitamins and minerals hold potential in managing rosacea symptoms, offering a safe and cost-effective alternative or adjunctive treatment option. Currently, there are no established recommendations regarding their supplementation for rosacea. Studies assessing serum levels of vitamins and minerals in relation to rosacea are warranted, as this avenue holds potential for future advancements in the field.

Abstract Title: The role of Neurexin expression on synapse formation in mouse retina

Investigator: Allen, Regan
Co-Investigator(s):
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Abstract

Introduction
Neurexins are a complex family of synaptic proteins known to mediate synapse assembly and function in the brain. There are three Nrxn family members (Nrxn1, Nrxn2, Nrxn3), each with a longer alpha isoform and shorter beta isoform expressed from independent promoters, with different properties ascribed to each. Moreover, knockout mouse models have shown that they regulate synaptic function in the brain in a cell-type and synapse- specific manner. Recent studies have shown that Nrxns are expressed in the retina, but very little is known about their role. This experiment was intended to learn the importance of Nrxn1β and Nrxn3β in the synapse stability of the mouse retina.

Methods
Eyes from male and female wild type (WT) and Nrxn1β and Nrxn3β knockout mice were harvested at 6-8 weeks of age, fixed in 2% paraformaldehyde, and processed for sectioning. Immunostaining was performed on 8um frozen retina sections using primary antibodies targeting synaptophysin (SYP) and PSD95 to detect synapses. Brn3a was used as a retinal ganglion cell marker. The following secondary antibodies were used: 488 donkey anti-rabbit, Cy5 donkey anti-mouse, and DAPI to stain the nuclei. Images were taken at four areas along each retinal section on a Zeiss 710 confocal microscope at 63X magnification using an oil objective. Synaptic puncta for SYP were quantified with the SynQuant Fiji plug-in and the PSD96 puncta were counted manually using Fiji. Separate sections were also stained with hematoxylin and eosin (H&E), and images were captured along the entire length of each section with a light microscope at 20X magnification. The images were stitched to create a composite and manually quantified using Fiji.

Results
Sections from four WT, two Nrxn1β-/-, and five Nrxn3β-/- mice were evaluated. SYP-positive puncta were detected in both the inner plexiform layer (IPL) and outer plexiform layer (OPL). Average SYP-positive puncta were 1558, 581, and 850 for WT, Nrxn1β and Nrxn3β respectively. The p values for the Nrxn1β was 0.09 and 0.11 for Nrxn3β. Puncta of PSD95 were detected in the ganglion cell layer (GCL) and IPL with a strong signal in the OPL. Average PSD95-positive puncta were 58, 43, and 36 for WT, Nrxn1β and Nrxn3β respectively. The p values for the Nrxn1β was 0.43 and 0.14 for Nrxn3β. The average number of cells in the GCL of the H&E stains for WT, Nrxn1β and Nrxn3β were 719, 441, and 588 respectively. The p values for H&E staining were 0.008 and 0.02 for Nrxn1β and Nrxn3β respectively.

Conclusion
In both knockout models, there were decreased cells in the GCL at 6 weeks of age and a trend towards a decreased number of puncta. While there were fewer SYP and PSD95 puncta in the knockout mice, the difference did not reach statistical significance.The lack of statistical significance between the number of synaptic puncta of Nrxn1β and Nrxn3β knockouts may be due to variability and a small sample size. The H&E staining showed a statistically significant decrease of nuclei in the GCL between the WT and the Nrxn1β and Nrxn3β mice. Further analysis with more mice per group is currently underway. This preliminary data suggests that Nrxn1β and Nrxn3β play a role in retinal synapses.

Abstract Title: Diagnosis and Management of a 4-Year-Old Male with Ulnar Artery Pseudo Aneurysm

Investigator: Artz, Nicolas
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Department: Department of Orthopedics, Louisiana State University, New Orleans

Abstract

Introduction
Aneurysms and pseudoaneurysms of the ulnar artery are a rare clinical occurrence that are often misdiagnosed in adult and pediatric patients. This vascular phenomenon is caused by an intimal tear leading to hemorrhage into the surrounding tissue. Ulnar artery aneurysms and pseudoaneurysms in adults are better described in comparison to pediatric cases.

Ulnar pseudoaneurysms have varying etiologies in pediatric patients. Several causes have been observed such as arterial infection, connective tissue diseases and trauma. Here, we present the case of an ulnar pseudoaneurysm of the right upper extremity in a 4-year-old male with a recent history of trauma.

Case Information
A 4-year-old right hand dominant male with past medical history of sacral melanocytic nevi presented to orthopaedic oncology clinic three weeks after a fall on his outstretched right hand. He complained of ecchymosis, pain, and progressive swelling in his right hand since his fall. Physical exam showed a volar cystic mass near the hypothenar eminence with overlying ecchymoses. The mass was pulsatile and tender to palpation. The presumptive diagnosis upon exam was a potential vascular injury, vascular anomaly, aneurysmal cyst, or an undiagnosed hand fracture. An Allen's test performed at the time of initial evaluation was within normal limits. An ultrasound was ordered to rule out the possibility of congenital vascular malformations such as a macrocystic arteriovenous malformation or additional soft tissue mass. Ultrasound revealed a 1.8 x 1.1 x 1.5 cm pseudoaneurysm with arteriovenous fistula and adjacent soft tissue swelling. CT angiogram was then ordered and showed radial dominant flow as well as a 2.0 x 1.1 cm pseudoaneurysm arising from the palmar surface of the ulnar artery at the level of the hamate, which was confirmed on direct visualization. Subsequently, the pseudoaneurysm was resected and end to end anastomosis of the proximal and distal ends of the ulnar artery was completed using a lateral circumflex femoral artery graft. The patient's surgical site was checked and to confirm graft patency; an Allen's test was performed both clinically and with doppler ultrasound, capillary refill of each digit was examined, and a doppler of the ulnar and radial arteries and the superficial palmar arch was normal. At 2- week follow-up post-surgery the patient had asymptomatic function of his right hand.

Discussion
Ulnar pseudoaneurysms have varying etiologies in pediatric patients. Several causes have been observed such as arterial infection, connective tissue diseases and trauma. Few instances of ulnar pseudoaneurysms are reported in the literature with one systematic review reporting 34 cases, 35% of which being pediatric. Of these pediatric cases, 17% were initially misdiagnosed. Misdiagnosis of upper extremity aneurysms and pseudoaneurysms are a serious cause for concern because without adequate treatment these can lead to serious complications such as thrombosis, skin necrosis, uncontrolled bleeding, and growth restrictions. If collateral flow is established, the pseudoaneurysm is typically resected and the vessel is repaired using end to end anastomosis. In this case, we opted to reconstruct the ulnar artery using a lateral circumflex femoral artery graft despite collateral flow through the radial artery being established. This is because we believe arterial reconstruction in pediatric patients can be beneficial for several reasons. Ulnar artery ligation in pediatric patients imparts an increased risk of growth restriction. Also, with ligation of the ulnar artery the patient incurs the risk of devascularization with an injury to the ipsilateral radial artery later in life. Additionally, since all pediatric patients would undergo ulnar artery repair there would no longer be a need for transfemoral angiography, preoperative plethysmography, or intraoperative plethysmography. Preoperative ultrasound with doppler flow is all that is required prior to surgery which is a more efficient, reliable, and cost-effective method of diagnosis. Finally, donor site morbidity in the thigh is very low and should not be considered as a potential hindrance for arterial reconstruction.

Conclusion
Here, we present a case of a pediatric patient with a traumatic pseudoaneurysm of the upper extremity, which was initially presumed to be a hand fracture versus a potential vascular anomaly. This case highlights the importance of prompt diagnosis and treatment of upper extremity pseudoaneurysms in patients to avoid potentially devastating complications. In addition, we propose the reconstruction of all pediatric ulnar arteries following pseudoaneurysm resection to increase cost efficiency and reduce future possible complications.

Abstract Title: Improved Cognitive Performance in Myeloid-specific STAT4 deficient Ldlr-/- mice

Investigator: Bai, Robin
Co-Investigator(s): 1. Alina Moriarty, Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA, 23507, USA 2. Coles Keeter, Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA, 23507, USA 3. Natalie Stahr, Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA, 23507, USA 4. Elena Galkina, Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA, 23507, USA
Department: Microbiology and Molecular Cell Biology

Abstract

Background: Neutrophils are myeloid cells involved in every step of atherosclerosis. The Galkina Lab has shown STAT4, a transcription factor known for driving T_h1 and T_h17 differentiation, to be critical for neutrophil activation. Recently, we demonstrated that myeloid-specific *Stat4* deficient Ldlr$^{-/-}$ mice (*Stat4^{LysM}Ldlr$^{-/-}$*) have improved plaque stability compared to controls. Increasing evidence suggests that atherosclerosis may be an important risk factor for cognitive impairment. While innate immunity is a known driver for atherosclerosis, its involvement in cognitive decline remains poorly understood.

Therefore, we investigated myeloid specific effects of STAT4 deficiency on cognitive performance in atherosclerotic mice.

Methods: *Stat4^{LysM}Ldlr$^{-/-}$* and control *Stat4$^{fl/fl}$ Ldlr$^{-/-}$* female and male mice were fed a high- fat/cholesterol diet (DDC) for 28 or 32 weeks. Behavioral analyses, open field, (OF) and Y-maze, were conducted to assess memory and anxiety via Noldus Ethovision XT. During the OF tests, fecal boli counts were collected to measure as an additional anxiety measure.

Results: 32 weeks DDC fed *Stat4^{LysM}Ldlr$^{-/-}$* female mice showed a significant increase in correct alternations on the Y-maze in comparison with age- and diet- matched *Stat4$^{fl/fl}$Ldlr$^{-/-}$* controls.

Interestingly, DDC feeding for 4 additional weeks resulted in a significant decrease in correct alternations among female *Stat4$^{fl/fl}$ Ldlr$^{-/-}$* mice, implying a decline in spatial recognition memory following extended DDC feeding. It is important to note that male mice showed no significant differences in correct alternations between genotype and/or diet duration.

Mice naturally avoid open areas and prefer to stay along the periphery. Decreased center/periphery duration implies increased anxiety. No significant difference was observed in the center/periphery duration among all groups. Additionally, no differences were observed in fecal boli count between groups. Together, these data suggest similar anxiety levels across groups.

Conclusion: Overall, *Stat4^{LysM}Ldlr$^{-/-}$* female mice made more correct alternations on the Y-maze compared to control *Stat4$^{fl/fl}$Ldlr$^{-/-}$* group, which indicates improved cognitive function and memory. Thus, our data suggests that STAT4 in myeloid cells and/or potentially other cells of the brain plays a pathological role for cognitive health that is likely connected with an increased neuroinflammation. Future experiments will be focused on an identification of cell-specific mechanisms by which STAT4 is involved in neuroinflammation in the conditions of atherosclerosis.

Abstract Title: Persistent lactic acidosis in metastatic prostate cancer

Investigator: Ball, Phillip
Co-Investigator(s): Sami Tahhan, MD, Department of Internal Medicine/ EVMS Jaeun Ahn, MD, Department of Internal Medicine/ EVMS
Department: Department of Internal Medicine, EVMS

Abstract

Introduction:
Lactic acidosis is the leading cause of metabolic acidosis in hospitalized patients.

Three types of lactic acidosis exist: Type A lactic acidosis is usually associated with impaired tissue oxygenation. Type B lactic acidosis occurs in patients without overt systemic hypoperfusion. D-lactic acidosis occurs in settings of GI malabsorption, diabetic ketoacidosis, and receiving rapid and high-dose infusions of propylene glycol. We present a case of a patient with persistent lactic acidosis despite appropriate treatment for sepsis believed to be secondary to prostate cancer.

Case Description:
A 91-year-old male with a known history of benign prostatic hyperplasia (BPH), diastolic heart failure, pulmonary embolism, hypertension and previous extended-spectrum beta-lactamase (ESBL)-producing *Escherichia coli* (*E. coli*) urinary tract infection (UTI) presented with encephalopathy. He was not tachypneic or tachycardic but his bicarb was low at less than 8 and his lactic acid was elevated at 7.8mmol/l. He had a leukocytosis and the patient was started on meropenem and vancomycin due to concern for sepsis from a UTI and he received thiamine supplementation. The patient's leukocytosis resolved and his mental status improved. His hepatic function and liver imaging were normal.

Review of his prior to admission labs showed that his prostate-specific antigen (PSA) was markedly elevated at 481ng/ml (normal range up to 4.4). Urine culture eventually grew pansensitive *Enterococcus faecalis*. Despite normal hemodynamics, appropriate antibiotics and thiamine supplementation, his lactic acidosis persisted between 6 and 12 mmol/l. Follow up thiamine and riboflavin levels did not show deficiencies.

The patient received degarelix prior to discharge, a gonadotropin-releasing hormone (GnRH) antagonist which reversibly binds to GnRH receptors in the anterior pituitary gland, blocking the receptor and decreasing secretion of luteinizing hormone (LH) and follicle stimulation hormone (FSH). This results in rapid androgen deprivation by decreasing testosterone production, thereby decreasing testosterone levels. With degarelix, testosterone levels do not exhibit an initial surge, or flare, as is typical with GnRH agonists.

Discussion:
Causes of type B lactic acidosis include toxin-induced impairment of cellular metabolism, regional areas of tissue ischemia, high levels of metformin, malignancy-associated lactic acidosis, alcoholism, and drug-induced mitochondrial dysfunction, often in HIV-infected patients. We believe that our patient had type B lactic Acidosis due to his underlying malignancy.

Type B lactic acidosis is more commonly reported in hematologic malignancies, while it is a rare finding in solid tumors without hepatic metastasis. Underperfusion of tumor clusters, hepatic metastases, increased rates of lactate production by the neoplastic cells that shift to primarily anaerobic glycolysis (Warburg effect) are possible mechanisms. Thiamine and/or riboflavin deficiency could also contribute to the pathophysiology of cancer-related type B lactic acidosis.

Although type B lactic acidosis is an uncommon metabolic complication in prostate cancer, it is a significant finding that indicates poor prognosis. Regardless of the mechanism, treatment of the tumor (by chemotherapy, irradiation, or surgery) usually corrects the lactic acidosis.

We generally encounter lactic acidosis in the context of sepsis and this case highlights the importance of having a good differential diagnosis for the various types of lactic acidosis to deliver the right treatment.

Abstract Title: MRI Findings of Scurvy

Investigator: Bector, Abanoub
Co-Investigator(s):
Department: Ann & Robert H. Lurie Children's Hospital of Chicago, Northwestern Feinberg School of Medicine

Abstract

Introduction
While rare in the United States, malnutrition of at-risk populations needs to be considered in a differential diagnosis. X-ray findings of scurvy are well established. However, detecting MRI findings of scurvy can spare pediatric patients unnecessary exposure to radiation and invasive procedures such as a bone marrow biopsy to rule out leukemia. This case presents a 7-year old patient suffering from scurvy.

Case Information
7-year-old male patient presents with one month of progressively worsening lower extremity weakness & pain (L worse than R) now with an inability to walk. He also presents with left calf tenderness with overlying bruising.

MRI findings in this patient include symmetrical bone marrow edema in all visualized metaphyses bilaterally on STIR images. On T1 weighted images, there is symmetric hypointensity in all visualized metaphyses. In the calf on the T1 fat suppressed image there is intrinsic hyperintense signal consistent with blood products indicative of hemorrhage. An axial view of the distal femurs demonstrates bilateral hyperintense signal in the femoral bone marrow and mild surrounding periostitis.

Laboratory testing demonstrates vitamin C deficiency <0.1 (Reference range: 0.2 to 1.5 mg/dL), vitamin A, D deficiency, and an MCV of 68.

The child has been improving well following a prescription of vitamin C 250mg daily, vitamin D 50,000 units, and iron supplements.

Discussion
This 7-year-old male patient presents with one month of progressively worsening lower extremity weakness & pain (L worse than R) now with an inability to walk. He also presents with left calf tenderness with overlying bruising. MRI findings in this patient include symmetrical bone marrow edema in all visualized metaphyses bilaterally. In the calf on the T1 fat suppressed image there is intrinsic hyperintense signal consistent with blood products indicative of hemorrhage. An axial view of the distal femurs demonstrates bilateral hyperintense signal in the femoral bone marrow and mild surrounding periostitis.

This patient's history coupled with the MRI findings, as in similar cases, gives rise to the differential diagnoses of osteomyelitis, chronic recurrent multifocal osteomyelitis (CRMO), leukemia, and scurvy. Scurvy is more likely than CRMO as MRI findings are more symmetrical. Similarly, osteomyelitis findings on MRI are typically focal. Leukemia is less likely as it is typically a diffuse bone marrow signal abnormality. Recognizing these MRI findings in correspondence with clinical presentation are indicative of scurvy, serum vitamin C level are checked revealing vitamin C deficiency <0.1 (Reference range 0.2-1.5 mg/dL), Common clinical presentations of scurvy include easy bruising, swollen gums, poor wound healing, and anemia. Symptoms present within one-to-three months after initiation of a vitamin- deficient diet. This child also has an MCV of 68 and vitamin A and D deficiency.

While x-ray findings of scurvy are well established, this pediatric patient has been spared exposure to radiation upon recognition of signs of scurvy on MRI. Such x-ray findings of scurvy include thin epiphyseal cortex, dense band of provisional metaphyseal calcifications (Frankel line) with an adjacent radiolucent line (Trummerfeld zone), and metaphyseal beaking.

Scurvy results from a defect of collagen hydroxylation caused by a deficiency of the co-factor ascorbic acid (vitamin C). Risk factors include food avoidant behavior in patients with neurological illnesses such as autism, restricted diet lacking fruits and vegetables, and nutrition neglect. The unstable collagen predisposes to weakened bones, increased susceptibility of fractures, and fragile vascular walls in areas of greatest growth such as distal femur and proximal tibia and fibula.

The child has been improving well following a prescription of vitamin C 250mg daily, vitamin D 50,000 units, and iron supplements.

Conclusion
Scurvy results from vitamin C deficiency leading to defect of collagen hydroxylation. This results in poor wound healing, anemia, swollen gums, and hemorrhage. While x-ray findings of scurvy are well established, detecting MRI findings of scurvy can spare pediatric patients unnecessary exposure to radiation and invasive procedures. MRI findings of scurvy include bilateral symmetrical bone marrow edema in the metaphysis in the long bones with overlying soft tissue edema.

Abstract Title: Multi-Site Assesment of Risk for Suicide in Youth: Feasibility and Acceptability of Intensive Research with High- Risk Youth

Investigator: Beene, Jacob
Co-Investigator(s): Evan Kleiman, PhD, Rutgers Richard Liu, PhD, Mass General Hospital Emelyn Auad, BA, ODU Abigail Luce, BA, ODU Mary Margaret Gleason, PhD, CHKD Laura Lang, MPH, CHKD Jasmine Summerlin, BA, CHKD Kali Delay, BS, CHKD
Department: Psychology, ODU

Abstract
Introduction: Suicide is a leading cause of death among adolescents, and, alarmingly, rates have continued to increase over the past decade. Given the limited empirically supported psychosocial interventions for adolescent suicidal behavior, there is a great need to identify processes underlying risk for this outcome. This poster presentation will report preliminary data from an ongoing large-scale collaborative project that is examining how social stress increases risk for suicidal behavior in youth.

Specifically, this poster will describe the feasibility and acceptability of this research design with high- risk youth during the critical period following discharge from acute psychiatric care - one of the highest risk periods for suicide deaths.

Methods: This project is recruiting adolescents (12-18 years old) and at least one parent/caregiver across three collaborating sites (Old Dominion University (ODU) in collaboration with Children's Hospital of the King's Daughter (CHKD), Rutgers, and Massachusetts General Hospital) following discharge from acute psychiatric care. The study has three components: (1) baseline assessment (within 90 days of discharge from acute psychiatric care for suicide risk), (2) 28 days of intensive longitudinal data collection via smartphone-based surveys and wrist actigraphy, and (3) follow-up assessment at the end of the 28-day period. Given that this is a high-risk period, adolescents' responses are monitored for risk and to ensure their safety during the intensive monitoring period.

Results: To date, the study has recruited 73 adolescents and at least one caregiver. The sample across all three sites was primarily female (73.97%). The average age was 14.67. 21% of the sample identified as Hispanic. 41% of the sample identified as White, 27% as Black/African American, 18% as multiracial, 8% as Asian, and 1% as Native Hawaiian or Pacific Islander. This poster will report adherence rates during the intensive monitoring period (i.e., what is the completion rate of surveys during the 28-day monitoring period). In addition, feedback from adolescents and parents/caregivers about what it was like to participate in this research will be provided. For instance, one adolescent participant commented on the thought-provoking aspects of the daily surveys, which "made [her] really think about how [she] felt and how much [she] progressed…" since beginning the study. Furthermore, a caregiver also commented on how the surveys challenged the perception of their child's condition, saying "[it] forced us to think deeper into our feelings regarding my child's depression…"

Conclusion: This multi-site project is one of the first to recruit such a large sample of adolescents during the high-risk post-hospitalization period. Results to date demonstrate that this research is feasible and acceptable to youth and their families. Future research will examine how proximal risk factors are related to suicidal thoughts and behaviors among youth.

Abstract Title: Rare Case of Breast Sarcoma and Associated Imaging Findings

Investigator: Behling, Emily
Co-Investigator(s): 1. Emily Behling, Medical Student / EVMS 2. Dr. Jake Graham, Radiology Resident / EVMS 3. Dr. Emily Glavich, Breast Radiology Fellow / EVMS 4. Dr. Shannon Wilson, Radiology Attending / EVMS
Department: Radiology

Abstract

Introduction:
Breast sarcomas are a rare form of cancer that make up fewer than 1% of all diagnosed breast cancers. These tumors are made up of malignant mesenchymal tissue and typically develop in women 55-59 years of age. A primary breast sarcomas presents as a rapidly growing mass of the breast, without nipple involvement. Breast sarcoma can be associated with genetic syndromes including familial adenomatous polyposis, neurofibromatosis type 1, and Li-Fraumeni syndrome. Breast sarcomas are difficult to distinguish based on clinical features and although cases may have imaging findings that are common, these are often nonspecific. Pathology is therefore used to obtain a definitive diagnosis. These tumors tend to be treated with mastectomy, adjuvant chemotherapy, and radiation. The 5 year survival rate for breast sarcoma has been documented as low as 14 percent. Here we report the case of a pathology-proven stage IIIa primary breast sarcoma in a 39 year-old female.

Case Information:
The patient is a 39 year old female with no prior history of cancer, no history of radiotherapy, and no history of smoking. She presented with a rapidly enlarging palpable left breast mass in the lateral upper quadrant after a year and a half of breastfeeding. Patient underwent mammography and breast ultrasound for further evaluation which demonstrated a large hypoechoic, heterogenous mass with internal cystic structures, prompting further evaluation with fine needle aspiration of the mass. The pathology report from the biopsy demonstrated findings of a high grade sarcoma. Further imaging was obtained with CT which revealed that the breast mass came in close proximity to the chest wall but did not show any invasion. Patient underwent treatment with a left total mastectomy with negative margins. The subsequent postoperative pathology report confirmed a high grade undifferentiated pleomorphic sarcoma. Adjuvant chemotherapy was initiated with no evidence of recurrence 7 months after diagnosis, the patient is also anticipated to undergo adjuvant radiation upon completion of chemotherapy. Genetic testing was obtained at the time of diagnosis and did not reveal any genetic predisposition.

Discussion:
Breast sarcomas tend to be difficult to diagnose as they cannot be definitively identified using standard approaches such as mammography and ultrasound. Our case supports this finding as a mammogram and ultrasound both identified the suspicious mass, but a subsequent tissue biopsy was used to make the definitive diagnosis. Diagnosis of breast sarcoma is essential due to its aggressive nature which necessitates surgery in most cases. In addition, preoperative diagnosis of breast sarcoma is important because it can change operative management. While lymph node dissection is common in epithelial breast malignancies, it is not indicated in breast sarcoma due to low rates of nodal spread. This case may also anecdotally suggest that it's important to consider breast sarcoma as a diagnosis for younger women. Our 39-year-old patient is somewhat younger than the 55-59 year-old patient population most commonly diagnosed with breast sarcoma.

Conclusion:
Breast sarcomas are rare tumors that should be considered as a broad differential diagnosis for a breast mass. The heterogeneous patient population and features of these tumors, as well as the lack of definitive imaging findings render breast sarcomas difficult to diagnose. Preoperative diagnosis is important and can be made with a tissue biopsy. Treatment for breast sarcomas involves surgery as well as adjuvant chemotherapy and radiation which requires close collaboration with the radiology, surgery, and pathology teams.

Abstract Title: Pulmonary Artery Pseudoaneurysm due to Blunt Force Trauma

Investigator: Behling, Emily
Co-Investigator(s): 1. Emily Behling, Medical Student / EVMS 2. Dr. Clink Sliker, MD, FACR, FASER, Department of Diagnostic Radiology / University of Maryland School of Medicine
Department: Department of Diagnostic Radiology and Nuclear Medicine Program in Trauma, University of Maryland School of Medicine

Abstract

Introduction
A pseudoaneurysm is an area of focal arterial dilation involving two or less layers of the arterial wall and is often associated with a perivascular hematoma. Pulmonary artery pseudoaneurysms (PAPs) are frequently iatrogenic conditions, but can also arise secondary to trauma, neoplasm, infection, or vasculitis. Non-iatrogenic traumatic PAPs are rare and primarily caused by penetrating injuries, such as gunshot wounds. There are few reported cases of PAPs due to blunt force trauma. We present a case of a 49-year-old male with a right pulmonary artery pseudoaneurysm (PAP) due to a blunt force injury caused by a high- speed motor vehicle collision.

Case Information
Our patient, a 49-year-old male, presented to the emergency department immediately following a high-speed motor vehicle collision with a blunt force injury. He was asymptomatic at the time of presentation. A chest x-ray and chest computed tomography angiogram (CTA) were performed. Based on the imaging obtained, the following diagnoses were made: right PAP, sternal manubrium fracture with retrosternal hematoma, small right pneumothorax, and right middle lobe pulmonary contusions. The patient was admitted to the hospital and received a follow-up CTA. The pseudoaneurysm was unchanged and the injury was central in an area deemed low risk for uncontained rupture. After seven days of observation without medical or invasive intervention, the patient remained clinically stable. He was discharged from the hospital without additional intervention. The patient was instructed to follow up, but at six months post-injury there was no available record of follow up.

Discussion/Clinical Findings
Pulmonary artery pseudoaneurysms are difficult to identify as they can be asymptomatic, or mimic other causes of chest pain such as pneumothorax, pulmonary embolism, and pericarditis. While identification of PAPs can be challenging, early identification is important, as PAPs can cause fatal hemoptysis, especially when peripheral (i.e., in the lung). Patients with traumatic PAPs typically present with a complaint of chest pain and may develop hemoptysis as well as shortness of breath. In addition, multiple treatments for PAPs exist, including trans-catheter embolization, surgical ligation, lobectomy, and endovascular graft placement. This case is unique in that our patient sustained a PAP due to blunt force trauma, was asymptomatic, and received no treatment for the PAP. No patients in the existing documented cases of PAPs sustained due to blunt force trauma remained asymptomatic and did not require intervention. Our take home message from this case is to have a high suspicion for PAPs, even in the context of blunt force trauma. Furthermore, patients with PAPs who remain asymptomatic can do well without intervention.

Conclusion
A pulmonary artery pseudoaneurysm is a very uncommon injury due to blunt force trauma to the chest. Pulmonary artery pseudoaneurysms may present with chest pain, hemoptysis, and shortness of breath. A minority of patients with a PAP are asymptomatic, which contributes to the under recognition of PAPs. The diagnostic standard for identification of a pulmonary artery pseudoaneurysm is a chest CTA, where PAPs appear as focal dilation of the pulmonary artery. PAPs can be treated with trans-catheter embolization, surgical ligation, lobectomy, endovascular graft placement, or continued observation.

Abstract Title: Anti-cytokine autoantibody screening for patients with sarcoidosis

Investigator: Benedict, Jubilee
Co-Investigator(s): Jubilee Benedict, Lindsey Rosen PhD, Serena Lee, Steven M. Holland MD, Chioma Udemgba MD
Department: NIAID

Abstract

Introduction:

- Sarcoidosis is a multisystemic disease with variable clinical presentations, the hallmark of which is the presence of granulomas. Patients diagnosed with sarcoidosis are also more likely to be diagnosed with other autoimmune conditions.
- Sarcoidosis is 2 times more likely to affect women and is 2-4 times more prevalent in African American populations than non-Hispanic White populations.
- The etiology of sarcoidosis is unknown, making diagnosis and management difficult.
- Anti-cytokine autoantibodies have been identified in patients with several autoimmune and immunodysregulatory conditions.
- This project seeks to investigate whether anti-cytokine autoantibodies may be present in patients with sarcoidosis.

Methods:

- 18 patients were screened for cytokine autoantibodies utilizing our particle based assay
- 44% (8/18) of patients enrolled were African American and 39% (7/18) were white, while 17% (3/18) did not have a documented race in the medical record
- 61% (11/18) of patients were female, 39% (7/18) of patients were male
- The age range of this cohort is from 37-73 with a median age of 58

In order to carry out the assay, magnetic microspheres were conjugated to cytokines of interest and incubated with patient plasma samples. A secondary detection antibody was used to identify samples with autoantibodies based on fluorescence intensity (FI). Patient samples were compared to healthy controls and positive controls. Each experiment was performed in duplicate.

Results:

- 22% of patients (4/18) were positive for cytokine autoantibodies.
- 2/18 patients were determined to have anti-cytokine autoantibodies to TNF-α.

Conclusion:

18 patients having a previous clinical diagnosis of sarcoidosis were screened for cytokine autoantibodies utilizing our particle-based assay. 22% of patients were shown to be positive for cytokine autoantibodies. Future plans are to perform functional testing on positive patient results, expand sample size, and establish screening tests for other auto-antibody targets.

Abstract Title: Caloric restriction reduces radiation-induced skin toxicity and metabolic dysfunction

Investigator: Brill, Ethan
Co-Investigator(s): 1. Brill E - 1, EVMS/MD26 2. Francois N- 2, Radiation Oncology/TJU 3. Shastri AA - 3, Radiation Oncology/TJU 4. DeAngelis T-4, Radiation Oncology/TJU 5. Simone NL-5, Radiation Oncology/TJU
Department: Radiation Oncology at Sidney Kimmel Center at Thomas Jefferson University

Abstract

Introduction: Patients undergoing radiation therapy, especially those with underlying metabolic dysfunction from obesity or diabetes, frequently suffer from radiation-induced toxicities including dermatitis and long-term fibrosis. These toxicities not only decrease patient quality of life but also decrease adherence to treatment regimens, resulting in unfavorable outcomes. Our laboratory has previously shown metabolic reprogramming augments the radiation response via downregulation of the IGF-1R pathway. Since IGF-1R is also implicated in radiation-induced toxicity, we sought to determine the role of dietary interventions in minimizing radiation- induced dermatitis and fibrosis.

Methods: The leg shortening fibrosis model was used to determine the effect of metabolism on radiation-induced fibrosis. Mice with either a normal baseline metabolism or diabetes (induced by injection with Streptozotocin (STZ) 75 mg/kg in PBS via intraperitoneal injection for 5 consecutive days) were treated with a single 30 Gy dose of RT to the right hind leg, while the contralateral leg was used as control. The mice were then randomized to a) Ad Libitum diet, b) Caloric Restriction (30% reduced calorie diet), or c) Ketogenic diet. Progression of acute skin toxicities (erythema, hair loss and desquamation) were noted daily for 30 days and fibrosis was determined by measuring changes in length of the irradiated leg at 2 weeks, 30 days, 90 days and 120 days. Skin and muscle of both irradiated and control legs were collected at 120 days for histological analysis.

Results: AL mice developed acute skin toxicities 2 weeks post-RT, which resolved within 4 weeks. CR altered the acute dermatitis and delayed signs of acute toxicity by 1 week post-RT (and resolving after 1 week), while KD fed mice had acute toxicity 2 weeks post-RT (and resolving after 6 weeks with persistent hair loss). Evaluating radiation-induced fibrosis, leg measurements at 120 days post-RT in the AL group were 10% shorter than the CR group (RT-78% vs CR-86%, p =0.01). Length percent changes of the irradiated AL and KD mice legs were comparable and not significantly different.

Acute dermatitis was notably worse in diabetic mice compared to normal metabolism mice; however diabetic CR mice had delayed skin toxicities compared to the control. STZ mice developed acute toxicities 2 weeks post-RT and resolved after 2 weeks. STZ+CR mice developed acute toxicities 3 weeks post-RT, and resolved after 1 week. Additionally STZ+CR mice measured a 33% decrease in average blood glucose change compared to the control, and a 29% decrease in average body weight fluctuations. At 7 days, legs of mice in the STZ group were significantly shorter than STZ+CR (STZ-78% vs STZ+CR-90%, p=0.05). IHC staining with IGF-1R confirmed that CR reduced radiation-induced IGF-1R expression in the epidermis.

Discussion: Radiation-induced acute skin toxicity and long-term skin fibrosis were alleviated in the setting of caloric restriction. Although mice with diabetes had worse acute skin toxicity, caloric restriction was able to mitigate the toxicity, as well as induce resistance to changes in both blood glucose and body weight. In the future, we will seek to elucidate the potential role of IGF-1R in the toxicity process and explore the effects of CR in other tissue types.

Abstract Title: Pediatric Lethal Means Counseling: Implementing a standardized screening tool to increase rates of counseling on promoting safe lethal means storage

Investigator: Carnell, Brendon
Co-Investigator(s): 1. Dr. Cassandra Stegall, CHKD Emergency Department 2. Dr. Alexandra Leader, CHKD Emergency Department
Department: CHKD Emergency Department

Abstract
Aims and Objectives: Implement a congruent lethal means counseling (LMC) protocol as a part of standard discharge education at Children's Hospital of the King's Daughters (CHKD).

Background: Firearm related injuries are the leading cause of death among children and adolescents in the United States excluding prematurity and congenital abnormalities.1 The presence of a firearm in the home increases the risk of injury and death. This risk increases when safe-storage practices are not implemented.2 Safe storage practices include storing firearms and ammunition locked separately with a locking device. Despite these risks, approximately 1/3 of households have a firearm, and among these households with children, 1/5 store one or more firearms loaded and unsecured.3 LMC in conjunction with free firearm storage devices significantly improves safe storage rates.2

Methods: This is a quality improvement project within a pediatric emergency department (PED) mental health unit evaluating current rates of LMC provided by mental health social workers (SW). Baseline data was obtained through distribution of an electronic survey through REDCap[4,5] to families presenting to the PED for a mental health evaluation or positive SSQ screen. Nominal dichotomous data was recorded deidentified in Google Sheets. This study was approved by EVMS IRB.

Results: The baseline data demonstrates that 85% (11/13) of patients are provided with at least one form of LMC. In this counseling, mental health SW specifically discussed access to firearms in 38% (5/13) of encounters, pills 46% (6/13), and knives 77% (10/13).

Project Updates: After identifying baseline rates of LMC, PDSA 1 was implemented on August 21, 2023. A PowerChart form has been added for SW in the Children's Pavilion, the CHKD Mental Health Emergency Services in the Emergency Department, and the CHKD trauma team. These departments have also been provided patient educational materials, survey QR codes, and free cable gun locks. Through future follow up surveys, this project aims to compare rates of safe storage practice, and adherence following appropriate counseling over time, and between departments.

Conclusions: While mental health SW often conduct lethal means assessment, there is not consistent counseling on safe storage of all of the following: firearms, pills, and knives. There is a need for standardization of LMC to help prevent access to harm within this patient population.

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Abstract Title: Genetic Connections Between 1p36 Deletion Syndrome and Craniosynostosis: A Case Report

Investigator: Castro, Rio
Co-Investigator(s): Aracelia Aldrete, MS Brendan Podszus, BS Yifan Guo, MD Samantha Vergano, MD
Department: Department of Plastic Surgery

Abstract

Introduction
This case discusses a pediatric patient with Turner Syndrome, Craniosynostosis, and 1p36 deletion syndrome. The incidence of Turner Syndrome and Craniosynostosis is similar with ~1 in every 2,000 live births. In contrast, 1p36 deletion syndrome is more uncommon, occurring ~1 in every 5,000-10,000 live births (Jordan, 2015). Individually these three conditions are rare but craniosynostosis is an atypical finding in conjunction with these two disorders. The patient's sagittal subtype of Craniosynostosis is typically due to deletions on the ERF, TCF12, and MMP23B genes on chromosomes 19, 15, and 1, respectively (Jordan, 2015). However, these deletions were not present. Therefore, in the setting of 1p36 syndrome and the mutations on chromosome 1, we hoped to find lesser known mutations that caused the patient's craniosynostosis. When looking at the specific genetic mutations, we found the PIK3CD gene which was mutated due to her 1p36 syndrome. The PIK3CD gene has a known connection to, and could be a proposed cause, of her craniosynostosis. Our objectives were to discover whether there was a causative correlation between her 1p36 syndrome and the presence of craniosynostosis and if existing, solidify any connection between the patient's 1p36 syndrome, subsequent PIK3CD gene deletion, and her craniosynostosis.

Case
A 7-year-old female with a history of turner syndrome, sagittal synostosis, and 1p36 deletion syndrome presented to the Craniofacial Clinic for a follow up post craniofacial reconstruction.

Prenatal care started at 25 weeks and the patient was born at 37 ½ weeks gestation with a complication of meconium ingestion. At birth, the patient's weight was 2775g (25th%), length 49cm (50th%), and head circumference 32cm (10th%) with microcephaly and thrombocytopenia present.

The patient's genetic analysis showed classic Turner Syndrome and a derivative chromosome 1 short arm with duplication and deletion, resulting in 1p36 microdeletion syndrome. The patient's karyotype was [45, X, der (1) dup (1) (p36.33p36.32) del (1) (p36.32p36.22)]. Her CMA report for chromosome 1 was [arr (X) x1, 1p36.33p36.32 (1,474167-4,294,000) x3, 1p36.32p36.22 (5,150,534-10,936,544) x1].

The patient underwent a bifrontal craniotomy, vertex craniectomy and osteotomy x 10 at 17 months. The plan was to complete Craniofacial reconstruction for correction of sagittal craniosynostosis to include a complete cranial vault remodeling, cranioplasties with cranial bone grafts to the frontal, temporal and parietal areas, and elevation of rotational bilateral temporalis muscles.

Pre-operatively, the patient's head circumference was 44.5cm, cranial index was 75.6%, with increased anteroposterior dimension and narrowed bitemporal dimension of the head. Right cranial length was 14.3cm and the left cranial length was 15.20cm.

Post-operatively seven years later, the patient's head circumference was 48.5cm, cranial index was 90%, measured Lateral Head width of 13.5cm, Anterior Posterior Length of 15cm, Right Oblique length of 14.8cm, Left Oblique Length of 15cm. No deformities were detected.

Discussion
To identify the presence of a causative correlation between a mutation in the PIK3CD gene and the presence of craniosynostosis, we gathered data from the genetic report of this patient with all three syndromes. We submitted the genes from the patient's deletion sequence into the Franklin database to determine which genes had known clinical associations. We then characterized the effect of each gene and isolated the ones typically affected in Turner Syndrome and 1p36 deletion syndrome separately. We then cross-referenced the genes between the three groups: the patient, genes involved in Turner Syndrome, and genes involved in 1p36 deletion to determine what genes were common among the groups and identify if craniosynostosis could be attributed to Turner Syndrome, 1p36 deletion syndrome, or neither.

Conclusion
By exploring genes involved in the etiology of craniosynostosis, we hope to understand gene mutations that may contribute to a patients' history of craniosynostosis. Future studies could focus on gathering more information from neonatal and pediatric patients at CHKD who also have a craniosynostosis diagnosis. Further analysis of these patients may help us explore connections between different gene mutations and craniosynostosis and identify screening measures for the improved identification and treatment of children with these genetic mutations.

Abstract Title: Identifying clinicopathological parameters contributing to racial disparity in pancreatic cancer in Hampton Roads, Virginia

Investigator: Chaudhry, Fatima
Co-Investigator(s): 1. Zakary L. Kolkey B.S., Doctor of Medicine 2. Ashleigh E. Hannah M.S., Master of Science in Biomedical Sciences-Research 3. Richard A. Hoefer D.O., FACS, Surgical Oncology 4. Amy Tang PhD, Department of Microbiology and Molecular Cell Biology
Department: Department of Microbiology and Molecular Cell Biology

Abstract
Introduction: Pancreatic Ductal Adenocarcinoma (PDAC) is the third leading cause of cancer-related deaths, with only 12% of patients surviving 5 years post-diagnosis. The dismal prognosis of PDAC is attributed to the delayed onset of symptoms, lack of an early and effective screening method, unsuccessful treatment, and advanced and metastatic presentation, rendering a majority of PDAC patients ineligible for surgical resection. As surgery represents the only "curative" measure, current treatment regimens for inoperable presentations only provide palliative support rather than remedial intervention, forcing this population to confront an unfortunate prognosis. The median survival for inoperable PDAC is less than one year, and three years for operable PDAC. Further, black/African American (AA) patients suffer a 30-70% higher PDAC mortality rate than other racial groups in the United States. From 2015 to 2019, the black/AA PDAC population in Hampton Roads, Virginia experienced a 17.3% mortality rate, which is a striking difference compared to its white counterpart's mortality rate of 10.8%. Therefore, this project was developed after a disparate disease burden of PDAC was identified in the black/AA Hampton Roads community.

Methods: Retrospective medical record review of 427 inoperable PDAC patients from the Sentara Cancer Network and Virginia Oncology Associates (VOA) was conducted. The age at diagnosis, treatment onset/delay, treatment type, survival time, and death date of the black/AA and white inoperable cohorts were extracted.

Average length of disease, age at diagnosis, and time between diagnosis and treatment were calculated. Average administration of each therapy type for both populations was also generated. Chi-square and T-tests were run to generate p-values. KM survival analysis was also performed to compare the survival rates of the Black and white inoperable PDAC patients in Hampton Roads, Virginia.

Results: From 2008 to 2016, the white PDAC cohort experienced a lower 1-5-year survival rate than the black/AA PDAC cohort. The black/AA population's average length of disease was 249 days, while it was only 190 days in the white population. The white cohort also had an older average age at diagnosis compared to the black/AA cohort's age at diagnosis, which was 67 and 70, respectively. The difference in the time between diagnosis and initiation of treatment was not statistically significant, however, 42.1% of white PDAC patients did not receive treatment, yet only 29.9% of black PDAC patients went without treatment. Further, 35% of the black population and 25.9% of the white population received both chemotherapy and radiation.

Discussion: Despite the higher mortality rate present in the black/AA PDAC population in Hampton Roads, Virginia, the white inoperable PDAC cohort had a reduced length of disease and survival rate. A higher proportion of their population also did not receive any therapy compared to the black/AA inoperable PDAC population. This could be explained by the white population's older average age at diagnosis, as they were more likely to have additional comorbidities and advanced stages of disease. Further, as chemotherapy is unlikely to extend their life span, elder patients often opt out of treatment due to the drastic decrease in quality of life.

Additionally, the prolonged disease survival observed in a subset of black/AA inoperable patients could paradoxically be attributed to a high mortality rate in black/AA patients. Inoperable PDAC patients typically die within a year, yet 21% of the black/AA cohort survived past a year, with 3.4% of patients living over 3 years.

This prompts questions about why these patients were classified as inoperable, and if they should have been deemed operable and provided access to the only curative treatment available. Therefore, this discovery has inspired further examination into the clinical decisions that characterized these patients as inoperable.

Investigation into other parameters, such as stage at diagnosis and standard of care adherence, will also be performed to continue our research in identifying the factors underlying the high mortality rate in the black/AA PDAC Hampton Roads population.

Abstract Title: Dendritic Cell Contribution to Microvascular Cell Dysfunction In Type 2 Diabetes

Investigator: Chaw, Phyu
Co-Investigator(s): Kiran Alluri, Physiological Sciences/Research Scholar
Department: Physiological Sciences

Abstract

Introduction: Type 2 diabetes (T2D) is a complex metabolic disease that presents itself with significant clinical problems such as microvascular endothelial cell dysfunction, which may lead to stroke, myocardial infarction, wound healing delay, and atherosclerosis. While it is established that the immune system is dysregulated in T2D, the impact of dendritic immune cells on these mechanisms is not well understood. This study aims to characterize how dendritic cells contribute to microvascular health dysfunction in T2D conditions.

Methods: Endothelial cells from C57/BL6 were incubated as control, with ATP, and with ATP + High Glucose/Lipid/Palmitic Acid and assessed for P-ENOS and Total ENOS (both in association with nitric oxide, a key component of vasorelaxation), Beta-Actin, and GAPDH protein expression via Western Blot.

C57/BL6 mice mesenteric arteries were incubated in isolation, with control dendritic cells taken from euthanized C57/BL6 mice, and and with dendritic cells incubated under similar control and hyperglycemic High Glucose/Lipid conditions. Endothelial-dependent relaxation and contractility were assessed with wire myography, and compared with wire myography data of this procedure done using DC cells from db/db mice and db/het mice for control and use of mesenteric arteries.

Results: Incubation of C57/BL6 EC cells with ATP + HG/L/P-Acid mixture presented with decreased expression of detectable proteins in comparison to control incubation and isolated incubation with ATP. C57/BL6 DC cells did not significantly impact mesenteric artery endothelium-dependent relaxation, however, DC cells from db/db mice did impair db/het mesenteric artery endothelium-dependent relaxation.

Conclusion: Endothelial cell exposure to hyperglycemic conditions inhibited expression of proteins associated with vasorelaxation, and dendritic cells exposed to hyperglycemic conditions in-vivo also led to vasorelaxation impairment, suggesting its contribution to microvascular dysfunction in patients with type 2 diabetes. Additional in-vitro assessments are warranted for further understanding of the vascular role of dendritic cells in type 2 diabetes.

Abstract Title: Assessing Access to Care for Sleep Apnea Oral Appliance Therapy

Investigator: Crafton, Will
Co-Investigator(s): 1. Alisa Rendina, (fellow Summer Scholar - but not an EVMS student - will not be at Research Day)
Department: Pediatrics/Community Health

Abstract

Introduction: Oral appliance therapy (OAT) is emerging as a popular alternative to CPAP, the gold standard for obstructive sleep apnea (OSA) treatment. However, CPAP machines are often poorly tolerated and thus have lower compliance rates. OAT is found by many patients to be less cumbersome, leading to improved compliance. Unlike CPAP and other traditional treatment methods employed by sleep physicians, OAT is often custom-fit and managed by dentists. The availability, efficacy and ease of access of OAT is an ongoing subject of research both nationally and internationally. This project seeks to elucidate the accessibility of OAT as a viable alternative for the treatment of OSA as it pertains to patients and providers in the Hampton Roads, Virginia area.

Methods: The "secret shopper" methodology, in which study investigators pose as patients calling dental practices, was used to garner information regarding availability and cost of OAT, insurance coverage, and prior referral requirements, among other factors. A call script probing these factors was piloted with three randomly chosen dental practices from a spreadsheet containing all general dental practices in Hampton Roads before being finalized. For each city in Hampton Roads (Chesapeake, Norfolk, Hampton, Portsmouth, Suffolk, Newport News, and Virginia Beach), 50% of practices listed on the spreadsheet were randomly selected to contact. A survey was created in the data entry and analysis service, REDCap, to operationalize and aggregate the information from secret shopper calls.

Results: Of 97 practices in the Hampton Roads area that were contacted, 43 (44.3%) offered OAT. Of these practices, 21 (53.8%) required a referral from a sleep physician. For the practices that shared the estimated cost of OAT (n=25), the average cost was $1628; lowest price of $470, and highest of $3000. Most practices report little to no coverage from either medical or dental insurance; 16 practices stated outright they accept no form of insurance for OAT. Only 19 practices were able to provide a referral to a local provider who does offer OAT; this included a combination of general dentists, cosmetic/implant dentists, periodontists, orthodontists, and oral/maxillofacial surgeons.

Conclusions: Just over half of dental practices surveyed in the Hampton Roads area did not offer OAT. Of those that did, there were variable requirements on prior referrals and proof of diagnosis. Most practices required an initial consultation/impression with a dentist. Overall, insurance coverage was limited and highly variable. Further investigation on insurance coverage, out of pocket costs and referral patterns in OAT is warranted to identify larger trends nationally, target common barriers to OAT, and improve outcomes in patients with OSA.

Abstract Title: Pott's Puffy Tumor: Associated dural sinus thrombosis and effect on surgical and medical management

Investigator: Cranmer, Mia
Co-Investigator(s): 1. Danxun Li, MD2026
Department: CHKD Plastic and Oral Maxillofacial Surgery

Abstract

Introduction:
Pott's Puffy Tumor (PPT) is a rare complication of sinusitis characterized by swelling on the forehead due to frontal bone osteomyelitis and subperiosteal abscess. We present a case of a 10-year-old girl who presented with PPT as a complication of pansinusitis which further progressed to intracranial abscess and sagittal sinus thrombosis. We aim to provide an overview of the definitive treatment options and highlight potential complications associated with inadequate treatment.

Case Information:
A 10-year-old female patient presented in the ED with altered mental status, ataxia, fever, and lethargy which had begun as toothache and earache a week prior. MRI revealed a left frontal lobe abscess and a right frontal scalp abscess alongside pansinusitis. Pansinusitis was surgically debrided and managed medically. The intracranial abscess was drained twice and the frontal scalp abscess was aspirated.

Cultures were positive for S. intermedius and antibiotics were de-escalated to penicillin and metronidazole from the initial broad-spectrum antibiotics with vancomycin and ceftriaxone. Superior Sagittal Sinus thrombosis (SSST) was noted on the initial MRI, however, anticoagulation was initially deferred until cleared from further operations. Heparin drip was administered with careful monitoring of acute hemorrhage. The patient was ultimately discharged home on 6-weeks course of penicillin, Keppra and Lovenox.

Discussion/Clinical Findings:
As illustrated by the case above, definitive treatment of Pott's Puffy Tumor involves a multidisciplinary approach combining medical and surgical interventions. The underlying sinusitis should be drained or debrided and may warrant functional endoscopic sinus surgery to correct sinus defects. Associated intracranial or extradural abscesses should also be drained and cultured. Prompt and appropriate antibiotic therapy should be administered following identification of the underlying infection. Heparin is first-line in the management of cerebral venous thrombosis.

Conclusion:
Complications arising from inadequately treated PPT may consist of incomplete resolution of the infection leading to extensive and persistent abscess formation, osteomyelitis of the frontal bone, or intracranial complications such as meningitis, brain abscess, or venous sinus thrombosis. These complications require more aggressive treatment modalities, including extended antibiotic courses and repeat surgical interventions. Inadequate treatment may also lead to chronic inflammation and bone destruction resulting in cosmetic deformities and functional impairments.

Abstract Title: Identifying Resource Gaps and Opportunities for Advancement in Neuroscience Research at EVMS

Investigator: Cranmer, Mia
Co-Investigator(s):
Department: Pathology and Anatomy

Abstract

Introduction
Medical students interested in a research-driven career often face barriers to opportunities at an institutional level. Limited funding, availability of faculty mentors, and number of research facilities at their school are some barriers to scientific research experiences. The goal of this project is to assess gaps in neuroscience research opportunities for medical students in the Tidewater region of Virginia compared to other regions that are associated with medical schools across the state.

Additionally, we identify students with an interest in medical neuroscience-related fields (neurology, neurosurgery etc). Publications indicate that early exposure through structured specific research contributes to increased workforces in its respective field of study. Overall, it contributes to improved patient care, diagnostics, and therapies.

Neuroscience research is an important part of medical education and may help alleviate the burden of neurological conditions. There are over 150,000 individuals with Alzheimer's and roughly 85,000 living with epilepsy in the state of Virginia. Stroke can be catastrophic to neurological health and is the 5th leading cause of death in the state. A workforce of physician-scientists focused on diseases of the nervous system is vital to improving therapies available to patients affected by these conditions.

Methods
The NIH Research Portfolio Online Reporting Tools (RePORT) was queried for NIH awards provided to medical schools in Virginia for the 2020, 2021, and 2022 fiscal years. This was limited to awards that fell under "Research Project Grants", "Research Centers", "Other Research-related", and "R and D contracts". Additionally, only awards that were granted to the School of Medicine for the corresponding institution were included in the analysis. Data abstracted included region, institution, project title, funding amount, department, and funding mechanism. Total funding for the fiscal year was calculated for each school. The number of neuroscience-related projects was assessed by screening project titles and abstracts. Student interest was assessed using data available from abstracts, publications, and presentations that have come from faculty and students at EVMS. Data on data neurological disease prevalence, incidence, and healthcare burden in Virginia was also included. Scholarly productivity was measured by PI publication count during the years of interest. PIs receiving NIH awards from 2020-2023 were selected at various institutions across Virginia. The publication rate of these PIs was compared to that of those that did not have documented NIH funding during this period.

Results
Schools with greater total NIH funding received more awards related to neuroscience research. At schools with greater total NIH funding, structured medical student research programs were common, and scholarly productivity was increased. Scholarly productivity and student engagement are increasing in neuroscience labs at EVMS, with many faculty involving both medical and graduate students in publications and presentations.

Conclusions
Additional NIH or similar funding is an important factor in providing opportunities for medical students to produce research. EVMS has an existing body of faculty and students highly interested in neuroscience research. Additional funding and a structured research program would aid in expanding these efforts and, hopefully, encourage students to enter careers in medical neurosciences where they can address limitations in treatments and diagnostics as physician-scientists.

Abstract Title: Teen Health 360 Academy: Implementing Comprehensive Sex Education among Adolescents in Eastern Virginia under the context of COVID-19 Pandemic

Investigator: Culver, Alex
Co-Investigator(s): 1. Janvi Agrawal, MD student
Department: Pediatrics

Abstract

Background: Although high rates of teen pregnancy and sexually transmitted infections (STIs) have been consistently reported in Eastern Virginia, access to comprehensive sex education (CSE) for adolescents is limited due to socioeconomic, cultural, and structural barriers. The Teen Health 360 program adopted the *Get Real Comprehensive Sex Education That Works* curriculum for pilot among adolescents. This study examined the effect of the program on sexual health knowledge among middle school program participants.

Methods: Participants were recruited between May 2021 and August 2023 through various channels, using a parent opt-in form. Academy sessions were delivered online or in-person by trained health educators. Program monitoring data was collected using pre- and post-assessments, fidelity logs, and participant feedback forms. Descriptive statistics and regression analysis were performed to examine differences in sexual health knowledge between pre- and post-assessment, and differential changes across sub-groups of program participants.

Results: Among the 296 Grade-six program participants, 209 completed the pre-assessment and 181 completed the post-assessment. Significant increases were revealed in knowledge related to anatomy and reproduction (mean scores: 3.16 vs 4.35) with the increase being larger among in-person participants (52%), relative to virtual participants (29%) and among African American (47%), relative to Asian/Pacific-Islander (36%), White (31%) and adolescents of other race/ethnicity (31%). Over 90% adolescents said they were glad they attended the pilot program and would recommend it to their peers.

Conclusions: This program is a feasible and effective approach to increase knowledge about puberty, developmental, and sexual health among adolescents under the context of the COVID-19 pandemic.

Abstract Title: Understanding Educational Needs for Teaching Clinicians Using a Mixed Methods Approach

Investigator: Davis, Spencer
Co-Investigator(s): 1. Spencer Davis BS, EVMS MD Class of 2027 2. Eric Werner MD MMM; EVMS Pediatrics, Children's Specialty Group, Norfolk, VA
Department: EVMS Pediatrics, Children's Specialty Group, Norfolk, VA

Abstract

Introduction: Developing impactful faculty development education for busy clinicians is challenging. Medical education literature is expanding exponentially while at the same time, clinical responsibilities and administrative tasks cause enormous time demands for clinical faculty and residents. These time demands limit participation in traditional learning experiences and in assessments of educational effectiveness. Understanding faculty and resident needs for assessing and improving their skills as educators and their preferences for how to receive that information is crucial for creating faculty development education that is useful for busy clinicians.

Methods: A convergent mixed methods design was used. Eastern Virginia Medical School Department of Pediatrics faculty and pediatric residents were recruited and interviewed virtually or in person using a semi-structured interview format. Thematic analysis was used to analyze interview responses. Faculty and residents were surveyed on faculty development topics and ways of receiving information using a 5- point Likert scale. Survey responses were entered without identifiers and analyzed using descriptive statistics.

Results: A total of 40 faculty members out of the 225 invited to participate were interviewed (17.8% response rate) along with 2 residents. 37 faculty surveys and 2 resident surveys were recorded.

Improving feedback to learners, how to assess learners' clinical skills, and how to assess for implicit bias were marked as high need or very high need by 84.6% (n=33), 57.9% (n=22), and 53.8% (n=21) of survey responses, respectively. Brief pearls and short videos were marked as quite useful or most useful by 76.9% (n=30) and 55.3% (n=21) of responses, respectively. Thematic analysis revealed three themes:

(1) creating a sustainable educational environment, (2) the importance of quality in the educational content, and (3) challenges to implementing faculty development.

Conclusion: Interviews revealed that faculty members largely wish to participate in faculty development activities. However, faculty development education must be given out in short, high- quality ways to increase participation. Survey data confirmed this finding as brief distribution methods were the most popular. Future faculty development education in this department needs to be high- quality, brief, and focused on improving feedback to learners, assessing learners' clinical skills, and assessing for implicit bias.

Abstract Title: Double Jeopardy: A Tale of Stroke and Two Synchronous Primary Lung Cancers

Investigator: De Cataldo, Riccardo
Co-Investigator(s): Riccardo De Cataldo, MD2024/EVMS Saad Mussarat, MD, Dept. of Internal Medicine/EVMS
Department: Internal Medicine

Abstract

Introduction: With the overall increase in medical imaging studies performed, Incidental findings on diagnostic workup for a condition are a well-known occurrence in the medical field. Rarely, however, does incidental workup reveal two, concurrent primary cancers. We report an interesting case of a patient who was admitted with stroke-like symptoms and was incidentally found to have two primary lung cancers.

Case Description: A 66-year-old male with a 25-pack-year smoking history and past medical history of hypertension and hyperlipidemia presented to the Emergency Department with stroke-like symptoms.

He was found to have an ischemic stroke which was managed appropriately. Incidentally, his chest X- ray revealed a suspicious, right middle-lobe pulmonary nodule. This finding prompted a CT chest which demonstrated a 4.1 cm, spiculated mass with multiple, sub-6 mm pulmonary nodules in the right middle and upper lobes. Subsequently, endobronchial ultrasound with Bronchoalveolar lavage (BAL), brushing, and transbronchial biopsy were performed. Bronchial brushing was positive for non-small cell carcinoma and BAL demonstrated atypical cells. Fluoroscopic-guided right middle lobe biopsy demonstrated adenocarcinoma and a small focus of carcinoid tumor. PET showed FDG avidity in the right middle lobe mass consistent with primary bronchogenic malignancy as well as avidity in a subcentimeter mediastinal lymph node. The patient is currently scheduled for another PET to determine the necessity of surgical resection in addition to chemotherapy.

Discussion: Incidental findings on imaging may sometimes lead to inconsequential diagnostic workups; however, in this case, an incidental pulmonary nodule was discovered to be two primary pulmonary cancers. Although improved imaging techniques and cancer survivability are causing an increase in incidental findings, finding two synchronous pulmonary cancers remains a rare occurrence. Such a case demonstrates the importance of maintaining a high index of suspicion in the workup of incidental findings in relevant clinical contexts as they may allow prompt detection of malignancy and improve prognostic outcomes for patients.

Abstract Title: Erythema Multiforme and Tizanidine: A Rare Association

Investigator: De Cataldo, Riccardo
Co-Investigator(s): Riccardo De Cataldo, MD2024/EVMS; Benjamin Crookshank, MD, Internal Medicine/ EVMS; Saad Mussarat, MD, Internal Medicine/ EVMS
Department: Internal Medicine

Abstract

Introduction: Tizanidine is an alpha-2-receptor agonist FDA-approved for the management of muscle spasticity, such as multiple sclerosis (MS) or spasticity secondary to injury of the central nervous system. Tizanidine has many common adverse drug reactions (ADR) which range from gastrointestinal (xerostomia, constipation, vomiting) to neurological (asthenia, dizziness, drowsiness), to psychiatric (delusions, nervousness, visual hallucinations). Mucocutaneous ADRs to tizanidine such as Steven- Johnson Syndrome (SJS) and dermatitis, however, are exceedingly rare and have only been reported in post-marketing analyses. We report a case of erythema multiforme (EM), a mucocutaneous hypersensitivity rash, developing after completing a course of tizanidine- which to our knowledge has not yet been reported in literature.

Case Description: A 56 y.o. female with history of MS, lupus, Sjogren's syndrome, rheumatoid arthritis, hypothyroidism, Raynaud's, chronic pain, hypertension, and chronically bedbound presented with an erythematous rash bilaterally on her upper extremities one week after completing a 30-day course of tizanidine for her MS. She initially sought treatment at a dermatology clinic that biopsied this rash and prescribed topical antibiotics and steroids. The rash continued to progress to her torso, back, and lower extremities, then blistered and ulcerated. The patient presented to an outside hospital, was evaluated, and transferred to our facility for dermatology consultation for concerns of SJS. During this admission, the rash continued to spread to the vaginal area and was described as "circular pink macules with a central dusky hue and overlying scale coalescing into patches on the face, trunk, and extremities." Biopsy from the outpatient dermatology clinic returned as EM. The rash improved with the administration of solumedrol and eventually resolved with an extended taper of oral prednisone.

Discussion: Tizanidine is a common drug that rarely causes dermatologic ADRs. This case demonstrates a potentially newly documented mucocutaneous rash ADR as a result of tizanidine administration. While rare, tizanidine should be considered as a trigger for EM. This is especially important to recognize when differentiating between serious dermatological conditions such as EM, SJS, and toxic epidermal necrolysis.

Conclusion: A high index of suspicion of ADRs to tizanidine should be maintained if a patient develops an otherwise unexplained mucocutaneous rash in the setting of tizanidine administration. A thorough workup is necessary to ensure other life-threatening ADRs to this medication are not present.

Abstract Title: A Rare and Life-Threatening Episode of Hypokalemia after Rituximab Infusion: A Case Report

Investigator: De Cataldo, Riccardo
Co-Investigator(s): Charles Miks, MD, Internal Medicine/University of Iowa Riccardo De Cataldo, M4/EVMS Saad Mussarat, MD, Internal Medicine/EVMS
Department: Internal Medicine

Abstract

Introduction: Rituximab (RTX) is a chimeric monoclonal antibody used for the treatment of malignancies and autoimmune diseases. Severe hypokalemia, a rare adverse effect of RTX treatment, has previously been reported only three times in the literature. We describe a patient who developed severe proximal muscle weakness hours after completing his second RTX infusion for acute relapse of membranous nephropathy (MN) and was found to have critically low potassium levels requiring ICU admission.

Case Information: A 50-year-old male with a past medical history of bilateral renal vein thrombosis and MN presented with proximal muscle weakness shortly after completing his second RTX infusion for acute MN relapse. Originally diagnosed with MN 15 years ago, the patient maintained stable renal function (Cr 1.5-1.8 mg/dL, proteinuria 1.5-2.0 g/day) for the last 5 years without MN relapse. He was started on RTX infusion after developing an AKI on CKD stage 3 (Cr 3.3 mg/dL) with severe proteinuria >8 g/day, hypoalbuminemia 2.9 g/dL, in the setting of worsening MN on kidney biopsy 2 months prior. The patient tolerated his first infusion well without significant reactions but developed severe weakness in his arms and legs beginning 5 hours after his second infusion. Common adverse effects of RTX, such as infusion-related reactions, lymphopenia, neutropenia, or signs of infection were not experienced by our patient. He was found to have severe hypokalemia (2.1 mg/dL) with mild hypomagnesemia (1.4 mg/dL). He was later transferred to the intensive care unit due to refractory hypokalemia. During his ICU course, his serum potassium was aggressively repleted orally and through central line placement, and closely monitored with serial BMP. The patient's potassium and magnesium returned to within normal ranges after 24 hours, and he demonstrated significant improvement in his symptoms. He was transferred out of the ICU and discharged a couple of days later with scheduled oral potassium repletion.

Discussion / Clinical Findings: This case report highlights a rare association of life-threatening hypokalemia after RTX infusion. Our patient did not receive potassium supplementation until 30 hours after symptom onset, ultimately requiring emergent attention and an ICU admission. Given the rapid onset and severity of this reaction, which can unexpectedly occur despite tolerating RTX previously, a low threshold for ICU admission should be adopted to avoid life-threatening complications. Close monitoring of symptoms after RTX infusions is essential to prevent this rare but serious complication, and further studies are needed to elucidate RTX's complete effect on renal tubules.

Conclusion: Hypokalemia induced by RTX may be rapid and severe, even if the medication has previously been tolerated well. Any clinical or laboratory evidence of down-trending potassium in a patient receiving RTX warrants a high index of suspicion for a rapid decrease in serum potassium and a low threshold for ICU admission.

Abstract Title: Assessing the Baseline Impact of Ultrasound Club on Physician Assistant Student Ultrasound Confidence

Investigator: De Cataldo, Riccardo
Co-Investigator(s): Riccardo De Cataldo, M4/EVMS Jeffrey Yates, PA-C, Master of Physician Assistants/EVMS Reid Wilkinson, MPA24/EVMS Lauren Paluch, PA-C, Master of Physician Assistants/EVMS
Department: Masters of Physician Assistant

Abstract

Introduction: One of the many benefits of student-led academic clubs is the opportunity for peer-to-peer education and peer-designed curricula. This style of learning has been shown to provide an excellent addition to traditional educational opportunities. One such program at EVMS is the EVMS Ultrasound (US) Club, which organizes ultrasound rounds in Emergency Medicine, OBGYN, Family Medicine, and soon in the intensive care unit. These rounds represent student-led initiatives to generate learning opportunities. This project aims to assess whether supplementing the faculty-designed curriculum with peer-to-peer student-organized ultrasound rounds provides improved subjective and objective clinical performance for US club members when compared to those students not involved in the ultrasound club and receive only the faculty-designed curriculum. Researchers and Master of Physician Assistant (MPA) program faculty analyzed student responses from a subjective survey of confidence levels involving ultrasound interpretation along with academic scoring of their Objective Structured Clinical Exam (OSCE) to evaluate whether such a benefit to student performance exists. Students from the graduating classes of 2023 - 2025 were invited to participate. Combining this survey and the ultrasound OSCE results would additionally allow faculty to establish subjective and objective benchmarks for each MPA class to determine the academic baseline of both member and non-member US Club students.

Methods: MPA students at EVMS completed a REDCap survey that asked for class, membership in US Club, and if so how many club events they participated in. The survey then presented students with nine different, uninterpreted ultrasound images of commonly scanned images. All of the anatomical locations of these images were included in their ultrasound curriculum and previously evaluated by every student. For each window, students ranked their confidence from 1 (no confidence) to 4 (very confident) for each category: 1) acquiring a clinically significant image, 2) interpreting anatomy, and 3) interpreting pathology. Data was exported to Microsoft Excel where averages of confidence for each imaging window were stratified according to MPA class and participation in US Club. Individual student OSCE scores were viewed only by the faculty member who is the Course Director for the Ultrasound Program. This faculty member was provided a list of US Club MPA student members for the graduating classes of 2023-2025 and reported deidentified OSCE averages, again stratified by student participation in the US Club along with those students who were not members.

Results: Consent was obtained from 105 MPA students who fully completed the initial survey. Of these respondents 19 were members of the US club and had participated an average 1.0 events. A two-tailed t-test found statistically significant differences ($p<0.05$) in average confidence of members ($n=19$) vs non-members ($n=86$) in all three above categories for all images, except in acquiring the sub-xyphoid window, interpreting lung pleura pathology and the female pelvic anatomy. All three categories for the Inferior Vena Cava (IVC) images demonstrated a statistically significant improvement for US club members in interpreting IVC pathology. MPA25 data was excluded from this analysis due to not yet having been instructed on this topic. Comparing MPA23 and '24 to MPA25 demonstrated statistically significant higher confidence in all windows for all categories.

Conclusion: The timing of this initial survey at the beginning of the academic year was purposeful in order to capture baseline MPA25 data with minimal involvement in formal ultrasound curriculum and academic clubs. Longitudinal follow-up of MPA25 confidence will be necessary in order to obtain similar data points for comparison. Comparing MPA23 and '24 classes to the baseline MPA25 data suggests that the current ultrasound curriculum and other opportunities are effective in improving ultrasound confidence, which is expected. The overall lack of difference between members and non-members in MPA23 and '24 suggests that current participation in US Club does not provide a noticeable increase in self-perceived confidence for aggregate class data, but may have benefits to self-perception on an individual student basis. Finally, club membership and participation appeared relatively low compared to all survey participants which invites opportunities to explore ways to increase access to and participation in club events for MPA students.

Abstract Title: Merging Automation and Quality of Hand Hygiene in a Children's Hospital

Investigator: DiGerolamo, Trevor
Co-Investigator(s): Ryan Krafty, EVMS/MD2026
Department: CHKD Pediatrics

Abstract

Introduction: The emphasis on hand hygiene (HH) in the setting of healthcare has been commonplace for over a century. In 1846, Ignaz Semmelweis observed that child deliveries performed by midwives who washed their hands displayed a significantly lower mortality rate than physicians who did not.
Since then, rules and regulations for handwashing have been implemented in healthcare facilities to enhance the safety of patient and provider alike. Today, hospitals have gone to great lengths to measure the frequency and quality of HH in medical professionals. Across Norfolk's Children's Hospital of The King's Daughter (CHKD), the "Wonder Washers" automated HH system has been installed to track how frequently medical professionals are taking advantage of HH opportunities using Bluetooth technology. In this study, we set out to assess the accuracy and validity of the Wonder Washers system as well as observe and improve the overall quality of HH amongst health care professionals within CHKD.

Methods: We learned the standard CHKD job instructions for both Purell and soap HH. Using a discrete observation approach, we rounded throughout the hospital and recorded data on unit, job role, whether the professional was entering or exiting the room, the method of HH, correctness of the HH, and any comments related to the quality of HH. Data was collected from day and night shifts to ensure proper coverage of all hospital shifts to increase sample size and diversity.

Results: The data collected was organized and visualized both graphically and in tabular format given the wide variety of variables we observed. When looking at the total data (day and night shift), ~50% of all HH observations were performed correctly with the majority of those seen in the ED from RNs coming out of patient rooms with Purell as their HH method.

Conclusion: This data suggests that there is significant room for improvement within CHKD regarding HH. Further analysis will be done to validate that the Wonder Washers system is recording statistically similar data as our manual observations. Quality of HH is best improved by real time intervention and would require "just in time" feedback to be successful.

Abstract Title: Beyond Booze and Stones - A Case of Hypertriglyceridemia-Induced Pancreatitis

Investigator: Dod, Rohan
Co-Investigator(s): 1. Tarik Alagha, MD, EVMS Internal Medicine 2. Sami Tahhan, MD, EVMS Internal Medicine
Department: Internal Medicine

Abstract

Introduction
Hypertriglyceridemia-induced pancreatitis (HTGP) is the third most common cause of acute pancreatitis (AP). Management is similar to other causes of AP but is also directed at rapidly lowering serum triglyceride levels. The degree of triglyceride elevation is associated with the severity of HTGP. We present a case of a 38-year-old female with severe HTGP necessitating plasmapheresis.

Case Information
A 38-year-old female with a past medical history of recurrent pancreatitis, heart failure with recovered ejection fraction, type 2 diabetes mellitus, and hyperlipidemia presented with acute-onset abdominal pain, nausea, and vomiting. Her history was notable for no alcohol use, a prior cholecystectomy, and an episode of pancreatitis with an unclear cause several months prior. Physical exam demonstrated a patient in mild distress with epigastric tenderness and guarding. Labs showed a lipase greater than 6,000 U/L and CT scan of the abdomen demonstrated edema in the head and neck of the pancreas consistent with pancreatitis. Additional workup was notable for a triglyceride level of greater than 3,500 mg/dL and a low ionized calcium of 2.9 mg/dl. The patient initially received intravenous insulin at an outside hospital. At our hospital, she was started on intravenous fluids, pain control, and admitted to the ICU for further management and insulin therapy. Her ICU course was complicated by acute kidney injury requiring temporary hemodialysis. She received plasmapheresis with eventual reduction in her triglyceride levels and resolution of her pancreatitis. She was discharged on gemfibrozil.

Discussion/Clinical Findings
The risk for HTGP increases significantly with triglyceride levels over 1000 mg/dL. The pathophysiology is believed to involve pancreatic lipase, which is released from acinar cells in the vascular bed of the pancreas. This enzyme cleaves triglycerides into free fatty acids, which induce a toxic effect on the acinar cells and capillary endothelium, thereby precipitating an inflammatory cascade within the pancreas. Furthermore, high levels of chylomicrons seen in hypertriglyceridemia increase viscosity in the pancreatic vasculature, leading to capillary plugging, ischemia, and potentially acidosis. Initial treatment for HTGP is similar to management of acute pancreatitis due to other causes and includes bowel rest, intravenous hydration, and pain control. Intravenous insulin therapy lowers triglyceride levels by activating lipoprotein lipase. Another approach is to use plasmapheresis, which is estimated to reduce the serum TG level by 49%-80%. However, current literature supporting the use of plasmapheresis in HTGP is from observational studies with a lack of randomized controlled trials.

Furthermore, the benefit of early initiation of plasmapheresis is still in question.

Conclusion
Our case demonstrates a multimodal approach to help lower serum triglyceride levels in severe HGTP, but data is needed regarding the combined use of insulin and plasmapheresis in terms of prognosis and mortality. Furthermore, further research is needed to validate the benefits of early initiation of plasmapheresis.

Abstract Title: Vocal Cord Dysfunction and Pediatric Psychiatric Comorbidities: A Comprehensive 5-Year Investigation

Investigator: Dombrower, Alex
Co-Investigator(s): Jorge H. Valencia Rico MD, CHKD Resident Carlos Sendon MD, Pediatric Pulmonogy, CHKD
Department: CHKD

Abstract

Introduction: Vocal Cord Dysfunction (VCD) entails an atypical closure of the vocal cords during inspiration, often mistaken for refractory asthma. Symptoms encompass dyspnea, throat tightness, stridor, dysphonia, and asthma-like manifestations such as coughing and wheezing. VCD triggers include exercise, emotional responses, reflux, and various environmental factors. While laryngoscopy serves as the traditional diagnostic method, historical context and pulmonary function assessments also provide valuable diagnostic insights. Our objective is to elucidate the relationship between VCD and psychiatric conditions, particularly depression, anxiety, and ADHD. This study aims to enhance diagnostic precision and contribute to improved therapeutic strategies in the realm of pediatric healthcare.

Materials and Methods: Retrospective chart review conducted on patients diagnosed with VCD in a Children´s Hospital in the U.S. from September 1, 2017 - September 1, 2022. Inclusion criteria included pediatric patients with VCD up to 21 years old. Exclusion criteria included patients with chest deformities, vocal cord paralysis, history of intubation, or discrepancies in diagnosis between ENT, Allergy, or Pulmonology regarding diagnosis. In addition to the chart reviews from the specialties mentioned above, we included clinical notes from Psychiatry, primary Pediatrician, and Speech Therapy to obtain a detailed mental health history, medications, involvement in sports and any signs of exercise- induced VCD. For our statistical analysis, we first compiled all data points into an Excel database to ensure uniformity. Once compiled, the raw data were systematically grouped based on predefined categories relevant to our study objectives, and percentages were calculated. Throughout the data collection, we conducted periodic random sampling checks to ensure accuracy and maintain the integrity of our data.

Results: From a gender perspective, females were predominant at 85%, with males at 15%. Remarkably, 78% had at least one mental health condition and 48% were on medications for anxiety, MDD, or ADHD. The distribution of psychiatric comorbidities showed that 74% had anxiety, 27% had ADHD, and 26% were diagnosed with MDD. Among individuals diagnosed with a psychiatric condition, at least 69% exhibited exercise-induced VCD. Additionally, 62% took part in competitive sports, with swimming and soccer as the predominant choices.

Conclusions: We noticed a significant gender difference in VCD prevalence, with females accounting for a substantial 85% of cases. This is consistent with broader VCD literature, suggesting possible hormonal, anatomical, or psychosocial factors predisposing females to this condition. Nearly 8 out of 10 individuals had at least one diagnosed mental health condition, emphasizing the complex relationship between VCD and mental health. These findings highlight the importance of a comprehensive approach to diagnosing and managing VCD, addressing both its physiological and psychological aspects. The high prevalence of exercise-induced VCD among individuals with psychiatric conditions emphasizes the need for increased awareness and specialized care strategies, particularly for young athletes. Future research should explore deeper into the mechanisms linking VCD to psychological conditions and explore targeted interventions for affected individuals.

Abstract Title: Targeting the Nape-pld pathway for treatment of skin ulcers and improving diabetic wound healing

Investigator: Dopp, Lia
Co-Investigator(s): 1. Sean Davies, PhD, Department of Pharmacology, Vanderbilt University, Nashville, Tennessee, USA 2. Abdulmusawwir Alli-oluwafuyi, PhD, Department of Pharmacology, Vanderbilt University, Nashville, Tennessee, USA
Department: Pharmacology, Vanderbilt

Abstract
Introduction: Diabetes and associated complications cost $116 billion in 2007 with 33% of these costs linked to foot ulcers. Due to neuropathy and poor circulation, diabetes is a major risk factor for the development of skin ulcers resulting in 15-25% of diabetic patients having nonhealing skin wounds. We hypothesize that enhancing palmitoylethanolamide (PEA) levels, either through topical administration of PEA or of N-acyl phosphatidylethanolamine hydrolyzing phospholipase D (NAPE-PLD) activators to enhance PEA synthesis, will result in reduced skin injury and ulceration in response to ischemia and reperfusion (i.e. pressure ulcers) and more rapid healing of these skin wounds.

Methods: We performed a pilot study to assess whether the pressure ulcer model could be used to test the role of NAPE-PLD in pressure ulcers. Four C57BL6 male mice, 28-31 grams, underwent three cycles of ischemia / reperfusion (I/R) by pinching a dorsal skinfold between two magnets for 6 h and then removing the magnets for 6 h. The injured (ulcerated) areas were treated topically with a sterile film of Vaseline or 2% PEA in Vaseline once daily.

Results: The extent of I/R injury in this pilot study was less than we expected from the literature, with no wound reaching a score greater than 2. This may be because we are using C57BL6 mice rather than Balb/c mice often used with wound healing experiments. In future studies, we will increase the ischemia time to 18 hours while keeping the reperfusion time at 6 hours.

Conclusion: The FDA has not approved a new wound-healing drug-based therapy in twenty years therefore this research proposes a new therapeutic strategy to target this major unmet need. If successful, this research would provide a novel, potential treatment for pressure ulcers using NAPE-PLD activators potentially minimizing the health risks that are associated with pressure ulcers.

Abstract Title: Efficacy of Streamline Surgical System Alone and in Conjunction with Cataract Extraction for Primary Open- Angle Glaucoma Management in African American Patients

Investigator: Drake, Taylor
Co-Investigator(s): 1. Siddharth Bhargava, MD, Ophthalmology, EVMS, Norfolk, VA; 2. Constance Okeke, MD, MSCE, Ophthalmology, EVMS, Norfolk, VA, CVP Physicians/Virginia Eye Consultants, Norfolk, VA
Department: Ophthalmology

Abstract

Introduction: The field of microinvasive glaucoma surgery (MIGS) has witnessed substantial growth, encompassing a diverse array of procedures, techniques, and innovations. These interventions collectively aim to enhance physiological aqueous outflow, thereby facilitating intraocular pressure (IOP) control and mitigating the risk of progressive glaucoma and associated irreversible vision loss. Commonly, MIGS procedures involve implant placement. The Streamline Surgical System is a pioneering device that employs an implant-free mechanism by delivering viscoelastic into Schlemm's canal and trabecular meshwork tissue modification, both crucial components of the natural aqueous outflow pathway. Its primary objective is to achieve effective IOP reduction and decrease the risk of progressive glaucomatous damage.

Primary open-angle glaucoma, the most prevalent type of glaucoma, is characterized by increased resistance to drainage in the trabecular meshwork, despite the presence of an adequately open drainage angle between the cornea and iris. This condition disproportionately affects the African American population, exhibiting higher incidence rates compared to other ethnic groups, particularly among individuals with a positive family history. In this study, our aim is to evaluate the effectiveness of the Streamline Surgical System in reducing IOP, diminishing the burden of IOP-lowering drops, and enhancing visual outcomes when combined with cataract extraction in a cohort of African American patients diagnosed with primary open-angle glaucoma in mild, moderate and severe stages.

Methods: A retrospective chart review was conducted, comprising 21 African American patients (31 eyes) who underwent the Streamline Surgical System procedure, with 18 of them undergoing concurrent cataract extraction (28 eyes) at Virginia Eye Consultants in Norfolk, VA by a single surgeon. Statistical analysis was performed to compare pre-operative and post-operative patient data, with a focus on key clinical outcomes, including reduced IOP, decreased reliance on IOP-lowering medications, and improved best-corrected visual acuity (BCVA).

Results: Paired-samples t-tests were conducted to compare pre-operative and post-operative IOP measurements, as well as the number of IOP-lowering drops used at various intervals (one day, one week, one month, three months, and six months). A significant decrease in post-operative IOP at six months ($M=14.00$, $SD=4.35$) was observed compared to the pre-operative state ($M=15.90$, $SD=4.73$); $t(30)=2.5593$, $p=0.0485$. This reduction in IOP could be attributed to a decrease in the use of IOP- lowering drops ($p=0.0158$). Furthermore, a paired-samples t-test revealed a statistically significant improvement in post-operative BCVA at six months ($p=0.0144$) in patients who underwent the Streamline Surgical System in conjunction with cataract extraction.

Conclusion: The Streamline Surgical System represents an innovative MIGS device that effectively restores physiological aqueous outflow, resulting in significant reductions in IOP and the reliance on IOP-lowering medications among African American patients diagnosed with primary open-angle glaucoma in mild, moderate and severe stages. When performed concurrently with cataract extraction, this approach also leads to improved BCVA, thereby enhancing the overall quality of life for these patients.

Abstract Title: A Case of Repeatedly Seronegative Myelin Oligodendrocyte Glycoprotein Antibody-Associated Disease (MOGAD)

Investigator: Eckstrom, Alexander
Co-Investigator(s): 1. Alexander Eckstrom, EVMS/MD Program 2. Seong Lee, MD, Radiology/EVMS Radiology Residency 3. Richard Barbu, MD, Radiology/EVMS Radiology
Department: EVMS Radiology

Abstract

Introduction
Myelin oligodendrocyte glycoprotein antibody-associated disease, also known as MOGAD, is an inflammatory demyelinating disorder of the central nervous system (CNS) with a phenotypic presentation similar to multiple sclerosis (MS) and neuromyelitis optica spectrum disorder (NMSOD). MOGAD is associated with a spectrum of disease including variations of transverse myelitis, optic neuritis, and acute disseminated encephalomyelitis (ADEM), with a tendency to present in pediatric patients. Disease course may be monophasic or associated with acute relapsing and remittingepisodes.

Pathogenesis is thought to be due to IgG antibodies against myelin oligodendrocyte glycoprotein (MOG), a component of the outer myelin sheath present on the cell surface of oligodendrocytes. Antibodies against MOG cause local areas of demyelination and inflammation, creating characteristic brain lesions. Demyelination leads to characteristic acute attacks of central vision loss, altered mental status, limb weakness, sensory loss, and incontinence and/or erectile dysfunction. Attacks are typically limited in course and may be associated with a preceding illness or vaccination. Diagnosis of MOGAD typically requires a positive result on anti-MOG-IgG titer. However, in this case, we present a patient with clinical and radiologic findings suggestive of MOGAD despite repeated negative anti-MOG-IgG titers.

Case Information
The patient is a 21 year-old female who initially presented with complaints of vision and balance issues following a case of pneumonia. During her hospital stay, the patient experienced paresthesias and loss of control in her right upper and lower extremities, suggesting transverse myelitis. MRI and biopsy of the brainstem showed a lesion with local inflammation. The patient received a course of high-dose steroids and plasma exchange (PLEX) before being discharged. Following discharge, the patient saw a complete resolution of symptoms. Since this initial episode, the patient has experienced multiple similar episodes with symptoms including headache, loss of function in the right upper and lower extremities, incontinence, altered mental status, and gait instability. These symptoms have regressed after each episode with a course of high-dose steroids.

Repeated MRIs have shown brainstem lesions as well as cervical and thoracic spinal cord lesions that regress following each attack. Over the course of each of these episodes, the patient has repeatedly tested negative for the anti-MOG-IgG antibodies that would confirm the diagnosis of MOGAD.

Discussion/Clinical Findings
In evaluation of patients with symptoms suggestive of MOGAD, MS and NMSOD should be included in the differential due to overlapping phenotypic presentations. A combined approach using clinical, radiologic, and laboratory biomarkers should be used to make the distinction between these three diseases. Patients with MOGAD tend to have a relapsing and remitting illness, with complete or nearly complete return to function after each episode. This is in contrast to NMSOD or MS, which typically show a progression in disease and accumulated disability after each attack. Spinal cord lesions associated with MOGAD also typically resolve completely over the course of months to years, while those associated with MS or NMOSD tend to leave residual hyperintensities. This patient presents with repeated episodes of transverse myelitis that improve with high-dose steroids as well as spinal cord lesions that regress and return, findings that support a diagnosis of MOGAD despite the lack of positive anti-MOG-IgG titers.

Conclusion
MOGAD should be considered in patients presenting with acute attacks of bilateral optic neuritis, ADEM, transverse myelitis, and/or bowel/bladder/erectile dysfunction. While current guidelines suggest the need for positive anti-MOG-IgG titers to make a diagnosis of MOGAD, we present a patient with clinical and radiologic findings suggestive of MOGAD despite repeatedly testing seronegative for the confirmatory antibodies. This patient's atypical presentation suggests a need for a greater understanding and characterization of the spectrum of demyelinating illnesses. This case stresses the importance of using a combined approach, including both clinical and radiologic diagnostic criteria, to guide diagnosis and treatment in patients with atypical presentations.

Abstract Title: Methotrexate-induced Acute Leukoencephalopathy in Adult Chronic Myeloid Leukemia: From physiopathology to medical recommendations perspective

Investigator: Eldosougi, Randa
Co-Investigator(s): 1. Denis C. Nchinda, Medical Student, M.S, Class of 2026
2. Alberto Musto, MD, PhD, FAES, Pathology and Anatomy, EVMS
Department: Pathology and Anatomy, EVMS

Abstract

Introduction:
Methotrexate (MTX) is a common anti-folate analog that is used in chemotherapy and autoimmune conditions. Due to MTX inhibition of DNA replication, it is an important chemotherapeutic agent. Intrathecal administration of MTX has been associated with an increased risk of neurotoxicity with symptoms of focal neurological deficits (FNDs), confusion, disorientation, and even seizures. MTX-induced Leukoencephalopathy (LE) can be acute and reversible or lead to irreversible chronic long-term FNDs due severe extensive neural damage. It is important to consider systematic medical imaging (magnetic resonance imaging, MRI) before and after MTX treatment to monitor for MTX-related acute neurotoxicity. We discuss the case of a 60-year-old female with acute lymphoid blast crisis of chronic myeloid leukemia who developed neurological symptoms 9 days post intrathecal MTX administration.

Case Information:
A 60-year-old female with a past medical history of chronic myeloid leukemia (CML) presenting with acute lymphoid blast crisis of CML under treatment with dasatinib. The patient was hospitalized and received intrathecal MTX infusion without immediate complications and underwent a second dose of intrathecal MTX with dexamethasone the following day. Nine days after, the patient had an episode of headaches (8/ 10), which failed to subside with over-the-counter analgesics. The headaches were associated with intermittent episodes of arterial hypertension, non-fluent speech, and bradypsychia. The patient was afebrile during these episodes.

On physical examination, the patient was awake, oriented, with isochoric and reactive pupils, no diplopia, and with conserved overall cranial nerve function. Language was preserved with no motor or sensory deficits. Coordination was preserved and no meningeal signs.

A head computed tomography and cerebral spinal fluid (CSF) sample from a lumbar puncture were normal. The initial differential diagnosis was posterior reversible encephalopathy syndrome (PRES). An MRI with gadolinium revealed confluent enhancing fluid- attenuated inversion recovery hyperintensity in the frontal, left parieto-occipital regions, and semioval centers. There was no evidence of restricted diffusion, midline shift or mass effect. The transient LE findings lead to progressive multifocal leukoencephalopathy (PML) as a probable diagnosis. Repeat CSF analysis was normal and JC virus PCR was negative. MTX-induced LE was the final diagnosis and MTX therapy was suspended. A follow-up MRI of the brain showed a decrease in hyperintense lesions.

Discussion / Clinical Findings:
At lower doses, MTX inhibits the enzyme 5-aminoimidazole-4-carboxamide ribonucleotide (AICAR) transformylase, leading to a decrease in Adenosine and Guanine breakdown, adenosine-induced vasodilation, and subacute, chronic toxicity due to increasing cerebrospinal fluid levels of homocysteine. Homocysteine is metabolized into homocysteine acid and cysteine sulfonic acid which causes seizures and excitotoxic neuronal cell death, causing direct toxicity to the vascular endothelium. Developing MTX-mediated leukoencephalopathy is dose-dependent, with high doses of IV MTX associated with the development of acute LE in 3-15% of cases with a recurrence rate of 10- 56% if therapy is continued. Intrathecal administration of MTX is associated with the highest risk of acute LE versus high-dose IV administration.

MTX-induced LE on neuroimaging shows hyperintensity signals in areas consistently vulnerable to hypoxic/ischemic degeneration and damage due to excitotoxic action of N-methyl aspartate (NMA). This is partly due to the elevated number of NMDA receptors seen in these areas, rendering these neuronal cell populations sensitive to excitotoxicity.

Conclusion:
Currently, there is no widely established protocol in place to ensure that patients receiving MTX are monitored through MRI. Imaging is usually ordered in response to new neurologic symptoms, however, continued monitoring starting at the time of treatment is imperative to prevent irreversible neurologic deficits in patients who may present asymptomatic, or with nonspecific symptoms.

Abstract Title: Bilateral Intrathyroidal Ectopic Thymus in a Three-Year-Old Male

Investigator: Euker, Brandon
Co-Investigator(s): 1. Brandon Euker, BS, MS4 EVMS 2. Kevin Nguyen, MD, Resident, Radiology EVMS 3. Jennifer Rush MD, Radiology EVMS
Department: Radiology

Abstract

Introduction
We report a case of incidental bilateral intrathyroidal ectopic thymus (IET) in a 3-year-old male, which was discovered during evaluation of congenital hypothyroidism on ultrasound scan. Ultrasound of the thyroid showed bilateral upper pole lesions with heterogeneous echotexture and irregular, ill-defined margins. While this appearance can be seen in papillary carcinoma, the patient's age made it much less likely and a diagnosis of intrathyroidal ectopic thymus was established, avoiding any further unnecessary testing.

Case Information
We report on a 3-year-old male with a medical history of congenital hypothyroidism without goiter discovered by abnormal thyroid function test (TFT) on newborn screen. His hypothyroidism was well-controlled on low dose thyroid replacement with levothyroxine and he was able to stop his medications at age 3 with a normal TFT. At this time, he underwent a thyroid ultrasound (US) to assess for thyroid dysgenesis. US showed a thyroid with heterogeneous echotexture along with bilateral lesions on the right and left upper poles. The right pole contained a solid hypoechoic lesion with irregular margins and punctate echogenic foci measuring 0.4 x 0.6 x 0.9 cm. The left pole contained a mostly solid hypoechoic ill-defined lesion with microcalcifications measuring 0.3 x 0.3 x 0.4 cm. Based on the ultrasound findings and this patient's age, he was diagnosed with bilateral intrathyroidal ectopic thymus and no further biopsy or treatment was required.

Discussion
IET is a condition in which ectopic thymus tissue is located within the thyroid, typically due to a defect in the embryologic migration of the thymus from the mandibular angle to the superior mediastinum. It is benign and requires no treatment. A recent (2017) cross-sectional study with 37,816 children in Japan found the prevalence to be 0.99% in the general population. Of the 375 cases of IET that were diagnosed during this study only 17 (~4.5%) were bilateral. Given that IET is relatively uncommon, it can be misdiagnosed as a thyroid tumor, potentially resulting in unnecessary treatment and surgery. Thyroid nodules are less common in children (1.5%) as compared to adults (4-7%), however they are more likely to be malignant. (26% in children vs 5-10% in adults) Although rare, it is important to be cognizant of IET to avoid unnecessary biopsy and treatment. IET is typically discovered during ultrasound evaluation of the thyroid gland with findings of irregular, triangular, polygonal hypoechoic or hyperechoic area with punctate, granular, linear echogenic foci surrounded by normal thyroid tissues. As for papillary carcinoma, it can share some common sonographic features including a hypoechoic echotexture with microcalcifications. When trying to distinguish between the two entities, demographics can help guide the medical-decision making process. Pediatric thyroid carcinomas tend to be diagnosed in adolescents, as seen in a large case study including 566 patients with an average age at presentation of 16 years of age. Given the young age of our patient, papillary thyroid carcinoma was felt to be much less likely.

Conclusion
Intrathyroidal ectopic thymus is typically discovered during ultrasound evaluation of the thyroid gland with findings that may mimic differentiated thyroid carcinoma. IET should be included in the differential for abnormal sonographic findings of the thyroid of young children, who do not fit the expected demographic age for thyroid carcinoma, and clinicians should be aware of its characteristics to avoid further unnecessary testing.

Abstract Title: Imaging Considerations and Case Series of Type A Aortic Dissection in the Acute Setting
Investigator: Fanney, Lewis
Co-Investigator(s): 1. Michael Pender MD, Radiology 2. Chris O'Neill MD, Radiology
Department: Radiology
Abstract

Introduction:
Acute aortic syndrome (AAS) is a life-threatening condition that may present as sudden onset severe chest or back pain, or more insidiously. The incidence of AAS increases with age, and it is more common in people with a history of hypertension, smoking, aortic valve disease, and connective tissue disorders. Early recognition and treatment of AAS are crucial to reduce morbidity and mortality rates associated with this condition.
Case Information:
We present a case series of acute Type A aortic dissections and associated complications.
An 80 year old male patient presented secondary to an acute syncopal episode and chest pain that persisted after the resolution of the syncopal episode. In the emergency department he was found to be tachycardic with mildly elevated troponins and a CTA of the chest, abdomen and pelvis was ordered. This study revealed a Type A aortic dissection involving the arch with acute hemopericardium and concern for tamponade.
A 70 year old female patient presented to the emergency department with sudden onset of chest pain and shortness of breath. A CTA chest pulmonary protocol with associated CT abdomen and pelvis was ordered given an elevated d-dimer. This exam revealed a Type A intramural hematoma originating from the proximal aortic arch and extending to the abdominal aorta. The Type A Intramural hematoma was found to have propagated along the brachiocephalic trunk. The patient underwent graft repair of the aortic arch successfully.
Discussion:
Timely diagnosis of AAS is essential for effective treatment. Computed tomography angiography (CTA) with and without contrast is the preferred imaging test for patients with acute chest pain and suspected AAS. CTA can identify aortic intimal flaps, vessel involvement, PAU, and IMH with high sensitivity and specificity. Other useful imaging modalities which can be used if CTA results are equivocal include magnetic resonance angiography (MRA) and transesophageal echocardiography. Treatment for AAS varies depending on the type and presentation. Type A AAS is a surgical emergency because of the high risk of proximal extension, rupture, and death. Type B AAS can often be managed conservatively with medical therapy, such as blood pressure control and pain management. Endovascular repair may be considered in selected cases of Type B AAS.
Conclusion:
AAS poses a grave threat, demanding swift recognition and treatment. The presented cases underscore the urgency of timely diagnosis using techniques like computed tomography angiography (CTA).
Tailored interventions, whether surgical or conservative, highlight the importance of decisive action.

Abstract Title: High sodium diet increases urinary endothelin-1 excretion in women but not in men.

Investigator: Fetter, Rebecca
Co-Investigator(s): 1. Victoria Nasci, Division of Nephrology and Hypertension, Vanderbilt University Medical Center 2. Austin Robinson, School of Kinesiology, Auburn University 3. Megan Wenner, Department of Kinesiology and Applied Physiology, University of Delaware 4. Eman Y. Gohar, Division of Nephrology and Hypertension, Vanderbilt University Medical Center
Department: Division of Nephrology and Hypertension, Vanderbilt University Medical Center

Abstract
Introduction: Gender differences in the prevalence of hypertension have been well established, and endothelin-1 (ET-1) is a proposed player in these differences. In the kidney, ET-1 serves as a pro- natriuretic peptide, and urinary ET-1 excretion reflects renal production of ET-1. Previous studies in our lab demonstrated that on a normal salt diet, female rats had higher urinary ET-1 excretion than male rats, and on a high salt diet, only male rats had an increase in urinary ET-1. However, the effect of dietary salt loading on the renal endothelin-1 system in humans is not clear; thus, we aim to investigate the effect of increasing dietary sodium intake on urinary ET-1 excretion in men and women. We hypothesized that women would have higher overall urinary ET-1 excretion than men, and increasing dietary sodium would augment urinary ET-1 excretion only in men.

Methods: 25 salt-resistant human participants with baseline blood pressure of less than 140/90 mmHg followed recommended sodium (RS) and high sodium (HS) diets (2300 and 7000 mg/day) for 10 days. The diets were administered in randomized order with a washout period of at least four weeks between each intervention. At the end of each dietary phase, 24-hour ambulatory blood pressure was measured, and 24-hour urine was collected. ET-1 excretion was quantified using the QuantiGlo (R&D) ET-1 ELISA assay and was normalized to urine flow.

Results: Women had higher urinary ET-1 excretion than men, which was more pronounced on the HS diet, and only women had a significant increase in ET-1 excretion on the HS diet. Mean arterial pressure, systolic blood pressure, and diastolic blood pressure did not increase significantly with the HS diet in either men or women. HS diet increased urine flow in women but not in men, and there was no significant gender difference in urine flow.

Conclusion: Women have higher overall urinary ET-1 excretion than men, particularly on a HS diet, and in opposition to our hypothesis, a HS diet increases urinary ET-1 excretion only in women. Further work is warranted to evaluate urinary ET-1 excretion in women and men on different sodium diets, especially considering the variance in sodium consumption across the United States. Understanding gender differences in ET-1-mediated sodium regulation in humans could potentially inform future studies towards developing gender-specific therapeutics for hypertension.

Abstract Title: Comorbid Musculoskeletal and Nerve Injuries of Schizophrenia Patients in the National Inpatient Sample

Investigator: Findley, Aidan
Co-Investigator(s): 1. Dustin Platter, MD Class of 2025 2. Morgan Rouse, MD Class of 2025
Department: EVMS Department of Psychiatry and Behavioral Sciences

Abstract

Introduction
Literature regarding injury comorbidity in schizophrenia patients in the inpatient setting is lacking in recency and breadth. The objective of this cross-sectional study was to investigate the association between schizophrenia inpatients and injury comorbidities in the inpatient setting using nationally representative data.

Methods
This study was cross-sectional and included data from the 2016-2019 National Inpatient Sample (NIS). The database was analyzed for patients with a diagnosis of schizophrenia or any of its subtypes (ICD-10: F20). All hospitalizations that were not associated with a diagnosis of schizophrenia were categorized as the control group. The presence of injuries was analyzed by ICD-10 codes and included injuries of the head, neck, thorax, abdomen/pelvis/external genitalia, hip/thigh, ankles/feet, and upper or lower extremities. Injuries were also categorized by type, including superficial injury, open wound, fracture, dislocation, nerve injury, muscle injury, crush injury, traumatic amputation, and "other". Chi-square analysis was used to determine associations between schizophrenia and various combinations of injury types and locations. Multivariable logistic regression was performed on injuries that showed statistically significant relationships via chi-square to generate adjusted odds ratios (aOR) and 95% confidence intervals (CI). The presence of schizophrenia was used as independent variable with individual and categorical injuries as the dependent variable. Odds ratios were adjusted using the following covariates: age (continuous), sex (male, female), race/ethnicity (White, Black, Hispanic, Asian, Native American/Other), and type of insurance (Medicare, Medicaid, private, self-pay, no-charge/other).

Results
Between 2016 and 2019, a total of 121,074,975 hospitalizations were identified in the US, with 1,626,729 (1.30% (1.3 - 1.4 CI, P < .001)) having an associated schizophrenia diagnosis. Demographic trends indicated that schizophrenia patients were more likely to be between the ages of 40-59, male, identify as White, and have Medicare compared to the control group.

After adjustment, multivariable logistic regression demonstrated that 19 out of 89 of the investigated injury types/locations had a significantly positive associated adjusted odds ratio with schizophrenia.

Abdominal/pelvic/external genitalia amputation (aOR: 10.819, 95% CI: 7.816 - 14.977, P <.001), "other" wrist/hand injury (aOR: 1.916, 95% CI: 1.740 - 2.110, P <.001), superficial ankle/foot injury (aOR: 1.863, 95% CI: 1.798 - 1.931, P <.001), superficial head injury (aOR: 1.600, 95% CI: 1.571 - 1.630, P <.001), and "other" ankle/foot injury (aOR: 1.482, 95% CI: 1.330 - 1.652, P <.001) demonstrated the highest adjusted odds ratios. Notably, once the odds ratios were adjusted, the association of schizophrenia with any type of injury at any of the categorized sites became positive with an adjusted odds ratio of 1.113 (95% CI: 1.106 - 1.120).

Conclusion
Schizophrenia was positively associated with comorbid superficial injuries, including superficial injuries of the head, neck, shoulder, elbow, wrist/hand, knee/leg, and ankle/foot. Other positive associations included comorbid open wound injuries at all sites, including the head, neck, elbow/forearm, and wrist/hands. There was a strong positive association with pelvic/external genitalia/abdominal amputations. Surprisingly, schizophrenia was negatively associated with comorbid fractures.

Abstract Title: Cleaning Up Our Language in Practice and Policy: Evaluation of the Prefix Hytero- as a Linguistic Microaggression in Gynecology

Investigator: Fleming, Jillian
Co-Investigator(s): 1. Co-A-1, Renee Morales, MD, EVMS Obstetrics & Gynecology 2. Jillian Fleming, EVMS School of Medicine 3. Annette Finley-Crowhite, PhD, ODU Dept. History 4. Judith Taylor-Fishwick, MSc, EVMS Pediatrics
Department: Obstetrics and Gynecology

Abstract

Introduction:
This paper examines the pseudoscience of hysteria and its etymological root *hyster-* as it relates to the pejorative use of the term hysterical. The historical and etymological context in which these words have been used against women perpetuates misogynistic bias as a microaggression within healthcare with terms such as hysterectomy. The aim for this paper is to offer background on the origin of the words hysteria and hysterectomy, the development of psychological and physical symptoms associated with hysteria, and the clear link between these diagnostic criteria and the female body, particularly the uterus.

Methods:
We performed an interdisciplinary and historical literature review to further understand the framework within which hysteria has developed as a medical diagnosis. We collated the information brought forth in these texts as evidence to assert that the term hysteria and its link to the female body continues to pathologize women pejoratively today.

Results:
We found that throughout countless ages and interpretations, hysteria, with its name derived from *hyster-*, womb, has been viewed and treated as a predominantly female ailment. Patriarchal society and medicine have fed into narratives of women as weak, defective, less than their male counterparts, which further bolsters the idea that the womb, feeble mindedness, and women who do not conform to accepted female norms contribute to the physical and psychological manifestations of hysteria.

Conclusion:
The word hysterectomy and other *hyster-* derivative words are no longer appropriate to use because this derogatory language constitutes a microaggression, which in this case, is pervasive in patient care including in medical education, diagnosis, electronic medical records, insurance current procedural terminology (CPT codes), and public policy. Therefore, we propose that policy and healthcare address this matter by abandoning the use of the prefix *hyster-* in favor of the etymological twin *uter-*. This realignment of language with current cultural values will intensify and expand current efforts ensuring respectful medical care for women.

Abstract Title: Factors associated with persistent severe hypertension in patients with preeclampsia

Investigator: Flicker, Kari
Co-Investigator(s): Kari Flicker, MS4; Maya Vishnia, MS4; Madeleine Wright, MS3; Danielle Long, MS3; Matilda Francis, MS4; Kenyone King, MS3; Lauren Gilgannon, MD; Aref Rastegar, MS3; Rohini Siva Srinivas, MD; Lea Nehme, MD; Neha Gupta, MS3; Tetsuya Kawakita, MD
Department: Obstetrics and Gynecology

Abstract
Introduction: Hypertensive disorders of pregnancy are a leading cause of maternal morbidity and adverse pregnancy outcomes. We sought to examine factors that were associated with persistent severe hypertension.

Methods: This was a retrospective study of patients with preeclampsia who delivered at 23 weeks' gestation or greater from January 1, 2010, to December 31, 2020 at a single academic institution. Analyses were limited to patients with preeclampsia who developed acute severe hypertension (systolic pressure 160 mmHg or diastolic pressure 110 mmHg) and received anti-hypertensive medications during the hospital stay. Our primary outcome was persistent severe hypertension, defined as persistent severe hypertension even after the first dose of anti-hypertensive medication. Variables with p-value <0.1 were included in multivariable logistic regression to calculate adjusted odds ratios (aORs) and 95% confidence intervals (95%CI).

Results: Of 822 patients with preeclampsia, 376 (45.7%) had persistent severe hypertension after the first dose of anti-hypertensive medication and 446 (54.3%) had resolution of severe hypertension. AORs of variables with P-values less than 0.1 are presented in Table 2. Patients with chronic hypertension compared to those without had increased odds of persistent severe hypertension (aOR 1.43; 95%CI 1.07-1.92). For every 10 mmHg increase in the systolic pressure, there were increased odds of persistent severe hypertension (aOR 1.35; 95%CI 1.20-1.51). BMI 40 or greater compared with BMI<40 was associated with increased odds of persistent severe hypertension (aOR 1.61; 95%CI 1.19-2.19).

Gestational age <34 weeks compared with gestational age 34 weeks or greater was associated with increased odds of persistent severe hypertension (aOR 1.40; 95%CI 1.04-1.88). Smoking was not associated with increased odds of persistent severe hypertension.

Conclusion: We found that chronic hypertension, BMI of at least 40, the degree of severe hypertension, and gestational age <34 weeks were associated with difficult acute blood pressure control.

Abstract Title: Confounding imaging findings on MRI following intravenous iron infusion

Investigator: Flicker, Kari
Co-Investigator(s): Abigail Winz MD, EVMS Radiology; Mitchell Wangsgard MD, EVMS Radiology
Department: Radiology

Abstract

Introduction:
Iron-Dextran is a commonly used form of iron replacement therapy for anemic patients. Iron is superparamagnetic and can therefore cause shortening of T1 and T2 on magnetic resonance imaging (MRI) and blooming on gradient sequences.

Case Information:
The patient is a 71-year-old woman with a past medical history of metastatic leiomyosarcoma and chronic gastrointestinal (GI) bleeding of unknown source, receiving chemotherapy and iron-dextran injections. Two days after an iron-dextran injection, she underwent head MRI for concerns of worsening metastatic disease in the setting of increasing lightheadedness, which revealed diffusely abnormal, hypointense susceptibility weighted imaging signal throughout the supratentorial and infratentorial subarachnoid space and increased signal on precontrast T1 images in the vasculature and nasal mucosa. These unexpected findings were due to IV iron supplementation.

Discussion:
Iron-Dextran is an effective iron-replacement therapy for anemic patients. The iron component of iron-dextran is known to be paramagnetic and can cause shortening of T1 and T2, presenting as increased signal on T1 weighted images.[1] Field inhomogeneities from the iron result in quicker dephasing from transverse magnetization and hypointensities on gradient echo.

Iron dextran is removed from the plasma by reticuloendothelial macrophages (RES) and is digested into iron and dextran, meaning that duration of iron effect has variation due to deviance of RES and digestive enzymes on a patient-to-patient basis.[2] It has been cited that the effects of iron-dextrose on MRI can last anywhere between 7 days and 3 months.[2] These effects on MRI are under documented and underrecognized, which can confound image interpretation and lead to delays in diagnosis or even misdiagnosis.[1] It is therefore recommended that MRI precede iron infusions when feasible. If not feasible, ensuring that the interpreting radiologist is aware of the recent infusion will help avoid confusion from this confounding variable.

Conclusion:
The limited awareness of the impact of iron-dextran on MRI findings contributes to confusion and image misinterpretation. Limiting the use of iron-dextran in patients who require impending MRI, utilizing alternate forms of imaging when appropriate, and increasing radiologist awareness of iron effects on MRI will all likely improve instance of accurate MRI readings in iron-dependent patients.

Abstract Title: Does Community Type Influence Collective Efficacy? A Comparison of Family and Senior Public Housing Communities Within Hampton Roads

Investigator: George, Gwendolyn
Co-Investigator(s): 1. Carolyn Caraballo Velez, Community Outreach and Partnership 2. Victoria O. Goree, Community Outreach and Partnership 3. Katie Jones, Community Outreach and Partnership 4. Kristen Moore, Community Outreach and Partnership 5. Miasha T. O'Neal, Community Outreach and Partnership
Department: Director, Community Outreach and Partnership

Abstract
Introduction: Collective efficacy describes the ability for a community to achieve a shared goal and is divided into two constructs, informal social control and social cohesion. Informal social control is determined by a neighbor's willingness to intervene for the common good, the likelihood of which decreases when neighbors do not trust each other or when a community's rules are vague or poorly enforced. Informal social control is therefore dependent on the social cohesion. We hypothesize that perceived collective efficacy will be higher in senior/disabled public housing communities across Hampton Roads.

Methods: Surveys were conducted by members of the research team in public housing communities in six of the Hampton Roads cities. Collective efficacy was measured using a series of Likert scale items as outlined by Sampson et al (1997). Results of the Likert scale items were divided into social cohesion and informal social control subscales, averaged, and then the average of the two subscales was taken to determine collective efficacy. Demographic information, including age and number of children living in the home, were also collected. Bivariate t-tests were used to estimate differences in collective efficacy based on housing type.

Results: Senior communities reported 10.57 higher levels of collective efficacy, 6.1% higher social cohesion, and 15.8% higher social control ($p < 0.001$ for all comparisons).

Conclusion: Overall, senior/disabled public housing communities were statistically more likely to report higher levels of collective efficacy as well as higher levels of social cohesion and informal social control.

Abstract Title: Breast Cancer Awareness in Young Black Women: Using Effective Messages

Investigator: Ghiorzi, Julianne
Co-Investigator(s): Juliet Bonnah GMU Department of Global and Community Health/ MPH Program Paris Stephens GMU College of Science/ Undergraduate Program Aamna Sohail GMU College of Science/ Undergraduate Program Adriana Aguilar GMU College of Science/ Undergraduate Program Dr. Michelle S. Williams GMU Department of Global and Community Health
Department: GMU Department of Global and Community Health

Abstract
Introduction: Breast cancer incidence rates among Black women under the age of 40 have been increasing over the last several years. However, breast cancer awareness among young Black women is low. Greater awareness of breast cancer risk factors and screening is associated with early-stage diagnosis and higher survival rates.

Purpose: The objective of this project was to identify the preferred attributes of breast cancer education messages among young Black women.

Methods: An exploratory mixed methods study design was used to conduct this project. A series of breast cancer education messages were developed based on the core constructs of the Health Belief Model. A conjoint analysis survey was used to identify preferred attributes of the messages including, message frame (gain frame vs loss frame), message source (peers vs healthcare providers), and message design (graphic vs image). Black female college students between the ages of 18 and 26 were recruited to participate in the study.

Results: The mean age of the participants (n=33) was 21.03 (±1.85) years. Over 94% of the participants preferred black female representation in breast cancer awareness when discussing breast cancer risk factors and screening. Realistic images were preferred over graphic depictions. Additionally, participants preferred positive framing when discussing the prevalence of breast cancer among women.

Conclusion: Positive framed messages with realistic black female images were strongly preferred when conveying to the target population. The results of this study can be used to tailor effective breast cancer education messages and increase breast cancer awareness in young black women.

Abstract Title: Complex Care Clinic at General Academic Pediatrics

Investigator: Glad, Trevor
Co-Investigator(s): Dr. Heidi Flatin, General Academic Pediatrics Dr. John Harrington, General Academic Pediatrics
Department: General Academic Pediatrics

Abstract
Introduction: Children with Medical Complexity (CMC) are a subset of Children with Special Health Care Needs which have multiple chronic conditions, are seen by multiple medical specialists, are dependent on technology, and exhibit high health care utilization. Managing care for CMC is complicated and requires extensive coordination methods to ensure these children receive the care they need. This study aims to facilitate the implementation of a complex care clinic in a general academics practice by performing a landscape analysis of pediatric complex care programs throughout the nation.

Methods: Semi-structured virtual interviews were conducted with representatives from complex care programs, with the option to correspond over email. Interviews consisted of six questions concerning the program's clinic structure, care model, CMC identification criteria, transition to adult care, and billing information.

Results: Data from ten complex care programs was collected, two of which preferred to correspond via email. Seven programs reported functioning as a medical home providing primary care for CMC and three reported working as a consultation service for PCPs treating CMC patients. The most widely used criteria for identifying CMC were dependence on technology and the number of specialists seeing a child. Two programs reported not having any set identification criteria and work with any patient referred by their PCP. Various programs reported the existence of a transition program, but every program noted the difficulty of transitioning patients to adult care.

Conclusion/Discussion: Several clinic representatives explained that their program had grown 'organically' out of the need for a care coordination program for CMC. Although some patterns can be seen between programs, the variation in care models and inclusion criteria can be attributed to this need- based implementation. Based on this analysis, the development of a program at general academic pediatrics (GAP) should be done by first assessing the patient population in need of complex care, and then determining which aspects of other programs would best care for its population. In addition, one model utilized their clinically integrated network model, similar to the one at GAP, to advocate for decreasing healthcare costs and as a way of funding the program for sustainability.

Abstract Title: Design of a community study on preclinical heart failure

Investigator: Graves, Amanda
Co-Investigator(s): Maryam Hashemian, MD, PhD, National Heart, Lung, Blood Institute, NIH
Department: National Heart, Lung, Blood Institute, NIH

Abstract

Introduction
Heart failure is continuing to have a larger impact on Black Americans than White Americans [1-3]. Social determinants of health (SDOH) are considered to play a role in mitigating factors that cause heart failure [4]. An individual's neighborhood provides these exposures, and neighborhoods can vary widely within cities, like Washington, D.C., in terms of wealth and resources [5-7]. These factors influence one's knowledge and ability to prevent or control heart failure. Determinants can then affect possible biomarkers, measured in biospecimens, that signal heart failure [2]. Using surveys, neighborhood data, and clinical measures like plasma and urine samples collected from Black and White residents of D.C., we want to pinpoint how these pieces mold the differences in prevalence and mortality of heart failure in Black and White individuals.

Methods
This study will use an observational, cross-sectional design with around 2000 participants, women and men, in each of the following cohorts: high socioeconomic status (SES) Black, low SES Black, high SES White, low SES White. The high SES participants will be recruited from wards 1, 2, 3 of D.C. and the low SES participants from wards 5, 7, 8. Participants must be at least 50 years old, and they will be grouped by 5-year age groups within their given cohort. Data collection will occur at the Hope Center, an NIH off-site research clinic in a subsidized housing complex in Washington, D.C., MedStar Washington Hospital Center, and NIH Clinical Center. Participants must have preclinical heart failure. Their initial visit will include collection of vital signs, anthropometric measures (BMI, waist circumference), ECG, plasma and urine samples, and a frailty assessment. The participant will then complete two surveys as follows: SDOH survey and the heart failure awareness survey. Their address will be input into various neighborhood databases to gather relevant data.

Conclusion
This protocol will contribute to expanding the limited data on heart failure disparities based on race, neighborhood, and clinical data measures in Washington, D.C. We hope to contribute to future proteomic studies for heart failure and hypothesis-driven research on more specific causes of heart failure disparities.

Abstract Title: Battling Time Restrictions with Collective Discourse: Collaborative Quizzes in a Condensed Human Anatomy Course

Investigator: Guo, Zi
Co-Investigator(s): 1. Natascha Heise, Pathology and Anatomy; 2. Jessica Bergden, University of Texas at San Antonio, Department of Cell Systems and Anatomy; 3. Lane Fickert, Pathology and Anatomy; 4. Taylor Roten, Pathology and Anatomy; 5. Madison Barber, Pathology and Anatomy; 6. Richard Gonzalez, Philadelphia College of Osteopathic Medicine, Philadelphia, PA, Department of Bio-Medical Sciences; 7. Alberto Musto, Pathology and Anatomy
Department: Pathology and Anatomy

Abstract

Introduction
Among the many trends of changing medical school curricula, includes a shortening of the pre-clerkship phase timeline from 24 to 18 or 12 months. Shortening of the curriculum is particularly difficult for anatomy teaching faculty as knowledge in anatomy is seen as foundational for medical and health profession students. In response to the dynamic medical education landscape and a novel opportunity to assess the potential of peer-learning in anatomical coursework, collaborative quizzes were introduced in a shortened and condensed anatomy course for first-year medical students at Eastern Virginia Medical School (EVMS) in Norfolk, VA. The aim of this study was to evaluate the benefits and implications of group assessments in a gross anatomy laboratory.

Methods
In fall 2022, the first-year anatomy course for medical (n = 151) and medical master's students (n = 52) at EVMS consisted of 9.5 weeks and focused on providing students with a comprehensive overview of clinically relevant human anatomy through lecture and laboratory components. Quantitative assessment of students' understanding was composed of two summative examinations of NBME questions (midterm and final), and four graded formative collaborative quizzes in the anatomy laboratory. Collaborative quizzes, consisting of 20 single-best answer multiple choice questions, were taken by students in groups of six. For each question, students were given time to answer before and after group discussion and both answer choices were recorded. Quiz questions were categorized into multiple groups based on their format, the number of tags, and the subject matter indicated. Qualitative data was collected in the form of open-ended questions as part of the course evaluations and analyzed using an open-coding theme by two independent researchers.

Results
Quantitative analysis of the averaged student collaborative quiz grades before and after group discussion displayed a statistically significant increase in scores after group discussion along with a decrease in standard deviation. Linear regression analysis of the percentage difference between individual and group scores and their respective average examination demonstrated a negative relationship. Question categories "Clinical Vignette," "Muscle," and "Other" exhibited greater changes in answers during the Head and Neck quiz. "Image-based" questions displayed greater answer changes in two quizzes: Upper Limb & Back and Thorax/Abdomen/Pelvis. Notably, "1 Tag", "Multiple Tags", "Blood Supply", and "Nerve" questions each showed greater answer changes across three quizzes. In contrast, "No Tag" questions exhibited consistently low answer changes for all quizzes. The number of positive responses in the course evaluations (n = 42) outweighed the negative responses (n = 8). Most of the positive responses centered around general positivity with notable comments expressing that the quizzes effectively stimulated group discussions, helped identify areas of weakness, allowed for application of knowledge in a low-stakes environment, and highlighted valuable information. Negative responses primarily centered around logistical changes.

Conclusion
This study advocates for the incorporation of collaborative quizzes in a compact anatomy curriculum. The negative relationship between the percentage difference in individual and group quiz scores and their respective average examinations scores offers a potential method of identifying struggling students before their first examination, enabling timely academic support. Categorization and analysis of the quiz questions revealed certain question types and subject matter that had increased reliance on group discussion, indicating areas of weakness for the students to study and educators to reinforce.

Furthermore, student feedback was overwhelmingly positive, expressing both enjoyment of the process and appreciation for the valuable learning benefits it provided. The uniqueness of these quizzes lies in their ability to administer students with opportunities to assess their knowledge in a low-stakes setting while simultaneously benefiting from peer learning. By implementing this assessment tool, anatomy educators may enhance both the efficiency and effectiveness of learning and teaching in an academic environment emphasizing time reduction. Collaborative quizzes prove to be a promising solution for optimizing the learning experience amid the constraints of condensed curricula.

Abstract Title: The Prevalence of Concealed Concurrent Substance Use during Acute Care Hospitalization for Treatment of Acute Pain and Opiate Detoxification

Investigator: Hager, Kallen
Co-Investigator(s): Megan Ralston, MD2025; Will Crafton, MD2026; Pavan Suryadevara, MD2026
Department: Psychiatry

Abstract

Introduction: The opioid epidemic in the United States poses a major public health concern, with concurrent substance use complicating treatment and management efforts. The lack of sufficient literature on the prevalence of concurrent substance use during hospitalization for acute pain and opiate detoxification necessitates a comprehensive study.

Methods: This study conducted a retrospective cohort analysis to evaluate opioid use disorder patients who had inappropriate use of controlled substances during inpatient treatment. The objective of this study was to determine the prevalence of positive drug screens on hospital admission among patients requiring acute hospitalization and coded for opiate use; and among this same patient group, the prevalence of positive drug screens for any non-facility prescribed substance during their hospital stay.

Results: However, an update to this abstract with the results of the study will include the prevalence rates found, any significant associations between opiate use and positive drug screens, and any notable differences between surgical and psychiatric departments.

Conclusion: Understanding the prevalence of concurrent substance use in patients receiving opioids during hospitalization is crucial to ensuring safe and effective patient care. The results of this study would offer valuable insights into concurrent substance use patterns, helping healthcare providers to mitigate potential risks and tailor treatment approaches.

Abstract Title: History-indicated cerclage compared with cervical length screening in individuals with a history of cervical insufficiency.

Investigator: Hatton, Wave
Co-Investigator(s): 1. Lea Nehme, MD, 2. Jerri Waller, MD, 3. Tracey DeYoung, MD, 4. Madison C. Collazo, MD, Department of Obstetrics and Gynecology, Inova Fairfax Hospital 5. Monica A. Ethirajan, BS, Department of Obstetrics and Gynecology, EVMS 6. Camille M. Kanaan, MD, Department of Obstetrics and Gynecology, EVMS 7. Alfred Abuhamad, MD, Department of Obstetrics and Gynecology, EVMS 8. Tetsuya Kawakita, MD, MS, Department of Obstetrics and Gynecology, EVMS
Department: EVMS Obstetrics and Gynecology

Abstract
Introduction: Preterm delivery occurs in approximately 10% of live births in the United States. Preterm birth is the leading cause of neonatal death and chronic neurological complications for pre-term infants. A history of cervical insufficiency in a current or previous pregnancy is one of the largest risk factors for pre-term delivery. This study evaluated pregnancy outcomes of history-indicated cerclage compared with ultrasound cervical length screening in patients with a history of cervical insufficiency defined as prior spontaneous preterm delivery from 14 0/7 to 23 6/7 weeks' of gestation.

Methods: This was a retrospective cohort study of patients with singleton gestations with a history of cervical insufficiency. Patients who started prenatal care after 24 weeks, delivered before 24 weeks, or declined a history-indicated cerclage or cervical length screening were excluded. The primary outcome was preterm delivery <37 weeks gestation. Secondary outcomes included gestational age at delivery, spontaneous preterm birth <37 weeks, spontaneous preterm birth <34 weeks, preterm premature rupture of membranes, cesarean delivery, birthweight, and neonatal intensive care (NICU) admissions. Adjusted odds ratios (aOR) with 95th confidence intervals (95%CI) were calculated, controlling for confounders.

Results: Of 376 pregnancies 177 (47.1%) patients underwent history-indicated cerclage, and 199 (52.9%) underwent cervical length screening. Of 199 who underwent cervical length screening, 92 (46%) underwent ultrasound-indicated or physical exam-indicated cerclage. Compared to cervical length screening, history-indicated cerclage was not associated with increased odds of preterm delivery less than 37 weeks (37.7% vs. 29.4%; aOR 0.75 [95%CI 0.48-1.18]). However, compared to cervical length screening, history-indicated cerclage was associated with decreased odds of spontaneous preterm delivery less than 34 weeks (18.1% vs. 9.0%; aOR 0.47 [95%CI 0.23-0.97]).

Conclusions: History-indicated cerclage compared with cervical length screening was associated with decreased odds of spontaneous preterm delivery less than 34 weeks. Given that approximately half of the patients undergoing cervical length screening required cerclage, history-indicated cerclage should be considered for patients with a history of cervical insufficiency. However, when it came to deliveries between 34 and 37 weeks, there were no major differences between pregnancies monitored with transvaginal ultrasound and patients who received cerclage for cervical insufficiency.

Abstract Title: Surgical Site Infections in Trauma Exploratory Laparotomies, Perioperative Rocephin and Flagyl versus Mefoxin

Investigator: Hepner, John
Co-Investigator(s): 1. Miles Reese, MD EVMS Surgery, PGY4 2. Brendan Roess, EVMS MS3 3. Lee Hogge, EVMS MS3 4. Michael Martyak, EVMS Surgery, Assistant Professor
Department: General Surgery

Abstract

Introduction
The effectiveness of empiric antibiotic therapy in preventing postoperative infection, particularly in damage control surgery, is well documented and has long been established as standard practice. However, surgical site infections (SSIs)- an infection following an operation at an incision site or adjacent to the surgical incision- remain a significant cause of morbidity and mortality in patients undergoing traumatic exploratory laparotomy. Thus, maximizing the efficacy of perioperative antibiotic prophylaxis is of utmost importance in an effort to reduce patient discomfort, length of hospitalization, rehospitalization rates, medical costs and ultimately leads to improvement of community health outcomes at large. For years the studied institution utilized cefoxitin (Mefoxin) for perioperative antibiotic prophylaxis, but now has transitioned to a combination of ceftriaxone (Rocephin) and metronidazole (Flagyl) because of both evidence in literature of greater efficacy as well as ease of administration of a one-time dose that can provide extended perioperative coverage. The primary goal of this study is to further contribute to existing literature by comparing specific antibiotic usage and subsequent outcomes in patients at an academic level 1 trauma center undergoing traumatic exploratory laparotomy

Methods
A retrospective chart analysis was performed on trauma patients who underwent trauma laparotomies at Sentara Norfolk General Hospital, the level 1 trauma and tertiary referral center for the Hampton Roads area of Virginia. The inclusion criteria included any trauma patient that received an exploratory laparotomy on admission admitted between January 2015 and March 2022 between the ages of 18 and 89. The exclusion criteria included any mortality within 7 days of admission, patients with open abdomens on index procedure or requiring a repeat exploratory laparotomy within 30 days postoperatively. Patient demographics, comorbidities, and perioperative antibiotics were documented. A chi-square test of independence was performed to examine the relation between antibiotic type and development of SSI, superficial SSI and deep SSI. A p-value below 0.05 was deemed statistically significant.

Results
323 patients were analyzed that met our inclusion and exclusion criteria. 111 patients received Mefoxin, 212 patients received Rocephin and Flagyl. The proportion of patients who developed SSI was 16.2% for the Mefoxin group and 9.9% for the Rocephin and Flagyl group, $X2$ (1, $N = 323$) = 2.7, $p = .098$. The proportion of patients who developed superficial SSI was 9.0% for the Mefoxin group and 4.2% for the Rocephin and Flagyl group, $X2$ (1, $N = 323$) = 3.0, $p = .084$. The proportion of patients who developed deep SSI was 9.0% for the Mefoxin group and 7.5% for the Rocephin and Flagyl group, $X2$ (1, $N = 323$) = 0.21, $p = .65$.

Conclusion
Our retrospective study showed that there was no statistical difference in the development of superficial or deep surgical site infection between patients in the Mefoxin group when compared to the Rocephin and Flagyl group.

Abstract Title: Spontaneous Rupture of an Ovarian Artery Aneurysm in a Postpartum Multigravida

Investigator: Heshmatipour, Daniel
Co-Investigator(s): Dr. Matt Kang, MD, EVMS Radiology; Dr. Adam Lustig, MD, Department of Interventional Radiology/Medical Center Radiologists; Dr. Harlan Vingan, MD, Department of Interventional Radiology/Medical Center Radiologists
Department: Interventional Radiology

Abstract

Introduction
Spontaneous rupture of an ovarian artery aneurysm is an exceedingly rare complication of multiple gestations. Although previously diagnosed and treated surgically, both diagnostic and interventional radiologic advances have allowed for a shift towards minimally invasive approaches, with high success rates and favorable outcomes.

Case Information
On postpartum day 1, a 28-year-old gravida 3 para 3 developed a severe right-sided abdominal and back pain prior to becoming hypotensive. CT abd/pel at that time revealed a 20 x 12 x 26 cm retroperitoneal hematoma, after which she was transferred to our interventional radiology center for angiography and embolization. Access was obtained through the right femoral artery, and an infrarenal aortogram showed a hypertrophied and tortuous right ovarian artery with active extravasation at the midpoint. Transcatheter arterial embolization of the ruptured artery was performed with Ruby coils and Gelfoam, and the patient was discharged home on postop day 7. Two weeks later, the patient returned with recurrent pain, and CT imaging revealed a persistent retroperitoneal hematoma from a collateralized ipsilateral uterine artery, treated with CT-guided percutaneous drain placement. Subsequent visits showed a resolving hematoma, indicating a successful embolization.

Discussion
Various hemodynamic changes have been implicated in the formation of aneurysms in pregnant women. During pregnancy, the enlargement of the uterus and dilatation of the pelvic blood vessels leads to an increased blood flow to the uterus. This peaks in the third trimester, as the heart rate, stroke volume, and overall cardiac output increases significantly to accommodate for the increased demands of the rapidly growing fetus. In addition, the changes in steroid hormones during pregnancy can lead to arterial changes that predispose patients to develop aneurysms in such high-flow states, such as intimal hyperplasia, thickening of the tunica media, fragmentation of reticular fibers, and loss of corrugation of elastic fibers. These changes should normally resolve in the postpartum period; however, it is thought that aberrant involution may lead to a predisposition for aneurysmal formation in subsequent pregnancies. This repeated cycle of hemodynamic and hormonal changes that occur in multigravida women are likely the cause of the formation of aneurysms, with hypertension serving as a common risk factor for aneurysmal rupture.

Spontaneous rupture of ovarian artery aneurysms can be a life-threatening event, that can rapidly progress to hemodynamic collapse. The most commonly presenting symptom of a ruptured aneurysm is acute flank/abdominal pain; however, as this pain is nonspecific, other differentials (such as acute abdomen and ureteral calculi, or uterine rupture and placental abruption in pregnant patients) need to be ruled out before a ruptured aneurysms should be considered. Previously, the diagnosis was usually confirmed via exploratory laparotomy; however, contrast-enhanced CT angiography has since come in favor, due to being highly effective and less invasive for confirmation of the pre-operative diagnosis.

As radiographic confirmation has come into favor as the preferred modality for diagnosis, similar shifts have been seen toward the interventional radiologic approach for treatment. Of the 18 reported cases of ovarian artery aneurysms, 61% were treated with a transcatheter arterial embolization, most commonly with microcoils and gelatin sponge particles (such as gelfoam), with an 82% success rate. However, as this is still such an exceedingly rare condition, the diagnostic and treatment protocol should continue to be adjusted as information from future cases arises. As shown in our patient, collateralization from the uterine artery could lead to a persistent hematoma even weeks after the initial ovarian artery embolization. As such, consideration should be given to angiography of the ipsilateral uterine arteries in future cases, ensuring that all the blood vessels supplying the aneurysm have been identified and properly embolized. By doing so, the hope is to ensure a greater overall success rate of transcatheter arterial embolizations of ruptured ovarian aneurysms, thereby decreasing subsequent repeat hospital visits.

Conclusion
Spontaneous rupture of an ovarian artery aneurysm is an exceedingly rare yet life-threatening complication of multiple gestations. With advances in diagnostic and interventional radiology, angiography and transcatheter arterial embolization have shown to be highly successful in both the diagnosis and treatment of these aneurysms. However, as information arises from future cases, consideration should be given to adjusting the approach to both diagnosis and treatment, ensuring higher treatment success rates and favorable outcomes.

Abstract Title: Incisional Negative Pressure Wound Therapy in Trauma Laparotomies and Rates of Superficial Surgical Site Infections

Investigator: Hogge, Raymond
Co-Investigator(s): 1. Raymond Lee Hogge, EVMS/MD Program MS3 2. Miles Reese MD, EVMS General Surgery/PGY-4 3. Brendan Roess, EVMS/MD Program MS3 4. John Hepner, EVMS/MD Program MS4 5. Michael T. Martyak MD, EVMS General Surgery
Department: EVMS General Surgery

Abstract

Introduction: A surgical site infection (SSI) is an infection following an operation at an incision site or adjacent to the surgical incision. SSIs remain a common hospital-acquired condition and contributes to substantial patient morbidity and mortality as well as financial burden for the healthcare system. The prevalence of SSI is particularly high in trauma laparotomy wounds, and although there is good evidence for the use of incisional negative pressure wound therapy (iNPWT) in the prevention of SSI in laparotomy wounds, there is limited data on the use of iNPWT in management of wounds of laparotomies performed due to trauma. This study aims to expand the size of the sample utilized by the only previous study to investigate the utility of iNPWT in the care of trauma laparotomy wounds. We hypothesize that rates of SSI and wound dehiscence will be decreased in trauma laparotomy wounds with use of iNPWT such as the Prevena Incision Management System.

Methods: A retrospective chart analysis was performed on trauma patients who underwent trauma laparotomies at Sentara Norfolk General Hospital, the level 1 trauma and tertiary referral center for the Hampton Roads area of Virginia. The inclusion criteria included any trauma patient that received an exploratory laparotomy on admission admitted between January 2015 and March 2022 between the ages of 18 and 89. The exclusion criteria included any mortality within 7 days of admission, patients with open abdomens on index procedure or requiring a repeat exploratory laparotomy within 30 days post operatively. Patient demographics, comorbidities, and closure type were documented. A chi-square test of independence was performed to examine the relation between closure type and development of superficial SSI and wound dehiscence. A p-value below 0.05 was deemed statistically significant.

Results: 247 patients were analyzed that met our inclusion and exclusion criteria. 135 patients were closed with iNPWT, 112 patients were closed with staples alone. The proportion of patients who developed superficial SSI was 9.8% for the staples group and 4.4% for the iNPWT group, $X2$ (1, $N = 247$) = 2.7, $p = .097$. The proportion of patients who developed wound dehiscence was 17.8% for the staples group and 6.7% for the iNPWT group, $X2$ (1, $N = 247$) = 7.4, $p = .006$. A subset analysis was done on patients that had a gastric, small bowel, or colonic injury with perforation or injury requiring resection. Within this subset, the proportion of patients who developed superficial SSI was 17.0% for the staples group and 5.3% for the iNPWT group, $X2$ (1, $N = 141$) = 5.1, $p = .023$.

Conclusion: Our retrospective study showed that there was no statistical difference in the development of superficial SSI between the iNPWT group and staples group, but there was a difference seen in the subgroup which only included gastrointestinal tract perforations or resections. There was a statistical difference in the development of wound dehiscence between the iNPWT group and staples group.

Abstract Title: Utilization of a stepped care model in CHKD Mental Health

Investigator: Holmes, Zachary
Co-Investigator(s): 1. Mary Margaret Gleason MD, EVMS & Children's Specialty Group, Children's Hospital of the King's Daughters
Department: EVMS, Children's Hospital of the Kings Daughters

Abstract

Introduction: In the US, our system includes a critical gap between the need for pediatric mental healthcare and an adequate workforce.[1] Fewer than two-thirds of patients referred to mental health will attend an appointment. Only one-third of those patients will receive follow-up care.[2]

CHKD has implemented a Stepped Care Model (SCM) approach to outpatient care to match a child's level of symptoms to appropriate intervention in a timely manner. A key element of SCM is a brief triage assessment after which most patients with lower acuity are offered low intensity group support instead of a passive waitlist. Patients with higher needs receive priority status for more rapid access to individual care. Compared to traditional care models, SCM approaches show both non-inferior results and cost-effectiveness.[3,4]

This study explores SCM at CHKD to examine interval duration between care components, the rate at which patients receive recommended treatments, and identify any disparities in accessing care.

Methods: A chart review of patients who received a Brief Childhood Needs Assessment (BCNA) with CHKD Mental Health, extracting documented treatment plans and dates and types of clinical encounters. 120 randomly selected patients seen for BCNA from four different time periods (July 2021, Jan 2022, July 2022, January 2023) were included.

Results: Overall, the wait time after BCNA for group therapy was 8.4 weeks (SD 6.0). However, out of the 78 patients with a recommended treatment plan of group, only 26 attended (33.3%). On average, patients waited 15.21 weeks (SD 15.66) to reach any mental health service (including group) following their BCNA, with this number falling to 8.8 weeks (SD 8.7) in the most recent cohort. Our analyses found no statistically significant disparities in waitlist times among various demographics.

Conclusions: In the current national child mental health crisis, wait times for MH services from BCNA to definitive care exceed optimal durations, although a decrease in nearly 50% wait time in the most recent cohort is promising. Limited engagement in low intensity support will be an important target for improvement, possibly expanding options to include app-based support. Examination of differences in wait times by provider discipline and child and family characteristics will provide additional opportunities for improvement.

Abstract Title: Patient Needs Assessment at EVMS HOPES Chronic Care Clinic to Identify Potential Barriers Affecting Hypertension and Diabetes Mellitus Management

Investigator: Horenstein, Katherine
Co-Investigator(s): Mia Achitoov, EVMS/MD Student
Department: Medical Student Research

Abstract

Introduction
Chronic conditions (e.g., diabetes mellitus and hypertension) are leading causes of death in the United States. Due to the complexity of the development, progression, and treatment of chronic conditions, barriers commonly arise. Patient health needs assessments (NA) are powerful tools for assessing the health barriers of patient populations. NAs allow for better shared understanding between patients and doctors and ultimately more efficient care delivery and condition management. The Eastern Virginia Medical School (EVMS) HOPES (Health Outreach Partnership of EVMS Students) Chronic Care Clinic (CCC) is a student-run free specialty clinic that focuses on treating uninsured patients who are diagnosed with diabetes mellitus and/or hypertension.

Methods
To assess the specific barriers experienced by HOPES patients in chronic disease management, the CCC will conduct a 10-minute NA. The surveys will be offered to patients who are diagnosed with diabetes mellitus and/or hypertension who are seen at HOPES CCC or Primary Care Clinic (PCC). The surveys will be offered in a digital (through REDCap) or paper format in both English and Spanish. The NA consists of 28 questions that seek to assess the patient's general health, their understanding of their chronic condition(s), how they manage their chronic condition(s), the care they receive at HOPES for their chronic condition(s), and potential barriers to managing their chronic condition(s). Data will be extracted from approximately 50 completed NAs to determine the potential barriers and needs of CCC patients. All data will be analyzed using standard descriptive summaries.

Results/Conclusion
Results of the NA will be primarily used to implement new practices and/or programs at HOPES CCC to better serve its patient population. Preliminary findings will be shared with the EVMS community at EVMS Research Day. Furthermore, we hope to publish our NA and findings as a prototype for other urban student-run free clinics to perpetuate patient population understanding and effective care.

Abstract Title: Tubular Semaphorin3B Mediates Glomerular Parietal Epithelial Cell Activity

Investigator: Hubbard, Gregory
Co-Investigator(s):
Department: VUMC

Abstract

Introduction
A recent experimental study by our lab indicated that isolated, clinically recovered, proximal tubule damage may sensitize the glomerulus to subsequent injury - independent of proinflammatory and profibrotic cytokine activation. These findings suggest previously unidentified direct/paracrine ligand- receptor interactions at the glomerulotubular junction. Preliminary spatial transcriptomics data revealed a concomitant decrease in tubular SEMA3B ligand and glomerular NRP1 / PLXNA2 receptor expression following proximal tubule injury. We therefore hypothesize that downregulation of this specific ligand/receptor complex plays a potential role in glomerular parietal epithelial cell activation, whereby the decrease of this ligand/receptor pair promotes injury.

Methods
Evaluate proximal tubule epithelial cells (PTEC) SEMA3B expression and glomerular parietal epithelial cells (PEC) NRP1/ PLXNA2 expression after tubular injury in vivo. Then, perform an indirect co-culture to isolate and examine PTEC-PEC mediated SEMA3B activity - independent of potential environmental interference.

Results
Paraffin-embedded kidney tissue samples from control (DT- LMB2+) and prior acute tubular injury (DT+ LMB2+) mice were visualized (IHC) with recombinant SEMA3B / NRP1 / PLXNA2 primary antibodies. After injury, PTEC SEMA3B ligand expression decreased in the proximal tubule but increased in the distal tubule, with insignificant urinary SEMA3B concentration change. PEC localization of NRP1 shifts from the cytoplasm to outer membrane following tubular injury. In vitro, AA exposed PTC supernatant contained markedly reduced levels of SEMA3B protein. The PECs exposed to the injured PTC supernatant showed increased NRP1 but not PLXNA2 expression.

Conclusion
The concomitant decrease in SEMA3B / NRP1 / PlXNA2 expression following tubular injury in vitro is consistent with our transcriptomic data results. This study affirms that paracrine dysregulation of semaphorin3B ligand and plexinA2 /neuropilin1 receptor activity implicates glomerular injury. Because SEMA3B activity is downregulated both in vivo and in vitro - we may conclude that SEMA3B dysregulation is not only associated, but a causative factor in glomerular sensitization.

Abstract Title: CD40 Influences Idiosyncratic Regional Oscillation Across The Cortex-Hippocampal Axis

Investigator: Hubbard, Gregory
Co-Investigator(s):
Department: Pathology and Anatomy, EVMS

Abstract

Introduction:
The role of CD40/CD40L receptor ligand complex has been classically understood as a mediator of B- cell activation in response to infection. However, recent research has highlighted its role in non- infectious neurological aberration. In-vivo rodent models suggest that downregulation of CD40 significantly attenuates neuronal excitability within the hippocampus. Because the hippocampus is a highly organized tri-synaptic circuit, a spatial understanding of regional network alterations may further elucidate the electrophysiological role of CD40 in vivo.

Methods:
A silicon probe containing multielectrodes was implanted across the cortex-hippocampal axis in adult male CD40 knockout mice (CD40KO) and wild type mice (WT). Electrical activity was recorded across specified channels during normal behavior and network stimulation (PTZ). Signal morphology and frequency analysis was then conducted using signal analysis software.

Results:
The preliminary data demonstrates that CD40 deficiency modulates electrophysiological activity distinctively across the cortex-hippocampal axis. While a pattern of overall attenuation is seen in all channels, reactive frequency band oscillation differed across a dorsal/ventral axis compared to wildtype.

Conclusion:
The hippocampus is not a homogenous structure. Distributed systems within the hippocampus facilitate circuitry and connectivity in both independent and integrated network mechanisms. Following CD40 attenuation, there are regional discrepancies in hippocampal neural oscillation.

Abstract Title: Individual and Synergistic Effects of Space Radiation and Social Isolation on the Sensorimotor Function of Female Rats

Investigator: Hwang, Jackie
Co-Investigator(s): 1. Alea F. Boden, Pathology and Anatomy 2. Riley S. Heerbrandt, Pathology and Anatomy 3. Zachary N. Luyo, Pathology and Anatomy 4. Larry D. Sanford PhD, Pathology and Anatomy 5. Laurie L. Wellman PhD, Pathology and Anatomy
Department: Pathology and Anatomy

Abstract
Introduction: Astronauts on future Mars missions will experience space radiation (SR) and social isolation (SI), which can impair sensorimotor functions in male rats. However, little is known about the potential effects of these stressors on sensorimotor function of female rats. We examined the individual and synergistic effects of SR and SI on sensorimotor performance of female rats during balance beam (BB) and bilateral tactile adhesive removal (BTAR) tasks, which assess gross and fine motor function, respectively.

Methods: Female, Wistar strain rats (retired breeders) were obtained from Hilltop Lab Animals, Inc. Two subgroups were either individually housed without visual barriers (CONT; n=10) or with visual barriers (SI; n=13) between cages. Two other subgroups were subjected to 15cGy galactic cosmic radiation and either individually housed alone (SR; n=12) or received SR + SI (dual flight stressor, DFS; n=12). Behavioral tasks began 90 days after irradiation. BB ran for five trials a day across seven consecutive days. BTAR ran for four trials a day across four consecutive days. Two-way mixed-factor ANOVA with post-hoc tests were used for analyses.

Results: During BB, there was a main effect of time but not of group. Specifically, there was increased success rates ($p<0.001$), decreased exploratory and disequilibrium behaviors ($p<0.001$ for both), and decreased failures due to time-out ($p=0.012$) and falls ($p<0.001$) over time. During BTAR, there was a main effect of group with the DFS ($p=0.006$) and SI ($p=0.036$) groups having longer average removal times than the SR group. There was also a main effect of group on behavior with the DFS and SI groups having significantly greater fear behavior than the control ($p=0.001$ and $p=0.021$, respectively) and SR ($p=0.001$ and $p=0.001$, respectively) groups. Moreover, there was a main effect of time with fear behaviors increasing on day 2 ($p<0.001$) and day 3 ($p=0.015$).

Conclusion: Female rats showed fear and fine motor deficits after SI and DFS. Should similar differences occur in humans, multiple mitigation strategies may be needed to support astronauts' differential abilities to withstand mission related stressors.

Abstract Title: Determining the relationship between the impostor phenomenon and mental health in medical students at EVMS

Investigator: James, Hannah
Co-Investigator(s): 1. Marilyn Bartholmae, EVMS-Sentara Healthcare Analytics and Delivery Science Institute 2. Samantha Strohm, EVMS MD Class of 2025
Department: Psychiatry and Behavioral Sciences

Abstract

Introduction: The impostor phenomenon (IP), also called imposter syndrome, is characterized by the fear of being discovered as a fraud, despite objective success. This term was coined by Clance et al in 1978 in relation to high-achieving business women, but studies since have shown that the impostor phenomenon is not limited to those original demographics. Prevalence among medical students has been found to be as high as 54.5%. The disconnection between self-perception and accomplishment may provoke decline in student mental health and professional identity. Clance also developed the Clance Impostor Phenomenon Survey (CIPS) used to measure a person's experience of IP. The Patient Health Questionnaire 9-item (PHQ-9) is a screening tool used to assess the presence and severity of depression. The Generalized Anxiety Disorder 7-item (GAD-7) is a screening tool used to initially assess the presence and severity of anxiety. While studies have explored the relationship between depression and/or anxiety and the impostor phenomenon in medical residents and physicians, no studies have been completed in the medical student population.

Methods: Our population includes EVMS medical students in all classes (MD 2024, 2025, 2026, 2027), as well as EVMS medical masters' students (MM 2024, 2025). Voluntary participants have been asked to complete the CIPS, PHQ-9, and GAD-7 in an anonymous survey on REDCap. Data collection began on 8/29/23 and is ongoing. Descriptive statistics were used to determine the prevalence of imposter phenomenon among participants. We used a Generalized Linear Model (GLM) to evaluate the effects of PHQ-9 and GAD-7 scores, age group, race, program type, and gender, on CIPS outcomes. We followed the GLM with a Pearson correlation test to evaluate the direction of the relationship between CIPS and PHQ-9 and between CIPS and GAD-7. Data was analyzed using SAS 9.4.

Results: As of 8/30/23, 83 participants have started the survey and 15 were excluded as they have not yet completed the survey, leaving 68 participants included in these preliminary results. The majority of participants were ages 21 to 25 years (64.71%), White or Caucasian (54.41%), in the MD 2027 program (35.29%), and female (63.24%). About 15% of participants had moderate to severe depression and about 28% had moderate to severe anxiety based on PHQ-9 and GAD-7 scores, respectively. CIPS scores were significantly affected by PHQ-9 (p=0.027) and GAD-7 (p=0.034) scores, and age group (p=0.046). CIPS scores increased for participants ages 26 to 35 years compared to the youngest group (21 to 25 years), and were the lowest for the age group 36 to 40 years. There is a moderate, positive, linear relationship between PHQ-9 and CIPS (r=0.54) and between GAD-7 and CIPS (r=0.52) . Gender, race, and program variables did not affect CIPS outcomes (p>0.05). However, CIPS scores tended to be higher for females, persons in medical master's programs, and for the Native American/Alaskan Native race.

Conclusion: The experience of IP in students completing medical school curriculum at EVMS is likely correlated with depression and/or anxiety. Therefore, efforts to alleviate the experience of IP should include emphasis on mental health care for medical students and medical masters students. There is also a trend of increased IP in less experienced medical students, with increased CIPS scores in the medical masters class participants and classes of 2027 and 2026 versus 2025 and 2024. Additionally, although there is no statistical correlation in our population between the experience of IP and vulnerable populations, the trend for such persons to experience IP to a greater degree is not negligible and should not be ignored. Current limitations include cross sectional design and uneven participation across categories. This is likely limited by demographics of EVMS students. Currently, there is only 1 participant each in the age groups 31 to 35 years and 36 to 40 years. Additionally, the majority of responses (63.23%) are from MD 2026 and 2027. An effort will be made to increase the participant numbers in these and other categories. Preliminary results are also limited by the total number of participants thus far. As more students provide complete responses, the power of our results will likely increase.

Abstract Title: Glycosylation of Extracellular Vesicles in Breast Cancer Subtypes

Investigator: Johnson, Benjamin
Co-Investigator(s): Dr. Li-Fang Yang, Microbiology and Cellular Biology, Leroy T. Canoles Cancer/ Assistant Professor
Department: Microbiology and Molecular Cell Biology

Abstract

Introduction: Extracellular vesicles (EVs) are small, membrane enclosed vessels that have recently gained interest as a mode of cell-cell communication in both pathologic and physiological conditions. Glycosylation of vesicle cargo proteins has been shown to play a role in the sorting of proteins into EVs and cell targeting and recognition. As aberrant protein glycosylation is a hallmark of cancer cells, and recent evidence has shown that cancer cells secrete significantly higher amounts of EVs compared to non-malignant cells, we set out to examine the glycosylation signatures across different breast cancer cell lines and their respective EVs.

Methods: Breast cancer cell lines representing luminal type, HER2 enriched, and triple negative subtypes were cultured in appropriate cell media. Cell protein lysates were collected were collected and microvesicles (MVs) and small extracellular vesicles (sEVs) were isolated via the differential ultracentrifugation approach. The concentration and size of isolated EVs were determined utilizing the NanoSight NS300. The EV purity was assessed by Western blotting with a panel of positive and negative specific markers. Lectin blots were performed to examine and compare the glycosylation patterns of specific carbohydrate moieties (sialylation, fucosylation, and N-glycan branching) in the protein lysates from EVs and their parent cells.

Results: Extracellular Vesicle size distributions for MVs and sEVs were within the expected ranges and samples were of ample purity based on the results of the western blot utilizing EV specific markers.

Lectin blots revealed unique protein glycosylation patterns of breast cells representing different subtypes. Additionally, sialylation and N-glycan branching of sEVs secreted by the luminal type cells and aggressive cell types were distinct from their perspective parent cells, with regard to degree and pattern.

Conclusion: These results confirm that there are subtype-specific glycosylation patterns existing at both cell and sEV levels. This exploratory work combined with our previous EV data obtained via metabolic glycoengineering provides a foundation to develop innovative EV glycosylation-based methods to improve breast cancer diagnosis and subtyping.

Abstract Title: Effect of HIV-TAT on Lipid Metabolism in Microglia

Investigator: Jung, Jaekeun
Co-Investigator(s): Yan Chen, Pathology and Anatomy; Rachael Dempsey, Pathology and Anatomy; Soheil Kazemi Roodsari, MD, Pathology and Anatomy; Ming-Lei Guo, PhD, Pathology and Anatomy
Department: Pathology and Anatomy

Abstract

Introduction
HIV infection remains a major public health concern in the era of combined antiretroviral therapy (**ART**) and human immunodeficiency virus (**HIV**)-associated neurocognitive disorder (**HAND**), characterized by cognitive and memory impairment, continues to be prevalent. Microglia (**Mg**), the brain resident macrophages, can be activated by HIV infection and abnormal Mg activation has been believed as the driving force promoting HAND pathogenesis. However, the mechanisms underlying Mg activation in chronic HIV infected individuals remain much elusive. Metabolism dysregulation has inherent roles in immune responses in Mg. Whether HIV/HIV proteins could dysregulate metabolism process leading to Mg activation has not been explored before. Thus in this study, we aimed to explore the effects of HIV protein transactivator of transcription (**TAT**) on lipid metabolism in Mg using multiple *in vitro* and *in vivo* approaches.

Method
BV2 microglial cells were cultured *in vitro* and primary Mg (**PM**) were isolated from new-born pups and cultured *in vitro*. The cells were then exposed to HIV-TAT with different doses (25 - 100 ng/ml) for different time periods (3 - 24 hours). Followed, the cells were collected for protein extraction. Also, HIV-TAT negative and positive mice were fed with doxycycline (**DOX**)-inducible food *in vivo* for three weeks for TAT expression. The mice were then sacrificed for the brain removal. Different brain regions were dissected followed by protein extraction. Western blots were performed to determine the levels of various molecules belonging to lipid metabolism pathways, including HMG-CoA reductase (**HMGCR**), SREBP-1, SREBP-2, and PLIN2. Meanwhile, the colocalization of lipid droplet (**LD**) with Mg were determined by double Immunofluorescence approach.

Results
HIV-TAT increases the levels of HMGCR, SREBP-1, SREBP-2, and PLIN2 in both BV2 and PM in time-dependent and dose-dependent manners. HIV-TAT elevates LD levels in Mg and SREBP-2 levels in the brain hippocampus.

Conclusion
HIV-TAT can dysregulate lipid metabolism *in vitro* and *in vivo*. More experiments have been planned to reveal whether HIV-TAT mediated lipid dysregulation is responsible for Mg activation.

Abstract Title: A Correlation Between Bradycardia and Reduced Anxiety in Mice? Dorsal Motor Vagal Neurons Use Peripheral Muscarinic Signaling

Investigator: Kauffman, Lily
Co-Investigator(s): 1. Nicholas J. Conley, Neuroscience Graduate Program at the University of Virginia
Department: Biology Department at the University of Virginia

Abstract

Introduction:
The dorsal motor nucleus of the vagus (DMV) is a functionally heterogeneous vagal motor region which controls a variety of digestive and metabolic functions but also innervates the heart, where its role in controlling heart rate is less clear. We therefore chemogenetically activated DMV neurons in awake behaving mice while monitoring heart rate. The results from these studies also prompted our investigation of the relationship between the DMV's role in controlling heart rate and behavior.

Methods:
To selectively activate DMV neurons, we injected an adeno-associated virus (AAV) which expresses the excitatory chemogenetic receptor, hM3Dq (8 injections, 40nl each), only after recombination by both Cre and Flp recombinases, into the DMV of Chat-Cre::Phox2b-Flp mice. Several months later, we injected the hM3Dq ligand clozapine N-oxide (CNO; 1mg/kg) via intraperitoneal injection (n=4 females, 5 males; mean age ± S.D., 32 ± 2 weeks) to activate hM3Dq+ DMV neurons while measuring heart rate via a non-invasive ECG system (ECGenie).

Results:
We measured heart rate 20 minutes prior to CNO and 0, 20, 40 minutes and 1, 2, 6, 8, 24 hours later. CNO administration significantly but reversibly decreased heart rate (mean ± standard deviation, S.D.: 20min before CNO, 705 ± 15 bpm; 40min after CNO, 536 ± 86 bpm, p=0.0271; 24hr after CNO, 727 ± 25 bpm, p=0.7347; one-way ANOVA, all timepoints, $F_{1.660, 6.638}$=10.31; Dunnet's post-hoc test, p=0.0107). Interestingly, when we intraperitoneally injected the peripheral muscarinic blocker, methyl-atropine (MA; 0.1mg/kg), in the same mice 20 minutes post CNO administration, heart rate values returned to baseline (baseline, 747 ± 5 bpm; after CNO, 640 ± 19 bpm, p=0.0078 vs. baseline; after methyl-atropine, 801 ± 4 bpm, p=0.0004 vs. baseline). In order to identify the specific neurons responsible, we repeated these studies, without the injection of MA, in Calb2-Cre::Chat-Flp mice (n=4 females, 5 males; mean age ± S.D., 29 ± 2 weeks) to target Calb2+ DMV neurons, a recently identified DMV molecular subtype. However, in striking contrast to what we observed when activating DMV neurons generally, administering CNO to activate Calb2+ DMV neurons specifically did not significantly affect heart rate (mean ± S.D.: 20min before CNO, 691 ± 69 bpm; 40min after CNO, 718 ± 31 bpm, p=0.6787; 24hr after CNO, 710 ± 54 bpm, p=0.4701; one-way ANOVA, all timepoints, $F_{2.911, 11.65}$=0.6277; Dunnet's, p=0.6069). A higher dose of CNO (3.5mg/kg) also had no effect on heart rate in Calb2-Cre::Chat-Flp mice (data not shown). Together, these studies indicate that DMV neurons are capable of suppressing heart rate through peripheral muscarinic signaling and that the underlying neurons likely do not express Calb2.

After observing fewer anxious behaviors in the hM3Dq+ Chat-Cre::Phox2b-Flp mice given CNO, we also decided to investigate the role of DMV neurons in reducing anxiety-like behaviors in both hM3Dq+ mice (n=4 females, 4 males; mean age ± S.D., 32 ± 2 weeks) and control mice (n=4 females, 4 males; mean age ± S.D., 29 ± 2 weeks) using an elevated plus maze. We injected CNO 20 minutes prior to placing the mice in an elevated plus maze where their movements were recorded for 10 minutes. hM3Dq+ mice given CNO spent significantly more time in the open arms of the maze, an indicator of reduced anxiety-like behavior, than the same mice given saline vehicle (CNO, 16.9 ± 4.83 s; vehicle, 0.23 ± 0.23 s; p=0.023). Like its effect on the induced bradycardia discussed above, injection of MA with CNO in hM3Dq+ mice served to negate the effects of CNO on behavior, again indicating peripheral muscarinic signaling by the DMV. When control mice were given CNO or CNO and MA, however, there was no significant change in the time spent in the open arms of the maze, indicating that neither CNO nor MA reduce anxiety-like behavior on their own.

Conclusion:
Uncovering the DMV's role in heart rate will expand our understanding of how this clinically relevant metric, associated with a host of cardiovascular disorders, is controlled. Furthermore, elucidating the moderate correlation between the CNO-induced bradycardia and increased time in the open arms of the maze (r = 0.6394) could prove vital for novel therapies for individuals suffering from anxiety disorders.

Abstract Title: Preliminary data from pilot program to assess and address food insecurity at a Student-Run Free Clinic in Norfolk, VA

Investigator: Kelley, Mackenzie
Co-Investigator(s): 1. Mackenzie Kelley, BS, MD Program, EVMS 2. Agnes Kwak, BS, MD Program, EVMS 3. Ellen V. Pudney, PhD, RDN, Department of Pediatrics, EVMS
Department: Community Health and Research, Pediatrics

Abstract

Introduction:
Food insecurity (FI), defined as uncertain access to nutritious food, has numerous adverse effects on health and well-being and disproportionally affects racial and ethnic minority groups, low-income households, uninsured individuals, and immigrant families. In particular, student-run free clinics have reported that up to 74% of patients experience food insecurity, many times the national average (10.2%). However, screening for and addressing food insecurity in clinics serving at-risk populations is rare. Furthermore, little is known about experiences with food insecurity among Hispanic immigrant families. HOPES is a student-run free clinic in Norfolk, Virginia,. HOPES provides primary and select specialty care to patients without health insurance, including many Hispanic undocumented patients and their children. The purpose of The HOPES Food Insecurity Project is two-fold: (1) To measure food insecurity and food assistance resource utilization among our patients, (2) To pilot an intervention connecting patients to food assistance resources based on their needs and preferences.

Methods:
We are collecting data from HOPES patients via a self-report survey. A project team member (PTM), consisting of EVMS medical students, approaches patients and caregivers while they are in the clinic's waiting room and invites them to complete the survey either independently via iPad or verbally with the assistance of the PTM. The survey is available in both English and Spanish and the PTMs who interact with the participants speak both languages. The 17-item survey consists of the validated 2-item Hunger Vital Sign, which measures food insecurity, and questions assessing utilization of food pantries, SNAP, WIC, soup kitchens, and Meals on Wheels. For participants not enrolled in WIC or Meals on Wheels we assess their eligibility for these programs. Participants also provide their first name, zip code, and phone number.

Finally, participants check off their interest in receiving more information about the following resources: federal food assistance programs, local food pantries, soup kitchen/hot meals, food delivery, or none of the above. Based on each participant's zip code, interest in resources, and eligibility for services, a PTM generates a tailored resource booklet in English or Spanish using the Bridge2Resources VA database, which is printed out and provided to the patient before they leave the clinic. To assess utilization of the resource booklet, a PTM will call patients after 1 month to ask them whether they still have the booklet, whether they are getting the help they need from it, and if they have any feedback they would like to share.

Results:
As of August 31, 2023, we have attended five HOPES Clinic shifts with 36 out of 39 patients filling out our survey. One patient refused to complete the survey and two patients were missed by volunteers. Of the 36 patients, 28 (78%) screened positive for food insecurity, defined as responding "often true" or "sometimes true" to either or both of the Hunger Vital Sign questions, and eight (22%) screened negative. Of the patients who screened positive for food insecurity, only 13 (46%) used some form of food resource in the past 12 months and 22 (79%) requested information about food resources.

Conclusion:
These preliminary data suggest that food insecurity is prevalent among HOPES patients, but food resource utilization is low. Patients may benefit from concerted efforts to address food insecurity as part of routine health care offered at HOPES.

Abstract Title: Mapping Global Pediatric Oncology Clinical Research

Investigator: Kelley, Mackenzie
Co-Investigator(s): 1. Mackenzie Kelley, MD Student, EVMS, Norfolk, VA 2. Daniel Moreira, MD, MEd, Department of Global Pediatric Medicine, St Jude Children's Research Hospital, Memphis, TN
Department: St Jude Children's Research Hospital

Abstract

Background
Clinical trials have been instrumental to the rapid improvement in pediatric cancer outcomes in past decades. Nonetheless, pediatric cancer outcomes are significantly worse in low- and middle-income countries (LMICs), where most of the world's pediatric cancer patients reside. Due to the importance of clinical trials in pediatric cancer care, we sought to evaluate the landscape of clinical research globally.

Methods
Clinical studies registered in two public trial registries, ClinicalTrials.gov (CTG) and the International Clinical Trials Registry Platform (ICTRP), were screened based on the following inclusion criteria: that participants were pediatric patients (≤17 years old) diagnosed with cancer. PubMed was used to perform a literature review to identify published results. Fisher's exact test and $\chi 2$ tests were done to compare frequencies across groups.

Results
The search identified 112,399 publications. A total of 637 studies met inclusion criteria. Most studies (470, 74%) were conducted in high income countries (HICs), while 167 (26%) studies were in middle- income countries, and no studies were registered in low-income countries. Study characteristics differed significantly among country income status, with HICs registering mostly early phase clinical trials focusing on cancer-directed treatment and LMICs registering later phase supportive care-based trials ($p<0.001$). Most patient accrual occurred in HICs. Further, more multi-institutional, multi-national patient accrual and collaboration occurred between HICs. Of the studies registered, 101 were published. Studies in HICs were more likely to be published ($p<0.001$). However, there was no difference found in time between study and publication ($p=0.20$).

Conclusion
Globally, LMICs are under-represented in the clinical research landscape. Most clinical studies in LMICs tend to be concentrated to a few countries and tend to be less complex and employ less rigorous interventions. These data describe the urgent needs to invest in clinical research infrastructure in LMICs and foster collaborations that include LMICs as critical steps in achieving equity in global pediatric cancer outcomes.

Abstract Title: Reconstructing Normal Brain Development with Epigenetic Barcodes

Investigator: Khan, Omar
Co-Investigator(s): 1) Omar Khan (myself, EVMS MD 2026 student. I completed this project during my time at USC this summer) 2) Dr. Darryl Shibata (USC Keck School of Medicine, Department of Pathology)
Department: USC Keck Department of Pathology

Abstract

Introduction:
The molecular clock concept serves to monitor the evolution of genes and genetic sequences by measuring their divergence from a shared ancestor over time. A novel model, rooted in CpG methylation and employing smnCAT-seq data, is introduced to effectively discern swift mutations and distinguish between neurons. This model underscores the substantial impact of embryonic neural tissue on methylation patterns, with excitatory neurons originating from the cerebral cortex and inhibitory neurons tracing back to CGE or MGE sources. Our objective is to determine if excitatory and inhibitory neurons have a common ancestor lineage and gain a better understanding of how methylation influences normal brain development.

Methods:
The data encompasses RNAseq and WGBS data derived from individual neurons in the frontal cortex, specifically focusing on single-cell phenotype and epigenome analysis of a 25-year-old individual post- mortem. This dataset, accessible via the GEO database and contributed by the Salk Institute, comprises binary barcodes representing CpG methylation on the X-chromosome in a male patient. Through a Python-based sorting algorithm, the raw methylome data is transformed into an N-by-N barcode matrix. This algorithm facilitates the comparison of methylation barcodes between neurons, each consisting of a minimum of 30 CpG sites. The metric employed for this analysis is the pairwise distance, where identical barcodes exhibit a distance value of "0," while random barcodes yield distances approximately around 0.5.

Results:
The preliminary data demonstrates that the neurons that have the most similar methylation patterns originate from the same embryological region, such as excitatory vs excitatory neurons and the neurons that are the most dissimilar are from different regions. Additionally, we found that there were significant differences even between subgroups of inhibitory or exhibitory neurons.

Conclusion:
Statistically significant disparities in pairwise distances are observed between inhibitory and excitatory neurons. These findings highlight the influence of embryological brain tissue location on neuronal methylation patterns. Furthermore, our study underscores the need to investigate various tissue types to assess the viability of CpG methylation as a molecular clock mechanism. In the future, we hope to expand upon our current model by adding additional patients as well as adapting our model for different types of tissues.

Abstract Title: Validation of Child-Reported Quality of Life Instrument in Children with Sleep Apnea

Investigator: King, Christiana
Co-Investigator(s): 1. Christiana King MS, EVMS Otolaryngology – Pediatric Division / EVMS MD '26 2. Daniel Heshmatipour MS, EVMS Otolaryngology – Pediatric Division / EVMS MD '24 3. Cristina Baldassari MD, EVMS Otolaryngology – Pediatric Division
Department: EVMS Otolaryngology – Pediatric Division

Abstract
Introduction: Obstructive sleep apnea (OSA) is a sleep-related breathing disorder characterized by episodes of upper airway collapse. It has been increasingly acknowledged that children with OSA may experience negative impacts on their quality of life (QOL) including behavioral problems, poor attention, cognitive deficits, and impaired family interactions. The gold standard for diagnosis of OSA is in-laboratory nocturnal polysomnography (PSG). PSG measures the presence of OSA and provides an objective scale for OSA severity. However, PSG fails to quantify the impact of OSA on a child's general well-being. Thus, QOL instruments such as the OSA-18 are increasingly being used to assess symptom burden in children. Currently, all disease-specific QOL surveys for pediatric OSA patients are designed for caregiver completion. An instrument to assess the child's perception of OSA impact on their QOL is currently lacking. Prior research in other chronic pediatric medical conditions has demonstrated a lack of correlation between caregiver- and child-reported QOL. Thus, our primary objective will be to develop and validate a child-reported, disease-specific QOL survey.

Methods: Children aged 5 to 16 years presenting to pediatric otolaryngology clinics for OSA evaluation are enrolled in concordance with the IRB-approved protocol. At baseline, children complete a modified OSA-18 that was developed during a focus group, while parents/caregivers complete the previously validated, standard OSA-18 survey and the Sleep Related Breathing Disorder section of Pediatric Sleep Questionnaire (PSQ-SRBD). The child-reported OSA-18 is readministered 7 days following baseline via telephone call, email, text messaging, or secure zoom encounter.

Results: There are currently 85 subjects enrolled with a mean age of 8 years and an obesity prevalence of 48.2%. At baseline, 23.5% had total caregiver OSA-18 and child-reported OSA-18 scores within the same severity category. A subset of 30 subjects have completed the 7-day follow-up child-reported OSA-18. Of those, 66.7% had total survey scores within the same severity category between baseline and follow-up for OSA impact on QOL.

Conclusion: When validated, the child-reported OSA-18 survey will enable determination of symptom burden experienced by children and adolescents. This may be a valuable tool for future guidance of management decisions for children and adolescents with OSA.

Abstract Title: More than meets the eye: a case of ocular syphilis

Investigator: Kolkey, Zakary
Co-Investigator(s): Sami Tahhan, MD, Department of Internal Medicine Waleed Kassabo, MD, Department of Internal Medicine
Department: Internal Medicine

Abstract

Introduction
Syphilis, or *Treponema pallidum*, is often referred to as "the great imitator" for its ability to manifest and present in a multitude of ways, and often look remarkably similar to a variety of other conditions. This can often lead to difficulty and delays in diagnosis and therefore delays in treatment, increasing the likelihood for the spread of the disease.

Neurosyphilis, or symptoms caused by damage to the brain, nervous system, or eyes, can occur at any stage of the disease course, and is especially difficult to diagnose. Our primary methods of diagnosing neurosyphilis, VDRL in the CSF and RPR titers, are not very sensitive or specific and do not necessarily rule out the condition if the tests return negative.

Herein, we review the case of a 21-year-old woman, who presented with ocular pain, vision changes, and scleral injection who was ultimately diagnosed with ocular syphilis.

Case Presentation
A 21-year-old female with no previous medical history presented to the emergency department with a complaint of right eye erythema, binocular blurry vision, headache, photophobia, nausea and vomiting that began the day before.

The patient was referred to the ED by her ophthalmologist after she presented with a 1-month history of ocular pain with acute worsening over the previous day and a decrease in visual acuity. Her ophthalmologist's impression was an acute anterior uveitis of the right eye, and he proceeded with a broad infectious and autoimmune workup. All tests were normal except RPR returned positive with a ratio of 1:64. The patient was referred to the ED for concern of ocular syphilis and potential meningitis.

In the ED, the patient was tachycardic but physical exam showed no signs of meningismus. CBC returned without leukocytosis or anemia. The patient underwent lumbar puncture (LP) and was tested for multiple STIs, and chlamydia and trichomonas returned positive. The patient's lumbar puncture showed only isolated elevated RBCs, and VDRL CSF was non- reactive. HIV testing was negative.

ID was consulted, and began the patient on 4mU IV penicillin every 4 hours. ID agreed that the patient's LP was not consistent with neurosyphilis due to minimal pleocytosis and normal protein, as well as a negative CSF VDRL. The patient was also treated Doxycycline 100 mg po BID and Metronidazole 500mg po BID for 7 days each to target her chlamydia and trichomonas.

During the patient's hospital stay, the scleral injection improved; eye pain, headaches, neck stiffness, and vision changes resolved. The patient was discharged with IV Penicillin to complete a 14 days course through a PICC line

Discussion:
The incidence of syphilis has been increasing in recent years in the U.S., making early detection and treatment all the more important. Reports suggest that rates of ocular syphilis are also rising in the US.

Ocular syphilis can involve almost any eye structure but posterior uveitis and panuveitis are most common as seen in our patient. Ocular syphilis is often but not always accompanied by syphilitic meningitis.

With syphilis, there is always more than meets the eye!

Abstract Title: Disparity analysis of pancreatic cancer in Hampton Roads

Investigator: Kolkey, Zakary
Co-Investigator(s):
Department: Canoles Cancer Center

Abstract

Introduction: Pancreatic cancer is one of the most lethal diseases, with a dismal five-year survival rate of 9% and a median post-diagnosis survival of 6 months. It is currently the third leading cause of cancer-related death in the United States. The dismal prognosis of patients diagnosed with pancreatic cancer points to our limited arsenal of effective anticancer therapies and screening tools. Pancreatic cancer disproportionately affects the Black and Jewish populations; nationally we see lower survival and later stage at diagnosis among the black population when compared to their white counterparts.

Objectives: This study aims to measure racial disparity in overall survival, diagnosis, and treatment regimens of pancreatic cancer in Hampton Roads Virginia in comparison to the national average. We hope to highlight the similarities/differences of cancer disparity in the two major racial groups in our local Pancreatic Ductal Adenocarcinoma (PDAC) cohort.

Methods: This retrospective study uses a cohort of 640 patients diagnosed with pancreatic cancer between 2008 and 2016 within the Sentara Healthcare and/or Virginia Oncology Associates (VOA) system in Hampton Roads. The cohort was stratified into two groups: 191 patients diagnosed with operable disease who underwent surgical resection, and 449 patients diagnosed with inoperable disease; and then further separated into a white and black populations. Survival was calculated from date of initial diagnosis to date of last follow-up or death from all- cause mortality. Clinical and pathological parameters (TNM classification) and standard treatment modalities were reviewed, validated, and compared using electronic medical records at Sentara EPIC and VOA iKnow Medicine.

Results: Of the 191 pancreatic cancer patients, 45 underwent surgical resection only, 100 received surgery and adjuvant chemotherapy, and 46 received NACT and surgery. In the operable cohort, 41.5% of the PDAC patients are African American (AA) and 55.8% are Caucasians. Thus, pancreatic cancer incidence among black patients was over-represented in Hampton Roads Virginia that has a 31.3% AA population. Treatment provided and stage of diagnosis for pancreatic cancer are comparable in the two major race groups. The total length of survival of our black patients was not worse when compared to the white patients in both operable and inoperable cohorts, however white patients more frequently met the 5-year survival milestone.

Conclusion: Our PDAC patients of the two race groups still have a lower 5-year survival as compared to that of the national average (SEER data). The underlying factors contributing to the dismal 5-year survival rate and higher incidence are likely multifactorial, possibly explained by unhealthy diet, genetic factors, mutant carriers, social economic status, insurance, and increased risk behaviors as compared to national averages.

Abstract Title: Quality Improvement in Pediatric Blood Cultures

Investigator: Krafty, Ryan
Co-Investigator(s): 1. Trevor DiGerolamo BS/MD c/o 2026 2. Barbara Stein RN/Sentara Infection Prevention and Control 3. John W. Harrington MD/Pediatrics
Department: Pediatrics

Abstract

Background: In the era of modern blood culturing, virtually all blood culture contamination occurs during the collection phase. At Children's Hospital of The King's Daughters (CHKD), 70% of the contaminated blood cultures come from the emergency department (ED). Nationwide, 60% of patients received unnecessary treatment as a result of contaminated blood cultures. This results in increased pharmacy charges from $210-$12,611 and laboratory charges ranging between $2,397-$11,152 per patient. In addition, unnecessary medical treatment due to contaminated blood cultures leads to patients' discomfort, decreased hospital reputation, and increased selective antibiotic pressure leading to resistant organisms. In this study, observation of blood cultures being drawn in the ED will be done, with the goal of identifying where in the drawing process contamination could be occurring.

Methods: We learned the standard job instructions provided by CHKD for blood culture collection via peripheral venipuncture. This included proper hand hygiene, maintaining an aseptic field, and proper collection of the blood. After learning the procedure and acceptable variations, we went to the ED and observed blood cultures as the ED techs completed them. As they were performing them, we noted any deviations or incorrect protocols performed during the collection process and compiled the data after our observations.

Results: Of the 5 observed blood cultures, 4 were performed incorrectly. In all 4 incorrect collections, at least 2 of the steps were performed incorrectly. In 3 of them, sterile gloves were not worn which immediately compromises the sterile field and its contents. Another consistent point of failure was the lack of alcohol prep before cleaning the site with CHG or betadine.

Conclusion: These findings suggest that the ED may be seeing an increase in contamination of pediatric blood cultures due to poor maintenance of the sterile field during the collection process and poor adherence to the job instruction sheet. Reinforcement of the job instruction sheet and aseptic techniques should improve the collection and help reduce contamination during collection.

Abstract Title: Impact of a Medically Tailored Food Security Intervention on Food Consumption in Food-Insecure Patients with Cancer

Investigator: Kwak, Agnes
Co-Investigator(s): Minlun Wu, MPA, Immigrant Health and Cancer Disparities Service, Department of Psychiatry and Behavioral Sciences/Memorial Sloan Kettering Cancer Cente; Francesca Gany, MD, MS, Immigrant Health and Cancer Disparities Service, Department of Psychiatry and Behavioral Sciences/Memorial Sloan Kettering Cancer Center
Department: Immigrant Health and Cancer Disparities Service, Department of Psychiatry and Behavioral Sciences, Memorial Sloan Kettering Cancer Center

Abstract

Introduction: Food insecurity is defined as a lack of access to adequate and nutritious food options. Due to high medical costs, patients with cancer are at higher risk of experiencing food insecurity and undernutrition and may also be restricted to choosing lower-cost, lower-quality food options. Dietary management is particularly important for medically ill patients who are already vulnerable to reduced overall food intake due to disease and treatment-related effects. While dietary recommendations vary based on treatment status, patients undergoing active treatment should consume a diet with adequate protein intake to minimize the effects of metabolic disturbances and maintain skeletal muscle mass. Nutritional guidelines in oncology recommend a protein consumption of 1.2-2.0 g/kg/day. However, most patients do not meet even the average daily recommended serving for healthy adults (0.8 g/kg/day). Cancer patients are also encouraged to consume a diet rich in fruits and vegetables. The American Cancer Society and the World Cancer Research Fund/American Institute for Cancer Research recommend that patients consume at least 5 servings (400 g or 14 oz) of fruits/vegetables daily. To better understand the relationship between food insecurity and food intake, we sought to investigate the effects of food security interventions on changes in food consumption among food-insecure patients undergoing active cancer treatment.

Methods: We are conducting a three-arm randomized controlled trial assessing the impact of food security interventions among food-insecure patients (USDA U.S. Household Food Security Module score ≥ 3) at 5 New York City safety net cancer centers (R01CA230446-06, PI: Gany). Patients with either breast or gynecologic cancer are randomized into one of three arms: $230 monthly food voucher (arm 1), weekly home grocery delivery (arm 2), or weekly hospital-based food pantry (arm 3). All patients are also provided with a one-hour, one-on-one Nutrition and Cancer Education presentation that is delivered by a trained staff member. Sessions focus on optimizing nutrition during cancer treatment, stretching food dollars, and preparing healthful foods on a budget. Surveys are administered at baseline, 3 months, and 6 months, with questions on protein intake (internally developed Protein Screener), and fruit/vegetable intake (CHIS Fruit & Vegetable Screener). We compared changes in fruit, vegetable, and protein consumption pre-post the 6-month intervention, using paired sample t- tests to detect significant differences ($p<0.05$) in mean food consumption across different food categories.

Results: 234 patients completed baseline and 6-month assessments. The mean USDA U.S. Household Food Security Module score at baseline was 6. Among all patients, fish intake increased ($p=0.000$) and full-fat dairy milk intake decreased ($p=0.000$) when comparing before and after the intervention. There was also a trend towards increased low-fat milk consumption. All three study arms saw significant increases in fish consumption (arm 1, $p=0.049$; arm 2, $p=0.013$; arm 3, $p=0.011$). Arm 3 also had a significant decrease in full-fat milk consumption ($p=0.005$). There were no significant decreases in consumption of other types of protein. For fruit/vegetables, there were significant decreases in the consumption of 100% fruit juice ($p=0.017$), fried potatoes ($p=0.005$), and sweetened juice ($p=0.001$) from pre- to post-intervention. A slight trend towards increased consumption of fruits, lettuce salads, and other vegetables was observed. In arm 1, there was a decrease in the consumption of fried potatoes ($p=0.036$) and sweetened juice ($p=0.011$). In arm 2, there was a decrease in consumption of 100% fruit juice ($p=0.005$). Patients in arm 3 had a decrease in the consumption of fried potatoes ($p=0.009$) and sweetened juice ($p=0.003$). For both protein and fruits/vegetables, there were no significant differences when comparing between arms.

Conclusion: A nutrition and cancer educational module plus access to regular food vouchers, grocery deliveries, or food pantries impact, to some extent, the types of food consumed by food insecure patients. In our study, all three intervention arms showed a significant increase in fish intake and favorable decreases in the amount of 100% fruit juice and sweetened juice that patients consumed. These findings suggest that nutrition education combined with a medically tailored food security intervention can benefit food-insecure patients undergoing active cancer treatment. Further research is needed to determine more specific dietary changes that result from food security interventions.

Abstract Title: EVMS Adaptive Gymnastics: An Effective Modality in Lowering Negative Behaviors and Parental Stress for Neurodivergent Children and Their Parents?: Early Findings

Investigator: Levin, Jamie
Co-Investigator(s): 1. Danielle R. Barry (EVMS Adaptive Gymnastics Co-Director) 2. Kaitlin P. Hardy, EVMS MS3 3. John W Harrington MD, CHKD Vice-President of Quality/Safety and Clinical Integration, Co-Director of General Academic Pediatrics, Vice-Chair of Primary Care 4. Gwendolyn R. George, EVMS MS2
Department: Pediatrics

Abstract

Introduction: EVMS Adaptive Gymnastics is a program designed to help children with developmental disabilities gain social and motor capabilities through a 45-minute gymnastics session over the course of eight weeks. The program uses basic gymnastic skills and time in the gym encouraging exercise, socialization, and fun for children that do not have the same opportunities for organized sports and other activities due to their disabilities. Additionally, it gives the parents a 45-minute break to relax, run errands, or spend time with their other children, while their participating child is in a safe and fun environment. We hypothesize that there will be a reduction in emotional reactivity, attention impairments, and parental stress as children progress through the adaptive gymnastics 8-week program.

Methods: New and returning families of children who were at least 5 years of age, but less than 13 years of age with known developmental disabilities including autism spectrum disorder, were recruited to take part in a longitudinal study evaluating the child's social and emotional skills and perceived parental stress. The child's behaviors were measured pre and post study using the Emotion Dysregulation Inventory (EDI), Pediatric Symptom Checklist (PSC), and Social Communication Questionnaire (SCQ). Parental stress was also measured pre and post using the Parental Stress Index (PSI). Additionally, the child's developmental history and family demographics were collected with information used to screen eligible families, including official rosters and participant modification plans (PMP).

Results: Of the 12 subjects enrolled, 8 have autism, and 5 of those 8 are co-morbid with both autism and ADHD. The most common negative behavioral triggers documented on the PMP were transitions, noise, change of routine, and autonomous control. Enrollees varied in use of expressive language, social abilities, and physical abilities. The PMP revealed the majority of subjects required assistance with respecting authority, staying on task for > 15 minutes and following multi-step directions. On the EDI, many families also indicated emotional reactivity greater than one standard deviation above the general population. Unsurprisingly, many children screened positively for signs of autism spectrum disorder on the SCQ.

Conclusion: We are currently still in the data collection phase of the study, but we have established baseline values of child behaviors and perceived parental stress among families participating in this longitudinal study about the effects of an adaptive gymnastics program on children with disabilities. Longitudinal analysis over the 8-week period will be critical in identifying any potential therapeutic benefits and possible additional interventions.

Abstract Title: Examination of the Frequency of Resource Use of Second-Year Students Across Multiple Medical Schools

Investigator: Li, Danxun
Co-Investigator(s): Danxun Li, MD Program, EVMS Andrea Berry, University of Central Florida; Curt Bay, A. T. Still University; Anna Campbell, A. T. Still University; Uzoma Ikonne, Physiological Sciences, EVMS
Department: Physiological Sciences

Abstract

INTRODUCTION
Students have an unprecedented number of study resources available to use. A recent study demonstrated a shift in the frequency of student resource use, particularly outside resources (academic resources not provided by academic institutions or faculty), as students progress through the curriculum. The purpose of the current study is to compare the frequency of resource use among medical students across different institutions.

METHODS
This is a prospective cross-sectional study that examines factors that influence outside resource use and frequency of resource use for second-year medical students. A questionnaire was sent to second-year medical students at three institutions: one osteopathic (ATSU-School of Osteopathic Medicine) and two allopathic (Eastern Virginia Medical School and the University of Central Florida). Welch's ANOVA was used for the statistical analysis.

RESULTS
Preliminary results suggest that students across institutions are using outside resources frequently. We observed similar influence of factors for use of outside resources such as preparing for licensing exams across institutions. However, we observed a difference regarding the use of resources to prepare for course exams. Analysis of resource use frequency between institutions revealed some differences. For example, the use of resources for disciplines such as physiology, microbiology, and pathology was observed. Additionally, differences were noted when comparing the use of specific resources such as transcripts, self-generated student resources, and online resources generated by peers.

CONCLUSION
The observation that students across all institutions are influenced similarly to use outside resources to prepare for licensing exams is expected. However, we did observe some differences which could be explained by variations in curriculum, faculty, and student culture. The preliminary results from this current study are consistent with what has been observed in previous studies. Establishing a better understanding of how students use outside resources will enable faculty and institutions to help students develop as self-regulated learners.

Abstract Title: Nerve Stimulator Implant or Surgical Decompression for the Management of Occipital Neuralgia: A systematic review and meta-analysis

Investigator: Li, Danxun
Co-Investigator(s): Mia Cranmer, MD26 EVMS; Gear Vincent, MD26 EVMS; Yifan Guo, MD, CHKD
Department: Plastic and Oral Maxillofacial Surgery, CHKD

Abstract

Introduction
Occipital neuralgia (ON) is characterized by severe pain originating from an occipital nerve. For patients that fail conservative and minimally invasive therapy, there are several surgical approaches to manage ON. Currently, there is little support in the literature for one surgery over another, and predictors of patient response are not standardized. We conducted a systematic review and meta-analysis to discuss the efficacy of two commonly used surgical interventions - subcutaneous nerve stimulator implantation and surgical decompression.

Methods
PubMed, Ovid(Medline) and Web-of-Science were searched following PRISMA guidelines to include studies describing nerve stimulation or surgical decompression in the management of occipital neuralgia. A total of 158 references were screened for relevance. Only studies that published discrete patient information were included. Demographic data and outcomes were assessed. Chi-square tests and analysis of variance were used to identify any significant differences ($p<0.05$) between the two procedures.

Results
Overall, 22 studies met inclusion criteria with a sample size of 74 patients. Of these, 13 underwent surgical nerve decompression (SD) and 61 had peripheral nerve stimulator implantation (NS). Patient ages ranged between 21-86 and symptom duration ranged between 6-132 months. Statistical significant differences between the two procedures were seen in patient age (SD: 38.9, NS: 49.9, $p = 0.01$), symptom duration (SD: 25 months, NS: 57 months, $p = 0.021$), 10-point pre-op pain score (SD: 7.2, NS: 8.3, $p = 0.0497$) and pre-op opioid use (SD: 0%, NS: 38%, $p = 0.019$). None of the differences in outcome variables such as change in pain score, complications or failures were statistically significant between the two treatment groups.

Conclusion
We sought to compare treatment outcomes and patient demographics for the treatment of ON by surgical decompression vs nerve stimulation and found that while there were statistically significant differences between age and patient symptom history (duration, pain, opioid use) at presentation, the difference in outcomes between the two procedures was not statistically significant. Our study was limited by the inclusion of only studies that published discrete patient information in which metrics we collected were sparsely reported and unstandardized. A larger scale meta-analysis that included studies with pooled rates would provide higher statistical power and better discernment of difference in efficacy between the two treatments.

Abstract Title: Triggers for Palliative Care Consultation in Advanced Head and Neck Cancer: A Quality Improvement Project

Investigator: Li, Nina
Co-Investigator(s): 1. Asheema Pruthi MD, Otolaryngology 2. Jonathan Mark MD, Otolaryngology 3. Matthew Bak MD, Otolaryngology 4. Patrick Morgan MD, Otolaryngology 5. Marissa Galicia-Castillo MD, EVMS Glennan Center for Geriatrics 6. Graham Watson MD, Virginia Oncology Associates 7. Mian Munir MD, EVMS Glennan Center for Geriatrics
Department: Otolaryngology

Abstract

Introduction:
Advanced head and neck cancer (HNC) is associated with high levels of physical, mental, emotional, and financial hardship on patients and caregivers. Advanced HNC is also associated with high healthcare utilization. These factors indicate poor quality of life and inadequate end-of-life care for patients. Palliative care (PC) is interdisciplinary care aiming to improve quality of life for patients with serious illness, and their families. Early palliative care is encouraged by international agencies such as the WHO, stating explicitly that "palliative care is applicable early in the source of illness, in conjunction with other therapies that are intended to prolong life." Involvement of palliative care offers many benefits to HNC patients by decreasing levels of patient and family distress, improving perceptions of care, and lowering rates of ICU readmissions. At EVMS, there are no current set guidelines for palliative care consultation in the HNC patient population. While patients are admitted, PC is often engaged for complex symptom management, discussion of goals of care, pain management, and for family/patient support. In an ambulatory setting, patients are noted to likely benefit from PC care, but do not always receive PC evaluation. There is additionally no set timeline for PC referrals (i.e. at initial diagnosis, after HNTB discussion, or in ICU with an end-stage diagnosis).

Our aim is to characterize the utilization of palliative care services in our practice with the intent of developing "triggers" to automate PC consultation in advanced HNC patients.

Methods:
After IRB approval, a retrospective chart review was conducted on patients presented to the EVMS multidisciplinary Head and Neck tumor board between 2021 to 2023 who received recommendations for palliative treatment. Adults ages 18-99 years old were included. Data regarding patient demographics, oncologic staging, surgical interventions, pathology findings, ED evaluations, ICU admissions, and reasons for palliative care consultation was obtained.

Results:
115 patient charts were reviewed. The average age of HNC patients was 69.4 years. The average length of time between initial tumor board evaluation and PC consult was 62.5 days. Despite tumor board recommendation for palliative care consultation, only 60.9% of patients received a palliative care consult and approximately 39.1% of patients did not. Palliative care was more often engaged in an inpatient setting (77.1%) than an ambulatory setting (28.6%). Palliative care consults were placed for goals of care discussion (52.7%), clarify goals (40.5%), symptom management (27.0%), patient/family support (35.1%), and pain management (16.2%). Of the patients who received PC consults, a majority had advanced stage III and IV disease with primary tumor T4 stage (64.3%, $p = 0.04$, OR = 2.38). Patients with T3 stage disease showed comparable rates of PC consults (18.6%) and no PC consults (22.2%). However, when accounting for comorbidities, patients with T3 stage and at least one comorbidity (diabetes mellitus, coronary artery disease, or previous history of malignancy) had a higher rate of receiving PC consults than not receiving a PC consult (OR = 1.67). Additionally, patients receiving PC consults had low Palliative Performance Scale (PPS) scores of 10-30% (27.9%), 40-70% (60.7%), and 80-100% (11.5%).

Conclusion:
Appropriate and timely palliative care services in advanced HNC cancer has the potential to improve patient quality of life and reduce healthcare costs. This quality improvement project characterizes our institution's current utilization of PC to identify triggers that can be implemented for standardized PC consults. These triggers will be implemented in discussion of HNC patients at the EVMS multidisciplinary Head and Neck tumor board to standardize and automate PC consultation. A prospective cohort study will be pursued after implementation of triggers and with the addition of quality of life indicators including documentation of advanced care planning, proxy decision maker, location of death, and receipt of chemotherapy in the last two weeks of life. It is our goal to provide a PC referral if deemed appropriate within 8 weeks of diagnosis in agreement with American Society of Clinical Oncology guidelines.

Abstract Title: Diagnosing Hidradenitis Suppurativa in MRI Breast

Investigator: Marfo, Emmanuel
Co-Investigator(s): Shripadh Chitta MD, Department of Radiology/EVMS
Department: Radiology

Abstract

Introduction:
This project is identifying hidradenitis suppurativa (HS) in MRI imaging, and how to stage it properly. HS is a chronic, recurrent, painful inflammatory skin disease of the skin. The inflammation is caused by hair follicle blockage, that causes dilation and rupture, followed by an inflammatory process that can lead to abscess formation and destruction of the surrounding area. This inflammatory process can lead to chronic recurrent infection, scarring, and sinus tract formation. The areas that are typically affected are intertriginous areas of the body, such as the axilla and inguinal region. Here, we present a case of a 45 year old woman who received breast imaging in multiple modalities, after which she had an abscess drainage.

Ultimately, she was diagnosed with bilateral HS.

Case Information:
This patient presented with bilateral breast redness and swelling over several months. She had a mammogram which revealed bilateral masses, highly suggestive of malignancy. MRI of the breast showed bilateral, multiloculated masses suggestive of an inflammatory process, but was not able to rule out malignancy. The patient had three breast procedures and an incision and drainage (I&D) which revealed bilateral, multifocal breast abscesses with sinus tracts. Despite multiple courses of antibiotics, her pain did not subside. The patient had three breast procedures and an I&D revealed bilateral, multifocal breast abscesses with sinus tracts, leading to the diagnosis of HS. The lack of sinus tract formation on initial breast imaging and the location of her abscesses necessitated the patient to have multiple imaging studies.

Discussion
HS is a chronic, recurrent, painful inflammatory disease of the skin. HS has an overall prevalence range of 0.1-2%. Risk factors for HS include African American race, obesity, and lower socioeconomic status. Imaging for HS can be done with ultrasound or MRI. MRI can be used to properly stage HS and characterize the lesion, leading to the proper treatment.

Staging of HS can be done using the Hurley Criteria. For example, initial MRI findings will show dermal thickening and subdermal induration, which appear as high signal intensity on T2-weighted imaging; staging depends on the image findings. Treatment for HS includes topical medications, systemic antibiotics, and wide excision of the lesions. If HS is not properly controlled, there is a small but notable risk of converting to squamous cell carcinoma. The patient in this case had an MRI with findings of bilateral abscesses, though HS was not diagnosed with this imaging. The lack of sinus tract formation and the atypical location of the breast abscesses made a radiologic diagnosis of HS difficult. Including contrast in the imaging protocols may have led to a faster diagnosis of HS, allowing proper staging.

Conclusion
This case reveals that HS should be on the differential when there is suspicion of a bilateral breast inflammatory process that may be abscesses. HS can be properly seen and staged with MRI. However, due to the atypical location of the HS associated abscesses in this patient's case, there was a concern for malignancy and HS was not initially diagnosed. The sinus tracts were not well visualized in imaging because of the patient's dense breast tissue, and lack of contrast. This case highlights the importance of adding intravenous contrast in the breast MRI protocol, and the fact that HS can be found in unusual places such as the breast.

Abstract Title: Differing Outcomes of Cleft Lip and Palate Repair Based on Patient Race, Ethnic Background, and Preferred Spoken Language

Investigator: Markert, Olivia
Co-Investigator(s): 1. Aracelia Aldrete, MD 2026
Department: CHKD Craniofacial

Abstract

Introduction: Orofacial clefts are a common congenital craniofacial malformation that occur when the facial prominences fail to fuse during the early weeks of development. Cleft palate and lip repair outcomes vary substantially in terms of feeding ability, speech ability, social skills, and aesthetics. Prior studies have noted increased lag time in the preoperative period in minority, non-English speaking populations as well as disordered speech outcomes for adopted children that undergo late palatoplasty. Thus, language and/or racial barriers could potentially contribute to these variable outcomes. Thus, this study aims to analyze differing outcomes of cleft lip and palate repair.

Methods: A retrospective review of cleft lip and palate patient care notes written prior to 4/23/2021 was completed. Variable repair outcomes were analyzed based on speech therapy attendance and compliance rate, feeding difficulties, behavioral difficulties, and educational difficulties. T-tests, ANOVA analyses, and logistic regression analyses were used to examine repair outcomes based on differential demographic features (race, ethnic background, and spoken language of patients) compared to a white, English-speaking control population.

Results: 337 patients that underwent cleft lip or palate repair met inclusion criteria. 53% attended speech therapy, signifying some form of speech delay. The only demographic feature found to be significantly associated with speech therapy attendance was race ($p < 0.001$). Specifically, Asians were 7.191 times more likely (95% CI 3.084, 16.767, $p < 0.001$) to attend speech therapy compared to the control group. Additionally, 10% exhibited behavioral delays, 6% exhibited educational delays, and 9% of patients experienced feeding difficulties. No statistically significant associations were found between these outcomes and race, ethnic background, or spoken language. 90 patients received speech therapy directly through CHKD. Asian patients had the highest mean compliance rate of 97.49% (95% CI 95.47, 99.52, $p < 0.05$), and Black/African American patients had lowest mean compliance rate of 81.51% (95% CI 70.38, 92.63, $p < 0.05$). Ethnic background ($p = 0.1455$) and spoken language of patients ($p = 0.5496$) was not associated with speech therapy compliance rate.

Conclusion/Discussion: Tangible discrepancies in cleft lip and palate repair outcomes exist regarding different patient demographics.

Abstract Title: From Recall to Reasoning: An Evaluation of Integrated Reasoning Quizzes

Investigator: May, Ashley
Co-Investigator(s): 1. Michelle Rogers, Educational Assessment and Evaluation/ Doctor of Medicine 2. Mily Kannarkat, Pre- Clinical Education/ Office of Education 3. David Bilberry, Medical Education
Department: Educational Assessment and Evaulation

Abstract

Introduction:
Integrated reasoning quizzes (IRQs) were implemented into the pre-clerkship curriculum during Academic Year 2022-2023 to provide medical students the opportunity to develop and practice high- order reasoning skills. This included questions with images/graphs/ tables, clinical vignettes, and required distinguishing between two or more "most likely" answers options. As part of the quiz functionality, students were asked to indicate what behaviors (e.g. gaps in knowledge, errors in reasoning, test-taking errors) led them to the correct/ incorrect answer after each question.

Methods:
Module course directors created quizzes that included questions that were more likely to be flagged by students during post-exam reviews. IRQs scores were compared with exam performance.

Results:
In general, there were significant positive correlations between IRQ average score and exam performance; the strength of the correlations varied between M1 and M2 students. While IRQs correlate with medical knowledge performance, they function differently for M1 vs. M2 students. For both M1 and M2 students, knowledge gaps were reported as the most common reason for answering questions correctly, compared to errors in reasoning and test-taking strategies.

Conclusion:
The evaluation study indicated the potential value of IRQs in preparing students for exams. Next steps would entail exploring the students' perspective on IRQs in helping with their medical knowledge and the differences in how M1 vs. M2 students use the quizzes.

Abstract Title: Addressing Professionalism DEI: The Use of Mentorship and Coaching to Address Unique Differences of URiM's in Medicine

Investigator: Mayo, Sarah Anne
Co-Investigator(s): 1. LaConda Fanning, PsyD, RN, LPC, LSATP, ACS, EVMS Graduate Medical Education
Department: Graduate Medical Education

Abstract
Introduction: The unique history within the United States has posed many challenges for POC. As a result, POC have been more susceptible to addressing microaggressions, navigating sensitivities, and needing additional support throughout their academic career. Mentorship is a form of teaching that can significantly enhance the trajectory of a mentee's career when done correctly. For URiM's specifically, it is integral that their needs are taken into consideration when formulating a mentoring curriculum.

Purpose: Our goal is to analyze survey data gathered from the perspective of URiM's to be used to develop a curriculum that highlights their values. *Method:* The survey specifically analyzed responses from URiM's where they were asked to rank the following five themes from 1 (most important) to 5 (least important): Engagement, Leadership, Management, Research and Guidance, and Interpersonal Skills. *Results:* Participants ranked Interpersonal Skills at the highest, followed by Engagement, and then Leadership, while Research and Guidance were ranked the lowest. This information allows us to implement more communication training and emphasis within the mentorship curriculum. *Future*

Phases of Project: The next steps of this project are to collect data on a secondary survey that will make curriculum development more specified. With both data sets, we can then implement the mentor curriculum and record post-survey data to then further adjust the curriculum to fit the needs of URiM's.

Abstract Title: An analysis of prenatal and postpartum needs and resources in the Hampton Roads Region: A Quality Improvement Survey

Investigator: McLaughlan, Katherine
Co-Investigator(s): 1. Lia Dopp, MD Student 2. Julianna Ghiorzi, MD Student
Department: Community Engaged Learning

Abstract

Introduction:
The United States has an infant mortality rate of 5.4:1000, yet Norfolk City has an infant mortality rate 9.6:1000. When broken down by race, black individuals in Norfolk have an infant mortality rate of 15.7:1000. Norfolk City is also above the national average for both low birthweight and very low birthweight newborns. Quality prenatal care has been shown to have a positive impact on both the mother and child. Mothers who receive consistent prenatal care are less likely to die due to pregnancy- related complications and their children are less likely to be born with low birth weight. Many factors can impede access to prenatal care. These factors include insurance status, fear/distrust of medical providers, medical racism, finances, availability of prenatal appointments, lack of social support, lack of transportation, and mental health status. Through this quality improvement survey, we aim to uncover areas where community support, resources, or prenatal care are most needed in the Hampton Roads region. With this information, the Mother and Baby Mermaids (MBM) CEL at EVMS can create a plan to improve the effectiveness of MBM's community outreach events at addressing these needs, with the overall goal of improving maternal and fetal health outcomes in the Hampton Roads Region.

Methods:
Our target population will be any individual over the age of 18 who is able to access the survey. The survey will include questions on demographics, pregnancy status, concerns during current/previous/future pregnancies, and awareness of currently available resources in Hampton Roads. We will be partnering with EVMS Minus9to5, the Virginia Department of Health, and various other shelters and organizations in the Hampton Roads Region to distribute our 29-question quality improvement survey at their locations. The survey is on Redcap and will be accessible via QR code on flyers with a description of the survey. We will then analyze the responses and look for trends.

Results: (Anticipated)
We are aiming to achieve at least 100 survey responses. We think that we will have a variety of responses from both pregnant and non-pregnant people. We plan on presenting results on respondent's concerns during current or previous pregnancies and postpartum periods (i.e. safety, nutrition, breastfeeding, postpartum birth control options, and finances), level of awareness/use of resources, and demographic trends. We anticipate that awareness of resources currently available to prenatal and postpartum women in the Hampton Roads Region is lower than is ideal. We hope to have the last survey administered and analyzed by October 10th, 2023.

Conclusion:
Our desired outcome is to find gaps in access to care and quality of prenatal/postpartum care among low-income women in Hampton Roads. We will work to directly address these gaps through the community outreach arm of MBM.

Abstract Title: Identifying Gaps and Suggestions for Further Exploration into our Current Understanding of PFAS and Bone Density

Investigator: Mea, Caitlin
Co-Investigator(s): 1. Danxun Li, MD 2026 2. Amanda Taylor, MD 2026 3. Nicholas Schouten, MD 2025 4. Ryan Krafty, MD 2026
Department: Pathology and Anatomy (former professor)

Abstract

Introduction
Environmental exposure to industrial chemicals including per- and polyfluoroalkyl substances (PFAS) may play a role in bone development and future risk of osteoporosis. We aim to develop an up-to-date understanding of the effects of PFAS on bone mineral density (BMD) and identify the gaps in current literature that can be explored in future studies.

Main Body
A PubMed search was performed using the terms PFAS, bone density and osteoporosis, yielding 44 results. Titles and abstracts were screened for relevance. Of the remaining articles (22), we reviewed studies related to pediatric (9) and adult (8) populations. Three articles discussed the biochemical effects of PFAS on physiologic receptors and cell types. Significant findings were extracted and synthesized. Studies included both cross-sectional and longitudinal samples.

The current literature demonstrates gaps in current knowledge about the pharmacokinetic and pharmacodynamic properties of PFAS in both animal models and human studies. There is limited data on what receptors, cells, and bones PFAS may impact. Even fewer studies exist that directly examine potential correlations between physiological changes induced by PFAS and the long term clinically significant effects of these changes.

Animal models and in vitro studies have found that PFAS are able to bind to and influence the activity of different transcription factors, receptors, and cells. PFAS were also shown to alter the differentiation andactivity of human bone cells. However, deposition and cellular effects of PFAS differed across different tissue types and body compartments. The literature revealed a significant inverse correlation between the serum concentration of PFAS and BMD in both adult and pediatric populations. However, one study did not find a significant association, and results were inconsistent across sexes.

Additionally, few studies demonstrated a clinically significant effect on bone pathologies, such as osteoporosis and pathological fractures. This is especially apparent in the dearth of studies that include adults over the age of 80, for whom bone pathologies pose a risk of considerable morbidity and mortality.

The studies reviewed rarely divided adults into smaller cohorts of exposure to PFAS mediates downstream pathophysiological effects. Many studies' statistical analyses. It is unknown how length treated adults with a wide age distribution, and therefore varying lengths of exposure, as a homogenous sample; this may have modified the observed correlations between PFAS and BMD based on age ranges

These studies also struggled to explore the interaction between socioeconomic status (SES) and PFAS. One study demonstrated higher levels of PFAS in individuals of higher SES. However, SES was not used as a predictor of the strength of the relationships between PFAS and BMD. Further research should be conducted to examine how protective factors (such as access to healthcare, diet, and occupational hazards) associated with higher SES may mitigate the harmful effects of PFAS.

Conclusions
The inverse correlation of PFAS and BMD has been extensively demonstrated across different populations and age groups. Nonetheless, significant correlations are inconsistent across studies. Further research should be done to elucidate the true relationships between BMD and PFAS. Understanding how factors such as age and SES affect the strength of known correlations between PFAS and BMD, and how these translate to clinical outcomes, are areas that merit further investigation. Large gaps still exist in our understanding of the potential effects, and their underlying mechanisms, that these ubiquitous substances have on normal physiology and various bone pathologies. More cause-and-effect relationships need to be brought to light by further research in order to educate healthcare providers in the development of meaningful clinical recommendations.

Abstract Title: Health Numeracy and Outcomes Among Hemodialysis Patients

Investigator: Opeke, Samuel
Co-Investigator(s): Charlotte Tu, Arbor Research Collaborative for Health Brian Beber, Arbor Research Collaborative for Health Rachel B. Fissell, Division of Nephrology, Vanderbilt University Medical Center Ebele M. Umeukeje, Division of Nephrology, Vanderbilt University Medical Center Devika Nair, Division of Nephrology, Vanderbilt University Medical Center Lisa Henn, Arbor Research Collaborative for Health
Department: Division of Nephrology, Vanderbilt University Medical Center

Abstract
Introduction: Health care for hemodialysis patients depends on understanding and interpreting quantitative data reflecting health status, risk, and prognosis. Few studies exist evaluating the role of health numeracy. In this study, we aim to identify characteristics associated with low health numeracy and determine its association with health outcomes among patients receiving in-center hemodialysis for end-stage kidney disease. We hypothesize that low numeracy in hemodialysis patients is associated with an increased risk for poor health outcomes.

Methods: The Dialysis Outcomes and Practice Patterns Study (DOPPS) is an international prospective cohort study of a representative sample of hemodialysis patients. Health numeracy was scored using a validated 3-item version of the Subjective Numeracy Scale (SNS-3) where higher scores (range 3-18) indicated higher numeracy skills. Regression models adjusting for potential confounding variables evaluated the associations between numeracy score and health outcomes including mortality, hospitalization, and vascular access.

Results: Among 5104 hemodialysis patients, 46% had low health numeracy. Lower numeracy scores were associated with fewer years of education, lower health literacy, unemployment, a diagnosis of diabetes, and female gender. Compared to high numeracy, low numeracy was associated with increased odds of catheter access use (Odds Ratio 1.30, 95% CI: [1.15, 1.50]) as well as an increased rate of all- cause hospitalization events (Rate Ratio 1.25, 95% CI: [1.05, 1.35]) in the fully adjusted model.

Although low numeracy also demonstrated a higher risk of all-cause mortality (Hazard Ratio 1.30 (95% CI: [0.99, 1.50]), it did not reach statistical significance.

Conclusion: In this large international cohort of patients receiving hemodialysis, lower health numeracy was associated with increased risk for important health outcomes including all-cause hospitalization and catheter use for vascular access. This study identifies health communication involving numeracy may be a key modifiable mechanism to improve these health outcomes as well as address related health disparities.

Abstract Title: The Effect of Chemotherapy on Olfactory and Gustatory Function in Pediatric Patients

Investigator: Osman, Alim
Co-Investigator(s):
Department: ENT

Abstract

Background: Side effects from chemotherapy have been thoroughly studied in the literature, with reports of nausea, fatigue, among many other symptoms. Additionally, very few studies have analyzed the effects of chemotherapeutic agents on olfactory and gustatory function. To date, no study has looked at the effects of chemotherapy on gustatory and olfactory function in the pediatric population. The purpose of our study is multifaceted in its approach: (1) To investigate the effect on gustatory and olfactory function of pediatric patients. (2) To understand the association between gustatory/olfactory dysfunction on the overall nutritional status of pediatric patients.

Methods: Pediatric patients undergoing chemotherapy will be subjected to three tests analyzing olfactory and gustatory function. The Sniffin' Stick identification test and the Snap and Sniff Threshold test will be used to gather olfactory function. Furthermore, Burghart Odofin Taste Strips will be utilized to test the gustatory function of the participants. To analyze nutritional status, patients will be given questionnaires in the beginning and at the end of the study. An ANOVA test will be used to compare the effects of the various chemotherapeutic agents on olfactory and gustatory function.

Results: Upon IRB approval, we hope to begin testing on the pediatric patient population at CHKD. We anticipate that there will be a statistically significant difference in the results based on the chemotherapeutic agent used. Furthermore, we anticipate the same trend in gustatory function due to the close relationship of olfaction and gustation.

Conclusion: As pediatric cancer continues to significantly impact patients across the globe, further research is warranted to better council the patient population regarding the adverse events of treatment. This study will provide more information regarding the adverse events of chemotherapeutic agents given to children. Furthermore, it will help researchers better understand the olfactory and gustatory system and how it is impacted by pharmacology.

Abstract Title: Dynamic Diagnosis: Navigating the Fourth Dimension of Parathyroid Adenomas on 4D CT

Investigator: Parker, Jonathan
Co-Investigator(s): 1. Jonathan Parker 2. Alexander Schlarb, MD, Radiology 3. John Campbell, MD, Radiology
Department: Radiology

Abstract

Introduction: Parathyroid adenomas are common causes of primary hyperparathyroidism. Preoperative localization of these adenomas is crucial for surgical planning and successful removal. Parathyroid four- dimensional CT (4D CT) is becoming increasingly popular for the diagnosis and localization of parathyroid adenomas. 4D CT harnesses time as the fourth dimension, enabling precise identification and localization of parathyroid adenomas.

Case information: We present the case of an 80-year-old female with a past medical history of chronic kidney disease and diabetes mellitus. During routine lab work, her serum calcium was found to be elevated at 11.9 mEq/L. Further workup revealed a serum parathyroid hormone level of 383.4 pg/ml, compatible with primary hyperparathyroidism. A planar scintigraphic sestamibi scan revealed abnormal radiopharmaceutical activity in the region of the left superior parathyroid, suggesting the possibility of parathyroid adenoma versus parathyroid hyperplasia. A 4D CT scan of the neck demonstrated a discrete 1 x 1 x 2 cm nodule along the posterior margin of the left upper pole thyroid with rapid enhancement and rapid washout-characteristics consistent with parathyroid adenoma. Surgical parathyroidectomy was carried out of the left superior, left inferior and right inferior parathyroid glands was performed.

Pathology of the left superior parathyroid confirmed tissue diagnosis of parathyroid adenoma.

Discussion: Traditional imaging techniques have limitations in accurately identifying the location of parathyroid adenomas. 4D CT scan is a reliable tool for the localization of parathyroid adenomas. This advanced imaging technique combines the advantages of computed tomography (CT) scans with dynamic imaging over time, enabling precise visualization of the parathyroid adenoma's vascular supply, its relationship with adjacent structures, and its functional characteristics. An additional benefit is the capability to locate ectopic adenomas in the neck and chest. From a surgical perspective, precise localization can potentially enable the use of smaller incisions and avoid the necessity to examine each parathyroid individually. On 4D CT imaging, parathyroid adenomas typically exhibit distinct characteristics. They often appear as discrete nodules adjacent to or within the thyroid gland, with rapid enhancement upon contrast administration and subsequent rapid washout. These dynamic imaging features, involving both quick uptake and clearance of contrast, aid in the precise identification and localization of parathyroid adenomas, contributing to improved diagnosis and surgical planning.

Conclusion: This case underscores the value of 4D CT in accurately diagnosing and pinpointing the location of parathyroid adenomas.

Abstract Title: Identifying Characteristics Associated with Repeat Visits for Pediatric Asthma Exacerbations

Investigator: Peluso, Joseph
Co-Investigator(s): Joseph Peluso, EVMS; Kristina Roth, Department of Pediatrics; Ashlee Law, Department of Allergy/Immunology; William Tredwell, Department of Pediatrics; Turaj Vazifedan, Department of Pediatrics; Angela Hogan, Department of Allergy/Immunology, CSG; Kelly Maples, Department of Allergy/Immunology, CSG
Department: CHKD Department of Pediatrics

Abstract
Introduction: Half of children with asthma experience at least one asthma exacerbation each year. Some require repeat treatments due to ongoing or worsening asthma. Some research exists exploring dexamethasone vs. prednisone/prednisolone outcomes showing equally efficacy, but limitations include exclusion of severe asthma, use of lower prednisone doses, and outcomes based on subjective reporting. Some studies report reduced risk of vomiting with dexamethasone. Clinicians from this group have anecdotally noted that some patients initially treated with dexamethasone end up requiring a course of oral prednisone/prednisolone. Little data exists on characteristics that predict the need for a second or longer course of steroids.

Methods: We performed a retrospective chart review of pediatric patients who had a visit to the CHKD emergency department in 2022 for asthma exacerbation/wheezing based on ICD-10 codes and who received a systemic steroid. Data collected included symptoms, exam, treatments, testing, and disposition. Charts were reviewed one month after the initial visit to assess for return visits where subsequent systemic steroids were prescribed for ongoing asthma exacerbation.

Results: The majority of patients were under 6 years of age. Patients classed with more severe asthma ($p<0.001$), prior admission ($p<0.001$), or previously seen by a subspecialist for asthma ($p=0.024$) were significantly more likely to be admitted. The likelihood of positive RP2 testing, for Human rhinovirus/enterovirus ($p=0.029$) and Parainfluenza ($p=0.025$), were significantly higher among admitted patients. No association with vomiting was identified.

Conclusion: Factors like asthma severity, past admissions, and previous specialist visits were significant for patients needing to be admitted. Dexamethasone was the most frequently used systemic steroid. More data is needed to make a statistically significant comparison with prednisone/prednisolone/methylprednisolone. Patients who received prednisone/methyl prednisone in the ER had a higher rate of admission, however a confounding variable is that this subset of patients had more severe asthma classifications. Viral illnesses were significant for admission. They were also associated with repeat visits, but this was not statistically significant. These factors could be considered as a part of a comprehensive assessment by clinicians when considering disposition and follow-up plans. More data is needed on factors associated with repeat visits.

Abstract Title: The Impact of De-Escalation Training for Medical and Health Profession Students in a Free-Clinic Setting

Investigator: Peppiatt, Irene
Co-Investigator(s): 1. Michael Pham, MD Class of 2024 2. Joshua Edwards, School of Health Professions
Department: School of Health Professions

Abstract

Introduction:
Agitation is excessive psychomotor activity resulting in an extreme form of arousal that may be complicated by aggressive or violent behavior. Agitation has a broad differential diagnosis, but regardless of the cause, it may serve as a safety risk for both patients and healthcare workers. Of note, healthcare workers experience 50% of occupational assaults in the United States (US), and studies have shown that younger clinicians and those in the emergency, psychiatric, and geriatric settings are at highest risk of violence. Despite these statistics, medical students repeatedly report that they feel they have inadequate time dedicated to management of agitation during the course of their medical education. Verbal de-escalation is the gold standard for agitation management. However, it is difficult to teach in real clinical settings as the presentation is unpredictable, and it may be difficult to maintain patient safety while still allowing the student to make mistakes and receive feedback. Although there is a lack of high quality evidence into the effectiveness of verbal de-escalation training programs, a previous study demonstrated that students have increased confidence working with agitated patients after receiving virtual simulation training. We decided to implement in-person simulation training for de-escalation techniques after learning that many pre- clerkship medical students felt uncomfortable managing episodes of patient agitation in the weekly Eastern Virginia Medical School (EVMS) Street Health clinic. The most common causes of acute agitation in this clinic are exacerbation of a psychiatric condition (at least 35% of our patients present for management of a psychiatric condition) or acute intoxication.

Methods:
A de-escalation workshop was led by a senior psychiatry resident. Following the presentation, several unique patient encounters were acted out by senior medical students for small groups. The psychiatry resident ended the session with feedback and final discussion. Pre- and post-session surveys were anonymously administered via QR code to a REDcap link. The survey instruments used were a combination of demographic questions, a modified Perceived Stigma Questionnaire (PSQ-13) and Thackrey's Confidence in Coping and Patient Aggression 10-item Questionnaire scaled 1-11. Data was stored and analyzed using REDCap.

Results
Fifty seven students completed the pre-session survey (51% female, 1.8% identified as gender non-conforming). Of those, 56 attendees completed the demographic survey. 35% were first year and 51% were second year medical students. 68% of the attendees were involved in an in-person free clinic. 94% had not participated in a de-escalation class in the past, and 75% would not know what to do when confronted with aggressive behaviors. On the pre-session Thackrey Confidence Scale, attendees measured comfortability working with aggressive patients at a mean of 4.84±2.68, handling psychological aggression at a mean of 3.58±2.16, and training for handling physical aggression at a mean of 3.56 ± 2.87. Forty seven students completed the post-session surveys and reported comfortability level working with aggressive patients at a mean of 6.74±1.47, handling psychological aggression at a mean of 6.59±1.69, and training for handling physical aggression at a mean of 5.81± 2.21. A mean of 10.04 ± 1.41 respondents would likely recommend this session to a friend. 58% overall rated this workshop as 'excellent' and 33% overall rated the session as 'very good'.

Conclusions:
In-person simulation training increases student comfort in working with aggressive patients and handling psychological aggression. Free responses from the post-session survey revealed that the students felt the session was helpful and recommended that other students attend the workshop. It would be reasonable to make the benefits of this verbal de- escalation training more widespread by incorporating it into the simulation-based clinical skills course provided by the school to all first and second-year medical students.

Abstract Title: A Comprehensive Review of The Woven Endobridge Device in Intracranial Aneurysm Treatment

Investigator: Phuyal, Simran
Co-Investigator(s): 1. Co-A-1, Ashely M. Carter, EVMS MD 2024 2. Co-A-2, Bethsabe Romero, EVMS MD 2024 3. Co-A-3, Harrison Dai, EVMS MD 2024 4. Co-A-3, danxun Li, EVMS MD 2026 5. Co-A-4, Dr. Brandon Lucke-Wold, Department of Neurosurgery, University of Florida
Department: Neurosurgery, University of Florida

Abstract

Introduction:
The treatment of intracranial aneurysms has a profound history, marked by notable breakthroughs in techniques and technology. Intrasaccular flow diverter devices emerged as a revolutionary paradigm shift in treating wide-neck intracranial aneurysms. These devices redirect blood flow away from the aneurysm, resulting in delayed clot formation and a gradual endothelialization of the parent vessel wall. Despite the breakthroughs, effective long-term treatment of wide-neck aneurysms remains an intricate challenge. Advancing modalities are actively being developed in endovascular therapies to facilitate efficient long-term benefits. Woven Endobridge (WEB) device is a recent and rapidly evolving innovation toward the treatment strategy of wide-neck intracranial aneurysms.

Body:
The Woven Bridge (WEB) embolization device is an intrasaccular flow diverter device designed to divert flow at the interface between the aneurysm and the parent artery. The device was first introduced in 2011 and has evolved in its design and uses over the past decade. It has been approved by the U.S. Food and Drug Administration (FDA) to treat wide-neck bifurcation aneurysms. Several pre-clinical and clinical trials have investigated the device's safety and efficacy, with promising results of long-term aneurysm stability and occlusion. The WEB device can be implanted in a shorter duration than other intrasaccular devices, providing the advantage of not requiring antiplatelet therapy post-procedure. It can be used to treat both ruptured and unruptured aneurysms. The device has undergone numerous modifications since it was first developed, guided by the insights from pre-clinical trials. Additional indications of the device have been identified in clinical studies, indicative of its evolving application.

Conclusion:
The WEB device is a pivotal tool in the ever-evolving landscape of intracranial aneurysm treatment. The device is unique in its innovation and indications, broadening the field of endovascular aneurysm management. As we continue to explore its potential, further investigation into the long-term association of recurrence and rupture rates would provide value for clinicians. It would also be beneficial to evaluate the rate of complications involving the WEB devices compared to those involving stents or clipping.

Abstract Title: Triple-Negative Breast Cancer (TNBC) Racial Disparity and High Mortality in Hampton Roads Virginia

Investigator: Piatak, Claire
Co-Investigator(s): 1. Taylor N. Drake, MD Student/EVMS 2. Ashleigh Hannah, Masters of Science in Biomedical Sciences- Research/EVMS 3. Jonathan Baker, PhD Candidate-Microbiology and Molecular Cell Biology/EVMS 4. Caroline Dasom Lee MD, Hematology and Medical Oncology Fellowship Program/Stanford Medicine 5. Emily L. Breeding MD, General Surgery Residency Program/Vanderbilt University Medical Center 6. Janet S. Winston MD, Department of Pathology/Sentara Healthcare 7. Billur Samli MD, Department of Pathology/Sentara Healthcare 8. Rick J. Jansen PhD, Clinical and Translational Science Institute/University of Minnesota 9. Michael Danso MD, Hematology & Oncology/ Virginia Oncology Associates 10. Richard A. Hoefer DO FACS, Surgical Oncology/Sentara Cancer Network 11. Amy H. Tang PhD, Microbiology and Molecular Biology/EVMS
Department: Microbiology and Molecular Biology

Abstract

Introduction: While high-resolution imaging and advancements in therapies have significantly improved breast cancer survival rates, 43,170 breast cancer patients will die in the United States in 2023 alone. Triple-negative breast cancer (TNBC) is the most aggressive breast cancer subtype and disproportionately affects BRCA1 mutation carriers and young black women. Black/African American (AA) patients have the highest mortality and the shortest survival of any racial/ethnic group in the US. Persistent cancer racial disparity remains due to a variety of risk factors. Genetics, structural racism, medical mistrust, treatment disparity, unstable employment, limited access to quality healthcare, and poor education background all contribute to cancer racial disparity and high mortality detected in many underserved communities. The SEER/CDC data show an 8% lower breast cancer incidence rate but a 41% higher mortality rate in Black/AA patients when compared to their white counterparts.

Methods: Chart review was conducted using Sentara MD Office/EPIC and VOA iKnowMedicine portals to update tumor relapse, metastasis, and survival information in 577 TNBC patients. Supported by strong evidence in developmental, evolutionary, and cancer biology, we hypothesize that persistent EGFR-K-RAS-SIAH pathway activation is a major driving force of TNBC malignancy, racial disparity, early relapse, and high mortality. We propose to integrate SIAH expression to augment the existing clinicopathological parameters to improve patient risk stratification, therapy quantification, and relapse/survival prediction at the 1st-line neoadjuvant settings.

Results: We report that cancer disparity and high mortality rates are even more pronounced in our racially-diverse communities in Hampton Roads Virginia. We discovered that SIAH is a tumor-specific, therapy-responsive, and prognostic biomarker whose SIAH$^{High/Low}$ expression can be used for patient risk stratification, cancer racial disparity detection, and relapse/survival prediction in TNBC. High SIAH expression in residual tumors reflects tumor-driving EGFR/K-RAS/SIAH pathway activation (ON) that will predict cancer disparity, treatment resistance, early relapse, and poor survival. Low SIAH expression in residual tumors reflect effective treatment and EGFR/K-RAS/SIAH pathway inactivation (OFF) that will predict tumor remission and prolonged survival.

Conclusion: We detect a major cancer racial disparity of Black/White TNBC patients at Sentara- EVMS-VOA. Our local Black/AA TNBC patients have a 1.6-fold higher mortality rate than their white counterparts. Encouraged by our preliminary data, we aim to develop a SIAH-centered biomarker panel by measuring the EGFR/RAS/SIAH pathway activation (ON)/inactivation (OFF), and use SIAH as a new prognostic biomarker to risk stratify patients, detect cancer racial disparities, forecast tumor relapse, and predict patient survival at 1st-line neoadjuvant settings. By focusing on EGFR/RAS/SIAH pathway, we will be able to detect racial disparity, reduce TNBC mortality rate, and identify and tailor therapies to save more patients from TNBC.

Abstract Title: A Quality Improvement Project to Improve Productivity at CHKD Urgent Care Centers

Investigator: Pierce, Emma
Co-Investigator(s):
Department: Pediatrics

Abstract

Urgent care service lines have become an important point of access to healthcare that help decrease workload on Emergency Departments. The Children's Hospital of the Kings Daughters has three urgent care centers (UCCs) in the Hampton Roads area that provide a range of services for non-emergent pediatric patients who are unable to see their PCP. CHKD UCC goals are to keep average patient length of stay (LOS) under 60 minutes, but current averages are consistently above 60 minutes. Longer LOS has been shown to correlate with lower patient satisfaction[1], and has also led to increased costs due to urgent care staff staying after hours. Longer average LOS also leads to an increased workload and a lower work-life balance for staff, which has been shown to increase burnout and decrease motivation to stay in the profession[2,3]. To improve LOS, a large quality improvement project (QI) project is currently being developed. In order to decide where to focus QI efforts, there is a need to determine the highest time costs for the highest number of patients. A power BI dashboard was created to collect various time points from all patient visits through March, April, and May 2023. The interventions studied were strep tests, urine analyses, X-rays, splints, albuterol inhalers, and ear flushes. Strep tests, urine analyses, and X-rays had two time points: order placed to order/ image collected, and then image/ sample collected to test resulted. All other interventions were measured by time ordered to order completed. A Pareto analysis of average time of intervention multiplied by the percent of patients who received that intervention was done. The Pareto analysis showed that the highest amount of time during patient stay is spent on strep test collection, followed by x-ray image collected to completed and x-ray collection. This conclusion allows a focused intervention on those specific tasks to help decrease patient LOS.

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Abstract Title: A case of steroid responsive encephalopathy associated with autoimmune thyroiditis treated as thyrotoxicosis with psychotic features

Investigator: Pilc, Emily
Co-Investigator(s): 1. Emily Pilc, Psychiatry and Behavioral Sciences/MD2025 2. Hannah James, Psychiatry and Behavioral Sciences/MD2024 3. Taseya Coleman, Psychiatry and Behavioral Sciences/MD2025 4. Samuel Fox, Psychiatry and Behavioral Sciences/MD2024 5. Trevor Schlecht, Psychiatry and Behavioral Sciences/MD2024 6. David Spiegel, MD, Psychiatry and Behavioral Sciences, EVMS
Department: Psychiatry and Behavioral Sciences

Abstract

Introduction: Steroid-responsive encephalopathy associated with autoimmune thyroiditis (SREAT) may be characterized by neuropsychiatric symptoms such as confusion, altered level of consciousness, seizures, mania, and psychosis. Corticosteroids are the first-line treatment, with immunosuppressants as additional therapy.

Thyrotoxicosis is an excess of thyroid hormone with symptoms including tachycardia, weight loss, tremors, depression, and emotional lability. Treatment includes antithyroid agents and beta-blockers. We present a young woman with a second episode of psychotic symptoms in the setting of thyroid disease, suspected to have SREAT.

Case Information: Our patient, a 31-year-old woman with a past medical history of hyperthyroidism and depression, was seen by this team during two admissions in the same year. We were asked to evaluate this patient after she presented to the emergency department (ED) for a motor vehicle accident and was found to be hypothyroid. During an earlier admission, months prior to our evaluation, the patient was agitated with delusions and auditory hallucinations. Physical examination at that time was remarkable for trismus and tonic-clonic movements. The patient denied alcohol and substance use and her blood alcohol level and urine drug screen were negative, as was a pregnancy test. Lab results included an elevated prolactin level of 72.4 ng/mL (consistent with seizure activity), elevated TSH (15.9 mcU/mL), low free T4 (<0.1 ng/dL), low free T3 (1.1 pg/mL), and elevated cerebrospinal fluid (CSF) 14-3-3 protein with negative real-time quaking-induced conversion. An electroencephalogram (EEG) was normal, with 9 Hz frequencies and no epileptic discharges. Magnetic resonance imaging (MRI) revealed a prominent ventricular system and areas of white matter change. She was started on levetiracetam, hydrocortisone, and levothyroxine. One week after admission and treatment with several antipsychotics, her psychiatric symptoms resolved and she was discharged. During the patient's current admission, she presented to the ED for bizarre behavior, including elevated mood and grandiosity. She was severely hyperthyroid and behaviorally similar to her prior admission. Lab results included low TSH (<0.01 mcU/mL), high free T4 (2.3ng/dL), and high free T3 (7.4 pg/mL). Physical examination was remarkable for hypertension and tachycardia. A repeat MRI demonstrated cerebral white matter lesions that appeared increased. Despite our suspicions for SREAT, the patient was started on methimazole, propranolol, and olanzapine. Three days after admission, her mania/psychosis resolved although she was discharged before informed consent for this case report could be obtained.

Discussion: SREAT is a rare disease, affecting approximately 2.1 out of every 100,000 people. The exact pathogenesis is believed to be immune-mediated and most patients present with anti-thyroperoxidase or anti- thyroglobulin antibodies. Hyperthyroidism is much more common, affecting 1.3% of the United States population. Thyrotoxicosis and SREAT clinically overlap in many ways, presenting with thyroid hormone abnormalities and neuropsychiatric manifestations. However, treatment differs such that treating SREAT as a primary thyroid disorder may lead to poor response and relapse. Psychotic symptoms occur in SREAT in up to 36% of patients, while psychosis secondary to hyperthyroidism only occurs in 1% of patients. The presentation of our patient during her first admission was suggestive of myxedema psychosis, however she also presented with seizure activity which is more common in SREAT, with 47% of patients presenting with convulsions. Further work-up revealing abnormal MRI findings and positive CSF 14-3-3 protein raised suspicion for SREAT. Her second admission for psychosis in the setting of hyperthyroidism and with a history of seizure activity, abnormal labs, and imaging, is most suggestive of SREAT.

Conclusion: We believe this case emphasizes the importance for clinicians (1) to consider SREAT for these patients, especially females presenting as thyrotoxicosis with a second episode of psychosis and history of seizure activity, and (2) to understand and be able to identify the differences between SREAT and thyrotoxicosis.

Abstract Title: Understanding Practice Processes for 6-Week Postpartum Care

Investigator: Platt, Mia
Co-Investigator(s): Takemia Cornegy-Hawks; Lindsay Robins, MD; Nikia Johnson
Department: Consortium for Infant and Child Health

Abstract

Introduction: Maternal mortality and morbidity rates in the United States are the highest of any developed nation in the world. During the postpartum period, there is a shift in the focus of care from the mother to the baby. It is during the period, from delivery to about a year postpartum that most mothers experience complications and unfortunately death. When considering race, ethnicity and socioeconomic background, black persons who give birth have the highest rates of postpartum mortality and morbidity. In the recent years, these statistics and health equity concerns have gathered national and worldwide attention resulting in an earnest push to find adequate solutions.

Methods: This study examined local practice protocols and statistics surrounding postpartum visit attendance. A survey was created that investigated how the practice conducted scheduling of postpartum visits for different scenarios, such as premature delivery or high-risk delivery. We also sought statistical information on attendance rates, no-show rates, and payer mix/patient demographic. Each survey was administered orally over the phone with a practice representative.

Results: We identified thirty-one separate practices in the cities and counties surrounding Sentara Norfolk General. Of these 31, six practices completed the survey, four practices declined participation in the survey and the other 21 practices neither declined nor completed the survey. Three of the six practices who completed the survey reported they completed postpartum visit scheduling either at the last prenatal visit or by calling the patient after delivery. The other half required the patient call and schedule their own appointment. The practices that reported higher attendance rates also reported adequate availability of statistical data regarding these appointments. These practices also had a higher commercial payer population. For the other practices who either did not know the data or reported low attendance rates, the patient population was generally majority Medicaid users.

Conclusions: Moving forward the formation of better protocols surrounding scheduling and follow-up with patients, as well as increased availability of statistical data regarding postpartum visit attendance is a necessity.

Abstract Title: Understanding, Improving & Tracking of Diabetes Care in the Western Tidewater Region of Virginia

Investigator: Poirier, Andrew
Co-Investigator(s): 1. Abby McMillan, MS, EP-C, EVMS Strelitz Diabetes Center 2. Carolina Casellini, MD, EVMS Strelitz Diabetes Center 3. David Lieb, MD, FACE, FACP, EVMS Strelitz Diabetes Center 4. Henri Parson, PhD, EVMS Strelitz Diabetes Center 5. Swara Chokshi, Virginia Commonwealth University
Department: Strelitz Diabetes Center

Abstract

Introduction: The Western Tidewater (WT) region consists of Franklin, Suffolk, Isle of Wight, Southampton, Surry, and Sussex, Virginia, as well as Gates County, North Carolina. In each locality, the prevalence of Diabetes is higher than the state average.[1] This study aims to gain a better understanding of the demographics and social determinants of health (SDoH) in WT to develop interventions to bridge this gap.

Methods: Demographics, SDoH, blood pressure, weight, BMI and point-of-care HbA1c were collected through widespread community-based events in WT from April 2022 to June 2023. Data was entered into REDCap and analyzed using JMP Pro10. Analysis of variance (ANOVA) was used for continuous variables to compare mean differences between groups, with post hoc analysis (Tukey-Kramer).

ChiSquare was used for categorical variables.

Results: 192 patients were screened. 28.64% had diabetes and 18.23% had pre-diabetes. Black participants were more than twice as likely to have diabetes than white respondents. (33.57% vs 15.22%; $p = 0.0484$). Diabetic and pre-diabetic participants were older, (mean age: diabetes: 63.36, pre- diabetes: 63.74 vs non-diabetes 52.64; $p < 0.0001$), had a higher BMI (mean BMI: 34.84, 35.38 vs. 30.91 kg/m^2, $p=0.0066$,) and had higher rates of hypertension, hyperlipidemia, and heart disease. Higher rates of diabetes also existed among lower income and less educated groups. No significant differences existed among the groups in other SDoH measures.

Conclusion: This study shows that income, education, age, BMI, and race are all risk factors for diabetes. Therefore, future interventions should focus on these more vulnerable groups. With WT being an underserved area, we expected there would be more respondents with barriers to care, such as difficulty finding a PCP and getting to appointments, but this was not observed. This could be explained by sampling bias, as people that experience these barriers likely have difficulty attending screenings. It is also important to note there was a disproportionate number of women and black participants (~75%, each group). A future goal is to seek a more representative sample, with efforts to target more underserved areas of WT and male participants.

[1] Sentara Healthcare. Sentara Obici Hospital Community Needs Assessment. Published online 2019.

Abstract Title: Prevalence of Concurrent Use of Controlled Substances in Opioid Use Disorder Patients During Hospitalization

Investigator: Ralston, Megan
Co-Investigator(s): Megan Ralston, MD2025; Will Crafton, MD2026; Pavan Suryadevara, MD2026
Department: Psychiatry

Abstract

Background: The opioid epidemic in the United States has led to widespread substance abuse disorders and fatalities. Patients with opioid use disorder (OUD) who self-medicate with other substances while hospitalized for opiate detoxification or acute pain treatment face potentially severe consequences. This study aims to assess the prevalence of concurrent use of controlled substances among hospitalized OUD patients.

Methods: A retrospective cohort study will be conducted at SNGH patients prescribed opioids from January 1st, 2022, to December 31st, 2022. Patients were included if they had treatment plan which included opiates for opiate detoxification, maintenance, or acute pain management will be included. Exclusion criteria will account for valid prescription use and false-positive drug screens. Data will be collected through EPIC EMR and analyzed using SPSS Statistical Subscription Service.

Results: Results pending. Baseline and demographic characteristics will be summarized using descriptive statistics. The prevalence of patients on admittance acute hospitalization with positive drug screens for non-prescribed substances will be determined. Secondary objective will assess the prevalence of positive screening any time following hospital admission.

Conclusion: This study will shed light on the concurrent use of controlled substances in hospitalized OUD patients. The findings will be crucial in guiding physicians and clinicians to make informed decisions regarding opiate treatment and health directives for this vulnerable patient population.

Keywords: opioid use disorder, controlled substances, hospitalization, retrospective cohort study, prevalence, patient care.

Abstract Title: Improving Patient Outcomes: An Analysis of Clinical Practice Guidelines and Order Sets at CHKD

Investigator: Rana, Noor
Co-Investigator(s):
Department: CHKD Hospitalist

Abstract

Introduction: Clinical Practice Guidelines (CPGs) and Order Sets are standardized, evidence-based tools that assist clinicians with patient care. They improve patient outcomes and lower the total cost of care by reducing unnecessary variability in treatment and decreasing medical errors. This project aims to generate a report on the current landscape of CPGs and Order Sets at the Children's Hospital of The King's Daughters (CHKD) that would inform the establishment of a centralized program to optimize their management.

Methods: Faculty members across CHKD departments were interviewed virtually using two surveys that assessed factors including accessibility, tracking, and revision of CPGs and Order Sets, respectively. Both internal and external interviews were conducted to evaluate the current state of CHKD and to gather insights from peer institutions with established programs. REDCap was used to input survey results and descriptive statistical analysis was performed.

Results: Analysis of responses (n=14/27) demonstrated that 14.3% of the interviewed departments have a designated time interval for reviewing and revising their Order Sets while 28.6% have one for their CPGs. 7.1% of responses indicate tracking the creation and expiration of their Order Sets; 21.4% indicate the same for CPGs. Only 7.1% of interviewed departments monitor the use of their Order Sets and CPGs. Accessibility, particularly for CPGs, was also found to be largely inconsistent across departments, with mixed responses for where they can be accessed and who can access them. External interviews detailed the benefits of a centralized program and strategies for successful implementation.

Conclusion: These findings highlight a need for a centralized program to establish consistent revision, monitoring, and expanding accessibility of CPGs and Order Sets at CHKD. External interviews revealed a significant disparity between CHKD and its sister institutions, underscoring significant areas for improvement at CHKD. With a response rate of 51.9%, limitations include a lack of responses, including "don't know" answers and restrictive schedules of clinicians. A report will be presented to hospital administration in the fall as part of strategic planning for program development in patient safety and quality.

Abstract Title: CD40 deficiency attenuates neuroinflammation in experimental epilepsy

Investigator: Reid, Faith
Co-Investigator(s): G. Jean, MS4 EVMS K. Vinokuroff, Department of Pathology and Anatomy, EVMS J. A. Sharp, Microbiology and Molecular Cell Biology EVMS E. Pototskiy, Pathology and Anatomy EVMS
Department: Anatomy/Pathology

Abstract

Introduction:
Neuroinflammation is a pivotal factor in the pathogenesis of seizures and epileptogenesis. CD40L and its receptor CD40 are members of the TNF family and are elevated in chronic epilepsy, both after seizures and during post-status epilepticus. The primary objective of this research was to determine whether the negative modulation of CD40 limits neuroinflammation in a model of epilepsy.

Methods:
The pentylenetetrazole (PTZ) model of seizure or the pilocarpine model of status epilepticus (SE) were induced in adult male mice deficient of CD40 (CD40KO) and their respective age-gender controls.

Seizures were analyzed clinically using Racine's score and electrophysiologically from local field potential recordings utilizing a silicone probe in the brain. In a group of mice, siRNACD40 or shRNA were injected into the brain before PTZ treatment. Following euthanization, brain specimens underwent histological and biochemical analysis. Secretory sCD40L and a group of cytokines and chemokines were analyzed using ELISA or the Meso-Scale Discovery platform. ANOVA, Student's t test and Z- scores were used for statistical analysis.

Results:
Our preliminary data indicates that CD40 and sCD40L increased after seizures and that intracerebral siRNACD40 limits both seizure susceptibility and sCD40L concentration in the hippocampus. In addition, CD40KO showed: a) a decreased concentration of pro-inflammatory KC/GRO, IL6 and TNF alpha and increased IL-10 after SE; b) reduction of seizure-induced gamma oscillations in hippocampus and recurrent seizures; and c) reduced chronic brain damage.

Conclusion:
These data suggest that CD40L-CD40 constitutes a key component in the initiation of the inflammatory cascade during the development of epilepsy.

Abstract Title: A Review of Impact and Mechanisms of Maternal Stress on Fetal Programming and Offspring Mental Health

Investigator: Remo, Julianna
Co-Investigator(s):
Department: Physiology

Abstract

Introduction
Perinatal mental health disorders, maternal stress, and trauma are often associated with poor maternal and fetal outcomes and a child's increased risk for mental illness. The field of fetal programming examines how adversity experienced by the mother affects fetal development and the offspring's mental health risk. This review outlines three related and overlapping mechanisms of fetal programming thought to underpin the impact of maternal stress on maternal/fetal well-being.

Main Body
Immune activation: Mental illness is linked to chronic inflammation. Moreover, excessive maternal inflammation induces fetal microglial activity which has been shown to enhance indoleamine-2,3 dioxygenase, and thereby decrease serotonin production. Quinolinic acid, a byproduct of this reaction, also causes damage to serotonergic neurons. Both result in decreased serotonin, which has been linked to multiple mental illnesses. Increased levels of maternal Interleukin (IL) 6 is also linked to increased fetal amygdala size and connectivity, which have both been implicated in multiple mental illnesses.

Hypercortisolism: Chronic maternal stress downregulates placental 11β-hydroxysteroid dehydrogenase expression and thus conversion of bioactive cortisol to biologically inactive cortisone. This downregulation permits transfer of maternal cortisol to the fetus earlier than physiologically appropriate and at higher levels, stimulating the fetal hypothalamic-pituitary- adrenal axis (HPA axis), fetal norepinephrine release, and induction of an inflammatory state. HPA activation downregulates brain-derived neurotrophic factor (BDNF), low levels of which are implicated in neurodegeneration of the hippocampus.

Interestingly, hippocampal volumes are decreased in fetuses of highly stressed mothers and there is a close association between decreased hippocampal volume and unipolar depression.

Fetal DNA methylation: DNA methylation generally inhibits transcription, is highly plastic and regulated during development, and stabilizes in adulthood. Increased stress generally increases DNA methylation. Glucocorticoid receptor and several serotonin transporter genes have been implicated in both mental illness and maternal stress. The most studied methylation change is the hypermethylation of the Nuclear Receptor Subfamily 3 Group C Member 1 promoter (NR3C1).

NR3C1 is involved in inflammatory response and glucocorticoid resistance. NR3C1 hypermethylation has been observed in adult survivors of trauma ranging from childhood abuse, Intimate Partner Violence (IPV), natural disasters, and in suicide victims on postmortem study. Selective NR3C1 knockdown in mice leads to increased progeny HPA axis activity and anxious behavior. NR3C1 placental methylation is inversely associated with infant self-regulation up to 2 weeks. Studies of Tutsi mothers indicated that survivors of the Rwandan genocide and their offspring/children displayed higher rates of NR3C1 methylation and mental illness compared to expatriate controls. This phenomenon has also been observed in mothers who experience IPV and their children.

Several other genes are also under investigation but have not demonstrated clear correlation between maternal stress, methylation status, and children's behavior as NR3C1. Fetal biological sex also has an unclear relationship with DNA methylation. Some studies indicate increased methylation and risk of mental illness in female children of stressed mothers compared to males, while others demonstrate the inverse.

There remains room for more research including increased characterization of suspected genes and epigenetic mechanisms as well as the role fetal sex. Current studies are limited by high methylation tissue specificity and tissue availability.

Conclusions
Maternal stress conferred to the fetus during pregnancy may influence the child's future risk of developing mental illness. The three mechanisms outlined, inflammation, hypercortisolism, and DNA methylation appear to overlap and act in tandem to promote a vulnerable phenotype. Maternal stress tends to remain stable from preconception to the post-natal period and is highly correlated with economic insecurity, IPV, and likely other causes. Targeted preventative intervention before pregnancy, liberal screening, and advocacy for greater societal support may help alleviate maternal stress and prevent the deleterious effects of stress on fetal neural development and offspring mental health.

Abstract Title: Atypical Hemolytic Syndrome Masquerading as Chronic Kidney Disease Progression

Investigator: Remo, Julianna
Co-Investigator(s):
Department: Internal Medicine

Abstract

Introduction
Atypical hemolytic syndrome (aHUS) is a form of thrombotic microangiopathy (TMA) secondary to a genetic cause. Due to the high morbidity and mortality of aHUS, prompt diagnosis and treatment are paramount. Diagnosis may be complicated by testing limitations and clinical prominence of acute kidney injury over thrombotic symptoms. We report a case of aHUS that was initially thought to be progression of chronic kidney disease (CKD).

Case Information
A 73-year-old female with chronic kidney disease (CKD) stage V due to ANCA vasculitis, lupus, hypertension, and chronic combined heart failure presented to the emergency department with oliguria, intractable nausea, dysgeusia, and unintentional weight loss of 20 lbs over 2 months. On exam she had 2+ bilateral pretibial edema, generalized fine crackles, benign cardiovascular exam, and conserved distal pulses. On admission she had creatinine of 6.1 up from her baseline of 3. Hemodialysis was initiated due to fluid overload and uremia with mild initial symptoms improvement. Progression of chronic kidney disease was suspected, and she was discharged home on hemodialysis.

Despite dialysis adherence she declined, was readmitted after four weeks, and was found to have new thrombocytopenia to 53 K/uL. Additional investigation revealed a haptoglobin <1 mg/dL, immature platelet fraction of 22.5%, elevated LDH to 211 U/L, normal coagulation panel, negative ADAMTS-13 testing, and schistocytes and decreased platelets seen on peripheral blood smear suggestive of TMA. Daily plasmapheresis (PLEX) was initiated with marked platelet count improvement and modest symptom improvement. Her genetic work up returned negative for known genetic markers of aHUS. Considering her clinical picture and improvement with PLEX, she was diagnosed with aHUS. Eculizumab was initiated and she achieved complete resolution of symptoms. On further follow up, her cell counts normalized after four cycles of eculizumab.

Discussion/Clinical Findings
aHUS is one of several subsets of TMA and represents a significant diagnostic challenge. aHUS is characterized by thrombocytopenia, microangiopathic hemolytic anemia(MAHA), and acute renal failure. Unlike other types of TMA, aHUS often presents as intrarenal pathology rather than with impressive systemic or coagulopathy findings. The exact cause of aHUS is not well characterized. Current theories suppose an underlying genetic origin that encodes individual susceptibility paired with some external insult such as drugs, pregnancy, or systemic disease.

Treatment with isolated plasmapheresis (PLEX) has a high rate of end stage renal failure. Eculizumab, a recombinant humanized monoclonal Ab to the C5 complement protein, is safe and effective for use in aHUS except in cases of specific genetic C5 polymorphisms. Eculizumab positively influences long term renal function as measured by eGFR. Due to the high morbidity and mortality of untreated aHUS, current best treatment guidelines are genetic testing, empiric PLEX, and eculizumab in cases of poor or absent response to PLEX.

Diagnosis of aHUS is difficult to establish early in care. aHUS lab findings are nonspecific, initial complement studies appear normal in majority of patients, and the primary renal etiology may further delay diagnosis. Additionally, only 40-60% of patients diagnosed with aHUS have a clear genetic association and only 10% have an isolatable complement auto-antibody. The remainder of cases are diagnoses of exclusion.

Our case demonstrates the two challenges to timely diagnosis of aHUS - renal predominant symptoms and imperfect genetic testing. Our patient had a history of complex and chronic renal disease, signs suggestive of AKI, and was found to have negative genetic testing for known aHUS variants. Her recovery with PLEX and early initiation of eculizumab supports standard practice and existing literature consensus. Her case demonstrates the importance of including aHUS on the differential of intrarenal disease and monitoring for coagulopathy development especially if symptoms are refractory to dialysis.

Conclusion
This case highlights a challenging diagnosis of aHUS in setting of advanced CKD. In our patient acute worsening of CKD V led to initiation of hemodialysis. Lack of symptom resolution prompted further work up revealing aHUS. This case also highlights current limitations of testing for aHUS. In cases with high clinical suspicion treatment directed towards presumptive diagnosis of aHUS may be lifesaving.

Abstract Title: Discovering New Inflammatory Pathways in Benign Prostatic Hyperplasia

Investigator: Ro, Chunghwan
Co-Investigator(s): Samara Silver, Microbiology and Molecular Cell Biology
Department: Microbiology and Molecular Cell Biology

Abstract

Introduction: Benign prostatic hyperplasia (BPH) is a significant health concern in the geriatric male population, primarily due to its effect on the quality of life through urinary symptoms, encompassing increased frequency and hesitancy. Furthermore, BPH introduces the potential for medical complications, including urinary tract infections and nephropathy. BPH pathology is influenced by steroid hormonal imbalance, which is depicted by the testosterone and 17β-estradiol (T+E2) mouse model. This model showcases enlarged bladders, narrowed urethral lumens, and increased prostate mass - all hallmarks of human BPH, making this model a valuable platform for exploring disease mechanisms. Recent studies in our lab have highlighted that macrophages infiltrating the glandular lumen due to steroid hormone imbalance accumulate lipid droplets, adopting a foam cell phenotype. We hypothesized that foam cells secrete cytokines that contribute to BPH. Accordingly, this study focused on validating the expressional alterations of foam-cell derived cytokines, *Tgfb1*, *Ccl6*, and *Cxcl16*, previously identified via single-cell RNA sequencing.

Methods: Male C57BL/6J mice were subcutaneously implanted with pellets containing 25 mg testosterone (T), and 2.5 mg estradiol (E2), and their prostates were collected after two weeks. Paraffin- embedded tissues from the ventral prostate were subjected to *in-situ* hybridization (RNAScope™) using probes targeting *Tgfb1*, *Ccl6*, and *Cxcl16*. Tissue samples were analyzed using a Mantra II. Pathological Workstation and InForm software. Student's t-test and one-way ANOVA or their non-parametric equivalent were used for statistical analysis.

Results: We found increased expressional changes of *Tgfb1, Ccl6,* and *Cxcl16* in foam cells in T+E2 tissues. Furthermore, when quantifying the expressional changes in the tissue, *Tgfb1* expression was dramatically upregulated by 10.07-fold in T+E2 tissues compared to the control group. Likewise, *Ccl6* and *Cxcl16* -positive cells, likely macrophages, demonstrated a 3.21 and 1.96-fold increase in T+E2 tissues compared to the controls, respectively.

Conclusion: This study corroborates prior scRNA sequencing studies, affirming the elevated expression of *Tgfb1, Ccl6,* and *Cxcl16* in foam cells. The pronounced expression of these factors suggests an active role of foam-cell-derived cytokines in stimulating an inflammatory response in the prostate, consequently contributing to BPH.

Abstract Title: Enhancing Pediatric Resident Wellness: Unveiling the Impact of Virtual Reality

Investigator: Rossbach, Kai
Co-Investigator(s): Emily Egress, MD, Pediatrics/Resident Haree Pallera, Pediatrics
Department: Pediatrics

Abstract

Introduction: Pediatric residents' demanding workloads and long hours have been associated with increased physical and emotional fatigue, raising concerns about patient care and resident well-being. This study addresses the urgent need for interventions to enhance the wellness of pediatric residents. With advancements in technology, virtual reality (VR) and artificial intelligence (AI) are gaining prominence in medicine, holding the potential to positively impact the well-being of pediatric residents and faculty.

Methods: Pediatric residents were surveyed to rank wellness categories of most importance: emotional, financial, environmental, skills, occupational, physical, social, and spiritual. Survey results were compared to a previous wellness survey (July 2022) of Virginia AAP pediatricians. Subsequently, residents were asked to participate in a VR emotional intervention based on survey results. The intervention featured a serene beach scene complemented by an AI-generated wellness script voiceover through an Oculus headset or computer.

Pre- and post-intervention surveys were administered to all residents, assessing subjective stress levels, using a Likert scale (1: minimal stress to 5: severe stress. Comments and time each resident spent watching the video were collected. Comments included residents' thoughts about the VR experience and ways to improve it.

Results: The initial study's findings aligned with a wellness survey of 79 Virginia AAP pediatricians conducted in July 2022, wherein emotional and physical wellness received the highest rankings. Among the 30 residents who participated in the VR intervention, results included: before VR intervention, stress levels averaged 2.83 (SD = 1.15). Following VR intervention, the average stress level decreased to 1.50 (SD = 0.63) (p-value <0.001). Residents watched the video for an average of 6 minutes (range 2 to 15 minutes). Comments (11) about the VR experience were 100% favorable.

Conclusion: The substantial decrease in stress levels after the VR intervention reflects the favorable use of VR to decrease resident stress. While limitations, such as the small sample size and potential biases require consideration, this research provides valuable insights into the potential impact of virtual reality on wellness.

The study also reflects favorably on the use of AI in constructing VR experiences for residents. Future studies will hope to include VR experiences for faculty and address physical wellness.

Abstract Title: From UV Rays to Pay Grades: Uncovering the Sunscreen Wealth Divide

Investigator: Sadr, Nargiza
Co-Investigator(s): 1. Nargiza Sadr, M2; EVMS | Doctor of Medicine (MD) Program 2. Rehan Qayyum, MD, MHS; EVMS Internal Medicine
Department: EVMS Internal Medicine

Abstract

Introduction
Benzophenone-3(BP3), an ingredient in sunscreens, is absorbed through the skin, excreted in the urine, and causes hormone disruptions. Conversely, as BP3 leaves a minimal white cast on the skin, is less greasy, and is more water-resistant, it is widely used in high-quality costly sunscreens. Household income influences sunscreen purchase and use. Because the relationship between BP3-containing sunscreen use and household income is not well-studied, we examined this relationship in a large cohort of the US population.

Methods
We used the continuous NHANES data from 2003-2016. Creatinine-normalized urinary BP3 (CnBP3) levels were calculated from urinary BP3 and creatinine to account for urinary dilution/concentration. The household income to poverty threshold ratio (HIPR) was used to account for the effect of inflation. To examine the relationship between CnBP3 and HIPR, we used generalized linear models (GLMs) with log-link and gamma distributions to account for the long right-hand tail of the CnBP3 distribution.

Missing data were imputed using multiple imputations by chained equations with a Gibbs-like algorithm. Models were adjusted for age, gender, race, education level, season, and sunscreen use.

Results
Of the 16691 study participants, 8404(50.3%) were females, 6561(39.3%) were Whites, and 3949(23.7%) were Blacks. The mean(SD) age was 36.6(22.7) years, and median(IQR) CnBP-3 were 12.2(44.9) µg/gm. In unadjusted GLMs, CnBP3 levels were 54% lower in the 16-25 age-group than the 6-15 age-group (95%CI=-0.82%, -0.25%; P<0.001); there was no significant difference between 6-15 and rest of the age-groups. Females had 2.2-times higher CnBP-3 than males (95%CI=1.57, 3.00; P<0.0001). Blacks had 67% lower (95%CI=-0.76%,-0.55%; P<0.001) and Hispanics had 44% lower (95%CI=-0.56%, -0.28%; P<0.001) CnBP-3 than Whites. Sunscreen-users had 5.9-times higher CnBP3 than non-users (95%CI=4.67, 7.48; P<0.001). Finally, in unadjusted models, participants with HIPR >4, had over 4.23-times higher CnBP3 than those with HIPR<1 (95%CI=3.10, 5.78; P<0.001) and this association remained significant after adjustment; participants with HIPR>4 had 2.06-times higher CnBP-3 than those with HIPR<1 (95%CI=1.53, 2.77; P<0.001).

Conclusion
We found a statistically significant association between HIPR categories and CnBP3. This association may allow the study of the most effective strategies to reduce BP3 exposure and protect the health of high-exposure populations.

Abstract Title: Sunscreen's Metabolite: Unveiling the Impact on White Blood Cells

Investigator: Sadr, Nargiza
Co-Investigator(s): 1. Nargiza Sadr, M2; EVMS Doctor of Medicine (MD) 2026 Program 2. Rehan Qayyum, MD, MHS; EVMS Internal Medicine
Department: EVMS Internal Medicine

Abstract

Introduction
An organic UV filter, benzophenone-3 (BP3) is widely used in sunscreens. The water resistance, minimal white cast after application, and non-greasiness of BP3 containing sunscreens make them appealing to users. Conversely, BP3 may be absorbed through the skin, excreted in the urine, and disrupt hormones. Additionally, animal models and in vitro human lymphocyte studies have shown that BP3 has immunomodulatory effects and increases inflammatory cytokines. However, the association between BP3 and white blood cells (WBC) using large cohort of the United States population has not been explored.

Methods
We used the continuous NHANES data from 2003-2016. Urinary BP3 and urinary creatinine were used to calculate creatinine-normalized urinary BP3 (CnBP3) to account for urinary dilution/concentration. We used linear regression models with adjustments for age, gender, race, body mass index (BMI), smoking, season, family income to poverty ratio (FIPR), and survey cycle.

Results
Of the 18,096 participants, 9,128 (50.4%) were female, 6,937 (38.3%) were White, 4,266 (23.6%) were Black, 5,181 (28.6%) were Hispanic, and 6,665 (55.1%) were non-smokers. Mean (SD) age was 36.9 (22.8) years, BMI 26.6 (7.43) kg/m2, and WBC 7.22 (2.53) 109/L. In adjusted models, highest quintile individuals had lower WBC count than those in the lowest quintile (-173 x 106/L; 95%CI=-320, -26; P=0.02). Among WBC subsets, neutrophil count was associated with CnBP3 (highest vs. lowest quintiles = -132 x 106/L; 95%CI=-246, -17; P=0.02) but not lymphocyte count.

Conclusion
Higher CnBP3 levels were associated with statistically significant decrease in WBC and neutrophil counts, but not lymphocytes. Potential anti-inflammatory effects of BP3 found in our study need further exploration.

Abstract Title: Visual Outcomes of the Streamline Surgical System in Patients with Mild, Moderate, or Severe Glaucoma

Investigator: Shah, Kush
Co-Investigator(s): 1. Kush Shah, Department of Ophthalmology, EVMS 2. Siddharth Bhargava, MD, Department of Ophthalmology, EVMS 3. Constance O. Okeke, MD, MSCE, Department of Ophthalmology, EVMS, CVP Physicians
Department: Okeke

Abstract

Introduction
Minimally invasive glaucoma surgeries (MIGS) aim to reduce intraocular pressure (IOP) by enhancing aqueous humor outflow through implant placement or tissue modification. The Streamline Surgical System is a recent MIGS procedure targeting the natural aqueous humor outflow pathway, designed to lower IOP and mitigate glaucoma progression without implant placement. Comprising a cannula within an outer shell that acts as a pump, it delivers small amounts of viscoelastic fluid into Schlemm's Canal, creating space for aqueous humor outflow. This system is intended for patients with ocular hypertension and open-angle glaucoma and can be used concurrently with other ocular procedures. In this study, our aim is to evaluate the effectiveness of the Streamline Surgical System in reducing IOP, diminishing the number of IOP-lowering drops, and enhancing visual outcomes when combined with cataract extraction in a cohort of patients diagnosed with mild, moderate or severe primary open-angle glaucoma.

Methods
A retrospective chart review encompassed patients who underwent MIGS with the Streamline Surgical System between 2022 and 2023, with or without concurrent cataract surgery by a single surgeon. Data collection occurred at multiple time points: pre-operatively, 1 day post-operatively, 1 week post-operatively, 1 month post-operatively, 3 months post-operatively, 6 months post-operatively, and 1 year post-operatively. The data included IOP, the number and list of glaucoma medications, Snellen VA distance, Logmar VA distance, spherical equivalent, pre-operative glaucoma stage, glaucoma type, cataract surgery type, and IOL type. The key outcomes of interest were changes from pre-operative to 1-year post-operative measurements in IOP, the number of glaucoma medications, Snellen VA distance, and spherical equivalent.

Results
All results were analyzed using paired t-tests with a significance level (alpha) set at 0.05. Significant findings include a marked reduction in the number of glaucoma medications used by all patients 6 months post-operatively compared to pre- operatively (p-value: 0.00002). This reduction was also significant in patients with mild glaucoma (p-value: 0.00023) and moderate glaucoma (p-value: 0.03527), while patients with severe glaucoma showed a non-significant decrease (p-value: 0.34344).

A significant decrease in IOP was observed in all patients 6 months post-operatively compared to pre-operatively (p-value: 0.0001). Patients with mild glaucoma (p-value: 0.0068) showed a significant decrease, while those with moderate (p-value: 0.07405) and severe glaucoma (p-value: 0.0555) exhibited non-significant decreases.

Logmar VA Distance also showed significant improvement in all patients 6 months post-operatively compared to pre- operatively (p-value: 0.00097). This improvement was significant in patients with mild glaucoma (p-value: 0.04092) and moderate glaucoma (p-value: 0.02122), while those with severe glaucoma showed a non-significant change (p-value: 0.28638).

Discussion and Conclusions
In this retrospective chart review, patients with primary open-angle glaucoma, particularly those with mild severity, experienced significant improvements in IOP, the number of glaucoma medications, and Logmar VA distance following Streamline Surgical System intervention. Noted complications included manageable residual inflammation, addressed with eye drops, and transient IOP increases, successfully managed with wound burps to achieve the target IOP. Complications remained minimal and well-controlled at the 6-month mark, with patients reporting enhanced vision. This review is part of a larger ongoing project under the AGE (Advocates for Glaucoma Education) Initiative evaluating the Streamline Surgical System, with further data expected as more patients reach the 1-year post-operative milestone. Future research could focus on case-control comparisons to establish baseline metrics for evaluating the Streamline Surgical System, particularly regarding changes in IOP, Logmar VA distance, medication use, and complications in patients with severe glaucoma. Overall, this review underscores the effectiveness of the Streamline Surgical System in enhancing visual outcomes and reducing medication requirements most notably in mild and moderate open angle glaucoma populations.

Abstract Title: Improvement in a Patient in a Minimally Conscious State using Combination Therapy of Zolpidem and N-Methyl- D-Aspartate Receptor Antagonists

Investigator: Singh, Namrata
Co-Investigator(s): 1. Hannah James MS4 2. Samuel Fox MS4 3. Trevor Schlecht MS4 4. Atif Niaz MS3
Department: Psychiatry and Behavioral Sciences

Abstract

Introduction: The minimally conscious state (MCS) is a disorder of consciousness (DOC) in which a patient retains some level of awareness. Development of a standardized protocol for the treatment of MCS is ongoing with approaches including deep brain stimulation, spinal cord stimulation, and non- invasive neuromodulation therapies. Evidence supporting pharmacologic treatment has included amantadine, an N-methyl-D-aspartate (NMDA) antagonist and indirect dopamine agonist and zolpidem, a nonbenzodiazepine-benzodiazepine receptor agonist. We present a woman status-post severe cortical injury from cocaine usage who presented in the minimally conscious state (MCS-), who showed improvement with the use of zolpidem and amantadine augmentation.

Case Presentation: Our patient, a 53-year-old woman with a past medical history of multiple sclerosis and psychiatric history of bipolar disorder and cocaine use disorder, presented to the emergency department (ED) for altered mental status. Physical examination, including vital signs, were unremarkable. An extensive ED workup was without conclusion, including a negative blood alcohol level and urine drug screen and MRI demonstrated symmetric white matter restricted diffusion, consistent with innate brain disease unlikely to improve with ECT per neurology. Her EEG was significant for non-specific, non-epileptic brain electrical abnormalities. We began zolpidem and on our next-day evaluation, our patient responded to simple commands although still visually fixated. After 4 days of treatment amantadine was added and after two weeks of this regimen, our patient improved such that staff was able to move her out of bed. By discharge, our patient demonstrated object manipulation, pursuit eye movements and reproducible movement to command. and was discharged to a skilled nursing facility on hospital day 64.

Discussion: The response rate to zolpidem has been found to be approximately 6% for all DOC, which is low, however, the response is typically significant with patients rapidly emerging from MCS. Case reports and studies are varied in their results, reporting everything from zero effect to full recovery after administration of zolpidem. This may differ based on the nature of the injury leading to MCS, however, one study found that zolpidem is less effective in improving MCS secondary to anoxic brain injury (ABI) while another report demonstrated recovery in their patients. In our patient, her MCS likely resulted from ABI secondary to her severe, chronic cocaine use disorder. On initial presentation to us, our patient demonstrated visual fixation and object manipulation by squeezing hands, both of which are indicative of MCS-. Our patient demonstrated an acute response to zolpidem, which improved with amantadine augmentation. While there is evidence supporting the use of amantadine and zolpidem in monotherapy for the treatment of MCS , to the best of these author's knowledge there are no studies revealing the effectiveness of combination therapy, although, it is possible that given increased time, either medication in mono therapy could have demonstrated efficacy.

Conclusion: In conclusion, we believe this case emphasizes the importance for clinicians to recognize DOC, including MCS -/+, the paradoxical, albeit uncommon, effectiveness of zolpidem and combination therapies for treatment of DOC.

Abstract Title: Anergic B-Cells in Atherosclerosis

Investigator: Smith, Evan
Co-Investigator(s): Cassandra Kirk, Shelby Ma, Alina Moriarty, Tayab Waseem, Marion Mussbacher, and Elena Galkina, Department of Microbiology and Molecular Cell Biology, EVMS, Norfolk VA
Department: Microbiology and Molecular Cell Biology

Abstract

Introduction: Atherosclerosis is a disease of large/medium-sized vessels characterized by an accumulation of cholesterol-rich LDL within the vessel, chronic immune response, and activation of vascular cells, leading to the formation of plaques and necrotic cores. While not a classical autoimmune disease, previous studies have shown the role of chronic inflammation that persists during the progression of atherosclerosis. Anergy is characterized as a state of unresponsiveness to self-antigens and occurs via intrinsic biochemical and gene-expression changes. While anergy break plays a critical role in autoimmune diseases, evidence suggests an existence of various forms of anergic autoreactive B- cells that may not necessarily induce classical autoimmune pathologies, but rather support low-grade chronic inflammation that is driven by different mechanisms. This study seeks to understand the extent to which atherosclerosis changes the responsiveness of anergic B-cells.

Methods: We used the p-azophenylarsonate (ARS)-specific mouse model (ARS/A1) which encodes a dual-reactive B-cell receptor (BCR) that binds to ARS and self-antigens. These mice have only anergic B-cells in circulation and can serve as an excellent model to study pathogen mimicry of self-antigens in atherosclerosis. We also used MD4 transgenic mice in which BCR only recognizes hen-egg lysosome and is thus unable to respond to any other stimuli. C57BL/6, ARS/A1, and MD4 mice were injected with an adenovirus vector containing PCSK9 to induce hyperlipidemia. After high-fat diet (HFD) feeding for 12 weeks, plaque burden and stability in collected aortas and hearts were analyzed using ImageJ. The number of peripheral blood anergic B-cells and their functions were also examined in healthy and atherosclerotic *Apoe*$^{-/-}$ mice.

Results: Histological analysis of en face Oil Red O-stained aortas showed MD4 had no significant differences compared to control C57BL/6 mice. In contrast, ARS/A1 mice had a significant overall higher atherosclerotic lesion burden throughout the aorta of anergic ARS/A1 mice vs control C57BL/6 mice. Additionally, ARS/A1 mice had a significantly higher aortic lesion burden compared to age- and diet-matched MD4 mice. Histological analysis of picrosirius red-stained aortic valves showed an increase in red birefringence indicating an increase in type I collagen and plaque stability in ARS/A1 mice compared to C57BL/6 mice.

Conclusions: The lack of differences in atheroprogression in MD4 vs. control suggests that the BCR may not play a critical role in the low-grade chronic inflammation that is seen in atherosclerosis.

Alternatively, the abolishment of BCR-signaling in both anti-atherogenic and pro-atherogenic B-cell subsets results in minimal effects in the regulation of plaque burden. The mechanism that drives a higher lesion development in ARS/A1 mice with anergic B-cells compared to BCR-transgenic MD4 mice or C57BL/6 is unclear but could potentially be due to the increased low-level activation of anergic B-cells in the ARS/A1 mice. Further work is needed to examine the effects by which atherosclerosis may change the responsiveness of anergic B-cells and identify specific mechanisms responsible for accelerated plaque burden in ARS/A1 mice.

Abstract Title: Will space radiation exposure lead to altered risk taking behavior?

Investigator: Smits, Elliot
Co-Investigator(s): Faith Reid, EVMS MD 2025
Department: Radiation oncology

Abstract
The Britten lab has previously demonstrated that space radiation (SR) exposure has a marked impact on executive functions related to cognitive flexibility [*1*]. However, executive functions also regulate response inhibition, impulse control, processing and regulating effect, motivation, and arousal [*2*]. In humans, risk behaviors demonstrated from decision-making tasks correlate with baseline risk propensities [*3,4*] and overall risk behaviors in real life [*3,5,6*].

There is currently no information on how SR exposure will impact risk decision-making. Our working hypothesis is that SR-induced loss of executive function performance will not be confined to cognitive functions but will also impact impulsivity and mood-regulating executive functions. As such we postulate that there may be additional SR-related pressures on risk-taking propensity over those anticipated from confinement-related and/or psychological stress.

Male and Female Wistar rats were trained in rodent risk decision-making touchscreen tasks. The touchscreen-based assay consists of four response lights, each of which has a defined win/loss probability, reward size, and loss penalty. The rats were subsequently irradiated and their post- exposure performance was assessed at 2-week intervals over 4 months. The post-exposure performance at these times will be contrasted to their pre-exposure performance status. Herein we present some of the preliminary data from this analysis.

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Abstract Title: Short-term success in treatment of acute hematogenous periprosthetic joint infection with debridement, antibiotics and implant retention

Investigator: Stephens, Senah
Co-Investigator(s): Cody L. Evans, MD, Carilion Clinic, Department of Orthopaedic Surgery
Department: Carilion Clinic, Department of Orthopaedic Surgery

Abstract

Introduction
Periprosthetic joint infection (PJI) is an established complication following total hip arthroplasty, with an incidence of one percent. Debridement, antibiotics and implant retention (DAIR) is an initial treatment option for acute hematogenous PJI, though it has reported failure rates up to 84%. Here we present a case demonstrating early success using this treatment approach in a 74 year old medically infirm patient.

Case Information
The patient in question-a 74 year old male with well-functioning bilateral total hip arthroplasties performed 14 years prior-presented to a rural emergency department with acute onset of right groin pain and hypotension. The patient was found to have sepsis and periarticular abscesses on assessment.

Synovial fluid from the right hip grew *methicillin-sensitive Staphylococcus aureus* after consecutive cultures. The patient underwent debridement of the right hip joint at the initial hospital followed by transfer to our tertiary hospital. Upon arrival, consideration was given to performing a two-stage exchange arthroplasty. However, given his medical complexity (ASA 4), it was felt that the risks were prohibitive, as supported by the presence of ileus, severe electrolyte imbalance, anemia requiring transfusion, anasarca, and vancomycin-resistant *Enterococcus faecium* infection of a sacral wound. As such, the patient underwent surgery utilizing an established DAIR protocol with aggressive debridement and cleaning of the hip space, exchange of the modular arthroplasty components, and placement of antibiotic calcium sulfate beads for local delivery. The patient developed a foot drop following the surgery. The patient was treated with parenteral antibiotics and remained on chronic oral antimicrobial suppression until ten months after the final surgery. During the treatment course, the patient's inflammatory markers have normalized and his function has improved. He is ambulatory without assistive devices but uses an ankle orthosis as needed. He has regained satisfactory mobility and has an Oxford hip score of 27.

Discussion/Clinical Findings
High failure rates of DAIR may encourage the utilization of other surgical treatment options for acute PJI including one or two-stage exchange arthroplasty. Two-stage exchange arthroplasty has been found to control infection at 89% for first revisions but poses risks of massive blood loss and increased mortality in comparison to DAIR. Such risks were deemed insufferable in this patient's case, thus the less invasive treatment option of DAIR was preferred. At one year postoperatively, the patient remains infection free.

Conclusion
This case demonstrates short-term success in treatment of acute hematogenous periprosthetic joint infection utilizing debridement, antibiotics, and implant retention in a medically infirm patient and may serve to inform future patient counseling.

Abstract Title: Identifying the Incidence of Colposcopy Referrals at the HOPES Free Clinic and Related Outcomes

Investigator: Strohm, Samantha
Co-Investigator(s): 1. Danielle Long, MD Student - Class of 2025 2. Megan Duggins, MD Student - Class of 2024 3. Dr. Katherine Schaffer, Emergency Medicine PGY-2
Department: Internal Medicine

Abstract

Introduction: Colposcopy is the process of using a colposcope for visualizing and assessing the uterine cervix to identify cervical intraepithelial neoplasia, squamous intraepithelial lesions, or invasive cancer. This procedure is utilized after an abnormal or inconclusive cervical cancer screening test, such as a Papanicolaou (Pap) smear, allowing the clinician to visualize lesions and biopsy to inform future management while minimizing unnecessary excisional procedures. Colposcopies have been implemented at free clinics across the country, preventing loss to follow-up. Currently, the procedure at the HOPES Clinic is to refer patients with abnormal Pap smears with human papillomavirus (HPV) and abnormal cellularity to the Sentara Ambulatory Care Clinic (ACC) for follow-up and colposcopy. Based on current procedures, we have no method of knowing if patients follow up for abnormal results with the ACC, which could potentially pose a serious risk to the patient as colposcopies are a tool in the prevention of cervical cancer.

Methods: Charts of HOPES Free Clinic patients that were seen for Pap smears and referred to ACC for colposcopy were evaluated in Practice Fusion to record patient demographics. Patients who required referral for colposcopy follow-up were reviewed in Epic in addition to Practice Fusion to record the date their Pap smear came back as abnormal from HOPES Free Clinic and collect the date they were seen at Sentara's ACC, if applicable. Pap smear cytology results as well as colposcopy and biopsy procedure results were recorded. Finally, the patient's follow-up recommendations were recorded, including loop electrosurgical excision procedure, repeat colposcopy, treatment for cervical cancer, or follow-up within one year.

Results: Between January 2017 and June 2022, there were eight patients who had recorded referrals from HOPES Free Clinic to ACC for colposcopy follow-up after receiving abnormal and/or inconclusive Pap smear results. Of these 8 patients, only 4 patients (50%) had recorded follow-up appointments at the ACC for colposcopy procedures.

Conclusions: While our data is limited due to the nature of recording referrals from HOPES Free Clinic to the ACC, the rate of completed follow-up at ACC for colposcopies indicates there is a loss to follow- up in patients with abnormal Pap smears. This is significant in identifying a gap in patient healthcare continuity that exists at HOPES Free Clinic through the current procedures for abnormal Pap smear results, indicating follow-up at HOPES Free Clinic rather than external referral could improve outcome tracking systems through improved communication avenues with patients. In referring patients out to the ACC for colposcopy follow-up, HOPES Free Clinic is unable to track completed follow-up on abnormal results, potentially limiting the clinic's ability to prevent the progression of cervical cancer in the vulnerable patient population. As such, there is some evidence for an improved communication system regarding completed follow-up between the HOPES Free Clinic and ACC to facilitate continuity of care for patients with abnormal Pap smear results. Additionally, future research and quality improvement studies could center around obtaining more information about follow-up barriers to patients who are referred to the ACC.

Abstract Title: The enzyme CHIP links protein quality control and glucose homeostasis by regulating microtubule polymerization and glucose transporter localization

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Co-Investigator(s): 1. Holly McDonough, McAllister Heart Institute (UNC Chapel Hill) 2. Sarah M. Ronnebaum, McAllister Heart Institute (UNC Chapel Hill) 3. Chunlian Zhang, McAllister Heart Institute (UNC Chapel Hill) 4. Jie An, Sarah W. Stedman Nutrition and Metabolism Center (Duke University) 5. Andrea Portbury, McAllister Heart Institute (UNC Chapel Hill) 6. Rebekah Sanchez-Hodge, McAllister Heart Institute (UNC Chapel Hill) 7. Kaitlin C. Lenhart, McAllister Heart Institute (UNC Chapel Hill) 8. Christopher B. Newgard, Sarah W. Stedman Nutrition and Metabolism Center (Duke University) 9. Monte S. Willis, McAllister Heart Institute (UNC Chapel Hill) 10. Cam Patterson, Presbyterian Hospital/ Weill-Cornell Medical Center 11. Jonathan C. Schisler, McAllister Heart Institute, Department of Pharmacology (UNC Chapel Hill)
Department: McAllister Heart Institute at UNC Chapel Hill School of Medicine

Abstract

Introduction : Approximately 1 in 10 Americans are diabetic, with over 90% of diabetic individuals having type II diabetes (Centers for Disease Control and Prevention 2023). Due to preexisting knowledge on the role of CHIP (carboxyl terminus of Hsc/Hsp70-interacting protein) in multiple metabolic cascades (Zhang et al. 2020), and its proven ability to lower blood glucose levels when overexpressed (Ali et al. 2021), we chose to examine CHIP's involvement in glucose regulation.

Methods : Mice: Wild-type and CHIP-deficient mice were generated and maintained on a mixed genetic background of C57BL/6 and 129SvEv (C57BL/6 ×129), or by repeatedly backcrossing the 129SvEv mouse strain with 129Sv/C57B6 mice carrying a single mutated CHIP allele. Mice in the present study were 3-3.5 months old.

- Glucose and insulin tolerance tests: n = 15/20 or 5/6 in wild-type/CHIP-/- mice for glucose or insulin tolerance bolus, respectively.
- Gastrocnemius fluorescence microscopy: Fasted mice received an IP injection of 20% D-glucose (2 g glucose/kg body mass). Mice were sacrificed 40 minutes after injection, and muscles were dissected and flash-frozen in liquid nitrogen. Protein concentration was quantified using Protein Assay Dye and normalized to wild-type gastrocnemius values per strain of mice.
- Creating skeletal muscle cell lines for stains: Lentiviral transduction of control or CHIP shRNA in mouse skeletal muscle C2C12 cells (creating shCONT and shCHIP cell lines) to compare cells containing CHIP (shCONT) with CHIP-deficient cells.
- Immunoblots and fluorescence: Cell lysates were collected and subsequently separated into NP-40-soluble and -insoluble fractions by centrifugation. Protein lysates were separated using Bis-Tris 4-12% SDS-PAGE, transferred to polyvinylidene fluoride membranes, and immunoblotted using standard chemiluminescence technique. Primary antibodies included: α-tubulin, β-tubulin, Glut4, CHIP, stathmin, phosphorylated stathmin at serine 16, and myc. All cells and muscle fiber preparations were mounted with glass cover slips using Vectashield mounting media with DAPI. Micrographs were obtained on a Nikon Eclipse E800 upright fluorescent microscope utilizing QCapture software.

Results:

Figure 1. Blood glucose levels in 129SvEv mice measured at the indicated time points after (A) glucose or (B) insulin bolus injection represented by the mean ± SEM.
Figure 2. Representative immunoblot analysis of phosphorylated stathmin at serine 16 (S16), total stathmin, and β-actin.
Figure 3. Fluorescent micrographs of C2C12 control cells (shCONT) or cells with reduced CHIP expression (shCHIP). After serum starvation (0 min) or stimulation (30 min) with complete media plus insulin, cells were fixed and visualized for nuclei (DAPI), phalloidin staining (F-actin), and endogenous Glut4 expression.
Figure 4. Representative fluorescent micrographs of individual gastrocnemius muscle fibers isolated from wild-type and CHIP-deficient fasted mice or fasted mice given a glucose bolus (40 min) were stained for α-tubulin (top). False color overlays of α-tubulin (orange) and the nuclear counterstain DAPI (blue) are provided (bottom).
Figure 5. Role of CHIP in insulin-mediated glucose uptake cascade.

Conclusion

We found that CHIP -/- mice demonstrate a Type II diabetes-like phenotype, including poor glucose tolerance, decreased sensitivity to insulin, and decreased insulin-stimulated glucose uptake in isolated skeletal muscle, characteristic of insulin resistance. In CHIP-deficient C2C12 cells, glucose/insulin stimulation fails to induce translocation of Glut4 to the plasma membrane. This impairment in Glut4 translocation in CHIP-deficient cells is accompanied by decreased tubulin polymerization associated with decreased phosphorylation of stathmin, a microtubule-associated protein required for polymerization-dependent protein trafficking within the cell.

These data describe a novel role for CHIP in sustaining the glucose/insulin-induced phosphorylation signaling cascade in a manner necessary for signaling to the interior of the cell such that the microtubule polymerization required for glucose transporter translocation occurs, thus promoting whole-body glucose homeostasis and sensitivity to insulin.

This research will hopefully drive future studies to investigate how CHIP's conserved role in glucose signaling presents in humans and the potential for CHIP to serve as a measure of relative risk for type II diabetes in a clinical setting.

Abstract Title: Parsonage-Turner Syndrome presenting as post-operative unilateral upper extremity weakness and pain

Investigator: Sun, Madeline
Co-Investigator(s): 1. Laura Columbus, MD, Radiology 2. Harrison Klause, MD, Radiology
Department: Radiology

Abstract

Introduction: Parsonage-Turner Syndrome (PTS), also known as idiopathic brachial neuritis, is a rare neurologic disorder characterized by sudden-onset, severe shoulder and upper extremity pain followed by muscle weakness and atrophy. This case report describes the clinical presentation of a patient with PTS to increase awareness of this uncommon condition and highlight its diagnostic challenges.

Case Information: A 47-year-old male presented to the neurology clinic with complaints of recurrent episodes of sudden- onset, severe bilateral shoulder pain and weakness starting several years prior. During workup of his most recent episode, he was found with moderate to severe C6-7 foraminal stenoses and underwent C5-7 anterior cervical discectomy and fusion.

Five days after surgery, he reported right shoulder pain followed by weakness and muscle atrophy. He underwent epidural steroid injections with reported mild pain relief. Scapular atrophy was noted on follow up and the patient was referred for physical therapy. His symptoms continued to persist with loss of strength in his shoulder, difficulty raising things overhead, and right shoulder pain. Upon physical examination, the patient exhibited atrophy of the right infraspinatus and teres minor as well as scapular winging. Sensory examination revealed no abnormalities, and distal pulses were intact. No signs of systemic illness or inflammation were noted. Additionally, patient reported his brother had presented with similar symptoms and had been diagnosed with PTS.

Diagnostic workups prior to surgery included MRI of the shoulder and brachial plexus which revealed no evidence of inflammation or mass lesion. Electromyography (EMG) and nerve conduction studies demonstrated carpal tunnel syndrome that improved over time. Subsequent post-operative EMG demonstrated changes of chronic C6/7 radiculopathy and right brachial plexopathy with active denervation of the suprascapular nerve and long thoracic nerve. Right brachial plexus MRI demonstrated no inflammation or lesion. Right shoulder MRI displayed atrophy and increased T2 signal in the supraspinatus and infraspinatus muscles suggesting denervation changes along the course of the suprascapular nerve compatible with the diagnosis of PTS. Given his brother's history, the patient underwent SEPT9 genetic testing, which was negative.

Discussion: Though PTS is often idiopathic, it has been noted in the post-operative, post-vaccination, and post-infectious setting. Ten percent of patients with PTS have a positive family history of hereditary neuralgic amyotrophy (HNA), a related disorder. Given our patient's brother's diagnosis of PTS, HNA was suspected but ultimately not confirmed. There have been reported cases of post-operative PTS with varying presentations following cervical spine procedures, but existing medical literature has yet to establish a definitive correlation between the site of surgery and PTS. Our patient presented with recurrent episodes of shoulder pain and weakness with negative MRI and EMG findings of PTS prior to his surgery. Cervical decompression was performed to improve the patient's symptoms, but interestingly he developed worsening symptoms post- operatively with positive findings of PTS, suggesting his surgery may have contributed to his presentation.

The clinical presentation often mimics other conditions, leading to diagnostic challenges. The diagnosis is primarily made based on clinical findings and confirmed through electromyography, which reveal signs of denervation. MRI is the mainstay of imaging diagnosis because it has been shown to be sensitive for detecting signal abnormalities in the shoulder girdle muscles and helps exclude other causes of shoulder pain, such as rotator cuff tears. Imaging features include T2-weighted images showing early high signal intensity indicative of muscular edema, with subsequent atrophy and increased intramuscular T1-weighted signal related to fatty infiltration as PTS progresses. The management of PTS is predominantly conservative. Most patients experience spontaneous recovery, although the process can range from several months to years.

Conclusion: PTS is often misdiagnosed, leading to treatment that fails to control patient pain and consequently delaying optimal treatment of patients. Increasing awareness and knowledge of PTS to help differentiate it from other causes of post- operative shoulder pain and upper extremity weakness allows for early detection and management.

Abstract Title: Common imaging findings in Addison's disease

Investigator: Sun, Madeline
Co-Investigator(s): 1. Garrett Rucker, MD, Radiology
Department: Radiology

Abstract

Introduction:
Addison's disease, also known as primary adrenal insufficiency, is a disorder caused by failure of the adrenal cortex, resulting in insufficient production of cortisol and mineralocorticoid hormones by the adrenal glands. In this case series, we describe three patients with Addison's disease to highlight the common imaging findings seen in this disease that may be used to help assess the adrenal glands and diagnose adrenal insufficiency.

Case Information:
Case 1: A 61-year-old female who was diagnosed with primary adrenal insufficiency due to bilateral adrenal hemorrhage. During her initial presentation, computed tomography (CT) of the abdomen revealed enlarged and edematous adrenal glands that were concerning for bilateral adrenal hemorrhage. Subsequent cosyntropin stimulation test was positive for primary adrenal insufficiency, and the patient was started on corticosteroid replacement. Repeat CT scan performed a year after her initial presentation demonstrated adrenal glands that remained large. Abdominal CT performed three years after initial presentation revealed atrophic and stable adrenal glands, consistent with her diagnosis of Addison's disease.

Case 2: A 55-year-old male with a history of Addison's disease for more than twenty years who was diagnosed with Polyglandular Autoimmune Syndrome Type II. His head CT showed chronic calcification of bilateral auricular cartilages, and severely atrophic glands were seen on abdominal CT. These findings are compatible with his history of Addison's disease.

Case 3: A 78-year-old male with long-standing history of Addison's disease. Skeletal survey showed calcified pinna on x-ray of the skull, and head CT also demonstrated calcified auricular cartilages bilaterally. Abdominal CT showed atrophic adrenal glands. The patient's imaging findings were consistent with his history of Addison's disease.

Discussion:
Addison's disease is a chronic condition and has many causes, including autoimmune adrenalitis, infection, malignant tumor, hemorrhage, and iatrogenic conditions. Patients with adrenal insufficiency may experience adrenal crisis, an acute life-threatening condition due to insufficient cortisol, so it is important to diagnose and treat this disease. Addison's disease cannot be diagnosed by imaging alone, but abdominal CT is the imaging modality of choice for adrenal assessment. The causes of Addison's disease have different CT findings, and imaging features of the adrenal glands also vary depending on acute, subacute, or chronic primary adrenal insufficiency.

Acute primary adrenal insufficiency may result from bilateral adrenal hemorrhage, which appear as adrenal enlargement on CT scan that may be asymmetrical. Adrenal hemorrhage may progress to adrenal hematomas that appear round or oval on CT. Subacute is defined as less than two years of disease, with CT typically showing enlargement of both adrenal glands with necrotic centers and a rim of contrast enhancement. In chronic primary adrenal insufficiency, CT scan demonstrates small, atrophic remnants of the adrenal glands, as seen in these patient cases.

Calcification of the auricle is an uncommon finding that usually results from ectopic calcification of the auricular cartilages and can manifest as rigid ear. The exact underlying pathogenesis is unclear, but it may be caused by trauma, frostbite, inflammation, or endocrinologic disorders. Adrenal insufficiency is the most common endocrine disorder to be associated with this condition. Calcified pinna can be confirmed on imaging and is seen as dense opacities within the cartilage on skull x-ray and CT. Auricular calcification can precede the development of endocrinopathies by many years and may be the only marker of underlying disease. Therefore, undiagnosed endocrinopathies, especially adrenal insufficiency, should be considered in patients found to have auricular calcification without a known cause.

Conclusion:
In patients with Addison's disease, CT can help evaluate the adrenal glands to determine the etiology and guide management. There should be suspicion of possible underlying adrenal insufficiency in patients with auricular calcification on imaging and no known cause. It is important for clinicians to recognize imaging findings of Addison's disease for early detection and management to prevent life-threatening adrenal crisis.

Abstract Title: Variable MRI appearance of hepatic steatosis

Investigator: Sun, Madeline
Co-Investigator(s): 1. Alexander Schlarb, MD, Radiology
Department: Radiology

Abstract

Introduction:
Hepatic steatosis, characterized by the accumulation of intracellular fat within hepatocytes, is a common liver condition with significant implications for public health. Hepatic steatosis can manifest with varying presentations, ranging from asymptomatic fatty liver detected incidentally to more severe cases, potentially progressing to cirrhosis. Magnetic resonance imaging (MRI) is a powerful non-invasive tool for assessing hepatic steatosis, enabling evaluation of fat content, distribution, and associated findings within the liver. This poster delves into the methodologies employed in MRI-based assessment of hepatic steatosis and highlights the challenges inherent in accurate quantification.

Main Body:
Hepatic steatosis is the result of abnormal accumulation of triglycerides within hepatocytes. There are various underlying causes, including nonalcoholic fatty liver disease, alcoholism, metabolic, toxic, and infectious causes. Patients with steatosis can subsequently develop fibrosis, cirrhosis, or hepatic insufficiency.

Hepatic steatosis can be broadly categorized into three groups:

1. Diffuse hepatic steatosis: This is the most common form where the entire liver demonstrates a homogeneous fatty appearance. "Focal fat sparing" can be seen in diffuse hepatic steatosis and is characterized by reduced or absent fat accumulation in specific areas of the liver.
2. Focal hepatic steatosis: Less common, it involves localized fat deposits in the liver. Focal hepatic steatosis can mimic primary or secondary hepatic masses but should demonstrate absent or minimal mass effect.
3. Multifocal hepatic steatosis: Multifocal hepatic steatosis, also known as multinodular hepatic steatosis, describes multiple nodular or ovoid fat foci that are randomly distributed throughout the liver.

MRI is a reliable non-invasive tool for evaluation of hepatic steatosis. Hepatic steatosis appears hyperintense on T1-weighted images and mildly hyperintense on T2-weighted images. To further characterize hepatic steatosis on MRI, fat suppression techniques are utilized.

There are different methods available to suppress fat on MRI; the technique used depends on the purpose of fat suppression and the amount of fat in the tissue of interest and whether the fat is microscopic or macroscopic.

Detecting microscopic fat can be achieved with opposed-phase imaging (OPI). OPI with in-phase (IP) and out-of-phase (OOP) acquisitions is a widely used MRI technique for microscopic fat detection and quantification. The signal from water and fat are additive on IP images, while the signal on OP images is the difference between water and fat signals and results in reduced signal from fatty tissue. Thus, hepatic steatosis shows a signal intensity drop on OOP images in comparison with IP images. OPI is highly sensitive for detecting microscopic

fat if the fat fraction (FF) is greater than 10%. FF refers to the proportion of fat within the liver and serves as a quantitative measure to assess the severity of hepatic steatosis.

Quantifying the degree of hepatic steatosis can be achieved on OPI using the relative IP and OOP signal intensity values of the liver and the spleen. The following formula is then used to calculate the percentage of signal intensity loss: [(Liver IP / Spleen IP) - (Liver OOP / Spleen OOP)] / [(Liver IP / Spleen IP)] x 100. This method becomes unreliable for quantification when the FF is greater than 50% because the OOP signal intensity paradoxically increases due to the presence of relatively fewer water molecules to cancel out the fatsignal.

Alternative forms of fat suppression include fat saturation and inversion recovery imaging. These techniques are especially useful for suppressing larger quantities of intracellular lipid or adipose tissue but are not useful in evaluating smaller concentrations of intracellular lipid.

Conclusion:
Hepatic steatosis is a common condition with important implications to public health. It is important to be able to identify hepatic steatosis because it may have serious consequences if left untreated. Knowledge and familiarity of imaging patterns of steatosis may prevent misdiagnosis. MRI with IP and OOP is a proven method for detection and quantification of intracellular fat in hepatic steatosis. MRI is particularly useful for diagnosing atypical forms of hepatic steatosis or when diagnosis is not certain, allowing for non-invasive diagnosis and quantification.

Abstract Title: Type B Aortic Dissection as a Complication of ECMO

Investigator: Surratt, Matthew
Co-Investigator(s): 1. Simran Phuyal, Co-A-1, EVMS/MD Student 2. Thomas Gear Vincent, Co-A-2, EVMS/MD Student
Department: Sentara Vascular Surgery

Abstract

Introduction
Type B Aortic Dissection (TBAD) is a life-threatening condition with a high mortality rate, presenting unique and challenging management considerations. Often patients present with complicating comorbidities and procedure complications. The management of TBAD has seen significant advancements over the past two decades, with the development of less invasive endovascular techniques such as Thoracic Endovascular Aortic Repair (TEVAR).

However, the choice of treatment must be individualized, considering the patient's overall condition and the specific characteristics of the dissection.

Case Information
We present a case report of the complex multidisciplinary management of a TBAD as a complication of extracorporeal membrane oxygenation (ECMO) cannulation in a patient with chronic hypertension. The patient, a 73-year-old male, presented to the Emergency Department with severe chest pain, subsequent cardiac arrest and resuscitation. He was diagnosed with a massive Pulmonary embolism with cor pulmonale. He required initiation of veno-arterial ECMO due to hemodynamic instability and underwent mechanical and suction thrombectomy.

Following the successful thrombectomy he was diagnosed with a TBAD from zone 2-10. Given the patient's condition and the extent of the dissection, the decision was made to perform a TEVAR, which was successfully completed with significant improvement in his hemodynamics, allowing for eventual ECMO decannulation, and patient recovery.

Discussion/Clinical Findings
After successful thrombectomy, his condition worsened, manifesting in lactic acidosis, shock liver and a cold left leg. Subsequent computed tomography angiography (CTA) findings revealed an acute TBAD of emergent nature, spanning zones 2-10. There was also a dynamic dissection flap observed via intravascular ultrasound (IVUS).

These findings lead the attending vascular surgeon to conclude that the TBAD was likely resultant from endovascular stress created by the ECMO cannulation.

The patient underwent thoracic endovascular aortic repair (TEVAR) and conversion to veno-veno ECMO, which improved his acidosis.

In addition, hypertension is a well-known risk factor for aortic dissection, and it may be that the use of ECMO may further exacerbate the risk due to increased shear stress on the aortic wall.

Conclusion
This case demonstrates the rare occurrence of an ECMO induced Aortic dissection and the successful management through TEVAR. It also underscores the importance of a multidisciplinary approach in the management of critically ill patients with complex aortic pathology.

While at least one case report exists that demonstrates ECMO as a cause of a Type A aortic dissection, this appears to be a novel case highlighting ECMO use as the likely cause for TBAD. Whether this is the first case, or part of an unacknowledged trend, further research and study should seek to unearth more occurrences and explore their common characteristics.

Abstract Title: Massive Bilateral Pulmonary Embolism Treated with ECMO and Thrombectomy

Investigator: Surratt, Matthew
Co-Investigator(s): 1. Nina Li, Co-A-1, EVMS Vascular/MD 2. Gear Thomas Vincent Co-A-2, EVMS Vascular/MD
Department: Vascular Surgery, Sentara Medical Group

Abstract

Introduction:
Massive pulmonary embolism represents the third leading cause of cardiovascular death in hospitalized patients within the United States. The management of acute high-risk PE has undergone drastic changes in the last 10 years. The primary treatment options include therapeutic anticoagulation, systemic thrombolysis, catheter-directed thrombectomy (CDT), and surgical thrombectomy. Patients with massive PE often present with complications necessitating optimization of management with existing therapies. Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) as a novel treatment for massive PE has been reported, but limited to salvage therapy when other interventions have failed.

Guidelines for ECMO use in massive PE are limited. This case report demonstrates a successful use of ECMO as support to allow a patient to undergo advanced endovascular treatment of massive PE.

Case Information:
We present a case report of a unique multidisciplinary management of massive pulmonary embolism. The patient is a 73-year-old male who presented to the emergency department with shortness of breath. He required intubation, but subsequently went into cardiac arrest. After achieving return of circulation, post-resuscitation imaging demonstrated massive bilateral pulmonary embolism (PE). The patient was not a candidate for systemic thrombolytics because of his recent cardiopulmonary resuscitation. He was critically ill, in cardiogenic shock requiring multiple pressors. Therefore, the decision was made to place the patient on veno-arterial extracorporeal membrane oxygenation (VA-ECMO) for stabilization, followed by mechanical and suction thrombectomy. These were successfully completed with improvement in the patient's hemodynamics allowing eventual ECMO decannulation.

Discussion/Clinical Findings:
This case report highlights the successful management of a critically ill patient with massive bilateral PE using a combination of VA ECMO and thrombectomy. The utilization of VA ECMO provided circulatory support while delaying the thrombectomy procedure until the patient's hemodynamic status improved. This multidisciplinary approach and endovascular intervention proved effective in treating the patient's life-threatening condition.

Conclusion:
The case presented demonstrates the efficacy of VA ECMO and delayed suction thrombectomy in managing massive bilateral PE, particularly in the presence of relative contraindications for other treatment options. This multidisciplinary approach and endovascular intervention can be considered in similar complex cases to optimize patient outcomes.

Abstract Title: Patterns and Correlates of Depression, Anxiety and Coping Strategies among Asian Americans and Pacific Islanders in Eastern Virginia During the COVID-19 Pandemic

Investigator: Suryadevara, Pavan
Co-Investigator(s): Pavan Suryadevara, EVMS/School of Medicine; Jaime Luis D. Almirante, EVMS/School of Medicine; Caitlyn F. Ling, EVMS/School of Medicine; Spencer G. Chee, EVMS/School of Medicine; Tracy Dien, EVMS/School of Medicine; Cynthia C. Romero, CHKD, Pediatrics; Hongyun "Tracy" Fu, M. Foscue Brock Institute for Community and Global Health
Department: M. Foscue Brock Institute for Community and Global Health

Abstract
Introduction: Although the health impacts of racial discrimination for immigrants have been widely acknowledged in major US cities, little is known about the effect of anti-Asian racism on Asian Americans and Pacific Islanders (AAPI) during the COVID-19 pandemic. This study examined the patterns and correlates of depression, anxiety, and coping strategies, using mixed-methods data collected in Eastern Virginia in April/August 2022.

Methods: We analyzed data from online surveys (N=1,795) and semi-structured in-depth interviews (N=48) collected among AAPI recruited via social media channels and in-person events using three sampling criteria: 1) decedents of Asian and Pacific Islanders; 2) ages 18-85 years, and 3) residents of Hampton Roads and the Eastern Shore. Descriptive statistics and multivariable regressions were performed, using survey data. Thematic analysis was performed to identify key themes, guided by the grounded theory and the Creswell method.

Results: Around 8% of AAPI ever had a diagnosis of mental health problems, 16% had symptoms of anxiety, 14% had depression, and 40% experienced more than 10 S&D (stigma and discrimination) items. Adjusting for confounding factors, receiving a mental health diagnosis was associated with experiencing high levels of S&D (AOR:1.52, 95% CI:1.01-1.52), being females (AOR:1.66; 95% CI:1.05-2.64); having private insurance (AOR:0.49; 95% CI:0.24-0.98) 1.01: 2.35), receiving college education (AOR:0.47; 95% CI:0.27-0.85), and higher incomes (AOR:0.54; 95% CI:0.29-0.99). Furthermore, having symptoms of anxiety was associated with being female (AOR:1.41; 95% CI:1.05-1.89) and U.S born (AOR:4.23; 95% CI:2.55-7.02); and having religious belief (AOR:1.72; 95% CI:1.22-2.44). Common stress coping strategies included talking with friends/families (44%), engaging in a game/sport (31.2%), and increased screen time (TV programs or social media). Qualitative interviews revealed higher mental health risks among AAPI who worked in blue-collar professions and had an English language barrier and significant buffering effects of receiving strong family/community support.

Conclusions: Findings revealed high rates of depression/anxiety among AAPI and elevated mental health risk among AAPIs who were socially and economically disadvantaged and who had higher exposure to anti-Asian S&D. Findings highlighted highlighting the need for targeted interventions to combat racism against AAPI and to improve mental health among AAPIs living in smaller cities in the U.S.

Abstract Title: Exploring Clinical and Radiographic Factors Associated with Recurrence in Stage I Lung Cancer Treated with Stereotactic Body Radiotherapy

Investigator: Thakur, Nikita
Co-Investigator(s): 1. Kei Suzuki, MD, Department of Thoracic Surgery/Inova Schar Cancer Institute 2. Michael Weyant, MD, Department of Thoracic Surgery/Inova Schar Cancer Institute 3. Ju Ae Park, MD, Department of Thoracic Surgery/Inova Schar Cancer Institute 4. Duy Pham, BS, Department of Thoracic Surgery/Inova Schar Cancer Institute 5. Kasper Nilsson, Department of Thoracic Surgery/Inova Schar Cancer Institute
Department: Department of Thoracic Surgery, Inova Schar Cancer Institute

Abstract

Introduction:
The current standard of care for patients with stage I non-small cell lung cancer (NSCLC) is surgery, but patients may undergo stereotactic body radiotherapy (SBRT) if they cannot have surgery due to significant comorbidities or age. However, the recurrence rate for those treated with SBRT is 30-40% compared to a 15-20% rate for those treated with surgery. Clinical management is also challenging due to variations in tumor histopathology and behavior. Computer Aided Nodule Analysis and Risk Yield (CANARY), a quantitative CT analysis tool, allows for non-invasive tumor assessment by grouping tumors into "good", "intermediate", and "poor" risk stratifications. While CANARY has been studied in stage I NSCLC surgically- resected cases, it has not been analyzed in SBRT-treated NSCLC. The aims of this project were to determine the clinical factors associated with recurrence in stage I NSCLC, and to utilize CANARY to analyze SBRT-treated NSCLCs with recurrence.

Methods:
This was a retrospective cohort study of 176 patients who received SBRT at Inova from 2016 to 2022. Inclusion criteria was a diagnosis of stage I NSCLC at the time of SBRT. Exclusion criteria were: incomplete SBRT; lung metastases from other cancers; and/or a diagnosis other than stage I NSCLC. The primary outcome measured was recurrence. Data was collected on demographics, comorbidities, tumor characteristics, SBRT-specific factors, and recurrence features. Statistical analysis was performed via univariate analysis with Chi-square and Kaplan-Meier. CANARY analysis was performed for those who met the inclusion criteria and had available image annotations, grouping the tumors into "good", "intermediate", or "poor" prognostic risk groups.

Results:
Of the 176 patients screened, 92 met the inclusion criteria and were eligible. Of these 92 patients, 27 had recurrent stage I NSCLC (recurrence rate: 29.3%). 84 of the 176 patients were not eligible due to incomplete SBRT (2), lung metastasis from another cancer (48), or not being stage I at the time of treatment (34). Gender was significantly associated with recurrence ($p = 0.037$), with recurrence among males greater than females. Smoking pack-years did not meet statistical significance ($p = 0.084$), with a majority of those with recurrence smoking more than 31-60 pack-years. As part of recurrence-free survival (RFS), the median follow-up time was 1.8 years, and three-year RFS was 61.8%. Of the 92 patients, 70 had available CANARY annotations grouped into: good (7, 0 of whom had recurrence); intermediate (9, 1 of whom had recurrence); and poor (54, 9 of whom had recurrence). Three-year RFS was calculated for: full cohort (56.8%); good (100%); intermediate (88.9%); and poor (48.2%). Median follow-up was 1.9 years. While each risk group was not statistically significant from each other ($p = 0.1$), there was statistical significance ($p = 0.04$) when grouping good and intermediate risk vs. poor risk.

Conclusions:
Our findings indicate that gender is a clinical factor associated with recurrence, with males having greater incidence of recurrence than females. While the amount of smoking pack-years did not reach statistical significance, it may be an important factor to consider when evaluating recurrence. CANARY analysis did not reveal significant difference in RFS when comparing the good, intermediate, and poor risk groups against each other. However, there was statistical significance ($p = 0.04$) when comparing RFS of both good and intermediate risk groups against the poor risk group. With these results, the goals for future studies would be to: apply CANARY and other clinico-radiographic factors (i.e. tumor volume, PET maximum standardized uptake value) in prognostication of stage I lung cancers; and to use these factors to update current surveillance protocols. Ultimately, we hope to utilize these results to create a clinico-radiographic model to aid in the current management of lung cancer.

Abstract Title: Indium-111 Uptake in a Case of Uncommon Ovarian Tumor

Investigator: Trivedi, Shikha
Co-Investigator(s): 1. Dylan Steffey, MD, EVMS Radiology
Department: EVMS Radiology

Abstract

Introduction
An Indium-111 tagged white blood cell scan is an important adjunctive test in the evaluation of fever/sepsis of unknown origin. Indium scans-111 scans are highly sensitive and specific in the evaluation and localization of abscesses/infection. An indium-111 scan is a two-part nuclear medicine examination in which a patient's blood is withdrawn and the white blood cells (WBC) are isolated and tagged with radioactive indium 111 before being injected back into the patient. 24 hours following re-injection, allowing for the tagged WBC to migrate the area of infection, planar spot images to include full body and orthogonal spot projections are obtained. The second portion of the exam involves injection of radioactive sulfur colloid, to rule out a marrow replacing process which may also show increased WBC uptake. A positive indium WBC scan would show increased radiotracer accumulation on Indium-tagged WBC images with absence of radiotracer uptake on the sulfur colloid images.

Case Information
Patient is a 38-year-old female with past medical history of chorioamnionitis presenting for LLQ pain and persistent fevers and chills. Several days prior, the patient was treated for presumed pyelonephritis with Ciprofloxacin. Initial laboratory evaluation revealed leukocytosis, negative urine pregnancy test and likely contaminated urine analysis. Initial imaging evaluation included CT abdomen and pelvis revealed a large, septated cystic mass within the midline pelvis without secondary findings suggestive of infection. Initial imaging suggested ovarian origin, with malignancy not ruled out. Findings were corroborated by Pelvic US. MRI was subsequently performed, suggesting likely ovarian carcinoma with peritoneal seeding. There was ongoing concern over the exact etiology of patient's leukocytosis, whether it was related to the ovarian lesion versus persistent pyelonephritis versus other occult infections. Indium tagged white blood cell was subsequently utilized for definitive evaluation. Indium-WBC scan displayed large, rounded region of discordant white cell uptake corresponding to the mass described in prior imaging. Patient subsequently underwent laparoscopic excision with Gynecological Oncology. Intraoperatively, a large cystic mass replacing the left ovary with dense adhesions to the adjacent intro-abdominal structures and surrounding inflammation. Pathology revealed that the large lesion was consistent with benign serous cystadenofibroma with hemorrhage and necrosis of the ovary compatible with torsion. Patient's leukocytosis was seen to be down trending at time of subsequent discharge.

Discussion
The radiologic literature supports the overall accuracy of this scan in patient's with malignancy/known tumors, however, there are sporadic reports of false positive examinations secondary to tumor uptake mimicking abscess. In the case described above, initial imaging results were highly suggestive of ovarian malignancy, with pathological results revealing a relatively rare benign tumor, known to mimic malignancy on MRI and Ultrasound. Literature suggests that this tumor type accounts for approximately 1.7% of all benign ovarian tumors. A possible imaging characteristic which may differentiate from malignancy are dense fibrous stromal proliferation which may be seen on MRI. Focusing on the results of the indium white blood cell scan, there is obviously little literature regarding the expected appearance of a cystadenofibroma. There are several hypotheses as to why tumors may show increased/discordant indium-WBC uptake including increased blood pool from hypervascularity, intrinsic immunological activity, or a sequela of our innate immunological response to this perceived "foreign body".

Conclusion
In conclusion, this is a case of both uncommon pathology and imaging findings, specifically the unusual Indium-WBC uptake by tumor. It has been suggested that the degree of uptake may be considered to differentiate between tumor and abscess, however other studies have shown little difference. Additionally, this case highlights some of the limitations and pitfalls of commonly utilized imaging modalities in the evaluation of complex ovarian pathology. Fortunately, the Indium- WBC scan was able to effectively rule out other sources of infection, focusing patient's care on this ovarian mass.

Abstract Title: The Importance of Proper Imaging Acquisition in DaTscans

Investigator: Trivedi, Shikha
Co-Investigator(s): Dr. Laura Columbus, MD, Radiology
Department: EVMS Radiology

Abstract

Introduction

DaTscans are used to detect defects in dopaminergic pathways aiding in the diagnosis of Parkinson's disease. It is also beneficial for differentiating between dopamine-deficient Parkinson's, Lewy Body Dementia and Alzheimer's[15]. This exam decreases the time to diagnosis and start of treatment.[1] Given the important role DaTscan has in patient management, proper imaging technique is essential to provide diagnostic imaging quality for confident interpretation. Our case highlights the importance of suboptimal scan recognition, and will discuss the differential for poor image quality and applicable correction methods.

Many factors are involved with performing a DaTscan accurately. The patient must be prepped appropriately, including blocking the thyroid gland with potassium iodide a hour before the exam and stopping certain medications, such as phenylephrine and antidepressants.[4] The patient is injected intravenously with radioactive iodine, ^{123}Iofluplane, which has a high affinity for the presynaptic dopamine transporters at the nigrostriatal pathway. The patient is imaged several hours later.[5] Imaging the patient involves placing them in head, arm, and knee restraints to minimize movement; the head is then rotated about 12-15cm. The cerebellum is not imaged as the structures of interest are above the ears.[4]

A typical, negative scan will demonstrate symmetric radiotracer uptake at the basal ganglia with an appearance described as a 'comma', and minimal uptake in the remainder of the brain (Figure 1: Normal DaT scan).

Case Information

The patient is a 75-year-old female with a two-year history of suspected Parkinsonism. She initially reported difficulty picking up her feet, getting up from a seated position, worsening handwriting, and throwing objects in her sleep. On exam, she had slightly increased tone in the left upper extremity, left greater than right decrement with finger taps, concern for gait freezing, decreased left arm swinging, stooped posture and en bloc turning. She was started on a trial of carbidopa levodopa which initially yielded an intermediate improvement in symptoms, but eventually the patient reported a return of symptoms. Due to her symptoms and abnormal physical exam, she underwent a DaTscan.

The patient's initial scan had an overall low count appearance (Figure 2a), and the quality of the exam was questioned by the radiologist. While one may call this abnormal positive for Parkinson's Disease, the confidence level is low. Quality assessment of any nuclear examination should be done when the images do not fall within expected normal limits. Review of the raw data images (Figure 2b) revealed inclusion of the salivary glands, which appeared quite intense. Repeat imaging was performed above the ears, to exclude the normal salivary gland activity, resulting in an improved image quality (Figure 3a and 3b). On the repeat scan, there was a more convincing loss of dopaminergic neurons in the posterior basal ganglia bilaterally, and a more definitive interpretation of a positive DaT Scan.

Discussion

DaTscans detect defects in the nigrostriatal pathway. The ratio of caudate to putamen uptake, and varying degrees of symmetry are crucial to measure qualitatively and/or quantitatively.[3] If there is interference with basal ganglia count detection because the image acquisition is too wide and the scaling is incorrect, as seen in this patient, the results will diminish diagnostic quality. Other artifacts that can cause abnormal imaging findings include improper head positioning, movement artifacts, medications that interfere with ^{123}I uptake, and patient history of previous infarcts.[4] Improper head positioning can be observed on raw data review, and corrected with reorientation tools. If that is unavailable, repeat imaging would be advised. Motion should be assessed on raw data imaging as this can cause diminution or distortion of the basal ganglia, and would also be corrected with repeat imaging. When faced with an overall low count study, some additional technical considerations include medication interference and dose infiltration. Review of the patient intake form and scanning of the injection site help exclude these confounding factors.

Conclusion

A DaTscan is clinically useful for diagnosing Parkinson's Disease. The examination requires proper patient preparation, image acquisition, and processing. This case highlights basic nuclear medicine principles and the importance of the knowledge to produce quality diagnostic images.

Abstract Title: Does Overuse of Zofran in a Pediatric Emergency Room Cause Diagnostic Delays?

Investigator: Tucker, Lauren
Co-Investigator(s): 1. Lauren Tucker, MD Class of 2026 2. Turaj Vazifedan MS, Department of Pediatrics Biostatistician 3. Ryan Krafty, MD Class of 2026 4. Trevor DiGerolamo, MD Class of 2026 5. John W. Harrington MD, General Academic Pediatrics
Department: General Academic Pediatrics

Abstract

Introduction: Zofran (Ondansetron) has been shown to decrease the length of emergency department (ED) stays for children with acute gastroenteritis (AGE) by inhibiting vomiting and allowing for oral rehydration. Zofran use in the ED has broadened beyond AGE and is commonly used to treat vomiting only. Expanded use for a specific symptom could introduce diagnostic uncertainty. Our aim was to assess the use of Zofran beyond the scope of AGE in a pediatric ED.

Methods: A retrospective chart review of patients aged 1 month to 17 years receiving Zofran at a busy pediatric ED in Norfolk, VA between 2/1/2023 and 4/30/2023 was performed using the electronic medical record for Cerner called PowerChart. Possible risk factors for delayed diagnoses included route and number of Zofran doses, vomiting, diarrhea, nausea, fever, abdominal pain, bloody stools, or signs of dehydration being present within 24 hours of the visit. Review of discharge diagnoses, return to the ED within 48 hours, and returning diagnoses were recorded and compared using risk factors and a logistic regression model.

Results: 1618 subjects were reviewed. 76 (4.7%) returned to the ED within 48 hours. Of those 76, we identified 8 (10.5%) diagnostic delays in which the returning diagnosis differed considerably from the original. There was a ninth subject, originally diagnosed with vomiting, who passed away from nonaccidental abdominal trauma after returning to the ED within 96 hours. Hence, 9 of the 1618 subjects (0.6%) experienced a delayed final diagnosis after receiving Zofran at their original visit. There was no statistically significant correlation between the risk factors reviewed and these 9 cases when compared to the 1618 total cases and 76 who returned.

Conclusion: Only 0.6% of those provided Zofran at a pediatric ED had a delayed diagnosis, suggesting that pediatric ED Zofran use is generally safe and rarely causes diagnostic uncertainty. Unfortunately, the results did not distinguish a risk factor to help discern a delayed diagnosis. However, knowing that 10.5% of the 76 who returned within 48 hours of receiving Zofran had a delayed diagnosis may help inform pediatric providers to expand their differential diagnoses when patients return after receiving Zofran.

Abstract Title: Teletraining: An Assessment of the Use Case of Remote Learning for Clinical Knowledge Acquisition

Investigator: Ukekwe, Chuka
Co-Investigator(s): 1. Alberto E. Musto, MD, PhD
Department: Pathology & Anatomy

Abstract

INTRODUCTION
The advancement of technology has made remote learning or *teletraining* an indispensable tool in the medical education space. This is especially true in the aftermath of the COVID 19 pandemic, during which most, if not all educational instruction was delivered remotely. However, as the popularity of remote learning continues to grow, it becomes increasingly more important to assess the quality and efficacy of this form of training, especially in comparison to more conventional methods (i.e., live, in- person learning). With that in mind, the purpose of this study is to evaluate the acquired competency of a group of medical students after they received instruction via teletraining in order to make a stronger case for the implementation of this learning modality.

METHODS
An educational video depicting experimental seizures in lab mice was created at Eastern Virginia Medical School and delivered to a group of six medical students at the Catholic University of Cuyo, San Luis, Argentina. Then, a training session led by the principal investigator describing the different types of experimental seizures and their associated scores on the Racine scale was also given to the medical students. These students had no prior experience with identifying the different types of experimental seizures contained in the video. The students independently evaluated the 16:41 minute video and assigned time frames to each type of seizure according to the Racine scale. This evaluation process was performed once a week over the course of three weeks for a total of three times. Descriptive statistical analysis was then performed on the collected data and agreement was assessed by an Interclass Correlation Coefficient (ICC).

RESULTS
Intra-observer agreement for all evaluators between the three review sessions ranged from 0.85-0.97 (ICC). Inter-observer agreement analysis of the evaluators ranged between 0.80-0.90. When further broken down into the different scores on the Racine scale, the inter-observer agreement for scores 1 to 4 ranged from -0.15 to -0.18, and 0.16 for score 5 ($p=<0.0001$). The observer scores were also compared with the original curve score sent from EVMS, observing a high correlation (rho ranging from 0.88 - 0.91).

CONCLUSION
This study provides insight into the effectiveness of teletraining as a learning modality and the potential for it to be used as a tool for the development of clinical competency in medical students. Moreover, the results from this study can provide valuable information to educators and organizations in the medical education space looking to implement teletraining in an efficacious manner. If used properly, teletraining can allow for deeper learning in live, in-person environments by establishing a baseline level of knowledge in learners before they gather for in-person didactic sessions.

Abstract Title: An assessment of the effectiveness of virtual escape rooms to review anatomical knowledge in medical education

Investigator: Velasquez, Mark
Co-Investigator(s): Co-A-1. Mark Velasquez, M3 Co-A-2. Jacqueline Shaia Co-A-3. Abhijith Atkuru, M4 Co-A-4. Lauren Yoho Co-A-5. Dr. Carrie Elzie, Cell Systems and Anatomy & Department of Medical Education, University of Texas Health San Antonio
Department: Cell Systems and Anatomy & Department of Medical Education, University of Texas Health San Antonio

Abstract

Introduction
The popularity of escape rooms as a teaching tool in medical education has grown in recent years. Escape room games have been shown to increase knowledge, self-confidence, and long-term retention. To determine if a virtual escape room could serve as an effective exam review, we implemented a cranial nerve escape room in a gross anatomy course with health professions students.

Methods
One hundred thirty-nine Pathologist Assistant, Surgical Assistant, and Physician Assistant students enrolled in the Health Professions Anatomy course at Eastern Virginia Medical school participated in a pre-post single-arm pilot as a required, ungraded portion of the course. Students completed a pre-activity competency test which comprised 10 multiple choice questions on relevant clinical cases. Next students worked in groups of 4-6 students to complete a virtual escape room built in Articulate Storyline. The concept was students were trapped within the brain and had to determine the correct cranial nerve exit.

To do so, students had to solve various puzzles (crosswords, drag and drops, hot spots, ordering, etc), each when answered correctly gave them a clue to narrow down the correct exit. When they determined the correct exit path, they were instructed to text the answer to the instructor. The activity took 36-67 minutes for teams to complete. Following completion of the activity, students repeated a 10 question knowledge quiz and a survey that explored if the activity was useful, if working in teams was effective, and if the activity in general was successful in helping to learn the material. Data from the surveys were downloaded and analyzed using Microsoft Excel. The data from pre-tests and post-tests with identical questions were compared using an unpaired t-test with a p-value of < 0.01 being considered significant.

Results
One hundred thirty-nine students completed the pre-test (100%), one hundred twenty-seven students (91.4%) completed the post-test, and ninety-five (68.3%) students completed the post-survey. When comparing the pre-activity and post-activity competency tests, scores improved for all questions with score increases ranging from 8.7% to 29.2%. There was a significant difference ($p<0.01$) in the overall pre-test score of 55.08% compared to the post-test score of 70.17%. On the post-activity survey, 82.1% agreed or strongly agreed that they found the activity to be a productive use of time. 90.5% thought the activity was an effective team building activity. 96.8% thought the activity encouraged the use of communication and collaborative skills. 66.32% felt more confident about the material after the activity. 92.6% agreed or strongly agreed that it helped expose their gaps in knowledge. And 75.8% said that they plan to play the escape room again as a review for their exam.

Conclusion
The increase in scores on all questions on the post-activity competency test is a strong indicator that the activity was effective at enhancing students' knowledge of the material. In addition, the majority of students found the activity to be a productive use of time, helpful with team building, and allowed them to feel more confident about the material. The use of an escape room tailored specifically to the curriculum of a graduate-level anatomy course was highly effective as a teaching tool.

Abstract Title: Effects of Galaxy Cosmic Radiation on Rat Ovary Size and Follicle Counts

Investigator: Vettichira, James
Co-Investigator(s): Richard A Britten, Department of Radiation Oncology and Biophysics
Department: Physiological Sciences

Abstract

Introduction
Space exploration has been a great interest for the United States since Neil Armstrong landed on the moon over fifty years ago. The Artemis mission to Mars will include equal numbers of female and male astronauts; therefore, it will be essential to determine how radiation affects women, specifically their ovarian health. There are four unique stages of follicle development. Primordial follicles are characterized by an oocyte surrounded by a singular layer of flat pre-granulosa cells. Primary follicles are characterized by an enlarged oocyte surrounded by a single layer of cuboidal granulosa cells. Secondary follicles are characterized by an oocyte surrounded by multiple layers of cuboidal granulosa cells without antral fluid.

Finally, the last stage of follicle growth is the antral follicle, containing multiple layers of granulosa cells with antral fluid. Only antral follicles are able to erupt and release the oocyte for ovulation. During the voyage to Mars, the astronauts will be subjected to different levels and types of radiation. Destruction of these follicles will lead to decreased fertility outcomes. If galaxy cosmic radiation (GCR) is detrimental to an ovary's ability to grow and/or retain follicles, then GCR exposure should reduce the numbers of ovarian follicles.

Methods
7-month-old adult female rats were divided into four groups: A FE10 (600 mEV) single exposure group, a double GCR (10 cGY each) exposure group, a GCR/He (10 cGY each) group, and a group that was not exposed to radiation (control group). All four groups of rats, which originated from Scottsdale, PA, were sent to the NASA Space Radiation Laboratory in Upton, New York, where they were irradiated, besides the control, and then shipped back to the Eastern Virginia Medical School laboratory. The ovaries were fixed in 10% formalin, processed using paraffin wax, and then sectioned using a microtome.

Every fifth slide was stained using hematoxylin and eosin, and primordial, primary, secondary, and antral follicles were counted. Special care was given to counting the ovaries; only primordial and primary follicles with clear oocyte nuclei were counted, while for secondary and antral follicles, a clear oocyte nucleus and nucleoli had to be present to be counted. This was to prevent follicles from being overcounted. Total number of sections containing ovarian tissue was noted as a measure of overall ovary size.

Results
To date, two ovaries have been fully analyzed: an ovary that was subjected to a double GCR exposure and a control ovary. Regarding follicle counts, the GCR-exposed ovary contained 141 primordial follicles, 45 primary follicles, six secondary follicles, and zero antral follicles. The control group ovary, on the other hand, contained 195 primordial follicles, 34 primary follicles, 17 secondary follicles, and zero antral follicles. Regarding ovary size, the GCR exposed ovary contained 269 total sections, while the control group ovary contained 595 total sections.

Conclusion
Our preliminary results suggest that galaxy cosmic radiation may have a negative effect on the number of primordial and secondary follicles within an ovary and the overall size of the ovaries. This ongoing study will ultimately include multiple animals per group and two more radiation groups to compare the effects of different types of radiation on ovarian follicles. One particular area of concern for the female astronauts onboard the Artemis mission is the development of primary ovarian insufficiency. Sometimes called hypergonadotropic hypogonadism, it refers to the early loss of primordial follicles, which can lead to early loss of fertility and an earlier start to menopause in women. The observed reduction in primordial follicles observed in this preliminary experiment correlates with this phenomenon. Ultimately, this research may indicate the need for methods to reduce ovarian follicle loss, including improved guidelines for protective equipment for women astronauts.

Abstract Title: Comprehensive agricultural pesticide pattern usage in evaluation of increased risk of multiple cancer types

Investigator: Vincent, Gear
Co-Investigator(s): Jacob Gerken MS, Rocky Vista University College of Osteopathic Medicine Demi Zapata MS, Rocky Vista University College of Osteopathic Medicine Ileana G. Barron MD MPH, Department of Epidemiology, University of Alabama Birmingham School of Public Health Isain Zapata PhD, Department of Biomedical Sciences, Rocky Vista University College of Osteopathic Medicine
Department: Department of Epidemiology, University of Alabama Birmingham School of Public Health, Birmingham, Alabama 35233, USA & Department of Biomedical Sciences, Rocky Vista University College of Osteopathic Medicine, Englewood, Colorado 80112, USA

Abstract
Pesticides are an essential feature of modern day agriculture, but have been previously linked to several types of cancer. Our study aims to reevaluate this relationship through a population-based perspective. We utilized county-level data on pesticide use and cancer incidence in the United States and adjusted for confounding variables such as county specific rates of smoking, socioeconomic vulnerability, and amount of agricultural land. Our findings demonstrated an association between pesticide usage and increased incidence of leukemia, non-Hodgkin's lymphoma, bladder, colon, lung, pancreatic, cancers, and all cancers combined. We identified several geographic patterns that showed areas with higher agricultural production, such as counties in the Midwest, as having elevated additional risk attributed to pesticide exposure. Through our comprehensive analysis and unique approach, our study emphasizes the importance of acknowledging the risks of pesticide usage for communities, which may be used to impact future policies regarding pesticides.

Abstract Title: Unraveling the mechanism of hyperaminoacidemia-induced activation of ErbB2/ErbB3 kinase.

Investigator: Vippa, Tarun
Co-Investigator(s): Yue Zhang, Department of Molecular Physiology & Biophysics
Department: Department of Molecular Physiology & Biophysics, Vanderbilt University Medical Center

Abstract

Introduction: Disruptions in glucagon receptor signaling leads to a state of hyperaminoacidemia which triggers compensatory proliferation of pancreatic α cells to normalize amino acid levels. We previously found that ErbB2/ErbB3 receptor tyrosine kinase is activated by hyperaminoacidemia independent of its ligand and this activation is required for a cell proliferation. How hyperaminoacidemia activates ErbB2/ErbB3 is unknown. We hypothesize that hyperaminoacidemia activates ErbB2/ErbB3 via transactivation by the amino acid sensitive calcium-sensing receptor (CaSR), which is also required for a cell proliferation.

Methods: We cultured pancreatic αTC1-6 cells (cell line clone derived from mouse glucagonoma) in low serum, high amino acid medium in the presence or absence of inhibitors of CaSR, Src kinase, or ADAM10/17 metalloproteinase for 15 minutes, 30 minutes, and 6 hours, and determined the level of activated ErbB3 (phospho-ErbB3) via western blot.

Results: Based on the mechanism of transactivation, we expected decreases in relative phospho-ErbB3 expression in only the CaSR and Src kinase groups compared to the positive control group at all timepoints. However, we were unable to report any significant results from the western blot due to loss of biological replicates for all groups over the course of the experiment.

Conclusion: Considering the nature of our results, we aim to improve cell culturing working conditions to maximize protein yield for future efforts. In doing so, we hope to generate broader conclusions in regard to how hyperaminoacidemia induces proliferation of pancreatic α cells. The results may shed light on how postprandial α cell proliferation can be controlled to limit adverse effects of glucagon receptor antagonism or provide more α cells for β cell transdifferentiation, for example.

Abstract Title: Attendance of the Postpartum Visit: What are the Barriers?

Investigator: Wagner, Madison
Co-Investigator(s): 1. Asma Azam, EVMS, M4/CHKD 2. Natasha Sriraman, EVMS/CHKD 3. Takemia Cornegy-Hawks/ EVMS
Department: CHKD General Academic Pediatrics, EVMS Center for Maternal and Child Health Equity and Advocacy

Abstract

Introduction: The postpartum period is an important period to diagnose and treat both physical and mental health conditions. The initial postpartum appointment is vital to diagnose postpartum mood and anxiety disorders (PMADs) as they are the most common obstetric complication, with maternal suicide being the number one cause of death within the first year postpartum. However, due to insurance guidelines, women are only seen 1-2 times postpartum, with most not being seen until 6 weeks after delivery. Lack of postpartum follow up is dangerous, especially for women of color, because it can lead to higher rates of untreated mental and physical health issues, leading to higher rates of maternal morbidity and mortality.

Methods: We surveyed moms when they brought their baby into the General Academic Pediatrics Clinic at CHKD for well child checks from 2-6 months of age. We collected information about their birthing experience and barriers to attendance of postpartum visits.

Results: Forty percent of mothers did not attend a postpartum visit (71.4% Black/AA, 35.7% Hispanic). Over 21% of mothers did not have a postpartum visit scheduled before they left the hospital after delivery. Reasons for not attending the initial postpartum visits included: postpartum visit was not important (36%), no active concerns (29%), forgot to attend appointment (21%), work/school schedule (21%), lack of insurance coverage (14%).

Conclusion: When mothers do not attend their postpartum visit, it is a missed opportunity to screen, diagnose and address health issues. Topics such as contraception, breastfeeding, and PMADs can be addressed. Education on these topics has been shown to improve birth spacing and reduce risk of preterm birth and birthing complications, which disproportionately affect women of color. Having systems in place where barriers are reduced for mothers to receive the postpartum care they need is essential in reducing maternal morbidity and mortality.

Abstract Title: Deltoid Ligament Repair in Acute Ankle Fractures: A Systematic Review and Meta- Analysis with a Proposed Treatment Algorithm

Investigator: Walker, Robert
Co-Investigator(s): James Butler, Research Fellow NYU Charles Walls, Orthopedic Student Resident NYU Dr. John Kennedy, Chief of Foot and Ankle Division NYU
Department: Orthopedic surgery at NYU

Abstract

Introduction: The purpose of this systematic review and meta-analysis was to compare clinical outcomes, complications, and failures between patients who underwent deltoid repair (DR) and those who did not (non-DR) during ankle fractures. In addition, we devised an evidence-based treatment algorithm to help guide decision-making for the indication of deltoid ligament repair in ankle fractures.

Methods: During July 2023, the Medline, Embase, and Cochrane library databases were systematically reviewed using the PRISMA guidelines. Fourteen comparative studies comparing outcomes between the DR cohort and non-DR cohort were included. If the heterogeneity was low ($I2 < 25\%$), a fixed effects model was used. If the heterogeneity was moderate-to-high ($I2 > 25\%$), a random effects model was used.

Results: In total, 402 patients (402 ankles) were in the DR cohort and 503 patients (503 ankles) were in the non-DR cohort. The weighted mean follow-up was 24.1 ± 2.8 months. There were superior AOFAS scores in the DL cohort, but no difference in VAS scores between the 2 cohorts. Superior medial clear space was observed in the DL cohort. No difference in complications was observed between the 2 cohorts, but a higher secondary surgical procedure rate was observed in the Non-DL cohort. We devised a treatment algorithm to help guide decision-making for the indication of deltoid ligament repair in ankle fractures.

Conclusions: This systematic review demonstrated superior subjective clinical outcomes, and radiographic outcomes together with a lower secondary surgical procedure rate following repair of the deltoid ligament in the setting of ankle fractures. We devised a treatment algorithm to help guide decision-making for the indication of deltoid ligament repair in ankle fractures. However, there was marked heterogeneity and underreporting of data between the included studies, limiting the generation of any robust conclusions.

Abstract Title: Digital Tools to Improve Standard of Living for People with Epilepsy using FACETS

Investigator: Watson, Frank
Co-Investigator(s):
Department: Pathology and Anatomy

Abstract

Introduction: Epilepsy is a type of neurological condition that, according to the CDC and World Health Organization, affects around 1% of Americans annually and over 50 million people worldwide. It presents a complex healthcare issue for many people chronically living with the condition, but it is estimated that up to 70% of people living with epilepsy could be seizure-free if properly diagnosed and medicated. To make matters more difficult, there have been numerous articles showing health disparities between minority and Caucasian patients with epilepsy (PWE) in terms of diagnosis rates, drug prescribing, medical compliance, treatment plans, health outcomes, overall satisfaction with care received, and many other aspects. The most significant factors that have been found to contribute to epilepsy disparities can be derived from the acronym **FACETS**: 1) **F**ear of treatment, 2) **A**ccess to Care, 3) **C**ommunication barriers, 4) **E**ducation lack/differences, 5) **T**rust between physicians and patients and 6) **S**ocial support. The factors this article aims to address are improving **A**ccess to Care, **C**ommunication barriers, and lack of **E**ducation. The goal of this review is to explore different digital health products and innovations currently available in the market through the FACETS framework in order to provide people with epilepsy (PWE) tools to improve their standard of living. Three main types of products were explored: biometric tracking devices, epilepsy management diaries, and epilepsy self-management education resources.

Main Body: Literature review was carried out using PubMed. 958 articles from 2018-2023 were reviewed using keywords: "epilepsy monitoring device", "epilepsy diary", and "epilepsy self- management education". Initial inclusion criteria were met by having at least 2 keywords in the title and/or abstract. 262 out of 615 (43%) articles reviewed in the monitoring group were initially included; 27 out of 201 (13%) articles reviewed in the diary group were initially included; 43 out of 142 (30%) articles reviewed in the education group were initially included. Out of 332 articles that were initially included, 110 have been further reviewed so far and 20 were included for analysis. Exclusion criteria for articles after the initial review includes animal studies, devices solely used for neurostimulation/ to improve neurosurgery outcomes, monitoring devices used only in clinic, opinion/comment articles, qualitative articles, and lack of keywords in the description. 17 out of 20 articles (85%) were found to have successful clinical trials, but none contributed directly to alleviating disparities in epilepsy outcomes between minorities and Caucasian patients.

Conclusion: More epilepsy health tools need to be tested and implemented in order to improve accessibility and confidence of usage. Further efforts are needed to reduce costs and provide products to patients of lower socioeconomic statuses (SES). This review will hopefully empower patients and their relatives by providing them a vast array of resources to better understand, monitor, and manage epilepsy. If successfully applied, these approaches could mitigate health disparities in epilepsy care and create equitable outcomes for more patients.

Abstract Title: Comparative Responses to Biologic Therapies in Moderate-to-Severe Pediatric Asthma

Investigator: Wetsel, Trenton
Co-Investigator(s): 1. Philip Mendez, DO, MPH, Department of Pediatrics 2. William Tredwell, MD, Department of Pediatrics 3. Sarah Abernathy, EVMS MD Program 4. Lindsey Moore, DO, Department of Pediatrics, CHKD Division of Allergy, Asthma, and Immunology 5. Maripaz Morales, MD, FAAP, Department of Pediatrics, CHKD Division of Allergy, Asthma, and Immunology
Department: Department of Pediatrics, CHKD Division of Allergy, Asthma, and Immunology

Abstract
Introduction: Among pediatric patients with moderate to severe persistent asthma, a subset of children continues experiencing poorly controlled asthma symptoms despite receiving standard treatment. Such patients may be eligible to receive biologic therapies for add-on asthma control; however, research on their real-world use and outcomes in the pediatric population is lacking. This study aims to assess pediatric patient responses to biologic therapy, reasons for discontinuing therapy, and changes in symptom control for patients who switched biologics.

Methods: Retrospective chart review of pediatric patients on omalizumab, mepolizumab, and dupilumab for moderate or severe persistent asthma was performed. Pulmonary function (forced expiratory volume in one second [FEV1]) and quality of life (asthma control test [ACT]) measures, as well as the number of emergency department (ED) visits, urgent care visits, hospitalizations, asthma exacerbations, and oral corticosteroids used were collected from 12 months before to 12 months after the start of biologic therapy.

Results: 115 patients were included in the study, with the majority (91%) diagnosed with severe asthma. Among participants with severe asthma, FEV1 measures and ACT scores increased significantly by 6 months post-therapy from baseline ($p=0.014$ and $p=0.036$, respectively). Additionally, the number of asthma exacerbations, ED visits, and oral steroids received significantly decreased from 12 months prior to 12 months after starting therapy among severe asthmatics ($p<0.001$). Among those with moderate asthma, there was no significant difference in FEV1 measures; ACT scores; or the number of exacerbations, ED visits, or oral steroids received before starting therapy and 12 months post-therapy (all $p>0.05$). There was no significant difference in the number of urgent care visits or hospitalizations overtime among moderate (all $p>0.05$) or severe (all $p>0.05$) asthmatics. Of the 115 patients enrolled, 30 patients (26.1%) stopped after at least one year of treatment for varying reasons (adverse effects, transportation or cost barriers, lack of improvement).

Conclusion: Biologic therapy shows benefits in pediatric patients with severe asthma, demonstrating improvements in spirometry and quality of life and reductions in ED visits, asthma exacerbations, and oral steroid use within a year of starting therapy.

Abstract Title: Assessing the reliability and quality of YouTube videos as a source of information regarding COVID-19 vaccines

Investigator: Yerena, Miguel
Co-Investigator(s): 1. Madeline Wright, EVMS School of Medicine 2. Emery Cuellar MD, Albert Einstein Healthcare Network, Department of General Surgery.
Department: Department of Neurology, UCLA

Abstract
Misinformation about medical treatments has been in circulation by means of print newspapers, magazines, books, and journals. Particularly during the COVID-19 pandemic, it is imperative for healthcare providers and health departments to understand the dissemination of information and public concerns regarding the COVID-19 vaccine. Previous studies have shown videos containing misleading information on COVID-19 vaccines have acquired an alarming number of views prior to the COVID-19 vaccine administration. It is unknown how the content, quality and reliability have changed since the COVID-19 vaccine roll-out in the United States. The purpose of this study was to evaluate the quality and reliability of the most viewed YouTube videos regarding the top two administered COVID-19 vaccines. In a cleared browser, we searched keywords "coronavirus [vaccine 1] vaccine" and "coronavirus [vaccine 2] vaccine" and selected the top 25 videos posted since the administration of the respective vaccines. These videos were sorted by views, relevance, source type and date and independently assessed using the modified DISCERN score and modified *Journal of the American Medical Association* score as metrics of video quality and reliability. It was found that while non-factual COVID-19 videos only accounted for 20% of the total videos analyzed, there were both a significant 1.5x increase in total views and four times the number of likes. Non-factual videos scored significantly lower in both reliability and quality outcome measures than factual videos. It is important for healthcare providers during the COVID-19 pandemic to be aware of the information their patients receive from YouTube regarding the COVID-19 vaccine and reasons for vaccination hesitancy, so they may better address the spread of misinformation as well as empowering patients to evaluate resources for credibility.

Abstract Title: Resources for Vaping Prevention and Cessation: Qualitative Analysis

Investigator: Yoon, Jeik
Co-Investigator(s): 1. Jeik Yoon MS, Department of Pediatrics, Division of Community Health & Research/EVMS MD Class of 2027 2. Hannah Savage BS, Department of Pediatrics, Division of Community Health & Research/EVMS 3. Ann Edwards MS, Department of Pediatrics, Division of Community Health & Research/EVMS 4. Kelli England PhD, Department of Pediatrics, Division of Community Health & Research/EVMS 5. Amy Paulson MPH, Department of Pediatrics, Division of Community Health & Research/EVMS 6. Natasha Sriraman MD, Department of Pediatrics, Division of Community Health & Research/EVMS 7. Noah Meester BS, Department of Pediatrics, Division of Community Health & Research/EVMS MD Class of 2025 8. Paul Harrell PhD, Department of Pediatrics, Division of Community Health & Research/EVMS
Department: Department of Pediatrics, Division of Community Health & Research

Abstract

Introduction: Previous studies have revealed that youth-serving stakeholders, including health providers, educators, and parents, face challenges in possessing the necessary knowledge and resources to effectively address adolescents who are either vulnerable to or currently involved in e-cigarette usage. Despite the existence of evidence-based resources, their utilization remains restricted. The objective of this qualitative study is to interview youth-serving stakeholders, and through thematic analysis coding, collect and evaluate the appropriateness of various nicotine prevention and cessation resources.

Methods: Stakeholder interviews (N=25) were conducted with youth-serving professionals (e.g., public middle and high school guidance counselors, health and PE teachers, nurses, administrative staff) working in the Hampton Roads community to understand specific concerns, barriers, and thoughts on the appropriateness of nicotine prevention and/or cessation resources using 3 example vignettes containing individuals of differing risk classifications. Transcripts from stakeholder interviews were imported into NVIVO 12 for qualitative analysis, and major themes were identified using a thematic analysis framework. Subsequently, an inductive coding process identified common codes and subthemes.

Results: Most participants (24 stakeholders) identified barriers and had concerns about the prevention/cessation resources contained within the clinical vignettes. Most commonly, participants (22 stakeholders) cited a lack of incentivization to complete nicotine prevention/cessation resources among adolescents as a major concern. We identified 9 specific barriers and concerns including a lack of access to technology (e.g., lack of cellular device access for nicotine cessation program that messages participants with information about vaping cessation and social support), the need for stronger cessation resources (e.g., text messaging cessation program coupled with in-person counseling), social and peer influence, and family and parental involvement. In addition to these findings, stakeholder interviews revealed the lack of nicotine prevention/cessation resources that currently exist for adolescents.

Participants highlighted current school policy disciplinary nature (most commonly school suspension) for adolescents caught vaping.

Conclusion: Our findings reaffirm the need to identify and develop tailored resources to assist youth- serving professionals in better supporting teens with differing prevention/cessation needs. Stakeholder input identified appropriate resources to match with different risk tiers, as well as appropriate implementation outcomes that ultimately decrease the use of e-cigarettes in adolescents.

Abstract Title: Lung Cancer Clinical Trial Enrollment Patterns in Underrepresented Patient Populations

Investigator: Zazueta, Christopher
Co-Investigator(s): Frank Weinberg, MD, PhD, Hematology/Oncology, University of Illinois Cancer Center Mary Pasquinelli, DNP, Hematology/Oncology, University of Illinois Cancer Center
Department: University of Illinois Cancer Center

Abstract
Introduction: Participation in cancer clinical trials is low in the United States as only 8% of eligible cancer patients enroll into clinical trials. Participation rates are even lower among minority groups. About 90% of lung cancer clinical trial participants identify as White, leaving minorities underrepresented in these trials. The primary aim of this study was to characterize and compare variables among participants in lung cancer clinical trials to non-participants at University of Illinois Cancer Center.

Methods: Data were extracted from 152 patient charts, all of whom were Dr. Weinberg's patients, using Epic Electronic Medical Record (EMR). 22 surveys were administered during follow-up visits.

Enrollment data from the Clinical Research Office were also included in the analysis. To explore potential similarities and differences between the populations, a chi-square test was employed.

Results: 33% of Dr. Weinberg's lung cancer patients enrolled into clinical trials. 60% of the patients who enrolled into clinical trials identify as African-American. Roughly the same percentage of males and females enrolled into clinical trials (51% and 49% respectively). Clinical trial enrollees were predominantly non-Hispanic (84%). Of the patients who did not participate, ineligibility and patient choice were roughly split (15 versus 17).

Conclusion: UIC has more success in enrolling diverse patient populations into clinical trials compared to other academic institutions. More work needs to be done to elucidate the reasons for this.

Abstract Title: Promoting Healthy Family Behaviors in Pediatric Primary Care: Little Steps 4 Health, a Community CQI Project

Investigator: Zia, Nadia
Co-Investigator(s): Amy Paulson, Department of Pediatrics Aishwarya Rajendran, Department of Pediatrics
Department: Department of Pediatrics, Division of Community Health & Research

Abstract

Introduction: More than 14.4 million children in the United States are affected by obesity. This problem partially arises from the gap in care between follow-up appointments between families and providers, as parents are unaware of how to start lifestyle changes. LittleSteps4Health (LS4H) is a local solution to this gap in care, as it is an early stage 1 obesity intervention program to provide parents guidance on how to make these changes. The aim of this project is to determine if LS4H is a feasible program to successfully change behavior among families.

Methods: Families in LS4H independently completed 1 module per week for 6 weeks that focused on movement, nutrition, or a new healthy behavior. Individual interviews were conducted weekly to assess family acceptance of the program and materials, impact on knowledge, changes in awareness or behaviors, and collect feedback on specific modules. Qualitative data analysis on 84 family responses were recorded using Qualtrics and themed into categories using spreadsheet software. Themes and patterns were identified from interviewer notes with multiple coders to ensure inter-coder reliability.

Results: Of 66 families registered, 25 families completed at least one module including 13 families who completed all 6 or are still active. Major themes included changes in knowledge, awareness, and behavior for each module topic. The majority of families reported that they had met their "little step" module goal, but some acknowledged room for continued improvement. Across all 6 modules, 100% of families reported continuing the respective module behavioral goal as a new habit moving forward.

Families also reported enjoying and engaging in the family activities guided by the modules.

Conclusion: The results of this program demonstrated that the initial feasibility pilot was well received by families and majority were successfully able to change behaviors related to small goals. Ultimately, these small steps towards behavior change can gradually progress towards childhood weight loss. Future phases include collecting feedback on subsequent modules, assessing physician acceptability, and performing an efficacy/health outcome trial. If successful, the LS4H program can be integrated into the electronic medical record for physicians to provide families guidance in between follow-up care.

Abstract Title: Incidental Discovery of Schizencephaly in a Trauma Patient: A Case Report

Investigator: Zyskin, Aleksandr
Co-Investigator(s): Kevin Nguyen, MD, EVMS Radiology Residency Scott Rader, MD, EVMS/MCR Radiology
Department: Radiology Residency Program

Abstract

Introduction
Schizencephaly, a rare anomaly (approximately 1.5:100,000 live births), is a congenital cortical malformation resulting from deficient neuronal migration during embryogenesis [(Veerapaneni et al., n.d.)]. This pathology leads to a cleft lined with heterotopic gray matter, attributed to a variety of etiologies including genetic mutations and in-utero perturbations linked to substances, medications, or vascular insults. Clinical manifestations include seizures, cognitive impairment, and hemiparesis to asymptomatic presentation. The morphology and dimensions of the malformation often correlate with symptom severity and prognosis. [(Rege & Patil, 2016)]

Case Information
J.C., a 32-year-old male, presented to the emergency department via ambulance following a motor vehicle accident. Initial evaluation confirmed hemodynamic stability, prompting a standard trauma assessment that included a non-contrast head CT (NCCT). The patient's medical history yielded no significant insights into neurologic or cognitive deficits. Although NCCT revealed no acute intracranial pathologies, it incidentally revealed the presence of schizencephaly. The patient did not require acute intervention for his presenting symptoms and was discharged home. The patient was instructed to follow up for neurological evaluation, potentially including MRI for enhanced characterization of soft tissue anomalies. The patient's future course likely entails neurological management to mitigate or treat seizures or other neurological complications.

Discussion: Imaging and Intervention
Schizencephaly primarily manifests as either a bilateral open-lip cleft or a unilateral closed-lip cleft affecting the posterior frontal or parietal lobes. Concomitant malformations include septo-optic dysplasia, gray matter heterotopia, septum pellucidum absence, and dysplastic corpus callosum [(Abera & Gaillard, 2008)]. J.C.'s NCCT divulged a sizable unilateral open-lip cleft within the posterior left frontal lobe. Heterotopic gray matter embellished cleft margins. Centrally, an absent septum pellucidum and an underdeveloped corpus callosum were evident (figure 1).

There is no demonstrated correlation to age of presentation and patients may remain asymptomatic or present with symptoms of hemiparesis, seizures, or neurological delay from childhood to adulthood. The extent of parenchymal involvement and morphology have associations with certain clinical presentations. Closed-lip clefts are associated with patients presenting for hemiparesis and motor delay and open-lip clefts are associated with hydrocephalus and seizures [(Alexander et al., 1997)]. J.C.'s morphology was concerning hydrocephalus and/or seizures, although there was no history of head enlargement, visual or gait disturbances, headaches, or seizures.

However, new adult-onset symptoms remain a possible inciting cause of the motor vehicle accident that brought J.C. in as a trauma patient.

Conclusion
Schizencephaly, a rare inborn anomaly, typically includes neurological deficits, intellectual impairments, and seizures. Patients may remain asymptomatic and only discover the presence of a malformation incidentally. Incidental findings suggestive of schizencephaly warrant MRI evaluation and warrant oversight by neurology to preempt potential complications. This case underscores the need to consider congenital malformations as plausible risk factors for traumatic injuries, albeit infrequent.

Abstract Title: Unsuspected Vascular Complication Following Transcatheter Aortic Valve Replacement

Investigator: Zyskin, Aleksandr
Co-Investigator(s): Lauren Jutras, MD, EVMS Radiology Residency Dina Elgohary, MD, EVMS/MCR Radiology
Department: EVMS Radiology Residency

Abstract

Introduction
Transcatheter aortic valve replacement (TVAR), a minimally invasive intervention for symptomatic aortic stenosis, is a procedure that involves replacing the aortic valve via the common femoral artery (CFA) access route. While typically safe, transfemoral TVAR is not devoid of complications, such as mechanical device malfunction, cardiac anomalies, and vascular complications at the CFA puncture site.

Case Information
W.F. is a 27 year old female admitted for transfemoral TVAR due to severe bioprosthetic aortic stenosis and aortic insufficiency. Left CFA access was employed for temporary pacemaker placement, while right CFA access facilitated catheter and guidewire insertion for the TVAR procedure. Subsequent to the successful valve replacement, the right CFA access site underwent repair through employment of a Perclose ProGlide suture-mediated closure system. Contrast angiography at the iliac bifurcation confirmed successful right CFA closure, indicating no vascular stenosis or extravasation. The left CFA access point was secured utilizing an Angio-Seal vascular closure device. Following intraoperative closure, the patient experienced hypotension, necessitating chest compressions and epinephrine administration, culminating in the restoration of spontaneous circulation (ROSC). After reassessment and intervention, a stent was placed due to compromised blood flow in the left main coronary artery ostium.The patient was transferred to the Cardiac Surgical Intensive Care Unit, where she continued to improve and remained hemodynamically stable. The patient was discharged on anticoagulation two days following the TVAR.

One day after discharge, W.F. presented to the emergency department with left groin pain, left lower quadrant tenderness, and dyspnea. Ultrasound confirmed left femoral deep vein thrombosis, prompting a pulmonary embolism (PE) assessment. Although CT angiography detected no PE, it unveiled active extravasation within the left CFA alongside a compressive hematoma encasing the left femoral vein. This led to surgical vascular exploration and repair. The patient remained remained hemodynamically stable and was subsequently discharged.

Discussion
The most common TVAR complications are vascular, which are categorized into major, minor, and percutaneous closure device failure. Historically, vascular complications have ranged from 10-20%, but current rates may be as low as 4%. Major and minor complications include ischemia, vessel injury (dissection, stenosis, hematoma), with major complications precipitating death, life-threatening hemorrhage, and end-organ impairment.

Abdominal CTA of W.F. demonstrated left retroperitoneal hemorrhage extending into the pelvis, small active extravasation anterior to the distal left external iliac vessels, and narrowing of the proximal left femoral vein lumen extending to the external iliac due to mass effect from an adjacent left pelvic sidewall hematoma. These findings were consistent with a major vascular complication (life-threatening bleeding) in left CFA.

This vascular injury may have occurred during the initial left CFA puncture for TVAR or when reestablishing after ROSC. Most likely, the left CFA injury occurred while reestablishing access when the patient developed obstructive shock. The active extravasation likely remained minimal and the patient remained relatively hemodynamically stable following ROSC. Her fluid status may have been masked by the administration of levophed and saline in the SICU, further delaying symptoms. Starting anticoagulation following discharge likely exacerbated the hemorrhage, which led to rapid deterioration and readmission.

Conclusion
This case highlights the intrinsic susceptibility to vascular complications accompanying TVAR and transfemoral procedures, with a focal point on the left CFA. Intraoperative angiography serves as a critical tool for assessing vascular integrity. Post-procedure, vigilant observation of patients displaying symptoms suggestive of active hemorrhage, particularly in those undergoing anticoagulation, necessitates expeditious dedicated lower extremity and pelvic CT angiography evaluation.

Abstract Title: Socio-demographic disparities in e-cigarettes and cigarette use among adults with epilepsy in the United States, findings from the 2021 National Health Interview Survey

Investigator: Gehris, Miranda
Co-Investigator(s): Mohammad Ebrahimi Kalan, School of Health Professions, MPH
Department: School of Health Professions

Abstract

Introduction: Smoking cigarettes among US adults has declined since the mid-1960s, however, disparities persist; declines have not been consistent across some populations including epileptic adults. This study examined socio-demographic disparities in e-cigarettes and cigarette use among people living with epilepsy (PLWE).

Methods: Data were drawn from the 2021 National Health Interview Survey (NHIS). Our analytic sample included 511 PLWE (extrapolated 4.5 million US PLWE) who participated in 2021 NHIS. We performed weighted multivariable regression models to explore the sociodemographic disparities in current use (i.e., use on every or some days) of e-cigarettes and cigarettes. All analyses were weighted to adjust for non-response and to be representative of PLWE in the US. Adjusted odds ratios(AORs) and 95% confidence intervals(CI) are reported.

Results: Compared to non-smokers, current smokers were more likely to be male (AOR=1.4; 95%CI:1.2-1.5), in older age groups (vs 18-24, AOR range=2.1-5.1), less educated (vs. graduate degree, AOR range=2.3-5.8), and live beneath the poverty threshold (vs above, AOR range=1.8-2.3) (all $ps<0.0001$). They were less likely to be non-white (vs. white, AOR range=0.3-0.6) and have health insurance (vs. none, AOR=0.6; 95%CI: 0.5-0.7)(all $ps<0.0001$).

Compared to PLWE who were non-users of e-cigarettes, current users were more likely to be male (AOR=1.5; 95%CI:1.4-1.7), gay, lesbian, or bisexual (vs straight, AOR=2.1; 95%CI:1.6-2.7), less educated (vs graduate degree AOR range=1.7-2.8, all $p<0.0001$), and live beneath the poverty threshold (vs. above, AOR= 1.2; all $ps<0.05$). They were less likely to be older in age (vs 18-24, AOR range=0.1- 0.5), non-white (vs. white, AOR range=0.4-0.7) and have health insurance (vs. none, AOR=0.8, 95%CI0.7-1.0; $p<0.05$).

Conclusions: Sociodemographic disparities exist in e-cigarette and cigarette use among US PLWE. This reflects the uneven distribution of tailored cessation interventions among this vulnerable population. Therefore, it is crucial to design, develop, and implement tobacco cessation preventive measures to address the needs of PLWE.

Abstract Title: Cigarette and E-Cigarette Use Among Cancer Survivors: A Cross-Sectional Study Among US Adults

Investigator: Ijaz, Ateeqa
Co-Investigator(s): Miranda Gheris, School of Health Profession, MPH Devoyae Fields, School of Health Profession, MPH Mohammad Ebrahimi Kalan, School of Health Profession,MPH
Department: EVMS

Abstract

Introduction: While the causal link between cigarette smoking and cancer risk is well-established, research on e-cigarette use and cancer is in its infancy. This study assessed e-cigarette and cigarette use among cancer survivors and how it differs from the general population.

Methods: Data came from 29,482 US adults who participated in the 2021 National Health Interview Survey. Weighted multivariable logistic regression was performed to examine the patterns of tobacco use by cancer status accounting for confounders including age, race, education, sex, sexual orientation, and income. Adjusted odds ratios (AORs) with 95% confidence intervals (CI) were reported. Tobacco products use patterns were reported as never, former (used in the past but not now), and current (use some days or every day)

Results: In 2021, 9.8% (estimated 25 million) of the US population were cancer survivors. Overall, 18.3% of reported cancers were smoking-related (e.g., lung cancer). Compared to the general population, cancer survivors were more likely to be former users of e-cigarettes (AOR=1.28: 95% CI:1.07-1.52,p-0.006) and cigarette (AOR=1.33:95%CI:1.21-1.47,p<.0001). No significant difference was observed in the current use of these products. Nevertheless, cancer survivors with smoking-related cancers (vs. non-smoking-related) were more likely to be current (AOR:2.3;95%CI:1.55-3.41:p<.0001) and former cigarette smokers (AOR=1.61: 95% CI:1.25-2.07,p-0.0002). They also had higher odds of being current e-cigarette users (AOR; 2.19; 0.88-5.45;p=0.09) than non-smoking-related cancer survivors.

Conclusion: The high rates of former smoking among cancer survivors highlights the need for continued support for cessation, even after a diagnosis. Relapse prevention interventions should target cancer survivors. In addition, smoking cessation interventions should be integrated into cancer care, especially for patients with smoking-related cancers where continued tobacco use can adversely impact outcomes. Further research on e-cigarette use among cancer survivors is warranted given potential risks/benefits for this population, considering long-term studies on efficacy and safety of these products.

Abstract Title: Disparities in tobacco products use at the intersection of social identities among veterans in the United States

Investigator: Ouedraogo, Issoufou
Co-Investigator(s):
Department: 142-Masters in Public Health

Abstract

Introduction: Tobacco use remains a significant public health concern, and veterans stand out as a group particularly vulnerable to its disparities. This study aims to identify social identity factors associated with disparities in tobacco use among veterans.

Methods: Data were taken from the 2021 Behavioral Risk Factor Surveillance System to estimate rates of tobacco use among 50470 veterans. We conducted weighted multivariate regression analyses and reported both unadjusted and adjusted odds ratios.

Results: In unadjusted model, veteran cigarette smokers were more likely to be older age (vs 18-24; OR range=1.7-2.1 for older ages, all *p<0.05*), LGB (vs straight; OR=2.0,p=*0.03*), Non-Hispanic (NH) other race groups (vs NH-White; OR=1.3,p=*0.006*), binge alcohol drinking (OR=2.7,p<0.001), and current cannabis users (OR=2.0,*p<0.05*). They were less likely to be asthmatic (OR=0.8,*p<0.0018*), insured (OR=0.4,p<0.001), educated (OR range=0.3-0.8,*p<0.001*), higher income (vs≤25k; OR range=0.3- 0.6,*p<0.001*). All factors stayed significant after adjusting except for cannabis.

In unadjusted model, veteran e-cigarette users were more likely to be LGB (vs straight; OR=3.0, p=*0.0014*), Non-Hispanic (NH) other race groups (vs NH-White; OR=1.6,p=*0.0028*), binge alcohol drinking (OR=3.8,*p<0.001*), current cannabis users (OR=2.8,*p=0.02*). E-cigarettes users were less likely to be older age (vs 18-24; OR range=0.1-0.4,all *p<0.001*), male (OR=0.7,*p=0.0046*), insured (OR=0.4,*p<0.001*), educated (OR range=0.3-0.7,*p<0.001*), income≥100k (vs ≤25k; OR=0.6,*p<0.005*), and asthmatic (OR=0.5,*p<0.001*). In the adjusted model, all factors lost significance except for age and education.

Conclusion: Disparities exist in cigarette and e-cigarette use among veterans at the intersection of age, race, income, education, sexual orientation, and income. Targeted cessation intervention should consider social identities to effectively curb tobacco use among veterans.

Abstract Title: "Unveiling Diagnostic Challenges: A Case of Giant Coronary Artery Aneurysm Masquerading as a Diaphragmatic Hernia

Investigator: Altaf, Zooha
Co-Investigator(s):
Department: Innovation Health Services

Abstract

INTRODUCTION
Giant coronary artery aneurysms, though rare, can present with a wide spectrum of clinical manifestations, often mimicking other medical conditions due to their unusual size and anatomical locations. In this case report, we describe an extraordinary instance of a patient presenting with symptoms that were consistently misattributed to a diaphragmatic hernia throughout their life. The colossal dimensions of the coronary artery aneurysm, exceeding the size of the heart itself on imaging studies, contributed to this diagnostic challenge. The case sheds light on the critical importance of considering atypical cardiovascular pathologies in the differential diagnosis of seemingly unrelated clinical presentations. Additionally, it underscores the significance of utilizing advanced imaging techniques and interdisciplinary collaboration to ensure accurate diagnosis and appropriate management for patients with complex and potentially life-threatening conditions. Through this report, we aim to highlight the complexities associated with diagnosing and managing giant coronary artery aneurysms, emphasizing the need for heightened clinical suspicion and a comprehensive approach to patient evaluation.

CASE REPORT
A 70-year-old patient with a past medical history of chronic diastolic heart failure with preserved ejection fraction, hypertension, morbid obesity (BMI 53), gastroesophageal reflux disease (GERD), obstructive sleep apnea (OSA was presented to emergency department (ED) with severe shortness of breath (SOB) and right shoulder pain. The patient states that he has had progressive dyspnea on minimal exertion for about 1.5 weeks. On admission EKG was stable, CXR with no findings, and troponins were negative. The patient underwent CTA to rule out PE, but the study was significant for giant right coronary artery aneurysm (no evidence of leaking from vessel). The cardiothoracic surgery was consulted. The patient had a history of wheezing, which had resolved, and a persistent cough. The patient denied any history of asthma or chronic obstructive pulmonary disease (COPD) and stated that he had never smoked. Respiratory symptoms were managed using Tessalon, Flonase, and Mucinex. The patient's chronic diastolic heart failure with preserved ejection fraction was managed using IV Lasix and intake/output monitoring. Hypertension was treated with amlodipine and metoprolol, GERD with a PPI, and obstructive sleep apnea with a CPAP device. A giant right coronary artery was identified on CT scan, measuring approximately 14 x 12 cm.Additionally, minimal atelectasis towards the lung bases and a small right effusion were noted. The diagnosis of coronary artery disease was also confirmed. A cardiac MRI was subsequently performed, which showed a massive 14 x 14 x 17 cm superior-inferior right coronary artery aneurysm with partial thrombosis. This aneurysm was observed to be compressing the right ventricle (RV) and superior vena cava (SVC).Left heart catheterization was carried out, revealing significant findings in various coronary arteries. The left main artery showed no significant disease. The left anterior descending artery (LAD) exhibited moderate calcification and irregularity with a 40% mid-stenosis, without significant obstructive disease. The diagonal branch displayed a 30% calcified stenosis. The intermediate marginal artery exhibited an 80% ostial narrowing, supplying a large caliber vessel. The left circumflex artery showed 40% ostial tapering but no significant obstructive disease. The right coronary artery (RCA) had an 80% proximal stenosis and fed the enormous aneurysm. Unfortunately, the distal RCA could not be visualized due to the inability to fill the aneurysm with antegrade injections. Cardiology recommended surgery to address the ramus intermediate artery. It was noted that there might be a distal vessel to bypass based on calcification of the posterior descending artery (PDA) as seen on CT scans. Due to the significant size and expansion of the aneurysm in the right coronary artery, surgical intervention was deemed necessary. The procedure began with the challenging task of mobilizing the right ventricle away from the aneurysm mass. This feat was successfully accomplished by gently peeling the pericardium off the mass, creating separation between the right ventricle and the right atrium.

Despite these efforts, complete removal of the mass was not feasible at that juncture. Adjustment of the venous cannulae and snaring of the SVC and IVC were performed to achieve caval exclusion. Identification of the proximal and distal ends of the right coronary artery indicated its disintegration from the mass, aligning with the pseudoaneurysm observed in imaging. Both ends were securely closed using pledgeted 4-0 Prolene and running 5-0 Prolene sutures. Subsequently, the right ventricle and right atrium were detached from the mass, unveiling a 2 x 3 cm defect in the right ventricle. Skillful repair of this defect ensued, involving the use of horizontal mattress 4-0 Prolene sutures

through a bovine pericardial patch. Addressing the coronary artery bypass, attention was turned to the posterior descending artery (PDA) and the calcified right coronary artery. Despite the calcification, a vulnerable area in the PDA enabled bypass, and a reverse saphenous vein graft was anastomosed. The same technique was applied to the ramus intermedius. The patency of both grafts was verified through testing. To mitigate the risk of postoperative dysrhythmias and anticoagulation-related complications, a 50 mm AtriClip was positioned on the left atrial appendage. The heart was de-aired, and meticulous management of bleeding points was executed using pledgeted 4-0 Prolene sutures. Successful weaning of the patient off cardiopulmonary bypass was achieved.

DISCUSSION

The phenomenon of coronary artery aneurysms (CAA) was initially documented in postmortem observations by Morgagni in 1761. CAA is characterized by localized dilation of coronary segments, exceeding 1.5 times the dimensions of adjacent normal segments. Additionally, the term coronary artery ectasia (CAE) is employed to describe more diffuse lesions. Notably, giant coronary artery aneurysms present a distinctive challenge due to their exceptional size, often surpassing typical dimensions. This remarkable enlargement can engender diagnostic confusion, resembling different medical conditions due to their substantial mass and distinct anatomical location. A pertinent illustration can be observed in this case where symptoms were consistently misattributed to a diaphragmatic hernia. The intricacies in identifying giant coronary artery aneurysms underscore the necessity for comprehensive evaluations, a heightened clinical suspicion, and the utilization of advanced imaging modalities.

Clinical manifestations of these aneurysms span a spectrum, ranging from serendipitous discoveries on cardiac imaging to instances of acute coronary syndrome. The underlying origins and associations of such aneurysms often encompass genetic predisposition, coronary artery disease, and certain vasculitic and connective tissue disorders like Kawasaki disease and Marfan syndrome. Instances of post-infectious CAAs have been documented, potentially arising from direct wall invasion or immune complex deposition. In clinical practice, coronary angiography remains a prevalent imaging technique for assessing aneurysmal or ectatic coronary arteries. However, challenges such as delayed antegrade contrast filling, segmental backflow, and contrast stasis in the dilated segments can impede clear imaging during angiography. Employing intravascular ultrasound (IVUS) can prove invaluable, offering enhanced visualization of vessel wall structures and enabling differentiation between true aneurysms, pseudoaneurysms, and segments exhibiting aneurysmal appearance due to plaque rupture or adjacent stenosis. Moreover, IVUS aids in precise sizing of the aneurysm and any neighboring stenoses, facilitating appropriate stent selection if percutaneous coronary intervention (PCI) is considered. As an emerging technique, coronary computed tomography is gaining traction in assessing these cases due to its ability to provide more accurate evaluation of aneurysm size, thrombus presence, and calcification compared to invasive angiography.

Managing patients with CAA poses substantial challenges for various reasons. The natural course of coronary aneurysms is inadequately understood, thus complicating decisions surrounding the management of incidentally detected CAA or coronary ectasia in the absence of concurrent stenosis or occlusion. Atherosclerosis is implicated in a significant portion of CAA cases, particularly among older patients, underscoring the critical role of aggressive risk factor modification in this demographic. The role of dual antiplatelet therapy or therapeutic anticoagulation in managing patients with CAA or CAE, particularly in cases incidentally identified, remains a subject of ongoing debate.

CONCLUSION:

In conclusion, the case report highlights the challenges associated with diagnosing and managing giant coronary artery aneurysms, emphasizing the importance of clinical suspicion, interdisciplinary collaboration, and the utilization of advanced imaging techniques. This case serves as a reminder that exceptional clinical scenarios require an integrated approach that accounts for both cardiovascular and non-cardiovascular factors, ultimately leading to accurate diagnosis, effective management, and improved patient outcomes. Further research and reporting of such cases are essential to enrich our understanding of this rare yet clinically significant condition.

Abstract Title: Perception of Provider Compassion and Its Relationship with Patient Race and Income in an Out-Patient Setting

Investigator: Altaf, Zooha
Co-Investigator(s):
Department: Internal Medicine

Abstract

Introduction: The perception of compassion exhibited by healthcare providers is fundamental to patient-centered care, influencing patient satisfaction and healthcare outcomes. This cross-sectional study aimed to explore the variations in the perception of provider compassion among different racial groups within the Hoffheimer Hall healthcare setting. Additionally, we investigated whether these perceptions were contingent upon patients' income levels.

Methods: A comprehensive cross-sectional study design was employed to investigate the perception of provider compassion, trust, psychological and emotional support, personal needs fulfillment, and interest in the patient as a whole. This study involved participants from diverse racial backgrounds who sought care at Hoffheimer Hall. A structured questionnaire, validated for reliability, was distributed to assess these perceptions. Participants were recruited through convenience sampling and assured of anonymity. Data were collected through self-administered paper-based questionnaires. We utilized R statistical software to perform ordinal logistic regression, incorporating race, income, and other control variables to understand the relationship between patient perceptions and provider characteristics.

Results: Our analysis revealed significant insights into the variations in how compassion is perceived by patients from different racial backgrounds and income levels. Importantly, the preliminary regression results indicated that the patient's perception of healthcare providers for different racial groups depends on income levels. Income conditions the perception of healthcare providers for various racial groups, emphasizing the intersectionality of these factors in patient experiences.

Conclusion: This cross-sectional study underscores the importance of understanding how provider compassion is perceived by different racial groups and its relationship with income within the healthcare setting. These findings highlight the need for culturally sensitive and equitable healthcare practices, recognizing that income levels can influence patient perceptions of provider compassion. This research contributes to ongoing discussions on patient-centered care, healthcare disparities, and the significance of tailoring compassionate care to meet the unique needs of diverse racial and income groups.

Abstract Title: EVMS Adaptive Gymnastics: A Unique, Cost-effective Opportunity for Neurodivergent Students and Their Families in Hampton Roads

Investigator: Barry, Danielle
Co-Investigator(s): Jamie M. Levin, EVMS MS2; Kaitlin P. Hardy, EVMS MS3; John W. Harrington MD, CHKD Vice-President of Quality/Safety and Clinical Integration, Co-Director of General Academic Pediatrics, Vice-Chair of Primary Care; Gwendolyn R. George, EVMS MS2
Department: CHKD Vice-President of Quality/Safety and Clinical Integration, Co-Director of General Academic Pediatrics, Vice- Chair of Primary Care

Abstract
Introduction: Traditional and emerging therapeutic interventions for neurodivergent children are an important part of their treatment plan, however, many families have difficulty accessing these therapies. Physical and occupational therapy require a trained professional, many of whom are in high demand but short supply, and can have significant out-of-pocket costs. Emerging therapies, such as equine therapy, are not covered by insurance or readily accessible to families who live in urban areas. Physical therapy goals focus on improving gross motor skills and strength, while occupational therapy goals include exposure to sensory stimuli and building social skills. Additionally, children with neurodivergence and autism spectrum disorder, are at a greater risk of obesity than neurotypical counterparts. The EVMS Adaptive Gymnastics program has developed a cost-effective therapeutic opportunity that addresses many of the same goals as traditional therapies for families of neurodivergent children in Hampton Roads.

Methods: This analysis used demographic data collected as part of an ongoing longitudinal study on the impact of the EVMS Adaptive Gymnastics program on neurodivergent children's social and emotional skills as well as their parent's perceived stress levels. Publicly available information regarding availability and estimated costs of comparable programs was also collected. Aggregate volunteering data available to members of the research team as co-directors of the program was also used in the analysis.

Results: For approximately $5.13 per 45-minute session, our program addresses many of the same goals as traditional physical and occupational therapy. In addition, our program provides group-based physical activity, which previous research has identified as a valuable non-medical intervention. Since becoming an official Community Engaged Learning initiative, EVMS students have volunteered over 921 combined hours working directly with neurodivergent children, a number which continues to grow each week.

Conclusion: EVMS Adaptive Gymnastics is the only program of its kind in Hampton Roads, and the closest active program members of the research team could find is in Maryland. The EVMS Adaptive Gymnastics program provides students early access to working with children who have neurodevelopmental disorders, who represent a unique subset of the pediatric population.

Simultaneously, our program provides families in Hampton Roads with a cost-effective, group-based physical activity program, thereby giving more families, regardless of income, the opportunity to support their neurodivergent children.

Abstract Title: Healthy Portsmouth Million Hearts Blood Pressure Control Community CQI Implementation Project

Investigator: Dua, Ashraar
Co-Investigator(s): Amy Paulson MPH, EVMS Pediatrics/Division of Community Health and Research Brett Sierra DHSc MPH, EVMS Pediatrics/Division of Community Health and Research
Department: Pediatrics

Abstract

Introduction: Portsmouth, VA ranks among the least healthy counties in Virginia (113/124), with significantly higher death rates from stroke, hypertension, and heart disease compared to state and national averages. Inadequate follow-up and patient education have hindered previous screening measures. The Million Hearts Blood Pressure Control Community Continuous Quality Improvement (CQI) Project aims to address the pervasive cardiovascular issues by conducting city-wide blood pressure screenings, followed by post-screening activities, educational programs on blood pressure management, and self-monitoring and control classes. This project seeks to improve blood pressure control, reduce health disparities related to hypertension, and enhance access to care and medication management for residents with elevated blood pressure.

Methods: The project engaged in a city-wide mass screening of blood pressure in trusted locations like churches, schools, workplaces, and community centers. Coordinated support activities assisted individuals in monitoring their situation and managing medication. Efforts were made to promote health literacy educational platforms, provide health insurance information to uninsured individuals, and offer education and support to participants. The project emphasized privacy and followed protocols to safeguard sensitive health information. Utilizing face-to-face and virtual approaches, the project included blood pressure screenings, education classes, and subsequent follow-up sessions.

Results: Cohort 1 (February, n = 220) identified 108 participants (49.1%) with elevated blood pressure or hypertension according to American Heart Association guidelines. In Cohort 2 (n = 56), 39 participants (69.6%) had hypertension or elevated blood pressure. Most participants had a primary care physician, but a significant proportion did not self-monitor their blood pressure. Additionally, the majority did not use tobacco/nicotine-containing products, and many had co-existing conditions such as diabetes or hypertension. Notably, some individuals reported fruitful efforts in addressing their high blood pressure by consulting their primary care provider.

Conclusion: Implementing a Plan, Do, Study Act (PDSA) model, the project aims to develop an improvement plan ensuring successful connections between participants and healthcare providers. Recommendations for screening site selection, based on data utilization, can optimize resource allocation and future screening efforts. The findings provide insights into the demographics and health indicators of individuals with high blood pressure. However, challenges remain in ensuring effective follow-up and engagement with healthcare providers. Overcoming these barriers may necessitate additional interventions or support systems. Addressing these issues will enhance the project's impact on blood pressure control, reduce health disparities, and improve the overall health of the community.

Abstract Title: Exploring the role of monoacylglycerol lipase (MAGL) in nitrogen mustard induced lung injury

Investigator: Ly, My Boi
Co-Investigator(s): My Boi Ly, Summer Scholar 2023 Gregory Nicholson, B.S., Department of Physiological Sciences, EVMS Janette Lockett, M.S., Department of Physiological Sciences, EVMS Nagaraja Nagre, Ph.D, Department of Physiological Sciences, EVMS
Department: Department of Physiological Sciences

Abstract

Introduction: Sulfur mustard (SM) and nitrogen mustard (NM) are cytotoxic vesicants developed as chemical warfare agents, causing severe respiratory damage with significant morbidity and mortality. The known stockpiles of these vesicants, along with its familiar simplicity of synthesis raises concerns over its intentional misuse and accidental exposure. NM-induced acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) can lead to fibrosis with pathological changes including inflammatory cell accumulation, epithelial and endothelial cell damage. Despite advances in understanding the biological effects, effective therapies are still needed. The endocannabinoid system is known to play diverse physiological functions, one of them being its natural mechanism to control aberrant inflammatory responses. Our preliminary study showed that acute exposure of mice lungs to NM resulted in an increased expression of monoacylglycerol lipase (MAGL), a component of the endocannabinoid system. In this study, we aimed to examine the effect of MAGL inhibition on NM- induced acute lung injury and inflammation via a selective MAGL inhibitor, JZL184.

Methods: We administered NM via the intratracheal route into the lungs of mice. JZL184 (10mg/kg) was administered via the intraperitoneal route 1h prior to NM exposure and every 24h thereafter. At 72h of post-NM exposure, we collected Bronchoalveolar lavage fluid (BALF) and lung tissues. The MAGL enzyme activity was measured in the lung. We measured the amount of the immune cells, and cytokine levels in the BALF was measured by using ELISA. NM-induced lung injury was examined by lung histology, and the inflammatory signaling was examined by immunohistochemistry.

Results: Acute exposure of mice lungs to NM resulted in an increase in MAGL activity. Inhibition of MAGL by JZL184 significantly reduced the immune cell infiltration into the lung that was elevated in response to NM exposure. JZL184-treated mice had lower BALF levels of IL-6 and CXCL1/KC. Lung histologic analysis revealed lowered immune cell infiltration and injury in JZL184-treated mice. MAGL inhibition resulted in reduced iNOS expression as revealed by immunofluorescence.

Conclusion: Inhibition of MAGL by JZL184 ameliorated the NM-induced ALI and inflammation in mice. Inhibition of endocannabinoid metabolism could promote anti-inflammatory effects in protection against NM-induced lung injury.

Abstract Title: The Effects of Toll-Like Receptor-4 Stimulation on B Cell Anergy

Investigator: Schendler, Evelyn
Co-Investigator(s): 1. Shelby Ma, Microbiology and Molecular Cell Biology/ Galkina Lab Graduate Student 2. Alina Moriarty, Dept. of Microbiology and Molecular Cell Biology/ Galkina Lab Graduate Student 3. Cassandra Kirk, Microbiology and Molecular Cell Biology/ Galkina Lab Graduate Student 4. Evan Smith, EMVS M2 student- Summer Scholars 2023 5. Robin Bai, EVMS M2 student- Summer Scholars 2023 6. Dr. Elena Galkina, Mentor- Galkina Lab Microbiology and Molecular Cell Biology
Department: EVMS Microbiology & Molecular Cell Biology

Abstract
Introduction: Atherosclerosis is a lipid-driven inflammatory disease caused by plaque buildup in blood vessel linings. Both innate and adaptive immune responses are involved in the development and progression of atherosclerosis. Previously, atheroprotective and pro-atherogenic functions of B cell subsets have been observed. Anergy, a state of unresponsiveness to antigens, is responsible for silencing many self-reactive B cells to prevent autoimmune-associated immune responses. Currently, it is not known how B cell anergy is affected in atherosclerosis. To date, it is also not quite clear to what extent anergic B cells can respond to stimuli other than the BCR engagement. It has been recently shown that TLR4 engagement induces B1a cell differentiation into innate response activator (IRA) B cells that play a pro-atherogenic role. The goal of this study was to test to what extent anergic B cells can respond to TLR4 activation using a model of IRA- B cell differentiation under homeostatic conditions.

Methods: Ars/A1 transgenic model, where anergic B cells express a dual-reactive antigen receptor that binds, in addition to a self-antigen, the hapten p-azophenylarsonate (Ars) and control C57BL/6 mice were used in this study. Additionally, as an additional BCR-transgenic mouse model (not anergic B cells), we used the MD4 transgenic mice that express a BCR that recognize hen egg lysozyme (HEL). Mice were administered 10 μg of LPS daily by intraperitoneal injection (i.p.) for 4 days. Controls received PBS alone. After 4 days of injections, the mice were euthanized and immune cells from the peritoneum and spleen were isolated, stained with Abs for B1 and IRA B cells and analyzed by Flow Cytometry.

Results: Our data demonstrates that i.p. injection of LPS induced a significant differentiation of IRA+ B cells in the spleen of C57BL/6 mice. Interestingly, LPS injection into MD4 transgenic mice induced similar levels of IRA+ B cells in the MD4-transgenic mice, suggesting that MD4 B cells respond normally to TLR4 stimulation. In contrast, i.p. injection of LPS into ARS/A1 recipients did not induce generation of IRA+ B cells in the spleen or peritoneal cavity of the ARS/A1 mice.

Conclusion: Several reports suggested that ARS/ A1 anergic B cells respond normally to a TLR simulation in vitro. Our experiments further tested this important question using in vivo assays of the generation of IRA+ B cells. The obtained results demonstrate that peritoneal ARS/A1 B cells do not respond to TLR4 stimulation in vivo and do not develop IRA+B cells. Further studies will be focused on testing effects of TLR stimulations on antibody production and release of pro-inflammatory cytokines in the in vivo assays.

Abstract Title: Characterization of prostatic foam cells in steroid hormone imbalance

Investigator: Silver, Samara
Co-Investigator(s): 1. Chunghwan Ro, Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA, Leroy T. Canoles Jr. Cancer Research Center, EVMS, Norfolk, VA 2. Petra Popovics, Microbiology and Molecular Cell Biology, EVMS, Norfolk, VA, Leroy T. Canoles Jr. Cancer Research Center, EVMS, Norfolk, VA
Department: Microbiology and Molecular Cell Biology and Leroy T. Canoles Jr. Cancer Research Center

Abstract

Background:
Benign prostatic hyperplasia (BPH) is an age-related disease associated with deteriorating urinary symptoms. The etiology of BPH involves an increase in estradiol-to-testosterone ratio and chronic inflammation but data is limited on how these processes are interconnected. In a mouse model reproducing steroid hormone imbalance (T+E2), we observed increased macrophage infiltration, accumulation in the prostate lumen and foam cell formation. However, the specific role of foam cells in the prostate is unclear. Therefore, to characterize the foam cell transcriptome and to gain a better understanding on macrophage populations and chemokine signaling in the prostate, we conducted single-cell RNA sequencing (scRNA-seq) on prostates from T+E2 mice.

Methods:
We implanted male C57BL/6J mice with pellets containing 25 mg testosterone and 2.5 mg estradiol and collected ventral prostates two weeks later. Cells were dissociated with cold protease and were loaded on Chromium Next GEM (7000 cells/sample). Samples were sequenced on a NextSeq2000 instrument at 100 million reads/sample. Confirmation of scRNA-seq results was performed using *in situ hybridization* (ISH) or immunohistochemistry (IHC) with specific probes for *Cd209a, Cxcl17, Folr2* and *Pmepa1* and an antibody against TGF-b1. Tissue samples were analyzed using Mantra II. Pathological Workstation and InForm software.

Results:
Our scRNAseq successfully identified five distinct macrophage clusters named after their corresponding marker genes: Mac^{Folr2+}, Mac$^{Pmepa1+}$, Mac^{Ear2+}, Mac$^{Cd209a+}$, and Mac^{Spp1+}, the latter representing foam cells. Further marker genes of Mac^{Spp1+} were *Gpnmb*, *Trem2, Fabp5, Ctsl* and *Mmp12*. Several cytokines and growth factors, including *Tgfb1, Vegf, Cxcl16,* and *Ccl6*, were significantly upregulated in Mac^{Spp1+} (confirmed via ISH and IHC). We also identified that Mac$^{Pmepa1+}$ cells were elevated in response to steroid hormone imbalance. We then conducted a chemokine screen in our scRNAseq data for all *Cxcl* and *Ccl* genes. This identified *Cxcl17* to be upregulated in epithelial cells which was then confirmed using ISH (13-fold, $p<0.001$).

Conclusion:
The upregulation of cytokines and growth factors in Mac^{Spp1+} foam cells suggest their potential pathological role in BPH. Mac$^{Pmepa1+}$ cells were also elevated highlighting their significance within the stroma. Furthermore, our cytokine screen identified *Cxcl17* as a potential driver of macrophage recruitment in the prostate. These results may promote the development of macrophage-targeting therapies for BPH.

Abstract Title: Underlying Causes of Lactic Acidosis in Urosepsis: Prostate Cancer

Investigator: Ahn, Jaeun
Co-Investigator(s): 1. Phillip Randolph Ball, EVMS 2. Sami G. Tahhan, MD, Internal Medicine/EVMS
Department: Internal Medicine

Abstract

Introduction:
Lactic acidosis is the leading cause of metabolic acidosis in hospitalized patients.

Three types of lactic acidosis exist: Type A lactic acidosis is usually associated with impaired tissue oxygenation. Type B lactic acidosis occurs in patients without overt systemic hypoperfusion. D-lactic acidosis occurs in settings of GI malabsorption, diabetic ketoacidosis, and receiving rapid and high-dose infusions of propylene glycol. We present a case of a patient with persistent lactic acidosis despite appropriate treatment for sepsis believed to be secondary to prostate cancer.

Case Information:
A 91-year-old male with a known history of benign prostatic hyperplasia (BPH), diastolic heart failure, pulmonary embolism, hypertension and previous extended-spectrum beta-lactamase (ESBL)-producing *Escherichia coli* (*E. coli*) urinary tract infection (UTI) presented with encephalopathy. He was not tachypneic or tachycardic but his bicarb was low at less than 8 and his lactic acid was elevated at 7.8mmol/l. He had a leukocytosis and the patient was started on meropenem and vancomycin due to concern for sepsis from a UTI and he received thiamine supplementation. The patient's leukocytosis resolved and his mental status improved. His hepatic function and liver imaging were normal.

Review of his prior to admission labs showed that his prostate-specific antigen (PSA) was markedly elevated at 481ng/ml (normal range up to 4.4). Urine culture eventually grew pansensitive *Enterococcus faecalis*. Despite normal hemodynamics, appropriate antibiotics and thiamine supplementation, his lactic acidosis persisted between 6 and 12 mmol/l. Follow up thiamine and riboflavin levels did not show deficiencies.

The patient received degarelix prior to discharge, a gonadotropin-releasing hormone (GnRH) antagonist which reversibly binds to GnRH receptors in the anterior pituitary gland, blocking the receptor and decreasing secretion of luteinizing hormone (LH) and follicle stimulation hormone (FSH). This results in rapid androgen deprivation by decreasing testosterone production, thereby decreasing testosterone levels. With degarelix, testosterone levels do not exhibit an initial surge, or flare, as is typical with GnRH agonists

Discussion / Clinical Findings:
Causes of type B lactic acidosis include toxin-induced impairment of cellular metabolism, regional areas of tissue ischemia, high levels of metformin, malignancy-associated lactic acidosis, alcoholism, and drug-induced mitochondrial dysfunction, often in HIV-infected patients. We believe that our patient had type B lactic Acidosis due to his underlying malignancy.

Type B lactic acidosis is more commonly reported in hematologic malignancies, while it is a rare finding in solid tumors without hepatic metastasis. Underperfusion of tumor clusters, hepatic metastases, increased rates of lactate production by the neoplastic cells that shift to primarily anaerobic glycolysis (Warburg effect) are possible mechanisms. Thiamine and/or riboflavin deficiency could also contribute to the pathophysiology of cancer-related type B lactic acidosis.

Although type B lactic acidosis is an uncommon metabolic complication in prostate cancer, it is a significant finding that indicates poor prognosis. Regardless of the mechanism, treatment of the tumor (by chemotherapy, irradiation, or surgery) usually corrects the lactic acidosis.

Conclusion:
We generally encounter lactic acidosis in the context of sepsis and this case highlights the importance of having a good differential diagnosis for the various types of lactic acidosis to deliver the right treatment.

Abstract Title: Peritoneal Carinomatosis and Pancreatic Adenomarcinoma: The Perfect Storm

Investigator: Crookshank, Ben Crookshank
Co-Investigator(s): Dr Saad Mussarat, Internal Medicine; Dr Zahra Tasneem, Internal Medicine
Department: Internal Medicine

Abstract

Introduction:
Peritoneal carcinomatosis (PC) is a condition where malignant cells from a primary tumor, either intraperitoneal or extra-peritoneal, shed off and implant within the peritoneal cavity. PC associated with pancreatic malignancy is rare, has a poor prognosis, and has been reported less in the literature. We report a presentation of pancreatic PC as a colonic stricture.

Case Information:
An 87-year-old female with a past medical history of atrial fibrillation, chronic heart failure, aortic stenosis, and multiple abdominal surgeries presented to the emergency department with abdominal pain and constipation for several weeks. CT findings suggested transverse colonic stricture (Figure 1) and mild intra-abdominal ascites. General surgery and gastroenterology were consulted. Patient opted for colonoscopy with stent placement, underwent colonic stenting and was noted to have a benign appearing intrinsic stricture with ischemic changes in the distal colon on colonoscopy (Figure 2). She reported improvement in her symptoms and was discharged. A month later she developed suprapubic pain and non-bloody, non-bilious emesis for several days. CT scan at that time was concerning for possible small bowel obstruction without evidence of perforation. Patient required transfer to intensive care with hemodynamically unstable atrial fibrillation with rapid ventricular response requiring urgent cardioversion. Patient developed worsening abdominal pain and did not have bowel movements with bowel preparation. Examination was remarkable for rebound tenderness and absent bowel sounds. She underwent emergent exploratory laparotomy and was found to have multiple omental implants, mass-like structure by the splenic flexure that corresponded with the stricture location and a small perforation was noted proximal to colonic stent. Histopathological examination of implants confirmed pancreatic adenocarcinoma thus confirming the diagnosis of PC secondary to pancreatic adenocarcinoma. The patient had increasing pressor and inotropic requirements after the procedure and unfortunately passed away in ICU.

Discussion:
Diagnosis of PC is often very challenging, requiring advanced imaging and surgical exploration. PC has the same attenuation as normal peritoneum and bowel making radiological detection on CT difficult (1). PET and MRI have better sensitivity and specificity than CT, however, higher costs and limited availability restrict their widespread application (1). Treatment for PC secondary to pancreatic adenocarcinoma is currently limited. There is modest evidence for complete cytoreductive surgery plus hyperthermic intraperitoneal chemotherapy (2,3).

Despite this overall survival is poor.

Conclusion:
PC is a complex, heterogenous disease that is difficult to diagnose and treat. Advanced imaging and surgical exploration should be considered for early diagnosis to improve chances of survival.

Abstract Title: Reconstruction of hypothenar hammer syndrome using arterial grafts

Investigator: Evans, Adam
Co-Investigator(s): Adam Evans, MD; Division of Plastic Surgery Maxwell Wagner, MD; Division of Plastic Surgery Victor Yu, School of Medicine Ramon Dejesus, MD; Division of Plastic Surgery
Department: Plastic Surgery

Abstract

Introduction:
Hypothenar hammer syndrome (HHS) is a peripheral vascular disorder of the hand that could lead to digital ischemia because of distal embolic events from the pathological segment of the ulnar artery (UA).[1] Formed by the terminal end of the UA and radial artery (RA), the superficial palmar arch (SPA) is the major source of arterial inflow (AI) to the hand.. Anatomical variants of the SPA are described based on the presence (complete) or absence (incomplete) of anastomosis between the RA and UA.

Case information: We are presenting two cases of right-hand dominant males age 38-years-old and 53- years-old, who presented with symptomatic hypothenar hammer syndrome, confirmed with computerized tomography arteriogram (CTA) showing decreased AI to the radial side of the hand. Upon exploration, an incomplete SPA variant was seen in one, and a thrombosed UA aneurysm was identified in the other patient. The pathological segments of the UA were resected and revascularization was done with a lateral femoral circumflex arterial graft with instant gain of multiphasic doppler signals at the pulp off all of the digits and resolution of all his pre-operative symptoms.

Discussion / Clinical Findings
HHS is a rare pathology that can lead to devastating changes in the fingers including irreversible necrosis requiring finger amputation. Arterial reconstruction with a vein graft has been described.[2] Our cohort is unique in that an arterial graft was used to repair the ulnar artery. An artery was selected due to neointimal hyperplasia that has been described to affect veins adapted to an arterial environment due to the native veinous wall not being physiologically adapted for high blood pressure, high shear stress, high wall pulsation and stretch of an arterial system.[3] Although our cohort has short-term follow-up of less than 1 year, the arterial grafts may provide better long-term outcomes in these young individuals.

Conclusion
Our patients had successful outcomes of ulnar artery reconstruction with an artery. Further research with long-term follow-up is needed to determine whether arterial grafting of HHS provides superior outcomes to venous grafting.

Abstract Title: Oral Cavity as Rare Metastatic Site for Renal Cell Carcinoma

Investigator: Fite, Jack
Co-Investigator(s): Lily Nguyen, MD, Internal Medicine
Department: Internal Medicine

Abstract

Introduction
Renal cell carcinoma (RCC) makes up roughly 5% of cancers in men and 3% of cancers in women, making it the sixth and tenth most common cancer in men and women, respectively. RCC is known for its late presentation, leading to a higher rate of metastases of 20-30%. Typical metastatic locations include the lungs, bones, liver, brain, and adrenal glands. Oral cavity metastases are rare, accounting for 150 reported cases of metastatic RCC as of 2020. The case demonstrates a patient with a large mass in the oral cavity that was diagnosed as metastatic RCC.

Case Information
This patient is a 56-year-old male with history of stroke and residual expressive aphasia, who presented with a large oral cavity mass. He reported that it had been present for two months and progressively increased in size, to the point where he had difficulty speaking and swallowing. The mass originated from the bottom of the mouth, near the base of the tongue, and had grown extensively through the jaw, measuring 20 mm wide x 30 mm long (Fig 1). The mass was impressively protruding, deforming the mandible, extracting the lower incisors, and friable with minimal contact. Oral surgery was consulted for mass removal but deferred until a biopsy. Upon review of previous imaging, the patient had a CT scan one month prior, which noted multiple pulmonary nodules with the largest at 2 cm and a large left upper pole renal mass (10.1 x 8.0 x 12.4 cm). He had been scheduled for a lung nodule biopsy. At the time, the patient had only a small, pedunculated growth behind his lower teeth and was discharged with instructions to see a dental specialist.

Given this information, ENT performed a biopsy of his oral mass at the bedside on admission, offering nebulized tranexamic acid for bleeding. Urology was consulted on admission, recommending a biopsy of the lung nodule as well, which was performed by interventional radiology. Both pathology results from the oral mass and lung nodule were consistent with RCC. Radiation oncology and hematology-oncology were then consulted. Based on a 10% survival rate at 5 years, palliative options were recommended. Urology and ENT also did not recommend surgical options, due to high risk. The patient continued to tolerate a pureed diet, so a gastric tube was not pursued during his hospital course. He was discharged with plans for outpatient follow-up and palliative radiation therapy to reduce the size of the mass.

Discussion/Conclusion
This case demonstrates a rare metastatic site for RCC. It also serves as a reminder to consider RCC metastasis in patients with known imaging concerning for renal malignancy. Unfortunately, distant metastases in RCC are often noted before the primary RCC is diagnosed, leading to poorer prognoses. Subsequent management is focused on palliative measures, to minimize pain, bleeding, and infection while prioritizing patient comfort.

Abstract Title: Dry Needling , the Double-Edged Sword

Investigator: Flathers, Ethan
Co-Investigator(s): 1. Vishal Aggroia MS4, EVMS/MD 2. Sami Tahhan MD, EVMS/IM
Department: EVMS Internal Medicine

Abstract

Introduction:
Iatrogenic pneumothorax is a usually benign complication most commonly caused by transthoracic needle aspiration, central venous catheterization, and thoracentesis, amongst other standard hospital procedures, with an incidence of 1.36% by some estimates. Here we describe a rare case of iatrogenic pneumothorax involving a dry-needling (DN) procedure.

Case Information:
A 66-year-old female with a medical history of hypothyroidism, chronic myalgias, and obstructive sleep apnea on CPAP presented to the emergency department with pleuritic chest pain, dyspnea, and left neck pain for two days after undergoing posterior cervical dry needling by her chiropractor for chronic pain management Initial vital signs were stable with SpO2 98% and an unremarkable physical exam. Chest X-ray (CXR) revealed a 3.5 cm left apical pneumothorax. She was treated with 100 % supplemental oxygen via nonrebreather, and repeat imaging demonstrated a reduction to 2.6 cm after four hours. The patient's pain improved significantly over 24 hours, and serial imaging showed less than 2 cm of residual pneumothorax. She was discharged in stable condition from the hospital and asked to hold off on using her CPAP till she received clearance from pulmonology. CXR on follow-up ten days later showed near complete resolution of the pneumothorax, and pulmonology cleared her to use her CPAP machine the following week

Discussion/Clinical Findings:
According to a survey in 2008, approximately 38% of Americans utilize alternative medical therapy. DN is a common complementary treatment offered in some physical therapy and chiropractic practices. DN is an alternative medicinal procedure involving filiform or hypodermic needles inserted into trigger points to treat musculoskeletal pain. The modality is similar to acupuncture but usually involves deeper needle insertion. Although research on the efficacy of this modality is limited, dry needling has been effective in clinical trials for the treatment of myofascial pain. Unfortunately, there is no standardized regimen, and there is a current gray zone in the practice of DN versus acupuncture.

Acupuncturists are licensed and undergo training, certification, and continuing education. Unfortunately, the training and accreditation for dry needling are not as rigorous as for acupuncturists. The American Medical Association adopted the following policy on June 15, 2016, stating that dry needling must be regulated with the same standards as acupuncture, stating that "...physical therapists and other non-physicians practicing dry needling should - at a minimum - have standards that are similar to the ones for training, certification and continuing education that exist for acupuncture.

The optimal management of iatrogenic pneumothorax is unstudied. Patients with iatrogenic pneumothorax are generally treated as if they had a primary spontaneous pneumothorax. Small Pneumothorax (less than or equal to 3 cm from apex or l2 cm from hilum) can be managed with oxygen, observation, and repeat imaging. Our patient did well despite having a large pneumothorax and not receiving drainage via a needle or catheter.

Conclusion:
The potential risks and benefits of alternative therapies such as DN should be discussed with patients, and shared decision- making can help reduce the chances of adverse events. This case brings to the forefront the risks of alternative therapies.

Abstract Title: A Case of Hyperthermia and Hypernatremia in Classic Lithium Toxicity: A Diagnostic Challenge

Investigator: Gakhokidze, David
Co-Investigator(s): Ethan Flathers DO - EVMS/Internal Medicine
Department: EVMS Internal Medicine

Abstract

Introduction:
Lithium has long been used as a mood stabilizer for patients with bipolar disorder and major depressive disorder. While effective, it can lead to various side effects, ranging from mild to severe. We present a case of lithium toxicity with significant hyperthermia, highlighting the challenges in diagnosis and management.

Case Description:
A 27-year-old female with a history of bipolar disorder, prediabetes, and traumatic brain injury presented with altered mental state progressing from combativeness to lethargy and obtundation over two days. Due to concerns of airway protection, she was intubated immediately. Physical examination revealed rigidity of the extremities, hyperreflexia, and a fever of 102.5 °F. Initial treatment with dantrolene was initiated for suspected neuroleptic malignant syndrome (NMS), but subsequent lab results revealed lithium toxicity, hypernatremia, and impaired renal function. Hemodialysis and continuous renal replacement therapy were initiated, leading to improvement in renal function and lithium levels. However, hypernatremia persisted, necessitating treatment with hypotonic fluids, free water, amiloride, and desmopressin therapy. After resolution of metabolic abnormalities, the patient was successfully extubated with restored mental function and no neurological deficits.

Discussion:
Lithium toxicity is a well-documented condition, with an estimated 6000 cases reported annually in the U.S. The majority of cases are chronic, with acute intoxications occurring in individuals at high risk for overdose. Acute toxicity presents initially with gastrointestinal symptoms, followed by neurological manifestations at higher lithium levels. Our case exhibited symptoms similar to other psychiatric medication overdoses, such as muscle rigidity and tremors. The presence of hyperthermia further complicated the diagnosis, as it can be seen in syndromes like NMS or serotonin syndrome. Empiric dantrolene use in our case had uncertain utility. Additionally, delayed recognition of lithium-induced diabetes insipidus resulted in hypernatremia, which was managed through hydration and fluid removal via hemodialysis. This case underscores the importance of considering lithium toxicity in patients with psychiatric history and suspected overdose, as it can mimic other associated conditions. Prompt identification and initiation of appropriate treatment, including emergent hemodialysis, are crucial in optimizing patient outcomes.

Abstract Title: Lipid Emulsion Therapy for Lidocaine Toxicity

Investigator: Hoerle, Reece
Co-Investigator(s): 1. Reece Hoerle, EVMS Internal Medicine 2. Xian Qiao, Sentara Pulmonary and Critical Care
Department: Sentara Pulmonary and Critical Care

Abstract

Introduction:
Lidocaine is a lipid soluble local anesthetic that blocks voltage-gated sodium channels. It prevents subsequent channel activation and interferes with membrane depolarization. Intravenous administration is generally well tolerated but excessive doses can lead to systemic toxicity. Mild lidocaine toxicity is known to cause symptoms such as numbness, tinnitus and blurred vision, and restlessness. Severe toxicity includes but is not limited to muscle twitches, seizures, CNS depression, unconsciousness, coma, hypotension, and bradycardia. While there is no proven treatment of lidocaine toxicity, intravenous lipid emulsion (ILE) is generally recommended for cases of severe toxicity.

Case Information:
81-year-old functionally independent female with past medical history significant for hypertension and frequent UTIs, weighing 65 kg, presented to an outside primary care office for dysuria and pyuria. The office administered Ceftriaxone 1 gram IV for presumed UTI. During preparation of the medication, powdered Ceftriaxone was inadvertently dissolved with 50 mL of lidocaine 1% instead of normal saline, yielding ~7.7 mg/kg, above the toxic dose of 4.5 mg/kg. After initiation of Ceftriaxone, the patient experienced witnessed tonic- clonic seizures, was apneic, and was briefly pulseless. CPR was performed with return of spontaneous circulation. Upon arrival paramedics administered benzodiazepines and Rocuronium, and intubated the patient.

In the ED, the patient was hypertensive with BP 211/103. She was started on propofol and midazolam for sedation and seizure abortion. ABG was significant for pH 7.046 and PaCO2 of 76.1. CT chest showed multifocal patchy groundglass opacities concerning for edema or multifocal infiltrates. EKG on admission notable for new pre-atrial complexes and delayed R-wave transition. CBC notable for WBC 15.4, Hgb 11.2, 81% Neutrophils. CMP was notable for Potassium of 3.4, bicarbonate of 18, anion gap of 21, and lactic acid was 4.0

Upon admission to the ICU, patient was given loading dose Keppra, midazolam was continued, propofol was stopped, and Ceribell EEG was performed. EEG showed encephalopathic but no epileptiform changes. TSH was 2.39. Urinalysis was notable for positive leukocyte esterase, nitrites, urine bacteria, and WBC 51-100. Soon after arrival, patient developed shock with BP of 76/48. Decision was made to initiate LIE. An initial dose of 1.5ml/kg was given over 3 minutes, followed by a 0.25ml/kg/min dose give for 30 minutes. Thirty to sixty minutes after completion of the doses, patient had profound neurological improvement. Treatment was complicated by lipase elevation to 2088 (U/L), triglyceride elevation 1525 mg/mL, and blood draw difficulties due to increased blood viscosity. Blood draw difficulties and hypertriglyceridemia resolved with 24 hours. Lipase elevation returned to normal after 48 hours. Serum lidocaine level was 1.0 mg/dL and < 1.0 mg/dL approximately 9 hours and 23 hours after infusion, respectively. Patient was extubated after 24 hours with full neurological recovery.

Discussion:
Local anesthetic toxicity, including lidocaine, can present a clinician with complex decision making. While all have a hydrophilic group, the presence of either an ester or amide link on the intermediary chain dictates its metabolism either via plasma cholinesterases or hepatic oxidation, which could lead to worsening toxicity in patients with cirrhosis. While there is no proven antidote to lidocaine toxicity, there are ample human case reports showing the beneficial effects of ILE treatment in lidocaine induced cardiac arrest. The exact mechanism of action is still unknown. Rat and human models have shown ILE creates a "lipid sink" phenomenon, which decreased serum concentrations of lidocaine but rarely showed a benefit in primary symptom outcomes. Rat models have also shown ILE has direct end organ benefit by actively removing the toxin from the organ tissue and improve post-ischemic cardiac reperfusion via its effects on glycogen synthase kinase 3β and mitochondrial permeability.

While ILE may be an effective therapy for lidocaine toxicity, there can be significant side effects, including pancreatitis, hyperviscosity, and hypertriglyceridemia. The combination of major side effects and proven therapeutic benefit from trials, the use of ILE should be reserved for patients with significant neurological findings or cardiovascular collapse in patients with lidocaine toxicity.

Conclusion:
ILE for severe lidocaine toxicity can be an effective tool. While the exact mechanism is unknown, studies suggest it may have a multi- modal effect. The use of ILE should be reserved for severe cases as the side effects in themselves can lead to significant secondary complications.

Abstract Title: Investigating the need for LGBTQ+ Affirming Psychiatric Care for Psychiatry Residents

Investigator: Lucci, Alex
Co-Investigator(s): Cory Gerwe, Graduate Medical Education
Department: Graduate Medical Education

Abstract

Introduction
LGBTQ+ health is a unique health topic that needs more attention in medical education. Studies show that medical students and residents often feel unequiped to handle this patient population's unique needs. For the psychiatry residency program at EVMS a unique lecture on LGBTQ+ affirming care was developed and presented to the program. With IRB approval, residnets were surveyed before and after the presentation.

Methods
A pre and post survey was administered to participants in the lecture, all of whom are EVMS psychiatry residents. The survey was voluntary and contained questions answered digitall using google forms.

Results
The results of the survey showed that there is both a need for this kind of didactic during training as well as this particular lecture residents found informative and helpful to their training.

Conclusion
Further refining of the didactic using resident input as well as broadening the audience to faculty and staff could be developed in the future.

Abstract Title: Shock Stemming from "Shock!": A Case of Multifaceted Cardiogenic Shock

Investigator: McAuliffe, Jacob
Co-Investigator(s): Jacob McAuliffe, MD, EVMS Internal Medicine, PGY3 Zooha Altaf, MD, EVMS Internal Medicine, Research Volunteer Zahra Tasneem, MD, EVMS Internal Medicine, Assistant Professor Qamar Ahmad, MD, Bayview Pulmonary and Critical Medicine Group Amit Badiye, MD, Sentara Advanced Heart Failure Center Saad Mussarat, MD, EVMS Internal Medicine, Assistant Professor
Department: Internal Medicine

Abstract

Introduction:
Takotsubo cardiomyopathy (TC) is a well-described, transient condition that commonly affects elderly women after a stressful emotional or physical trigger. Presenting features often include: severe chest pain, ECG abnormalities mimicking acute myocardial infarction, and transient left ventricular wall motion abnormalities (including apical ballooning, from which the condition's namesake arises). Severe manifestations of TC can include cardiogenic shock of patients, with a sharp increase in rate of mortality [3].

Case Information:
A 66-year-old female with no significant cardiac history presented to an emergency department for evaluation of two hours of chest pain, attributed to stress about moving in with her daughter. Her ECG met STEMI criteria, prompting emergent left heart catheterization (LHC) which demonstrated normal coronaries. She was initiated on milrinone and levophed infusions for cardiogenic shock. Initial echocardiography demonstrated reduced systolic function (LVEF 20%), a strain pattern consistent with Takotsubo cardiomyopathy (apical ballooning), severe mitral valve regurgitation (MVR) with posterior leaflet systolic anterior motion (SAM), and pulmonary hypertension (sPAP 45). Subsequent right heart catheterization demonstrated reduced CI (TD 1.66) with elevated SVR (>1600 cgs), prompting the decision to place a left ventricular assist device (LVAD). During peri-procedural LHC, significant pressure drop on pullback from the LV to aorta confirmed a severe dynamic left ventricular outflow track obstruction (LVOTO). LVAD placement was then aborted. Given her complex, multifactorial shock (TC, SAM w/ LVOTO, & MVR), the patient was transferred to a regional tertiary shock center. The accepting advanced heart failure team discontinued milrinone and levophed, in favor of continuous esmolol, lasix, and vasopressin infusions. Structural heart and cardiothoracic surgery teams considered options for interventional management, ultimately deciding to pursue urgent percutaneous Mitra-clip placement. Repeat echocardiography showed trace residual MVR with resolution of LVOTO, leading to rapid improvement in hemodynamic status. She was able to be weaned off all supportive infusions within 48 hours after Mitra-clip placement. She was initiated on goal directed medical therapy and discharged a few days later. Serial echocardiograms showed full recovery of systolic function.

Discussion:
The associated features of LVOTO and severe MVR represents a very rare presentation of TC, previously described in only a few scattered case reports [2]. The contraction pattern of typical TC, namely apical ballooning with basilar hyperkinesis, is thought to induce narrowing of the LVOT. In this case, the MVR involved SAM, which exacerbated the already narrowed channel, producing a dynamic LVOTO. For MVR, afterload reduction improves cardiac output, but for LVOTO, increased afterload helps prevent LVOT collapse. Because of these opposing goals, standard management of cardiogenic shock (pressors and inotropes) can paradoxically worsen hemodynamic status, as it did in this patient [2]. Consideration of this complex hemodynamic interplay led to pursuit of mitral valve repair. This key intervention reduced the severity of the MVR and resolved the LVOTO by anchoring the posterior mitral leaflet, eliminating the SAM.

Conclusion:
This case highlights a rare presentation of TC, in which a complex association of SAM, LVOTO, and MVR produced a multifaceted cardiogenic shock. Mitra-clip placement resolved the confounding hemodynamic picture and led to rapid clinical improvement.

Abstract Title: Huffing and Puffing: Olanzapine-Induced Dyspnea

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Co-Investigator(s): 1. Rupinder Bahniwal MD, EVMS Internal Medicine 2. Jacob McAuliffe MD, EVMS Internal Medicine
Department: Sentara Pulmonary and Critical Care Medicine

Abstract

Introduction: Antipsychotic agents have been the primary treatment modality for schizophrenia, particularly demonstrating efficacy in the management of psychosis. Olanzapine belongs to the class of atypical antipsychotics and has demonstrated an enhanced efficacy and safety profile. It works via antagonism of different classes of receptors - dopamine (D1-4), serotonin ($5HT_{1A, 2A, 2C, 3, 6,7}$) and α1, α2. However, it does have the propensity to induce weight gain, increase insulin resistance and alter lipid metabolism. In this case, we would like to highlight a rare side effect of central neurogenic hyperventilation in a patient receiving Olanzapine for the management of agitation while on mechanical ventilation.

Case description: We present a 59-year-old male patient with a medical history significant for heart failure with a reduced ejection fraction (HFrEF) who underwent aortic root replacement and transaortic valve replacement for severe aortic stenosis and an ascending aortic aneurysm. His postoperative course was complicated by cardiogenic shock requiring impella and inotropic support. He was transferred to the ICU for further hemodynamic monitoring via a Swan-Ganz catheter. During his ICU stay, he continued to have a complicated course of acute hypoxic respiratory failure, resulting in multiple reintubations and eventually resulting in him getting a tracheostomy. The Impella was later switched to LVAD to manage his cardiogenic shock. In the interim, he was started on Olanzapine in addition to dexmedetomidine drip for multiple episodes of agitation and desynchrony with mechanical ventilation. Over the course of the next five days, his ventilation requirements increased from 6.6 to 9.6 L/min (reaching max 20 L/min), with Vt of 550 ml and respiratory rate up to 40/min. An arterial blood gas revealed a pH of 7.62, PCO2 of 24.4, PO2 of 125 and bicarbonate of 25, indicating acute respiratory alkalosis. Chest x-ray and CTA chest demonstrated mild pulmonary edema and small bilateral effusions, treated with intermittent hemodialysis.

Imaging studies were negative for a pulmonary embolism.

A complete evaluation and review were conducted to determine the culprit responsible for the increased respiratory drive, including an extensive review of his medications, clinical history and examination. However, no definitive cause could be identified. A decision was made to stop Olanzapine (why). Over the next 48 hours, the patient's hyperventilation resolved, indicated by a drop in his ventilation requirements to 7 L/min, tidal volume of 350 ml and respiratory rate of 20/min. ABG showed resolved respiratory alkalosis with a pH of 7.44, PCO2 of 36.9, PO2 of 112 and bicarb of 26.

Discussion: Olanzapine has been known to cause side effects of dystonia, tardive dyskinesia, insulin resistance and, less commonly, seizures and neuroleptic malignant syndrome. However, only a handful of case reports have demonstrated a relationship between Olanzapine and hyperventilation. Although proving causality is difficult, an increased minute ventilation on the ventilator while on olanzapine therapy, lack of other causes of increased respiratory drive, and improvement after discontinuation suggest a causal association. Several medications, including adenosine, salicylates, progestin and quetiapine, have also increased minute ventilation. However, the mechanism is still unclear. It is postulated due to its direct action on the respiratory center and indirect action, through serotonergic involvement, in central and peripheral chemoreceptors. Another explanation is respiratory dyskinesia, an akathisia-like extrapyramidal side effect involving respiratory muscles causing forceful breathing and hyperventilation. This association has also been reported in patients not on mechanical ventilation. Moreover, hyperventilation appears to be dose-dependent; hence, patients tolerate lower doses of Olanzapine without experiencing respiratory symptoms.

Conclusion: Olanzapine is a commonly used medication for patients with agitation and delirium in the ICU. Compared to typical antipsychotics, atypical antipsychotics, like Olanzapine, are known for their better-tolerated side effect profile and decreased risk of extrapyramidal effects. This case report highlights that physicians should be cautious when using atypical antipsychotics - specifically Olanzapine - which can cause increased respiratory drive without other explainable causes.

Abstract Title: Something in the Water: An Unlikely Cause of Acute Encephalopathy and Rhabdomyolysis

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Department: Internal Medicine

Abstract

Introduction
Rhabdomyolysis, a condition characterized by muscle necrosis and the release of intracellular protein and electrolytes, can lead to acute renal failure. This syndrome can be caused by various factors such as trauma, prolonged immobilization, strenuous exercise, hyperthermia, drugs, toxins, and infections. The following case study presents a unique patient with encephalopathy, dysarthria, and rhabdomyolysis.

Case Information
A 50-year-old male with no significant medical history was admitted with altered mental status and difficulty speaking. He was found unconscious at home, experiencing malaise, dizziness, and speech impairment. Upon evaluation, he was febrile to 103°F, disoriented to place, noticeably dysarthric, and demonstrated 4/5 lower extremity weakness. Initially, stroke was suspected, but a non-contrast head CT showed no abnormalities. He was subsequently admitted to internal medicine for management.

Clinical Findings
His initial laboratory results were concerning; transaminitis (aspartate transaminase 208, alanine transaminase 845), troponinemia (reaching 88), acute renal failure (creatinine 2.1), and significantly increased creatine phosphokinase (CPK 116,476). Consultations were requested from nephrology, neurology, cardiology, and infectious disease specialists. Despite intravenous fluids over the next two days, CPK continued to rise, peaking at 163,200, and renal function worsened. Empiric intravenous antibiotics were started for blood cultures that grew Gram-positive bacteria, later identified as Staphylococcus lugdenensis.

Additional information was obtained from the patient's family; they had recently returned from a cruise to the Bahamas, two weeks prior to admission. Since returning home, the patient had become progressively withdrawn. A comprehensive workup was conducted, including urine drug screen, chest X-ray, infectious disease tests, lumbar puncture, and MRI head studies.

Toxicology screening was negative. Chest X-ray showed right lower lobe pneumonia and MRI of the head without contrast was concerning for multiple sclerosis lesions. Among the various infectious disease tests, two yielded positive results: Epstein-Barr virus IgG and Legionella urine antigen. Azithromycin was initiated before hemodialysis, with a corresponding decrease in CPK level. Lumbar puncture results showed increased protein and neutrophils, while other test results were within normal limits. A multiple sclerosis profile and MRI head with contrast confirmed an incidental diagnosis of multiple sclerosis; reviewing the current literature suggested no association with Legionella and the patient's presentation was an acute encephalopathic process. Meanwhile, the patient showed significant improvement with azithromycin, cefazolin (to treat bacteremia), high-dose intravenous steroids for multiple sclerosis flare, and hemodialysis. His dysarthria and encephalopathy resolved, and he was discharged with arrangements for outpatient hemodialysis.

Conclusion
This case represents an exceptionally rare presentation of Legionnaire's disease. Legionella pneumophilia, the bacteria responsible for this condition, is transmitted through contaminated water, such as in air conditioning or cruise ships. Typical presentations of Legionella infection include pneumonia, hyponatremia, and occasionally, acute encephalopathy.

Rhabdomyolysis has been linked to Legionella in 35 reported cases since 1980, with observed improvement after antibiotic treatment targeting the underlying source of muscle breakdown. The recommended course is azithromycin 500 mg daily for 10-14 days. This case contributes to the existing literature, emphasizing the importance of early diagnosis and highlighting that Legionella infection can present with encephalopathy and rhabdomyolysis.

Abstract Title: Limp in a Pediatric Patient: A Common Presentation with a Rare Diagnosis

Investigator: Ravi, Sai Susmitha
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Department: Pediatrics

Abstract

Introduction:
A chief complaint of a new limp or refusal to bear weight in the pediatric population, especially in the toddler age group, can be challenging to diagnose. Infectious osteomyelitis, transient synovitis, rheumatologic conditions, and malignancy are major categories around which workup is focused. Here, we present a rare diagnosis of chronic non-bacterial osteomyelitis (CNO). CNO is a chronic, inflammatory bone disease with slightly over 500 reported cases worldwide. CNO affects children and adolescents, typically females, with a peak incidence between 7-12 years of age. Once thought of having a post-infectious origin, CNO is no longer considered as such after extensive microbiological analyses failed to show pathogenic involvement and lack of response with antibiotic use. The current school of thought is that CNO is primarily an immunologic disorder where there is a cytokine imbalance. The disease can be persistent or episodic in symptomology and can affect one or multiple bones. We present a case of a 2-year-old female with the ultimate diagnosis of CNO, and the extensive workup associated with such a rare disease.

Case Description:
A previously healthy 2-year-old African American female initially presented with visible atraumatic right-sided limp leading to an emergency department visit. The limp first developed approximately one month after a bout of pneumonia. The initial diagnosis was presumed transient synovitis. Two weeks following emergency department discharge, the limp progressed to involve bilateral lower extremities with refusal to bear weight. At her orthopedic follow-up, she was noted to have subtle ataxia and unsteady knees bilaterally. Given the progression and duration of symptoms, she was admitted for evaluation of limp with MRI pelvis. Through the hospital course, she complained of low back pain with tenderness to palpation of lower right back along the SI joints. She was unable to bear weight or walk. She was started on scheduled Naproxen with some improvement. She had extensive workup with multiple sub-specialties including orthopedics, infectious disease, neurology, hematology/oncology, and rheumatology. She also had extensive diagnostic testing with magnetic resonance imaging (MRI) of the pelvis, x-ray of the hips, computed tomography of the head, ultrasound of the abdomen, and bone marrow biopsy. The biopsy showed several areas of fibrosis of cortical bone but no malignancy. With these results, hematology was concerned for CNO. Whole-body MRI revealed increased short inversion time inversion recovery (STIR) signal bone marrow in multiple locations consistent with CNO. Gait improved in 24 hours after initiating treatment with steroids, Cellcept, and Plaquenil.

Discussion:
Limping in a young child can have a variety of etiologies. It often involves multiple subspeciality consults with a vast array of diagnostic testing. Though CNO tends to have a peak incidence in 7-12-year age group, it should be considered in all age groups. Whole-body MRI is the gold standard imaging modality for diagnosis of CNO. Bone biopsy is confirmatory. As this is a diagnosis of exclusion, it is important to rule out other disorders such as infectious cases, cerebellar abnormalities, intra-articular processes, and malignancies as in this case. Another important diagnosis to consider in this clinical scenario is scurvy, as MRI findings are identical. This patient was growing well along her growth curve and did not show any other associated symptoms. Additionally, her bone marrow biopsy showed fibrotic changes, which is pathognomonic for CNO.

Conclusion:
Though CNO remains a rare diagnosis of exclusion, with its spectrum of severity, it is important to keep this differential diagnosis in mind when managing a pediatric patient with atraumatic, insidious onset of limp with refusal to bear weight.

Abstract Title: Syringomyelia and Thoracic Spinal Arachnoid Web: A Rare Association

Investigator: Stein, Samuel
Co-Investigator(s): Kirk Tran, MD, EVMS Internal Medicine
Department: Internal Medicine

Abstract

Introduction: Syringomyelia is the development of fluid-filled cavities within the spinal cord parenchyma and is typically caused by congenital or acquired alterations in cerebrospinal fluid flow. An arachnoid web is a pathologic thickening of arachnoid tissue bands within the spinal canal which inhibits laminar flow of cerebrospinal fluid. This can predispose patients to syringomyelia formation and occurs with increased frequency after spinal cord trauma and surgeries [2]. This case highlights a rare presentation of syringomyelia associated with arachnoid webs in a patient with neurologic deficits.

Case Information: A 44-year-old male with no significant past medical history presented to the emergency department with a two-week history of left sided facial weakness and droop as well as left lower extremity numbness and tingling. He was a steel mill worker who often lifted heavy objects at work. He noted a history of left shoulder trauma due to a fall from a roof about 10 to 15 years ago with full recovery. Initial neurological exam revealed mild left facial droop with nasolabial fold flattening, left lower facial weakness, mildly decreased light, touch and pinprick sensation in the left V1-V3 facial distribution, and weakness with left eyelid closure. Bilateral patellar reflexes were mildly hyperactive without clonus and motor strength was normal in all extremities. Light touch sensation was diminished at the left thigh only and the spine had full strength and motion. Brain imaging was unremarkable. Spine imaging identified a syrinx extending from C2-T10 secondary to an arachnoid web at T5. Neurosurgery were consulted and recommended conservative management. On his subsequent outpatient follow up two weeks later, he endorsed new thoracic midline back pain radiating into the left hip.

Examination at that time was notable for 3+ bilateral patellar reflexes without clonus as well as normal strength, tone and sensation to light touch in all extremities. Surgical arachnoid web removal was discussed, but the patient elected to pursue conservative management with repeat imaging in 6 months.

Discussion: Based on our review of the current literature, the rarity of syringomyelia associated with arachnoid webs is demonstrated with only 29 other documented cases [3]. Average time of syrinx formation post spinal cord injury (SCI) is 5 years for patient's over 30 years and 17 years for those under 30 years at time of injury [1]. Patients over 30 years of age with SCI are at risk of more rapid syrinx formation and should be screened for syringomyelia with MRI, which may also help elucidate its underlying cause. Based on the neurosurgeon's review in this case, the leading differentials for our patient included post-traumatic versus primary spontaneous syringomyelia. Management depends on syrinx size, symptom severity and overall clinical status. Conservative management can be considered for stable patients with mild symptoms, whereas laminectomy with intradural arachnoid web excision is considered in those with refractory pain unresponsive to medical therapy or acutely worsening neurological symptoms [3].

Conclusion: This case demonstrates a rare presentation of syringomyelia associated with a thoracic arachnoid web in a patient with neurologic deficits and a remote traumatic history.

Abstract Title: are we ALL able to make a diagnosis?

Investigator: Tasha, Tasniem
Co-Investigator(s): 1. CO-A-1: Matthew McCarron, Internal Medicine/EVMS 2. Co-A-2: Cecil Jnawali, Internal Medicine/University of the free state faculty of health sciences 3. Co-A-3: Waleed Kassabo, Internal Medicine/EVMS 4. Co-A-4: Sami G Tahhan, Internal Medicine/EVMS
Department: Internal Medicine

Abstract

Introduction:
Acute lymphoblastic leukemia (ALL) is characterized by the uncontrolled proliferation of immature lymphoid cells within the bone marrow and peripheral blood. The BCR-ABL fusion gene can occur in up to 30 percent of adults with ALL and is a marker of poor prognosis. Such patients are routinely treated with allogeneic hematopoietic cell transplantation (HCT) after remission induction. We present a case of a patient who was first suspected to have ALL by having a positive BCR-ABL1 quantitative blood test by Reverse transcription (RT) PCR.

Case Presentation:
A 28-year-old woman with recent endometritis following an abortion, presented to the emergency department with complaints of abdominal distension, weight gain, malaise, orthopnea, exertional dyspnea, and bilateral lower extremity edema. She also reported chills, nausea, and a decreased appetite. Her systolic blood pressure ranged from 180 to 200 mmHg despite no history of hypertension.

Examination revealed hepatosplenomegaly and spontaneous bruising, Labs disclosed anemia (7.9 g/dL), thrombocytopenia (110,000/mm3), elevated proBNP (2,021 pg/mL) as well as elevated LDH. The initial assessment suggested new-onset heart failure and volume overload due to hypertensive urgency. She responded to diuretics and antihypertensive therapy. Hematology was consulted due to anemia, thrombocytopenia, and hepatosplenomegaly on ultrasound. Labs ruled out sickle cell anemia, thalassemia, and porphyria. The patient was discharged with close follow-up after a quantitative BCR-ABL1 test was drawn.

Nine days later, the patient returned to the emergency department due to worsening bilateral leg pain, primarily concentrated in the upper thighs, along with nausea, vomiting, and dyspnea. Blood work revealed continued anemia (8.4 g/dL), thrombocytopenia (12,000/mm3), and CT imaging confirmed hepatosplenomegaly. In the interim, her quantitative BCR-ABL1 test had returned markedly positive. A bone marrow biopsy confirmed extensive B-lymphoblastic leukemia/lymphoma, accompanied by BCR-ABL1 fusion leading to immediate initiation of chemotherapy.

Discussion:
The Philadelphia (Ph) chromosome, a fusion between chromosomes 9 and 22 resulting in the BCR-ABL fusion protein, was first discovered in Chronic Myeloid Leukemia (CML). The Ph chromosome is also implicated in Acute Lymphoblastic Leukemia (ALL), predominantly within the adult population, constituting approximately up to 30 % of cases.

Because RT-PCR quantitative BCR-ABL testing is low-cost, sensitive, rapid, and not labor intensive, it is the diagnostic test of choice for Ph-positive leukemia. It can also be used to assess response to treatment and to detect measurable residual disease (MRD) following allogeneic bone marrow transplantation. Identifying BCR-ABL positive ALL subtype early is pivotal. Tyrosine kinase inhibitors (TKIs) have notably curbed MRD, a pivotal prognostic marker in Ph-positive ALL. Dasatinib, a TKI, is commonly favored based on prospective studies and potential CNS penetration.

Our patient received dasatinib with a subsequent bone marrow biopsy showing no disease and has continued follow-up with hematology.

Conclusion:
This case highlights the utility of the blood RT-PCR BCR-ABL test and teaches us about the presence of it not just in CML but also in ALL. It might in time, in the right patient, become a tool useful to hospitalists as well as outpatient physicians while awaiting input from hematologists.

Abstract Title: A no-sweat diagnosis of a rare cause of pancreatitis

Investigator: Varava, Yuliia
Co-Investigator(s): Dr. Mark Flemmer, MD, Internal Medicine/ EMVS Dr. Anum Javaid, MD Internal Medicine/EMVS Dr. Philip Olivares, MD, Internal Medicine/EMVS
Department: Internal Medicine

Abstract

Introduction:
Chronic pancreatitis (CP) can result from episodes of an acute pancreatitis of any cause. The syndrome of chronic pancreatitis results from exposure to risk factors (genetic and environmental). Cystic Fibrosis (CF) is one of the genetic disorders caused by CF transmembrane conductance regulator gene (CFTR) mutation which can lead to chronic pancreatitis in 15-20 percent of cases.

Case description:
A 20 year old male with a past medical history of asthma, gastroparesis and eosinophilic esophagitis was admitted with recurrent episodes of acute pancreatitis. He denied using tobacco, alcohol or illicit drugs. His first episode 6 months ago was of unclear etiology. MRI MRCP showed evidence of acute pancreatitis without evidence of necrosis, abscess ,cholelithiasis or presence of annular pancreas or pancreas divisum. Anti nuclear antibodies and IGG4 subtypes were negative. Since this episode, the patient has had multiple attacks of symptomatic pancreatitis, some of which were complicated by pancreatic necrosis.

Related to diagnostic uncertainty a 6 gene panel for chronic pancreatitis was sent to Invitae Genetics which revealed heterozygous pathogenic mutations (p.Phe508del and p.Met952Ile). CT of the chest and sinuses showed no pathology and a sweat chloride was negative (20mmol/L). The patient was subsequently referred to a cystic fibrosis clinic where it is anticipated Trikafta (elexacaftor/tezacaftor/ivacaftor) will be prescribed.

Discussion:
The classic or typical form of CF is diagnosed if a patient demonstrates clinical disease in one or more organ systems and has elevated sweat chloride (≥60 mmol/L). Patients with CFTR mutations and chronic pancreatitis who do not fit the diagnostic criteria for CF often can be categorized as having either "nonclassic CF" or "CFTR-related disease. These patients are more likely to present later in childhood or adulthood and to have unusual CFTR mutations, which may not be included in the standard CF screening panel. They may still be diagnosed with CF if they meet the genetic criteria for the diagnosis, including two copies of a disease-causing mutation in the CFTR gene on each parental allele. Our patient falls under this category by having only one organ system involved (gastrointestinal) and having a negative sweat chloride test. However he did have 2 mutations in CFTR gene which is consistent with atypical CF diagnosis.

Conclusion:
On rare occasions pancreatitis may be the initial presenting symptom of CF even in the absence of any other organs involved particularly lungs. It is reasonable to perform a genetic testing for CFTR gene mutation in this patient population to initiate an early treatment and to prevent the devastating sequelae of chronic pancreatitis.

Abstract Title: Whipe that B12 out. A case report describing the devastating consequences of a recreational use of nitrous oxide.

Investigator: Varava, Yuliia
Co-Investigator(s): Dr. Rehan Qayyum, MD; EVMS Internal Medicine Maria Cortes, M3; EVMS Internal Medicine Dr. James Wyant, MD. EVMS Internal Medicine
Department: EVMS Internal Medicine

Abstract

Introduction
Nitrous oxide is an increasingly popular inhalant of abuse commonly called "Whip-its". It exhibits euphoric properties via NMDA receptor antagonism. One of the adverse effects include multiple neurologic deficits secondary to the functional vitamin B12 deficiency. Nitrous oxide irreversibly oxides the cobalt ion of cobalamin, inactivating it and resulting in impaired DNA synthesis and myelin production, as well as accumulation of homocysteine.

Case description
A 25-year-old woman with no known past medical history presented to our emergency department (ED) complaining of six weeks of progressive symptoms of neck pain, weakness, numbness in the bilateral lower extremities and inability to walk. The symptoms started shortly after suffering from a fall in her home and got worse after seeing a chiropractor. Patient went to the ED 2 weeks prior to her current presentation, where an MRI neck and brain were done followed by an outpatient neurologist evaluation. She was prescribed gabapentin for a neuropathic pain and sent home.

On our evaluation patient had unusual distribution of multimodal sensory disturbances notable for absence of vibratory and proprioception in distal extremities but preserved pain and temperature sensations. She had positive Romberg test and unsteadiness when standing. Cervical MRI from her prior ED visit was reviewed and noted to have nonspecific changes in the dorsal column at the level of C3 through C5 consistent with subacute combined degeneration. Her lumbar puncture, complete blood count, complete metabolic panel, HIV, syphilis, serum zinc and copper level, and serum B12 levels were within normal limits. On further interview the patient endorsed a long-term daily use of nitrous oxide and taking vitamin supplement a night prior to her hospitalization. A serum methylmalonic acid was markedly elevated which confirmed the total body B12 deficiency despite the normal serum levels. The patient was given daily intramuscular vitamin B12 during hospitalization and a prescription for oral vitamin B9 and B12 supplementation at discharge.

Discussion
This case illustrates the importance of awareness of vitamin B12 deficiency with nitrous oxide use. Our patient did not provide a full history on her initial visits to the ED and to neurology and had denied any recreational drug use. This led to the misinterpretation of her cervical spine MRI and delayed the treatment. Furthermore, with this degree of neurological damage one would expect her vitB12 level to be low rather than normal. However, this was again misinterpreted as she took vitamin supplement a night before coming to the hospital.

Educational point
It is important to recognize subacute combined degeneration of spinal cord in a high-risk patient population with typical symptoms despite normal vitamin B12 level. The high index of suspicion, early recognition, and treatment are the mainstay to prevent irreversible neurological damage.

Abstract Title: Multisystem Involvement in a Pediatric Patient with Peripheral Eosinophilia

Investigator: Xia, Di
Co-Investigator(s): 1. Di (Maggie) Xia, MD, Children's Hospital of the King's Daughters, Department of Pediatrics 2. Sai Susmitha Ravi, DO, Children's Hospital of the King's Daughters, Department of Pediatrics 3. Broderick Jameson, MD, Children's Hospital of the King's Daughters, Department of Pediatrics
Department: Children's Hospital of the King's Daughters, Department of Pediatrics

Abstract

Introduction
Peripheral eosinophilia, defined as an absolute eosinophil count (AEC) ≥500/μL, can be connected to many disease states that range in prevalence and severity. Often it is a sign of singular organ involvement, such as asthma or eczema. Rarely, it can be an indicator of a more infiltrative process requiring timely diagnosis and treatment. One rare pediatric diagnosis associated with eosinophilia is hypereosinophilic syndrome (HES). HES is an umbrella term for a group of rare disorders defined by persistent AEC of ≥1500/μL, as well as hypereosinophilia (HE) associated multiorgan manifestations. Data on HE in pediatric patients is limited. This is a case of a pediatric patient who developed progressive pulmonary, gastrointestinal (GI), and hematologic disease from HES.

Case Presentation
Our patient is a previously healthy 13-year-old African American male with a recent diagnosis of severe persistent asthma, bronchiectasis, and gastritis. He initially presented seven months prior due to new symptoms of wheezing and respiratory distress which required β-agonist and steroid treatment. His pathology was determined to be viral-induced wheeze, but he was diagnosed with asthma during pulmonology follow-up several weeks later.

Two months later, the patient required admission for hemoptysis and was found to have bronchiectasis of unknown origin. He was sent home on antibiotics and a steroid taper. He then presented four months later with complaints of abdominal pain, vomiting, diarrhea, and labs significant for HE (AEC of 20,088/μL) which led to further testing. Bone marrow biopsy and bronchoscopy were performed, with no diagnostically significant results. Rheumatology was consulted, but as his antineutrophil cytoplasmic antibody was previously negative and he did not have multi-organ dysfunction, further workup was deferred.

He continued to have diarrhea and significant abdominal pain following discharge. Due to this, an endoscopy was performed, revealing scattered intraepithelial eosinophils in the duodenum, esophagus, and throughout the colon. His HE persisted, with an AEC of 10,876/μL at the time of the scope. He was readmitted and received an infectious disease workup for parasitic etiology that returned negative.

During his admission, computed tomography angiography of the abdomen/pelvis was obtained to evaluate for intestinal vasculitis and eosinophilic disease. It showed no vascular abnormality but revealed wall thickening and enhancement of the ileum concerning for eosinophilic enteritis. Cardiac imaging results were normal.

A diagnosis of HES was concluded from his new onset asthma, bronchiectasis/chest imaging abnormalities, GI symptoms and biopsy results, and peripheral HE.

Despite being on high-dose oral prednisone for over six months, it was thought that the patient was having poor absorption due to extensive GI inflammation. He was transitioned to intravenous steroids which resulted in normalization of his AEC. Nucala therapy was initiated while inpatient and he was discharged on an oral steroid taper.

Discussion
HES is defined by presence of peripheral blood HE and multi-organ dysfunction directly caused by tissue eosinophilia. Eosinophils infiltrate the body, causing inflammatory changes and ultimately organ dysfunction. Our patient was a previously healthy male who developed asthma, bronchiectasis, and gut involvement in addition to peripheral eosinophilia.

The incidence and prevalence of HES is not well defined in adults or pediatrics, due to variation in clinical presentation, underreporting, and underdiagnosis. The prevalence of pediatric HE is reported as 31.4/100,000, and the incidence rate of HES, age adjusted, is approximately 0.4/million.

While he meet clinical criteria for eosinophilic granulomatosis with polyangiitis, another disease associated with eosinophilia that can present with similar clinical findings as HES, no lung biopsy was obtained to be able to make such a diagnosis.

Steroids are the first-line treatment for HES, but pediatric cases of HES are often severe, and steroids are often not sufficient to induce remission. Immunomodulatory agents, like Nucala, that block signaling of eosinophil production are often required to treat, as in this case.

Conclusion
We present a rare pediatric case of non-infectious multi-system organ damage from HES. This case is an important example of how to recognize, formulate a differential, and manage pediatric HE.

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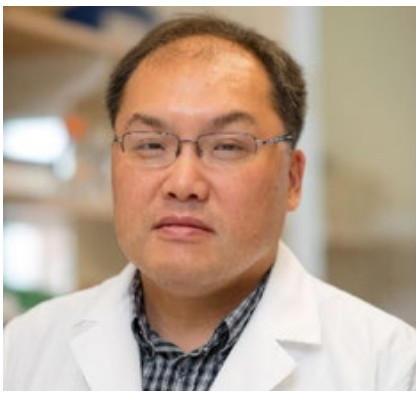

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