37th Annual
RESEARCH DAY

Friday, November 21, 2025

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

EVMS Community Faculty Designated Student/Resident/Fellow Research Award

Travel Award: This travel award seeks to recognize and promote scholarly activity by trainees at Macon & Joan Brock Virginia Health Sciences at Old Dominion University. Up to eight awards of $1,500 each are available each fiscal year to support trainee travel to a regional, national, or international academic conference to present research. To be eligible, applicants must present at an academic conference and prepare a submission quality manuscript for publication. Those interested in being considered for this award should contact the Office of Research for more information.

Publication Award: This publication award provides funding to students, residents, and fellows at Macon & Joan Brock Virginia Health Sciences at Old Dominion University who have submitted a manuscript for publication. This award provides up to $500 in reimbursement for costs incurred while publishing, up to the maximum award amount. Those interested in being considered for this award should contact the Office of Research for more information.

Student Affairs Award

Publication Award: TThe Student Affairs publication grant provides financial assistance up to $3,000 for MD students who are the first author to cover manuscript publication fees for those accepted to professional journals.

Medical Student Research Award

Travel Award: Provided through Medical Student Research for any medical students looking to travel to regional, national, or international academic conferences. This award is only available to 2nd-4th year medical students who have submitted the Intent to Travel Form before they travel and is limited to one award per student each academic year. Awards up to $1500 are available for students that meet the criteria.

For more information about these awards or the application process, students, residents, and fellows can contact the Office of Research at ***VHS-EVMSResearch@odu.edu***.

37th Annual Research Day
Macon & Joan Brock Virginia Health Sciences at Old Dominion University
November 21, 2025
Timeline of Events

Connection information and more on the Research Day Website:
https://www.odu.edu/vhs-research-day

Sponsor, Internal Service Provider, and Core Facility Exhibitionn

10:30 AM - 5:00 PM **Waitzer Hall lobbies: first and second floor**
Attendees: To minimize our carbon footprint, we are asking you to take a photo of the information the vendors are displaying rather than taking a paper handout

Oral Presentations

In person: Waitzer Hall, room 300 (*Pizza lunch will be served)*
Remote: (***click here to join*** or join via link on the website)

Opening Remarks

12:00-12:15 PM Dr. Paul Harrell, EVMS Research Advisory Committee Chair
Dr. Alfred Abuhamad, Executive Vice President of Virginia Health Sciences at ODU
Dr. Milton Brown, Senior Associate Vice President for Research
Dr. Judette Louis, Dean of Eastern Virginia Medical School

Presentation of Faculty Awards

12:15-12:30 PM Early Career Research Excellence Award
Presented by Dr. Paul Harrell, Research Advisory Committee Chair

Excellence in Research Mentorship Award
Presented by Dr. Lifang Yang, Research Advisory Committee Vice Chair

Junior Clinical Investigator Program (JCIP)
Presented by Dr. Juliana Martins, JCIP Program Director

Keynote Speaker

12:30-1:15 PM Introduction of Keynote Speaker
Dr. Paul Harrell, Research Advisory Committee Chair

Dr. Michael Henry, Ph.D.
Professor and Chair, Department of Biomedical and Translational Sciences
Macon & Joan Brock Virginia Health Sciences at Old Dominion University

Topic: ***Metastatic Journey Through the Fluid Microenvironment of the Circulation***

Platform Presentations

1:15-1:29 PM Afia Salsabil Alam, Biomedical Sciences Graduate Student
Title: Investigating the Role of ALK2 Signaling in Function and Stability of Regulatory T Cells
Mentor: Piotr Kraj, Ph.D., DVM

1:30-1:44 PM Mitch Chad Warren, MD Student
Title: Galactic Cosmic Radiation Negatively Affects Rat Ovarian Follicles
Mentor: Diane Duffy, Ph.D.

1:45-1:59 PM Samantha Vos, MD student
Title: Validating the clinical utility of a novel prognostic biomarker and an oncogenic k-RAS signaling gatekeeper, SIAH, to risk stratify pancreatic cancer patients at Sentara-EVMS-VOA
Mentor: Amy Tang, Ph.D.

2:00-2:14 PM William Miller Rice, MD student
Title: Robotic versus Laparoscopic Cholecystectomy in Emergency General Surgery: Do Older Adults Benefit More than Younger Adults?
Mentor: Jessica Burgess, MD

2:15-2:29 PM Tasniem Tasha, MBBS, Internal Medicine Resident
Title: Recurrent Follicular Lymphoma Unmasking Common Variable Immunodeficiency: A Case Report and Review of Immunologic Links
Mentor: Sami Tahhan, MD, FACP

Continued on next page

Short Break
2:30-2:45 PM

Poster Presentations
In person: Waitzer Hall, rooms 100 & 200
Posters 1-113 are in Room 100, Posters 114-204 are in Room 200
Refreshments served in the 2nd floor lobby

2:45-3:45 PM **Poster Session A**
Even numbered posters

3:45-4:45 PM **Poster Session B**
Odd numbered posters

Short Break
4:45-5 PM

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

5 - 5:15 PM Poster Awards
Presented by Dr. Paul Harrell and Dr. Li Fang Yang
Virginia Health Sciences Research Advisory Committee Chairs

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

People's Choice Poster Award
Presented by Dr. Lifang Yang
Virginia Health Sciences Research Advisory Committee Vice Chair

Closing Remarks
Dr. Paul Harrell
Virginia Health Sciences Research Advisory Committee Chair

Save the Date NOW! Research Day 2026 will be Friday, November 13, 2026.
Abstracts will be due in early September.

2025
KEYNOTE LECTURE

Metastatic Journey Through the Fluid Microenvironment of the Circulation

Michael Henry, Ph.D.

Professor and Chair,
Department of Biomedical and Translational Sciences
Macon and Joan Brock Virginia Health Sciences
at Old Dominion University

POSTER PARTICIPANTS

Biomedical Sciences Students

Ellmer CHS Graduate Students

Medical Masters (MS) Students

MD Program Students

Medical Students (cont.)

Medical Students (cont.)

Master of Public Health Students

Other Students and Presenters

Residents/Clinical Fellows

Abstract Title: Testing the Efficacy of a Novel Acidic-Sensing Phlip Delivery Reagent for Oncomir Knockdown in Prostate Cancer

Investigator: Alex Tyler James Cain
Mentor: Aurora Esquela Kerscher, PhD
Co-Investigators:
1. Alex Cain, Department of Biological and Translational Sciences, Macon & Joan Brock Virginia Health Sciences at Old Dominion University
2. Raman Bahal, Department of Pharmaceutical Sciences, University of Connecticut
Departments: Biological and Translational Sciences

Abstract

Introduction:
Metastatic prostate cancer (PCa) represents an unmet treatment need, with a 5-year survival rate of only 30%. MicroRNAs (miRNAs) are small (~24 nucleotides) noncoding RNAs that act as tumor suppressors and pro-oncogenic factors in the prostate. We noted that miR-888 and miR-891a were enriched in human metastatic PCa cells and prostatic fluids from high-grade compared to low-grade/non-cancer patients. Non-aggressive human PCa cells overexpressing miR-888/miR-891a showed increased proliferation and invasion in vitro and accelerated prostate tumor load in mice. Conversely, prostate cells treated with antisense miRNA oligonucleotides (antimiRs) to block miR-888 or miR-891a reversed these phenotypes. AntimiRs are valuable tools for inhibiting miRNA function; however, current antimiR-based therapeutic regimens require high concentrations and suffer from poor tissue-targeting specificity. To address these shortcomings, we collaborated with chemist Dr. Raman Bahal to test the efficacy of acid-sensing peptides known as pHLIP (pH low insertion peptides) as prostate tumor delivery reagents using chemically optimized peptide nucleic acid (PNA) conjugates designed to bind/inhibit miR-888/miR-891a. pHLIP is a 36-amino acid peptide that adopts an alpha-helical conformation at low pH, facilitating membrane insertion and transport of its cargo into cells. When administered systemically, pHLIP targets solid tumors with inherently high glycolytic rates that create acidic microenvironments. We hypothesized that pHLIP-PNA antimiR conjugates against miR-888/-891a would allow efficient delivery to human PCa cells in a simulated acidic environment and result in suppressed cell growth. More pronounced effects were predicted in castration resistant versus androgen-responsive PCa lines, correlating with miRNA expression. Additionally, this technology enables simultaneous inactivation of multiple miRNAs, so we evaluated whether combined antimiR-888/891a treatment produced additive or synergistic effects. We also aimed to translate this work using a pre-clinical PC3-ML xenograft mouse model.

Methods:
In vitro experiments: PC3-ML or LNCaP cells were treated with 4 uM pHLIP-PNA-antimiRs (or NC67 controls) in pH 6.0 media for 3 hours, recovered for 24-48 hours in pH 7.4 media, and then harvested for RNA isolation and qRT-PCR analysis. Alternatively, cells were prepared for WST-1 (proliferation) or soft agar assays (anchorage-independent growth). miR-888/891a expression was analyzed in RWPE-1, LNCaP, PC3-ML, NIH-H660, LASCPC-01 lines to correlate expression with castration resistance. Mouse experiments: PC3-ML cells were injected into flanks of male NOD SCID mice. When tumor volume reached ~300 mm^3, animals were injected with cy5-pHLIP for imaging, or with pHLIP-PNAs (antimiRs-888/891a/NC67) on days 1, 4, 8, and 11, to measure efficacy.

Results:
miR-888/miR-891a expression correlated with castration resistance, especially neuroendocrine CRPC. In vitro, pHLIP-PNA-antimiR-891a more effectively reduced growth in PC3-ML than LNCaP, while antimiR-888 treatment showed minimal effects. Combined antimiR treatment exhibited more potent growth phenotypes. In vivo, cy5-pHLIP efficie ntly targeted xenograft tumors in mice, with low signal in kidney and liver. Ongoing mouse efficacy studies suggest antimiR-891a is promising.

Conclusion:
Novel acid-sensing pHLIP reagents designed to inactivate miR-888 and miR-891a demonstrate clinical promise for lethal PCa. Further work is needed to address variable in vitro results. Developing luciferase sensor assays to monitor miRNA activity will be useful for batch and formulation testing. This research may improve PCa patient outcomes.

Abstract Title: Exploring the Role of GlycoRNAs in Breast Cancer Endocrine Resistance

Investigator: Joanna Marie Camacho
Mentor: Lifang Yang, MD PhD
Co-investigators:
Shanaya Haque1,2, Fanying Li1,2, Eric Feliberti2,3,
1Department of Biomedical and Translational Sciences, Division of Tumor Biology, 2Leroy T. Canoles Jr. Cancer Research Center,
3Department of Surgery, Macon & Joan Brock Virginia Health Sciences at Old Dominion University, Norfolk, VA
Departments: Department of Biomedical and Translational Sciences Division of Tumor Biology

Abstract

Introduction
Breast cancer affects 1 in 8 women in the United States , with 70-80% of the cases diagnosed with the estrogen receptor positive (ER+) subtype. Despite the current availability of therapies against these subtypes, such as tamoxifen and fulvestrant, a significant portion of patients will experience recurrence due to de novo or acquired endocrine resistance, underscoring the need for continued research to understand and treat this major hurdle. Glycosylation of biomolecules such as proteins and lipids are crucial for cellular functions such as trafficking, recognition, and signaling. In breast cancer as well as many other malignancies, alteration of glycosylation patterns have been observed and are known to contribute to disease progression, epithelial to mesenchymal transition, and tumor metastasis. Recent insights in glycan modifications have revealed the presence of glycosylated RNAs, termed glycoRNAs, on the cellular surface. Further research has demonstrated potential roles of glycoRNAs in cell biology, including neutrophil recruitment and malignant transformation, however their role in breast cancer and drug resistance remains in its infancy. Herein, the aim of this lab is to determine if glycosylation alterations are associated with endocrine resistance in breast cancer specifically regarding the role of glycoRNAs in cellular communication.

Methods
An endocrine resistance cell model including MCF10A cells (a non-tumorigenic breast epithelial cell line), MCF7 (an endocrine-sensitive ER+ breast cancer line), and LCC9 (derived from MCF7 with dual resistance to tamoxifen and fulvestrant) was used. Sialoglycans were metabolically labelled with the chemical azide group (AC4ManNAz) and further tagged by biotin via the copper-free click reaction in total cellular RNA lysates or on intact cell surface. Then RNA was strictly purified and cleaned up using TRIzol and silica columns followed by DNA and proteins decontamination. RNA quality and quantity was measured by NanoDrop and TapeStation. Northern Blot analysis with SYBR Gold and streptavidin dyes was employed to detect total and cell-surface glycosylated signal on RNA.

Discussion/Results
RNA with high purity (A260/280 ≥ 2.0; RIN > 9.0) was exacted from above breast cells. GlycoRNAs were detected in cells treated with AC4ManNAz and click chemistry-based RNA blots. MCF10A cells displayed higher glycoRNA abundance compared to MCF7 cells while LCC9 cells completely lost glycoRNA signal. The expression of cell-surface glycoRNAs in these cells is consistent with the expression of cellular glycoRNAs. Treatment with RNA with protease K did not affect the glycoRNA signal, whereas treatment with an RNase cocktail completely digested the total RNA and glycoRNA signal.

Conclusion:
GlycoRNAs are displayed on the cell surface of breast cells, and their expression levels are inversely associated with tumor aggressiveness and endocrine sensitivity. Future studies will characterize both glycan structures and underlying RNA species, as well as investigate potential functions of these glycoRNAs in endocrine resistance of breast cancer.

Abstract Title: Effects of Early Life Social Isolation on Cognitive Performance in Adult Rats

Investigator: Frederique Emma Edjane Keumeni
Mentor: Larry D Sanford, PhD
Co-investigator(s):
1. Riley Heerbrandt, Sleep Research Laboratory\Biomedical and Translational Sciences
2. Alea Boden, Sleep Research Laboratory\Biomedical and Translational Sciences
3. Zachary Luyo, Sleep Research Laboratory\Biomedical and Translational Sciences
4. Richard Britten, Radiation Oncology\Biomedical and Translational Sciences
5. Laurie Wellman, Sleep Research Laboratory\Biomedical and Translational Sciences
Department: Biomedical and Translational Sciences

Abstract

Introduction
Social isolation (SI) and loneliness have adverse effects on health across the lifespan. In early life, the deleterious effects of SI and loneliness on development can persist and impact adulthood, whereas in older adults, they can increase the risk of cognitive decline, dementia, mental health disorders as well as chronic physiological diseases. There also are sex differences, with most evidence suggesting that females are more negatively impacted. In this study, we assessed how two levels of SI beginning at weaning impacted cognition in adulthood in male and female rats.

Methods
Male and female Wistar rats, at postnatal day 21, were assigned to one of three housing conditions: (SI; single housing), enhanced SI (ESI; single housing with opaque barriers between cages to prevent visual contact), or pair housing (PH; same-sex cage mate). Beginning at 11 weeks, cognitive performance was evaluated using three tasks (novel object recognition (NOR), Y-maze, and rat gambling task (rGT). In the NOR task, recognition memory was tested by evaluating the ability to distinguish between familiar and novel objects across two test days. In the Y-maze, spatial memory was tested by evaluating preference for a novel arm vs. familiar arms as measured by entries and exploration time. In the rGT, decision-making and response times were evaluated. Rats underwent at least two weeks of habituation with touchscreen training that became progressively more difficult. During testing, they could choose between safe low-reward options and riskier alternatives with higher potential rewards, allowing assessment of risk-taking strategies and sensitivity to outcomes.

Results
Full analysis is ongoing; however, preliminary findings from two of three behavioral tasks suggesting that SI beginning in early life can alter cognitive performance in Wistar rats in adulthood. Effects were greater in ESI rats and females performed more poorly on some tasks. In the rGT, ESI rats demonstrated altered decision making and differences in reward sensitivity compared to PH controls.

Conclusion
Our preliminary results demonstrate that SI beginning in early life can adversely impact cognition in adulthood and suggest that greater degrees of isolation have greater negative effects. Females may also be more negatively impacted. As studies progress, this work will examine the effects SI and ESI at different ages and explore neuroimmune and neurocircuit mechanisms underlying their effects on cognition.

Abstract Title: Design and Synthesis of Novel Artemisinin Analogs for Hematologic Cancer Therapeutics

Investigator: Nile Daniel Ross
Mentor: Yali Kong, PhD
Co-investigators:
Milton Brown, MD, PhD
Department of Internal Medicine, Macon & Joan Brock Virginia Health Sciences at Old Dominion University, Norfolk, VA 23507, United States
Department: Department of Biomedical and Translational Sciences Macon & Joan Brock Virginia Health Sciences at Old Dominion University

Abstract

Introduction
Artemisinin, a sesquiterpene lactone derived from Artemisia annua, has demonstrated broad biological activity beyond its well-established antimalarial use, including promising anticancer effects. However, its clinical translation to hematologic malignancies has been limited due to the poor solubility, rapid metabolic clearance, and unclear mechanisms of resistance. To address these challenges, we pursued a strategy to design and synthesize novel artemisinin analogs with optimized physicochemical properties for the treatment of hematologic cancers.

Methods
Our design strategy focused on the modification of Artemisinin, Dihydroartemisinin (DHA), and Artesunate scaffolds on their C10 and O11 positions to enhance their stability, solubility, and potential interactions with resistance-associated pathways. At the same time, hybrid molecules were also explored through chemical covalent conjugation of artemisinin with potent therapeutics used in hematologic malignancies to enhance their potency and to overcome the known resistance mechanisms. The novel Artemisinin analogs were synthesized using linker tethering and coupling reactions. The reactions were monitored by Thin Layer Chromatography (TLC) and purified by flash chromatography. The purified compounds were structurally characterized by Nuclear Magnetic Resonance (NMR) spectroscopy and analyzed by high resolution mass spectroscopy (HRMS). This chemistry approach yielded a diverse library of analogs with favorable drug-like properties to be evaluated in hematologic cancer cell lines.

Results
Artemisinin, DHA and artesunate were chosen as scaffolds to tether a linker with the function group -COOH, -NH, -Br, -N3 and -OH, followed by coupling reaction with the potent anti-hematologic agents to generate our novel analogs. We confirmed the structure through NMR and HRMS spectroscopy analysis. The calculated physical properties including PSA and cLogP values by Chemdraw software have shown their improved drug-like properties compared to artemisinin.

Conclusion
Future efforts will focus on biological assays to assess cytotoxicity in leukemia and lymphoma cancer cell lines as well as in normal cell lines, investigate mechanisms of resistance, and evaluate potential synergy with current chemotherapeutics. Collectively, this work demonstrates that rational chemical modification and synergistic drug conjugation strategies provide a viable path toward novel therapies for the treatment of hematologic malignancies and to overcome drug resistance.

Abstract Title: Inhibition of Monoacylglycerol Lipase reduces Ventilator Induced Lung Injury in Mice

Investigator: Ryan Keon Washington
Mentor: Nagaraja Nagre, PhD
Co-Investigators:
1. Nicholas Richards/ Biomedical and Translational Sciences
2. Nagaraja Nagre, PHD/ Biomedical and Translational Sciences
Department: Biomedical & Translational Science

Abstract

Introduction
Acute respiratory distress syndrome (ARDS) is a life threatening form of Acute Lung Injury (ALI), and is a common cause of respiratory failure in critically ill patients. Approximately 10 to 15% of patients in the ICU meet the criteria of ARDS. ARDS is characterized by a dysregulated immune response leading to the recruitment of neutrophils into the alveolar space, interstitial and alveolar oedema, and injury to epithelial and endothelial cells. Mechanical ventilation is a crucial, life saving intervention for patients with ARDS. However, mechanical ventilation can exacerbate alveolar lung injury, leading to the development of Ventilator Induced Lung Injury (VILI). The development of lung protective ventilation protocols has reduced the incidence of VILI over the years, but there is still a clinical need for alternative protective strategies.

The Endocannabinoid System has a wide array of physiological roles. One of which is the attenuation of aberrant immune responses. Indeed, a previous study by the Nagre Lab indicated that Cannabinoid Receptor 2 (CB2R) activation could ameliorate Pseudomonas aeruginosa (PA) induced lung injury. The Endocannabinoid system is composed of Cannabinoid receptors, endocannabinoids which interact with those receptors, and enzymes that break down or synthesize endocannabinoids. Monoacylglycerol lipase (MAGL) is an enzyme that regulates the activity of the endocannabinoid (2-AG) which serves as an endogenous ligand for both CB1R and CB2R. MAGL hydrolyzes 2-AG, preventing the activation of both CB receptors, and releasing arachidonic acid (AA) which serves as a precursor for the synthesis of pro-inflammatory eicosanoids. In this study, we wanted to examine the role of endocannabinoid signalling in VILI. We utilized LEI-515, a reversible, peripherally restricted MAGL inhibitor to pharmacologically inhibit MAGL in a two-hit murine lung injury model consisting of LPS induced inflammatory injury and high-tidal volume mechanical ventilation

Methods
Lipopolysaccharide (LPS) was intratracheally administered to C57BL/6J mice. 24 hours later, the mice received high tidal volume ventilation (30 mL/ kg bodyweight; 100 breaths per minute) for two hours. To inhibit MAGL, LEI-515 (10mg/kg) was administered intraperitoneally 1h after LPS exposure and 1h before ventilation. Control mice received normal ventilation (10 ml/kg body weight, 10 minutes). Bronchoalveolar Lavage Fluid (BALF) was collected and analyzed for cell number. Following this, BALF cells were differentially stained and analyzed for neutrophil percentage. BALF IL-1β level was assessed by ELISA. The lung injury was assessed by histology. NF-kB activation was analyzed via Western Blot.

Results
Inhibition of MAGL with LEI-515 significantly reduced the BALF total cell count, which was otherwise elevated by VILI. The LEI-515-treated mice also had a significantly lower percentage of neutrophils. Histological analysis (H&E staining) demonstrated mitigation of lung tissue injury in LEI-515-treated mice. Moreover, BALF IL-1β concentrations were substantially lower in the LEI-515 group compared to vehicle controls. Western blot analysis further revealed that LEI-515 suppressed VILI-induced NF-κB activation.

Conclusion
In summary, these findings show that the inhibition of MAGL ameliorates acute lung injury induced by VILI in mice and MAGL could be a promising therapeutic target for ARDS.

Abstract Title: Altered Cell-Surface Glycosylation Patterns in Endocrine Resistant Breast Cancer

Investigator: Linsong Zhang
Mentor: Lifang Yang, MD PhD
Co-Investigators:
1. Fanying Li, Department of Biomedical and Translational Sciences, Division of Tumor Biology, Leroy T. Canoles Jr. Cancer Research Center
2. William Glembocki, Department of Biomedical and Translational Sciences, Division of Tumor Biology, Leroy T. Canoles Jr. Cancer Research Center
3. Kara Friend, Breast Surgery, Sentara Surgery Specialists Leigh
4. Eric Feliberti, Leroy T. Canoles Jr. Cancer Research Center, Department of Surgery, Macon & Joan Brock Virginia Health Sciences at Old Dominion University, Norfolk, VA
Department: Leroy T. Canoles Jr. Cancer Research Center

Abstract

Introduction
Breast cancer is the most common diagnosed non-cutaneous cancer in women worldwide. Estrogen receptor (ER) is expressed over 70% of cases. Endocrine therapy is the mainstay treatment for ER+ breast cancer, and tamoxifen and fulvestrant are the most common used drugs that target ER. However, 20-30% of these patients have cancer recurrence within 10 years after initial diagnosis, highlighting the unmet need to overcome endocrine resistance for this largest population of breast cancer. Glycosylation is a post-translational modification of cell-surface and soluble proteins. Abnormal glycosylation has been implicated in tumor malignancy, progression, and therapeutic resistance in multiple cancer types. However, the specific glycosylation alterations associated with endocrine-resistant breast cancer remain largely unexplored. The objective of this study is to characterize cell-surface glycosylation patterns and underlying glycoproteins associated with endocrine resistance in ER+ breast cancer.

Methods
An endocrine resistance model including MCF10A (non-tumorigenic), MCF7 (endocrine-sensitive and tumorigenic), and LCC9 (derived from MCF7 with dual resistance to tamoxifen and fulvestrant) breast cell lines were employed. Cell proliferation assays, RT-qPCR, and Western blotting under different drug treatments were performed to examine their estrogen and drug response phenotypes. Cell-surface glycosylation was analyzed by flow cytometry (FC) using two orthogonal strategies: 1) lectin affinity staining for linkage-specific sialic acid and complex N-glycan epitopes; and 2) metabolic labeling and copper-free click chemistry (N-azidoacetylmannosamine ManNAz and DBCO-Biotin) for nascent sialic acid content. Correspondingly, the expression of underlying glycoprotein carriers was compared by lection blotting of cellular membrane fractions and Western blotting of metabolic labelled/clicked samples.

Results
Cell proliferation assays, RT-qPCR, and Western blotting confirmed different status in estrogen dependence, expression of ERalpha and estrogen-induced protein (pS2), and tamoxifen/fulvestrant sensitivity among three cell lines. FC quantitation of cell-surface lectins recognizing linkage-specific sialoglycans and complex N-glycans revealed significantly reduced cell-surface α(2,6)- and α(2,3)- sialylation, as well as bisecting/β1,6-branched N-glycosylation in LCC9 cells compared to MCF10A and/or MCF7 cells. The alternation in sialylation was further supported by decreased metabolic labelled signal in LCC9 cells. Moreover, these glycosylation changes are reciprocated on the cell-surface glycoproteins discerned by the combination of acetone precipitation and lectin/Western blotting, suggesting the glycoproteins are main players responsible for altered glycosylation.

Conclusion
The present work shows the correlation of reduction in cell-surface sialylation and complex N-glycosylation with endocrine resistance in ER+ breast cancer. Cell-surface glycoproteins harboring these altered glycans have great potential as biomarkers for monitoring resistance and therapeutic targets for intervention. Specific glycoprotein candidates will be identified and characterized with future profiling and functional studies.

Abstract Title: Investigating the Role of ALK2 Signaling in Function and Stability of Regulatory T Cells

Investigator: Afia Salsabil Alam
Mentor: Piotr Kraj, PhD DVM
Co-Investigators:
1. Jonathan Waldron, Biomedical Sciences, ODU.
2. Noel Miller, MS., Biomedical Sciences, ODU.
Department: Department of Biological Sciences

Abstract

Introduction
Regulatory T-cells (Tregs) are central to maintaining immune tolerance by suppressing effector T-cell responses and preventing autoimmunity. The T-reg transcriptional landscape is programmed by the transcription factor Foxp3 on which their lineage stability depends. However, T-regs can lose Foxp3 expression and convert into pro-inflammatory "exT-regs," under inflammatory conditions, produce cytokines such as IFN-γ and IL-17 that exacerbate pathology. Signaling pathways including TGF-β and bone morphogenetic proteins (BMPs) control this phenomenon known as Treg plasticity. Our laboratory has made progress studying BMPR1α which is a type-I BMP receptor that safeguards T-reg stability and restrains Th-17 conversion. In contrast, the role of ALK2 (ACVR1), another BMP type-I receptor with distinct ligand preferences and signaling properties, is yet unventured. As ALK2 is widely expressed in $CD4^+$ T cells, we hypothesize that it serves as a critical regulator of T-reg identity and function. Our objective is to identify the genes and regulatory networks involved in Treg plasticity and stability and define how ALK2 signaling contributes to these processes under homeostatic and inflammatory conditions, and whether its loss promotes conversion into pathogenic exT-regs.

Methods
To investigate ALK2 function in T-regs, we generated conditional knockout mice using ALK2fl/fl alleles with reporters. Genotyping was performed using DNA extracted from toe biopsies, followed by PCR analysis of floxed alleles and reporter constructs. Blood was stained for CD4/CD8, Foxp3-GFP, and Ly5.1/Ly5.2 congenic markers to confirm construct integrity and allow donor/recipient tracking. T-regs were flow-sorted from wild-type or ALK2-deficient mice and transferred into recipients injected with diphtheria toxin (DTR) to model T-reg instability in inflammatory settings. Spleens and lymph nodes were collected for flow cytometry analysis of T-reg frequency, Foxp3 stability, and cytokine expression. Parallel in vitro cultures assessed T-reg proliferation and conversion under activating conditions. RNA was extracted from sorted T-regs for downstream transcriptomic and epigenomic profiling, including single-cell RNA-seq (scRNA-seq) and ATAC-seq.

Results
Preliminary data indicate successful generation of ALK2 conditional knockout lines and reliable gating strategies for T-reg identification. In adoptive transfer experiments, ALK2-deficient T-regs exhibited reduced Foxp3 stability compared to wild-type controls when placed in lymphopenic DTR hosts, with increased proportions of Foxp3^low and cytokine-producing exT-regs. Ongoing RNA-seq and ATAC-seq analyses will define transcriptional modules and chromatin accessibility changes specific to ALK2 deficiency, These experiments will establish whether ALK2 deletion promotes epigenetic remodeling that destabilizes Foxp3 expression and drives T-reg to exT-reg conversion.

Conclusion
Our study investigates the previously unexplored role of ALK2 in T-reg biology. Early results suggest that ALK2 signaling is required for maintaining T-reg stability under inflammatory stress, with its loss leading to Foxp3 downregulation, acquisition of effector functions, and impaired immune homeostasis. By integrating adoptive transfer models with high-resolution transcriptomic and epigenomic profiling, this work will provide mechanistic insight into how ALK2 controls T-reg plasticity. Understanding ALK2-mediated regulation of T-regs may identify new therapeutic targets to modulate immune tolerance in autoimmunity and inflammation.

Abstract Title: Investigating the ovarian alternative splicing landscape during reproductive aging and the impact on ovarian function

Investigator: Adnan Alsamaraee
Mentor: Pavla Brachova, BS PhD
Co-Investigators:
Department: EVMS Physiologic Sciences Research

Abstract

Introduction
Female reproductive aging alters ovarian function, leading to a decline in oocyte quantity and quality. However, the underlying molecular mechanisms driving ovarian decline remain poorly understood. At the cellular level aging is associated with widespread changes, including mitochondrial dysfunction, altered metabolism, increased oxidative stress, and disruptions in post-transcriptional regulatory processes. At the molecular level, emerging evidence indicates that alternative splicing undergoes extensive age-related changes, as reflected by aberrant splicing events and altered expression of splicing factors. Age-associated splicing changes modulate protein diversity, producing isoforms that may impair key pathways of metabolism, steroidogenesis, mitochondrial function, and stress response. However, the role of alternative splicing in reproductive aging, particularly its impact on ovarian function, remains largely unexplored. Our preliminary transcriptomic analyses of reproductively aged mouse ovaries identified an increase in splicing factor expression and distinct splicing patterns, including a significant abundance of unannotated transcript isoforms of genes involved in metabolism and other key cellular functions.

Methods
To build upon these findings, we are employing global spatial transcriptomics coupled with long-read sequencing to determine cell type specific changes in alternative splicing networks. To do this, gonadotropin stimulated and unstimulated ovaries from young (6 weeks) and reproductively aged (14 months) C57BL/6 mice will be sequenced using 10X Genomics Visium HD 3′ technology and long-read cDNA sequencing using Oxford Nanopore Technologies.

Results
Based on our preliminary long-read direct RNA-sequencing data, we expect to identify widespread alternative splicing changes in reproductively aged ovaries. Our spatial transcriptomics approach enables comprehensive mapping of splicing alterations at the single cell level.

Conclusion
Integrating isoform remodeling with spatial context, the spatial map will demonstrate how cell type-specific changes in splicing orchestrate organ-wide alterations in ovarian function across aging. Ultimately, our findings will deepen our understanding of ovarian aging and may reveal new approaches for preserving female reproductive health.

Abstract Title: Investigating the effects of androgen deprivation on the dedifferentiation of prostate cancer cells under hypoxic conditions

Investigator: Arooba Ayaz
Mentor: Harold Riethman, BS PhD
Co-Investigators:
Department: Health Sciences

Abstract

Introduction
Androgen deprivation therapy (ADT) is used to treat prostate cancer (PCa) in patients by decreasing the levels of circulating androgens needed by the cancer cells to grow. At first most patients are responsive to ADT; however long-term treatment is met with resistance & the development of Neuroendocrine (NE) PCa which is a rarer but more aggressive type of PCa. In vitro, PCa cells under long-term androgen deprivation become NE-like and adopt stem-like characteristics. Hypoxic conditions in the PCa microenvironment influence resistance to ADT and play a role in tumor growth and evolution by escalating the aggressiveness of tumor cells. In vivo, PCa tumors often have disorganized microvasculature leading to regions with lower oxygen concentrations within the tumor. Further research is needed to better understand the effects of ADT on PCa under hypoxic conditions.

Methods
Doubling time and morphological changes were assessed in PCa cells cultured under hypoxia and androgen deprivation for 8 weeks. Stage specific genes were chosen based on analysis of patient PCa tumor gene expression data from the PCa atlas. The expression of stage specific genes related to NE and stem-like dedifferentiation were determined using qPCR. CD44 Immunofluorescence was used to measure levels of CD44 expression along the 8 weeks.

Results
CD44 levels in LNCaP cells increased upon 60 days of androgen deprivation under both hypoxic and normoxic conditions but showed a larger increase under hypoxia. Morphological changes and fold change results indicate that hypoxic conditions influence the expression of NE & stem-like markers in PCa cells.

Conclusion
PCa cells cultured under androgen deprivation in normoxic conditions for 8 weeks showed morphological changes and gene expression changes consistent with a NE phenotype, however the pattern in expression of NE and stem-like markers is different under hypoxia. CD44 levels along the 8 weeks increased in response to androgen deprivation as well as hypoxia with the cells cultured under both hypoxia and androgen deprivation showing the largest increase. On going experiments are in progress to further investigate how PCa cells respond to androgen inhibition under normoxic and hypoxic conditions.

Abstract Title: Investigating molecular mechanisms of tumor eradication by targeting a major tumor vulnerability downstream of the EGFR/K-RAS signaling pathway: Seven in Absentia Homolog (SIAH)

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Abstract

Introduction
RAS GTPases represent the second most frequently mutated oncogenic driver in cancer, with more than 3 million new diagnoses per year. Harbored mutation hyperactivate the EGFR/K-RAS pathway subsequently dysregulating downstream signaling networks, driving cellular neoplastic transformation, tumorigenesis, treatment resistance, relapse, and metastatic dissemination, making K-RAS a major therapeutic target in the treatment of the most aggressive human cancers. Despite being studied for over 40 years, even the most recently FDA-approved small molecule inhibitors targeting K-RAS, have failed to reach curative anti-cancer efficacy: leaving oncogenic K-RAS as a largely "undruggable" target and unmet clinical need. Seven in absentia homologues (SIAHs) are RING-domain E3 ubiquitin ligases that function as the most downstream signaling gatekeeper of the EGFR/K-RAS pathway. Our preclinical studies demonstrated that SIAH inhibition led to a tumor eradication phenotype of multiple stage IV human cancer lines in xenograft models. We propose SIAH is a major tumor vulnerability and actionable drug target for inhibiting EGFR/K-RAS pathway activation. In this study, we aim to elucidate the molecular mechanisms underpinning the antitumor efficacy of our potent SIAH inhibitor as a promising new targeted therapy to achieve tumor eradication in vitro and in vivo.

Methods
Reverse phase protein arrays (RPPAs) in conjunction with Principal Component Analysis were used to identify significantly up- or down-regulated fold-changes of 294 signaling proteins/phospho-proteins in response to SIAH inhibition. RPPAs were performed in triplicate on doxycycline (DOX)-inducible MiaPaCa, MDA-MB-231, MDA-MB-468, HeLa, and A459 cell lines in which our SIAH inhibitor, SIAH2PD, expression was induced by a Tet-ON/OFF system. Four experimental conditions were used: Tet-ON control cells with/without DOX induction (group A/group B); Tet-ON-SIAH2PD cancer cells with/without DOX induction (group C-no inhibitor/group D-with inhibitor). The ratios of group were calculated in a pairwise comparison after normalization to GAPDH as an internal control. To validate putative targets of interest, immunoblotting, immunofluorescence, and fluorescence-activated cell sorting (FACS) were performed on cells for group C and D at 3-, 5-, and 7-days post-DOX-induction. Biological triplicate cell lysates were normalized to α-Tubulin, and adherent and single cell suspensions were used respectively for cell-based assays. Target proteins' expression was standardized, quantified, and validated in SIAH-mutant cancer cells. Statistical analyses were performed by paired and unpaired student ANOVA and t-tests using the Prism software.

Results
Following the RPPA analyses in the five human cancer cell lines, we focused on 7 putative target proteins: cleaved PARP, cleaved Caspase-3, cleaved Caspase-7, NFκB, Cofilin, PD-L1, and Collagens. Their altered protein expression was differentially detected in SIAH-proficient and SIAH-deficient cancer cell lines. Immunoblot, immunofluorescence, and FACS assays confirmed RPPA findings that cleaved PARP, cleaved Caspase-3, and cleaved Caspase-7, phospho-NFκB, and phospho-Cofilin are markedly upregulated in SIAH-deficient cancer cells, suggesting a role in cellular stress, DNA damage, and apoptosis pathway activation induced by SIAHloss of function.

Conclusion
The RPPA-based cancer pathway mapping provides invaluable molecular insight into the antitumor efficacy of SIAH, revealing a major tumor vulnerability in human cancer network rewiring mechanisms when SIAH2 is blocked in late-stage, incurable cancer cells. The kinomic data support our innovative strategy to design anti-SIAH-based, anti-EGFR/K-RAS targeted therapies.

Abstract Title: Characterization of CDCP1 Expression and Glycosylation in Triple-Negative Breast Cancer

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Abstract

Introduction
Triple-negative breast cancer (TNBC), accounting for ~15-20% of breast cancers, is a lethal subtype of breast cancer characterized by its aggressive behavior, high rates of metastatic recurrence, and limited treatment options. This disease exhibits considerable biological heterogeneity, comprising at least four recognized transcriptomic subtypes, which poses significant challenges to treating TNBC effectively. CUB-domain-containing protein 1 (CDCP1), a cell-surface type I transmembrane glycoprotein, plays an oncogenic role in many human cancers. Overexpression of CDCP1 has been reported in TNBC and is associated with adverse outcomes. Mechanistically, CDCP1 is a master regulator of tumor invasion and metastasis in TNBC by acting as an oncogenic signaling hub to control multiple intracellular biological processes. It is well known that CDCP1 harbors a larger ectodomain with heavy N-glycosylation modification, suggesting its potential function in intercellular communication. We previously reported dysregulated expression of CDCP1 in prostate cancer, and the extent of sialylation of CDCP1 was correlated with the metastatic potential of prostate cancer cells. However, the structure and role of CDCP1 glycosylation in TNBC remains unexplored. The objective of this study was to characterize CDCP1 expression and sialylation in TNBC and explore the role of CDCP1 sialylation in tumor-immune interactions.

Methods
Six breast cell lines-five TNBC representing basal-like (HCC1143, HCC1937) and mesenchymal-like (MDA-MB-436, MDA-MB-231, and BT549) subtypes, and one benign epithelial mammary cell line (MCF10A)-were cultured under standard conditions. CDCP1 expression at the mRNA and protein levels was assessed by RT-qPCR and Western blot. CDCP1 N-glycosylation and sialylation were examined by two approaches: (1) in vitro enzymatic deglycosylation with PNGase F and α2,3/6/8-neuraminidase A followed by Western blots; (2) affinity pulldown assays with linkage-specific lectins Sambucus nigra agglutinin (SNA) and Maackia amurensis lectin II (MALII), which recognize α2,6-linked and α2,3-linked sialic acids, respectively.

Results
Compared to non-tumorigenic breast MCF10A cells, CDCP1 is overexpressed, both at RNA and protein levels, in TNBC cells, with the most pronounced expression in mesenchymal-like TNBC cells (BT549, MDA-MB-231, and MDA-MB-436). Tumor-associated proteolytic cleavage produced heterogeneous expression of full-length (flCDCP1, ~135-140 kDa) and cleaved (cCDCP1, ~70 kDa) species in TNBC cells. PNGase F treatment yielded clear downward molecular weight shifts of both CDCP1 variants (~40 kDa for flCDCP1, ~15 kDa for cCDCP1) in breast cells, confirming extensive N-glycosylation of CDCP1. Neuraminidase treatment caused an apparent mobility shift of flCDCP1 in all tested cells, indicating substantial terminal sialylation on flCDCP1. SNA pulldown enriched flCDCP1 in MCF10A, BT549 and MDA-MB-436 cells while MALII pulldown enriched flCDCP1 in HCC1937 cells, suggesting various sialoglycan compositions of CDCP1 in breast cells.

Conclusion
Our findings suggest that altered sialylation of CDCP1, along with overexpression, is associated with more aggressive TNBC subtypes. Further validation of CDCP1 sialylation characteristics and functional interrogation of their impact on TNBC progression, specifically in immune escape, is our next step.

Abstract Title: IgA-dependent mechanism of sleep fragmentation accelerated atherosclerosis

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Abstract

Introduction
Atherosclerosis is a disease of large and medium-sized vessels, characterized by dyslipidemia, vascular dysfunction, foam cell formation and chronic inflammation. B cells play a subset-specific role in atherogenesis, with a complex role of immunoglobulins (Ig) where some are protective and others are pathogenic. IgA is the predominant Ig at mucosal sites, defending against pathogens and maintaining mucosal homeostasis. Pathologically, circulating IgA immune complexes can drive inflammation and tissue injury in chronic inflammatory diseases. Sleep fragmentation (SF), a common consequence of contemporary lifestyles, disrupts immune homeostasis, promotes systemic inflammation and accelerates atherosclerosis. To date, the role of IgA in atherogenesis and in SF-accelerated atherosclerosis remains unclear. Here, we investigate how disturbed sleep supports gut-associated inflammation and suppresses IgA production, thereby triggering the release of lipopolysaccharide (LPS) into circulation. Conversely, bone marrow-released IgA activates myeloid cells, which, in turn, play a key role in the formation of accelerated vulnerable plaques.

Methods
12-week-old apolipoprotein E deficient (Apoe-/-) mice were assigned to SF or activity control (AC) groups and fed High-fat diet (HFD). Atherosclerotic lesions in the aorta were measured as percent of total aorta via Oil Red-O staining (ORO). Dihydroethidine staining was used to measure reactive oxygen species (ROS) levels in the small intestines. Immune phenotyping of the aorta and gut was assessed by flow cytometry. IgA deficient low-density lipoprotein-deficient receptor (Iga-/-Ldlr-/-) mice and control Ldlr-/- mice were fed a HFD for 16 weeks to induce hyperlipidemia and atherogenesis. Plaque burden in the aorta and brachiocephalic artery (BCA) was measured by ORO staining and BCA grading. Oxidized-LDL (oxLDL) was pre-incubated with mouse IgA or human IgA and treated with mouse peritoneal macrophages (MFs) and human IgA and oxLDL was pre-incubated and treated with human monocytic THP-1 cells, to measure oxLDL uptake by MFs and MF activation.

Results
SF promoted atherosclerosis with accelerated lesion development in the BCA of HFD-fed, Apoe-/- mice. SF increased ROS production and interferon gamma (IFNg) expression but reduced IgA+ B cell frequency and tight junction protein 1 (Tjp1) expression in the small intestines of HFD-fed Apoe-/- mice. Furthermore, SF and HFD-feeding increased circulating LPS and ROS levels in Apoe-/- mice. IgA deficiency (Iga-/-Ldlr-/-) attenuated plaque burden in the aorta and BCA with reduced aortic leukocyte content of HFD-fed mice compared to controls (Ldlr-/-). Mouse or human IgA pre-incubated with oxLDL diminished oxLDL uptake while enhancing the activation of mouse MFs, reflected by MHCII and CD63 upregulation. Similarly, human IgA attenuated oxLDL uptake and elevated mitochondrial superoxide (mitoSOX) levels in THP-1 cells.

Conclusion
SF exacerbates systemic inflammation and atherosclerotic plaque burden, potentially through dysregulated gut immunity and integrity as evidenced by increased intestinal ROS production and reduced Tjp1 expression and IgA+ B cell presence with concurrent elevated circulating LPS and ROS levels. IgA can bind to oxLDL and prevents its uptake by MFs and supports MF activation. Unexpectedly, IgA deficiency reduces atherosclerotic plaque burden. Taken together this data shows that IgA may play a complex role in SF accelerated atherosclerosis by supporting gut health and modulating myeloid cell activation.

Abstract Title: Sleep Fragmentation Induces Urinary Dysfunction in Mice

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Abstract

Introduction
Benign prostatic hyperplasia (BPH) is the benign growth of the prostate gland due to the proliferation of epithelial and stromal cells in the transition zone. This enlargement can lead to urinary dysfunction, causing lower urinary tract symptoms (LUTS). The most bothersome symptom is nocturia, or getting up at night to urinate, which results in sleep fragmentation (SF). SF has been found to worsen inflammation after stroke and in cardiovascular disease, leading us to speculate that SF may also contribute to inflammation and subsequent urinary dysfunction in BPH. This project utilized a mouse model of sleep fragmentation to test this hypothesis.

Methods
C57BL/6J mice were housed in a SF chamber for twelve weeks. During their sleep period, from 6am-6pm, an automated bar moved across the bottom of the chamber to interrupt their sleep. Activity control mice had the bar moving from 6pm-6am whereas another group of control mice were kept in normal cages. Every second week, the mice underwent a void spot assay (VSA), where they were individually housed for 4 hours in a cage fitted with filter paper. Filter papers were imaged with a ChemiDoc station and analyzed with Void Whizzard to observe changes in urination. After the 12-week experiment, the mice were euthanized, and the bladder and prostate lobes were weighed, fixed, and embedded in FFPE. Inflammation was determined with CD45 immunohistochemistry, and images were analyzed by counting CD45+ cells normalized to tissue area. Groups were compared using one-way ANOVA or the nonparametric equivalent.

Results
After 12-weeks, bladder weights were significantly increased in the SF group (15% increase, $p=0.012$) compared with controls. VSA showed that, at week 12, there was a significant decrease in both voiding volume (1.8-fold decrease, $p=0.0328$) and void count (2-fold decrease, $p=0.0498$) in the SF group compared with controls. CD45+ cell count was not significantly changed in the SF group compared with controls.

Discussion
The increase in bladder weights with the decrease in voiding volume and count points towards hypertrophy of the bladder caused by bladder outlet obstruction. These results suggest that SF may exacerbate LUTS. Though CD45 count was not significantly changed in the prostate lobes, further work will include determining immune cell types and fibrosis. Understanding this relationship could reveal a new driver causing or worsening BPH/LUTS.

Abstract Title: 3D Bioprinting as a Novel Approach to Explore the Stem Cell Niche at the Single-Cell Level

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Abstract

Introduction
The stem cell niche is the microenvironment where stem cells reside and receive specific cues. These cues can be cell to cell or cell to extracellular matrix (ECM) interactions and signals in which they influence the stem cell behavior, determine its fate, and facilitate asymmetric divisions [1]. This process remains poorly understood, highlighting the need for improved model systems.

Methods
To address this, we present a novel 3D bioprinting system that enables the study of this niche at a single-cell level [2]. We assessed whether the system could be employed to unravel differential signaling between stem cells and various ECMs. Single mouse embryonic stem cells (mESCs) were printed in different ECMs to uncover the influence of different matrices on the redirection of the stem cell fate. We then evaluated if our system could be used to generate artificial niches using immobilized growth factors to drive asymmetric divisions. To achieve this, we conjugated Epidermal growth factor (EGF) and Fibroblast growth factor 2 (FGF-2), growth factors required for the self-renewal of neural stem cells (NSCs), to fluorescent FluoSpheres™. The EGF/FGF tagged FluoSpheres were incubated with NSCs and either cultured or bioprinted into arrays under differentiation conditions.

Results
Our results demonstrate that the system allows for the printing of single cells in grids and large arrays in both 3D and 2D by injecting into hydrogels or directly onto glass slides using nanoliter droplets. Moreover, Different ECMs influence the proliferation, fate, and stemness of embryonic stem cells (ESCs) differently as they have their distinct cues that impact the stem cell microenvironment diversely. We also show that the interaction with the EGF/FGF beads protects NSCs from differentiating using the NSC marker Nestin. Our results therefore demonstrate that the FGF/EGF beads could serve as an artificial niche to protect NSCs from differentiation and drive asymmetric divisions.

Conclusion
Collectively, our results demonstrate that our bioprinting system is a unique and robust tool that aids in mimicking the microenvironment where stem cells thrive, while also enabling the study of stem cell-niche interactions at a single-cell level. Our results showed that the ESCs fate and proliferation were different when different ECMs were used.

Abstract Title: Sex Differences in Stress Responses and Stress Related Learning in Wistar Rats exposed to Social Isolation and Space Radiation

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Abstract

Introduction
With the planned Mars missions, male and female astronauts will be traveling deeper into space for longer durations of time than ever before and will be exposed to spaceflight stressors including Social Isolation (SI) and Space Radiation (SR). Additionally, astronauts may encounter stressful situations they have never experienced before with potential sex differences in their ability to cope. In rodents, freezing behavior and stress-induced hyperthermia (SIH) are indexes of the stress response that can also be used to assess stress-related learning. Previous research in our lab has shown that male rats exhibit altered conditioned freezing and SIH when exposed to SI and SR. However, it is unknown whether the effects of SI and SR on stress responses and stress related learning differs in females. This project utilized a conditioned fear (CF) paradigm and wireless telemetry to investigate the effects of SI and SR using freezing and whole-body temperature as indices.

Methods
Male and female outbred, Wistar rats (8-9 months upon arrival) served as subjects. Animals were either individually housed (IH) as a control group (SHAM) or exposed to ground-based analogs of SI (IH with opaque barriers) or SR (15cGy GCRsim) independently or in combination (dual flight stressors, DFS). Five weeks prior to behavioral testing, animals were intraperitoneally implanted with wireless telemetry transmitters to record whole-body temperature. The CF paradigm consisted of Shock Training (ST, Day 0), Context (CTX, Day 7), and Extinction (EXT, Day 21) to assess fear responses, fear memory consolidation, and extinction learning, respectively. Temperature recordings were conducted prior to CF (baseline) as well as after ST, CTX, and EXT.

Results
All female treatment groups showed differences in freezing between ST and CTX or EXT. Additionally, female SR froze significantly less during EXT compared to CTX. Between sexes, female SHAM and SI rats froze significantly more than their male counterparts during ST, CTX and EXT. However, DFS females froze significantly less than their male counterparts during ST. Females in all treatment groups had significantly higher body temperature for the first 90 minutes post-ST, -CTX and -EXT compared to baseline (with post-CTX and -EXT being significantly lower than post-ST). Between sexes, female SI body temperature was significantly lower during baseline compared to male SI. All female treatment groups had significantly lower whole-body temperatures compared to their male counterparts post-ST, -CTX and -EXT.

Discussion
This project demonstrates that spaceflight stressors (SI and SR) can alter freezing behavior and whole-body temperature in female rats when exposed to footshock. Analyses of males and females revealed that SI and SR differentially influence freezing and whole-body temperature between sexes. Additionally, SI and SR may produce synergistic effects in one sex that is not seen in the other. Taken together, these results suggest that spaceflight stressors differentially impact the stress response and stress related learning in males and females in ways that may need to be considered when planning deep space missions.

Abstract Title: Epithelial Cxcl17 Does Not Affect Prostatic Foam Cell Inflammation but Promotes Immune Infiltration and May Suppress Basal Cell Proliferation

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Abstract

Background
Benign Prostatic Hyperplasia (BPH) is an age-related disease characterized by non-malignant prostate enlargement, leading to urethral constriction and lower urinary tract symptoms (LUTS). Prior work from our lab using a steroid hormone-induced mouse BPH model revealed macrophage infiltration into the prostatic lumen and foam cell formation. We identified the chemoattractant Cxcl17 as a potential mediator of macrophage migration. This study tested whether epithelial-derived Cxcl17 promotes macrophage recruitment and foam cell formation in a steroid hormone-induced mouse BPH model.

Methods
Cxcl17-knockout (KO) mice and wild-type (WT) littermates received subcutaneous testosterone and estradiol implants for 2, 6, or 12 weeks or underwent sham surgery. Urinary function was assessed via the Mouse Urovoid system. Prostates and the bladder were harvested and weighed. Immunohistochemistry assessed CD45 (immune cells), CD68 (macrophages), and Ki67 (proliferation) positivity; collagen and foam cells were visualized via picrosirius red and Oil Red O staining, respectively. Bulk RNA sequencing was performed on 2-week ventral prostates (VP).

Results
Cxcl17-KO T+E2 mice showed increased voiding frequency, while WT T+E2 mice had greater average void mass at week 4; other timepoints showed no significant differences. Cxcl17-loss did not affect prostate or bladder weight, nor bladder volume. Foam cell formation in the VP showed no genotype-specific changes. However, CD45/CD68+ immune cell infiltration was nearly abolished in Cxcl17-KO mice at 6 and 12 weeks. Collagen content and Ki67 expression were largely unchanged. RNA-seq revealed significant upregulation of basal cell markers (Krt5, Krt14, Trp63, Col4a2) in Cxcl17-KO T+E2 prostates.

Conclusion
Our results demonstrate that Cxcl17 is dispensable for foam cell differentiation in the prostate, despite our initial hypothesis. In contrast, Cxcl17-loss abolished tissue macrophage numbers at the chronic stages of our model. Future studies will test whether Cxcl17 regulates basal cell proliferation or survival. Additionally, we are using laser capture microdissection to identify other epithelial cytokines that may drive foam cell formation in the prostate.

Abstract Title: Methods of Induction of Cellular Senescence

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Mentor: Yan Y Sanders, MD
Co-Investigators:

Department: Biomedical and Translational Sciences

Abstract

Introduction
Idiopathic Pulmonary Fibrosis (IPF) is a fatal, age-related interstitial lung disease with no curative treatment. IPF arises from aberrant wound healing that leads to excessive extracellular matrix deposition, which makes breathing increasingly difficult as the disease progresses. The accumulation of senescent cells with abnormal secretory phenotypes exacerbates inflammation and impairs tissue repair. This altered state, known as the senescence-associated secretory phenotype (SASP), drives fibrosis by promoting epithelial dysfunction, fibroblast activation, and pathological ECM remodeling. Therefore, eliminating senescent cells has emerged as a potential therapeutic option. However, cellular senescence caused by various stimuli exhibit different secretory phenotypes; this heterogeneity makes it challenging to study lung fibrosis, as it is not clear whether cells would present the same mechanisms under senescence induced by different stimuli. In this project, we used various methods to induce senescence in IMR90 human lung fibroblast cells, including replicative, genotoxic stress, such as X-ray and UV radiation. The senescent markers of p16 and p21, as well as SASP related chronic inflammatory markers such as IL-1β, IL-6, and IL-8, will be evaluated at RNA and protein levels of expression. Additionally, after establishing the senescent models, senolytics will be tested for their ability to clear senescent fibroblast cells.

Methods
Methods of inducing cellular senescence were tested by exposing the human lung IMR90 cell line to acute X-ray radiation once at 2Gy or 8Gy, repeated at 1Gy every 2-3 days for a total of 10 days, or subjecting to UV treatment once at 10mJ/cm^2 or 15mJ/cm^2. The cells were collected after 15 days of final treatment for RNA and protein extractions, as well as senescence-associated β-gal staining to examine cell phenotype. Quantitative real-time PCR (qPCR) was used to evaluate the expression of the senescent and SASP markers including p21, p16, IL-1β, IL-6, and IL-8; the protein levels expression was assessed with western blots or ELISA assays.

Results
Acute and repeated low dose X-ray radiation showed increased β-gal stain, and increase the expression of senescence and SASP markers, like p16, p21, IL-1β, IL-6, and IL-8 in IMR90 human lung fibroblasts. UV treated cells showed increased p21. This project is ongoing, and we are not sure if all, or only some markers, will be altered. It is expected that these effects will be lessened by treatment with senolytics, which eliminate senescent cells.

Conclusion
The various methods to induce senescence in IMR90 cells were evaluated by senescence-associated β-gal staining, as well as well-established senescent markers p21, p16, and SASP-related genes IL-1β, IL6 and IL8. After establishing these models, the mechanisms of induced senescence will be explored, and the effectiveness of senolytics will be assessed. Overall, this project will lead to a better understanding of how environmental stress leads to cellular senescence, provide better in vitro aging lung injury repair models that could lead to stronger medical interventions for patients with IPF.

Abstract Title: Induced Pluripotent Stem Cells Suppress Cancer Proliferation through Mitochondrial Transfer in a 3D Bioprinting Model

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Abstract

Introduction
The regenerating mammary microenvironment has the unique ability to redirect non-mammary and cancer cells to a normal cell fate (1, 2). Our group has shown mitochondrial transfer from mammary epithelial cells to cancer cells contributes to this cancer fate redirection (3). We studied if mitochondrial transfer from induced pluripotent stem cell (iPSC)-derived mesenchymal stem cells (iMSC) could redirect cancer cells without the mammary microenvironment, as studies have shown that embryonic stem cells (ESCs) have the extraordinary ability to redirect cancer cells without the mammary niche. The iMSCs transferred their mitochondria, however, it caused increased glycolysis in the cancer cells. This transfer did not suppress tumorigenicity in 3D tumoroid models, contrary to the findings seen with normal mammary epithelial cells (3). Our aim is to investigate if mitochondrial transfer from iPSCs could redirect cancer cells in the absence of the mammary niche.

Methods
To visualize mitochondrial transfer, we labeled active mitochondria in iPSCs with MitoTracker live cell stain. We investigated mitochondrial transfer in 2D and 3D cocultures using our novel 3D bioprinting system to print 3D chimeric tumoroid models of mammary cancer cells and iPSCs in collagen hydrogels.

Results
It was found that iPSCs transferred their mitochondria to mammary cancer cells in 2D and 3D, resulting in decreased growth rates in the cancer cells. The iPSCs did not induce apoptosis or alter the metabolic profile of the cancer cells. Finally, iPSC-derived extracellular vesicles (EVs) were found to transfer mitochondria and similarly decrease cancer growth in 2D and 3D.

Conclusion
Overall, iPSCs have the capability to suppress tumorigenicity in mammary cancer cells through mitochondrial transfer, with a possibility of cancer redirection. Highly concentrated iPSC-derived EV transfer can mimic the anti-proliferative effects of the parent cells in 3D in vitro models, broadening the potential for cell-free approaches in cancer research.

Abstract Title: Preliminary Characterization of Molecular Changes in iPSC-based Huntington's Disease Models Following psPEF Exposure

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Abstract

Introduction
Huntington's Disease (HD) is an autosomal dominant neurodegenerative disorder characterized by progressive motor and cognitive impairments. It is caused by an unstable expansion of cytosine-adenine-guanine (CAG) trinucleotide repeats in the huntingtin gene, often exceeding 35-40 repeats. The resultant extended polyglutamine tract in mutant huntingtin (mHTT) disrupts normal protein folding and leads to pathogenic intracellular protein aggregates. In our previous work, we proposed picosecond pulsed electric fields (psPEF) as a means to dissolve mHTT aggregates and demonstrated proof of concept in human neuronal stem cells (NSCs) derived from HD patients via induced pluripotency. Here, we examine the downstream effects of psPEF following aggregate disruption.

Methods
HD-NSCs were exposed to psPEF at 20 kV/cm or 40 kV/cm stimuli using a modified 3D bioprinter. Expression of neural gene was determined by qPCR. Mitochondrial membrane potential (DYm) was measured by tetramethylrhodamine ethyl ester (TMRE) staining.

Results
Although a single exposure did not produce significant changes, preliminary data revealed dose-dependent increases in the expression of several neural genes often suppressed in HD, including BDNF, DRD2, mGluR1, GABARAP, SYN1, and DCX. Additionally, mitochondrial membrane potential-known to be compromised in HD-was restored in a dose-dependent manner.

Conclusion
While these findings are based on in vitro data, they highlight the potential of psPEF to modulate mHTT pathology and warrant further investigation, including in vivo validation, as current HD treatments are primarily limited to symptom management.

Abstract Title: Structured Bilayer Biomimetic Organoids: A Platform to Study Hormonal and Tumorigenic Events in the Mammary Gland

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Abstract

Introduction
The microenvironment of the mammary gland is dynamic in its ability to change over the lifetime of an organism. This includes ductal luminal epithelial and myoepithelial cellular fate and physiological structure necessary for the development of healthy tissues (Inman et al., 2015). Recent advances have shown the effects of the microenvironment on cell fate include differentiation of cell types (Bruno et al., 2017). Current models have yet to produce a structurally accurate and biochemically representative model that can simulate mammary function of the body in vivo. Therefore, we purpose a biomimetic mammary gland model that mimics this niche environment in structure and function.

Methods
To achieve this here we test the combined use of mammary derived ECM with 3D resin printing assisted production of a structural platform to provide consistent growth of mammary ductal organoids. We hypothesize the system will influence primary cell fate through biochemical factors and structural components to a mammary gland bilayer state encompassing myoepithelial and epithelial tissues and increase precision of cell placement and greater control of growth when incorporated into our 3D bioprinting system. These in vitro glands will better replicate a mammary gland and provide a superior platform for the study of mammary gland dynamics and tumorigenesis.

Results
Primary cells have been successfully reprogrammed and influenced to a mammary stem cell linage. Preliminary results in have shown successful structure orientation and compatibility of mammary type stem cells in alginate stabilized collagen.

Abstract Title: The Impact of Exercise Intensity on Glycemic Control Following Removal of Exercise

Investigator: Taskina Akhter
Mentor: Leryn J. Reynolds, PhD
Co-Investigators:
1. Joel E. Harden, University of Tennessee at Chattanooga
2. Phillip Ball, Wake Forest University Baptist Medical Center
3. Eric Gyuricsko, Eastern Virginia Medical School, Macon and Joan Brock Virginia Health Sciences at Old Dominion University.
4. Monica L. Kearney, Southeast Missouri State University
Department: Exercise Science

Abstract

Introduction
The detrimental effects of exercise cessation on free-living glycemic control (GC) in habitually active individuals are well established. However, the role of exercise intensity to mitigate GC impairment after exercise cessation is not well understood. PURPOSE. To examine if exercise intensity differentially influences the negative impact of exercise cessation on GC.

Methods
This randomized, cross over study design recruited nine healthy, recreationally active participants (Age: 26±2 years, BMI: 25.2±1.1 kg/m2, VO2Peak: 39.8±2.0 ml/kg/min) to complete two isocaloric (300 kcals/session) bouts of exercise at moderate (Mod EX: 55-60 %HRR) or vigorous (High EX: 75-80 %HRR) intensity followed by 3 days of exercise removal (No EX). GC was measured via a continuous glucose monitoring system throughout both phases. Other than a standardized breakfast, participants were not provided food. Participants were instructed to consume the same type and volume of food each day across and between phases. Results

Physical activity was lower during the No EX phases compared to the exercise phases (Mod EX: 10,714±962 steps/day, 65±7 moderate physical activity (MPA) minutes, 11±4 vigorous physical activity (VPA) minutes; Mod No EX: 5480±817 steps/day, 29±5 MPA minutes, 4±4 VPA minutes), (High EX: 10,246±1021 steps/day, 54±6 MPA minutes, 15±4 VPA minutes, High No EX: 5867±973 steps/day, 34±7 MPA minutes, 4±4 VPA minutes), $p<0.05$. 24-hour average blood glucose (Mod EX: 90±4, Mod No EX: 94±3, High EX: 87±4, High No EX: 98±3; mg/dL) and average peak post prandial blood glucose (Mod EX: 131±12, Mod No EX: 134±7, High EX: 127±10, High No EX: 141±7; mg/dL) demonstrated no significant main effect of exercise intensity ($p>0.05$), but did demonstrate a significant main effect of phase ($p<0.05$).

Conclusion
Removal of exercise for 3 days impairs free-living glycemic control, and exercise intensity does not appear to differentially modulate this response.

Abstract Title: Effects of Therapeutic Interventions on Neural Excitability in Individuals with CAI: A Systematic Review

Investigator: Saeed Eshghi Sr
Mentor: Ryan S McCann Sr, PhD ATC
Co-Investigators:
Amin Mohammadi, School of Rehabilitation Sciences, kinesiology and Rehabilitation program
Department: School of Rehabilitation Sciences

Abstract

Introduction
Chronic ankle instability (CAI) is a frequent consequence of ankle sprains and is linked to sensorimotor deficits. Alterations in spinal and corticospinal excitability may impair motor control, contribute to instability, and increase the risk of re-injury. Understanding whether therapeutic interventions can modulate neural excitability is essential for improving rehabilitation outcomes in this population.

Main Body
A systematic search of PubMed, CINAHL, and SPORTDiscus through March 2025 identified studies examining therapeutic interventions targeting neural excitability in individuals with CAI. Eligible studies assessed changes in spinal reflex activity via the Hoffmann reflex (H-reflex) or corticospinal excitability via transcranial magnetic stimulation (TMS). Fourteen studies (12 randomized controlled trials, 2 quasi-experimental) met the inclusion criteria. Interventions included balance training, joint mobilization, sensory-level stimulation (e.g., TENS), cryotherapy, taping, neuromuscular electrical stimulation, and neuromodulatory approaches such as anodal transcranial direct current stimulation. Moderate-quality evidence supports balance training, joint mobilization, and sensory stimulation in enhancing spinal excitability. Limited but promising evidence suggests that neuromodulatory and movement-based interventions can improve corticospinal excitability, although findings varied across studies depending on posture, dosage, and task engagement.

Conclusion
Therapeutic interventions can positively influence neural excitability in individuals with CAI, particularly when they emphasize active, proprioceptive, and task-specific engagement. Spinal adaptations were more consistent than corticospinal changes. While these findings highlight promising rehabilitation strategies, further high-quality and standardized studies are required to establish the long-term clinical effectiveness of neuromodulatory approaches in CAI management.

Abstract Title: Assessing neuromotor and postural control after repetitive subconcussive soccer headers: A narrative review

Investigator: Joshua Tye Lawton
Mentor: Christopher Rhea, PhD MS
Co-Investigators:
Dr. Eric Schussler, Physical Therapy/KRS
Dr. Christopher Rhea, Associate Dean of Research/KRS
Department: Associate Dean of Research

Abstract
Head impacts in sports have received considerable attention in the research and clinical communities over the past two decades due to the known short- and long-term effects on brain and behavioral health. However, most of this research has focused on concussive head impacts despite the observation that nearly all head impacts in sports are subconcussive in nature. To address the latter in a controlled laboratory setting, a soccer heading task has been used to induce subconcussive head impacts and their potential connection to short-term changes in neuromotor and postural control. Despite the increased research in this area, the magnitude and number of headers that are substantial enough to effect neuromotor or postural control in a consistent/reliable manner is unknown. A reason as to why it hasn't been determined is due to the lack of standardized heading protocols and assessments. The purpose of this narrative review was to examine past studies which have tested the neuromotor and/or postural control effects of soccer heading. Three online databases were searched: Google Scholar, PubMed, CINAHL Complete, using the key words "soccer heading", "neuromotor control", and "postural control". Fifteen studies assessed neuromotor and/or postural control before and after a bout of soccer heading. Four of these studies used King-Devick tests to assess neuromotor control while four separate studies used the BESS test to assess postural control. Eleven of the studies reported a decline in neuromotor and/or postural control following repeated soccer headers. One study compared collegiate soccer and non-soccer athletes, showing soccer athletes had less postural control decline following the impacts, while another study evaluated the effectiveness of a soccer heading intervention, which did not show a significant difference. A limitation in this research is the inconsistency of magnitude and number of headers, with some heading bouts not being ideal for assessing neuromotor or postural control changes. In addition, inconsistent results may be explained by the vast difference in the number of impacts, velocity of the ball, and type of assessment. A universal neuromotor and postural control assessment and protocol are needed to further our understanding of subconcussive head impacts.

Abstract Title: Chronic Ankle Instability Impairs Cartilage Health and Balance in Middle-Aged Adults

Investigator: Amin Mohammadi
Mentor: Ryan McCann, MS PhD
Co-Investigators:
1.Saeed Eshghi, School of Rehabilitation/ Kinesiology and Rehabilitation Program
2. Eric Schussler, School of Rehabilitation / Doctorate in Physical Therapy Program
Department: School of Rehabilitation

Abstract

Introduction
Chronic ankle instability (CAI) is associated with impaired function and the development of post-traumatic osteoarthritis. While CAI has been studied extensively in younger adults, its long-term impact on talar cartilage health, balance, and sensorimotor function in middle-aged adults remains underexplored. This study evaluated differences in talar cartilage structure, postural control, ankle-specific function, and injury-related fear between middle-aged adults with and without CAI.

Methods
Talar cartilage characteristics, including medial and lateral cross-sectional area (CSA), echointensity (EI), and echogenicity (EG) were assessed using diagnostic ultrasound. Postural control was assessed using the Clinical Test of Sensory Interaction and Balance (CTSIB) under six sensory conditions (firm and foam surfaces with eyes open, closed, and sway-referenced vision). Center of pressure (COP) data were collected and analyzed to derive medial-lateral (ML) sway, anterior-posterior (AP) sway, and total sway path length. Patient-reported outcomes assessed included the Foot and Ankle Disability Index (FADI), Fear Avoidance Beliefs Questionnaire (FABQ), and Tampa Scale of Kinesiophobia-11 (TSK-11). Independent t-tests ($P < 0.05$) and Cohen's d effect sizes with 95% confidence intervals were used to compare outcomes between groups.

ResultsTwenty middle-aged adults (40-59 years) participated (CAI: n=10 [age: 51.5±6.2]; Control: n=10 [age: 48.9±6.6]). CAI was defined using the International Ankle Consortium guidelines. The CAI group demonstrated significantly greater medial CSA (P=0.001, d=1.76[0.69, 2.78]) and lateral CSA (P=0.025, d=1.09[0.13, 2.02]) than controls. They also showed greater ML sway in the eyes-open condition (P=0.030, d=1.05[0.1, 1.98]) and increased path length in the eyes-closed condition (P=0.035, d=1.02[0.07, 1.94]). CAI participants had lower FADI-ADL scores (P=0.034, d=-1.03[-1.95, -0.08]) and higher FABQ scores (P=0.006, d=1.41[0.40, 2.38]), indicating reduced function and elevated fear. No other differences were significant.

Conclusion
Middle-aged adults with CAI exhibit structural alterations in talar cartilage, characterized by increased CSA, which may reflect early-stage cartilage swelling and maladaptive remodeling in response to abnormal joint loading. These changes, alongside balance deficits, reduced ankle function, and elevated fear-avoidance beliefs, may contribute to long-term functional decline and heightened risk for joint degeneration.

Abstract Title: Cognitive Function and Reaction Time in Collegiate Athletes with Concussion Histories

Investigator: Amin Mohammadi
Mentor: Tom Campbell, MS PhD
Co-Investigators:
Reza Pousti, School of Rehabilitation Sciences/ Kinesiology and Rehabilitation Program
Eric Schussler, School of Rehabilitation Sciences/ Doctorate in Physical Therapy Program
Department: Ellmer College of Health Sciences

Abstract

Introduction
Concussions are a prevalent concern in athletics, particularly among collegiate athletes, due to their potential for long-term cognitive impairments. Sport-related concussions can lead to deficits in executive function, psychomotor speed, memory, and reaction time, which may persist beyond the acute recovery phase. While many athletes return to play after symptom resolution, research suggests neurocognitive deficits may linger, affecting overall cognitive performance. Reaction time is particularly relevant in assessing post-concussion recovery, as slowed reaction times have been associated with altered brain function and prolonged cognitive dysfunction. Additionally, impairments in executive function and psychomotor speed are known to impact decision-making and motor coordination, both critical components of athletic performance. Despite the widespread implementation of neurocognitive testing in concussion management, there is a need for further research on how these deficits manifest in collegiate athletes with a history of concussion. This study aims to examine the relationships between reaction time, executive function, psychomotor speed, and memory in NCAA Division I athletes with a history of concussion. Understanding these associations may help refine post-concussion assessments and inform return-to-play decisions.

Methods
112 college-aged athletes (M: F = 72:40) from a NCAA Division I institution with a self-reported history of concussion were included in this cross-sectional study. Reaction Time Composite (RT-Comp), executive function, and psychomotor speed were assessed using Concussion Vital Signs (CNS Vital Signs LLC), a computerized neurocognitive assessment. Immediate memory and delayed recall were evaluated as part of the Sport Concussion Office Assessment Tool - 6th edition (SCOAT-6). Correlations were analyzed using Pearson's correlation to assess the strength of associations. A priori p-value was set at $p < .05$.

Results
RT-Comp demonstrated significant negative correlations with executive function ($r = -0.430$, CI [-0.572, -0.265], $p < 0.001$), indicating that slower reaction times were associated with reduced cognitive flexibility and decision-making abilities. A similar negative correlation was observed with psychomotor speed ($r = -0.355$, CI [-0.508, -0.184], $p < 0.001$), suggesting impairments in motor response efficiency. Additionally, slower RT was associated with lower scores in immediate memory ($r = -0.307$, CI [-0.469, -0.127], $p = 0.001$) and delayed recall ($r = -0.233$, CI [-0.403, -0.043], $p = 0.013$), highlighting potential long-term cognitive consequences of concussion.

Conclusion
Slower reaction times in collegiate athletes with concussion history predict lasting deficits in executive function, psychomotor speed, and memory, underscoring the need for ongoing cognitive monitoring before return to play.

Abstract Title: Bertolotti's Syndrome: Understanding the Functional Limitations of a Lumbosacral Transitional Vertebrae (LSTV)

Investigator: Andrea Muffly Oliver
Mentor: Patricia Laverdue, OTD
Co-Investigators:
Julie Cavallario, Athletic Training
Department: Occupational Therapy

Abstract

Introduction
Bertolotti's Syndrome (BSy) occurs in 4-8% of the general population, however many specialists believe that this condition is vastly underdiagnosed (Miller & Zhang, 2023). Bertolotti's Syndrome (BSy) is a congenital disorder which leads to back pain caused by the presence of a lumbosacral vertebrae (LSTV) (Miller & Zhang, 2023).

Methods
A concurrent multi-method survey was completed using Qualtrics software, 113 individuals with BSy completed the survey.
Data analysis performed using SPSS and Excel for quantitative data. Qualitative analysis followed Consensual Qualitative Research (CQR) using multi-phased thematic analysis and deductive coding, consensus coding to finalize the thematic framework, and an external reviewer to confirm final findings.

Results
Individuals with BSy reported disruption in ADLs, IADLs, due to symptoms. Symptoms of pain, fatigue, mobility constraints, and decreased endurance were reported fluctuate throughout the day but at no point be zero, suggesting significant disruption of participation in meaningful occupations.

Conclusion
Patients with BSy present with pain, fatigue, decreased endurance, and limited mobility that impact function and participation. Increased education, advocacy and research for this condition is needed. When patients described their experience(s) with healthcare providers 86% of participants surveyed reported interacting with non-knowledgeable providers.

Abstract Title: Facilitating Independence through Radial Deviation Gains in Congenital Titinopathy: A Case Report

Investigator: Katherine Elisabeth Peterson
Mentor: Abigail Lemmon, BS OTD
Co-Investigators:
1. Co-A-1: Sara Higgins, Doctor of Occupational Therapy Program
Department: Occupational Therapy

Abstract

Congenital titinopathy is a rare autosomal recessive genetic disorder caused by mutations in the titin gene. As the largest protein in the human body, titin plays an essential role in muscle contraction, sarcomere integrity, and passive force generation. When mutations occur, individuals may present with a wide range of symptoms, from severe lethality to mild adult-onset muscle weakness. In pediatric cases, congenital titinopathy frequently manifests as hypotonia, joint contractures, and overall impaired muscle performance, which directly impacts participation in daily activities and play.

Children with congenital titinopathy often experience limitations in gross motor and fine motor skills, endurance, and mobility, leading to reduced independence in activities of daily living (ADLs). Occupational therapy has the potential to make a meaningful difference by addressing strength, endurance, range of motion, and functional performance. In particular, child-centered and play-based approaches can increase engagement, repetition, and neuroplasticity. This case report explores non-traditional occupational therapy interventions and assessments designed to promote independence in a young child with congenital titinopathy.

The client is a 3.5-year-old female diagnosed with congenital titinopathy at birth. Early complications included fractures of the right femur and left humerus. Clinical presentation includes global hypotonia, mild scoliosis, and wrists resting in ulnar deviation. She currently wears a thoracolumbar sacral orthosis (TLSO) to support spinal alignment during activity and bilateral ankle-foot orthoses (AFOs) to promote stability in functional mobility.

The client participates in occupational therapy twice weekly, focusing on building strength, encouraging radial wrist positioning, and enhancing independence in play and self-care. She lives with her parents in a two-story home and has access to multiple pieces of adaptive equipment including an indoor/outdoor power wheelchair, stander, activity chair, Kaye benches, and a Rifton bath chair. Her mother is the primary caregiver, attends every therapy session, and actively implements therapy strategies at home.

To capture baseline performance and motivation, a non-traditional assessment was created using a toy hammer and golf tees inserted into a cardboard box. This tool measured time, number of hits, and change in tee depth per hit, while also functioning as a motivating, play-based task. Baseline results showed the left hand completed the activity faster with more hits, while the right hand achieved greater depth per strike. These findings provided a foundation for targeted interventions.

Intervention goals were developed to increase wrist radial deviation strength and activity tolerance, thereby supporting participation in play and ADLs. Specific targets included improving average tee depth per hit with the right upper extremity and increasing independence in dressing tasks.

Play-based interventions were designed around the client's preferences, including fishing games, hammering activities such as "Don't Break the Ice," and marble pouring tasks. Strategies emphasized isolated wrist movement while reducing compensatory use of the elbow and shoulder. Supportive methods included forearm stabilization on a Kaye bench, hand-over-hand facilitation, and temporary use of elbow immobilizers. Motivation was sustained through the use of preferred toys, child-friendly terminology, and caregiver encouragement. Reassessment demonstrated significant improvements in the right (dominant) hand, with faster performance, increased accuracy, and greater depth per hit.

Abstract Title: Balance but not Core Endurance is Related to Single-Leg Hops in Female Collegiate Dancers.

Investigator: Prachi Pisay
Mentor: Jatin P Ambegaonkar, MS PhD
Co-Investigators:
Co-A-1: Jatin P. Ambegaonkar, Department of Kinesiology
Co-A-2: Oladipo O Eddo, Department of Kinesiology
Co-A-3: Kelley R. Wiese, Department of Kinesiology
Department: Kinesiology

Abstract

Introduction
Dancing requires technical skills to execute explosive movements while maintaining balance. SLH is common in dance and requires stability and strength. Dancers need core endurance and dynamic balance for precision and control of complex movements. While these factors may affect SLH performance independently, their combined impact on SLH performance remains unclear.
Purpose: To investigate relationships among core endurance, dynamic balance and single-leg hops (SLH), and determine whether core endurance and dynamic balance predict SLH performance in female collegiate dancers.

Methods
With IRB approval, 17 female collegiate dancers (18.1±0.3years,163.6±6.7cm, and 61.9±6.6kg) participated. Core endurance was assessed using composite scores from right and left side planks, prone plank, and the Biering-Sorensen test(extensor plank) in seconds. Dynamic balance was assessed using the Y Balance test-YBT (composite score of anterior, posteromedial, and posterolateral reach scores, normalized to % leg length:LL). SLH (normalized to % Body Height:BH) performance was assessed using published methods. Pearson's correlations examined relationships among the variables, and linear regressions predicted SLH.

Results & Discussion:
Mean core endurance score was 95.2±29.1 s, YBT was 93.4±7.7 %LL, and SLH was 67.4±17.2 %BH. YBT and SLH were positively correlated (r= 0.53, p= 0.03),while core endurance was not correlated with SLH (r= 0.26, p= 0.31). YBT predicted SLH(adjusted R^2= 27.9, p=0.03, 95% CI = 0.13, 2.21), with each 1% increase in YBT reach distance increased SLH jump distance by 1.17%. Core endurance did not predict SLH (p = 0.50, 95% CI = -0.20, 0.38).

Conclusion
Dynamic balance but not core endurance was related and predicted SLH distance in female collegiate dancers. These study results emphasize relationships between dynamic balance and single-leg landings. Healthcare practitioners, educators, and dancers wanting to improve dancers' horizontal hop performance can use these results and incorporate dynamic balance exercises into training and rehabilitation protocols.

Abstract Title: EEG and Gait Signal Processing: Comparison between a novel filter and more traditional filtering techniques

Investigator: Reza Pousti
Mentor: Christopher K. Rhea, PhD
Co-Investigators:
1. Daniel M. Russell, Kinesiology & Rehabilitation \ Old Dominion University
2. Derek C. Monroe, Radiology / Biomedical Research Imaging Center (BRIC) \ University of North Carolina at Chapel Hill
Department: Kinesiology and Rehabilitation

Abstract
Noise degrades both EEG and gait signals, and classical IIR filters (Butterworth, Chebyshev, elliptic) involve trade offs between passband flatness, ripple, and roll off. This study compares a novel exponential "Reza" filter with these designs for neural and locomotor data. We analyzed an open mobile brain-body dataset from 49 healthy adults (EEG: 256 channel, 512 Hz; IMUs: six APDM Opals, 128 Hz). EEG channels were grand averaged and band pass filtered at 0.5-50 Hz; IMU axes were averaged and band pass filtered at 0.5-5 Hz. Outcomes were signal to noise ratio (SNR) and power spectral density (PSD). One way ANOVAs tested the effect of filter type (Butterworth, Chebyshev I, elliptic, Reza) with Bonferroni correction ($\alpha\_adj = 0.0083$). For EEG, PSD did not differ among filters ($p = .24$). SNR differed ($F(3,43)= 9.21, p = 1.45\times10^{-5}$): Chebyshev yielded the highest mean SNR; elliptic and Reza were intermediate and similar to each other; both exceeded Butterworth. For IMU, SNR differed ($F(3,42)= 31.69, p = 2.47\times10^{-15}$): Reza and Butterworth were highest and not different; elliptic and Chebyshev were lower. IMU PSD also differed ($F(3,42)= 171.09, p = 2.97\times10^{-44}$): Reza retained the most motion signal power, followed by Butterworth, with elliptic and Chebyshev retaining less. These results show that filter choice materially shapes EEG and gait outcomes. For EEG, Chebyshev maximized SNR, while elliptic and Reza maintained comparable fidelity. For IMU gait signals, Reza matched Butterworth for denoising and preserved more signal power. Findings support context specific selection of filters rather than defaulting to a single design.

Abstract Title: Relationships Between Falls Risk, Preferred Walking Speed, and Accelerations at the Head and Trunk in Individuals with Parkinson's Disease (PD) and Healthy Elderly

Investigator: Paphawee Prupetkaew
Mentor: Daniel M. Russell, PhD
Co-Investigators:
1. Alex A. Grunsfeld, Dept. of Neurology, Sentara Hospital, Charlottesville, VA
2. Steven Morrison, School of Rehabilitation Sciences, Ellmer College of Health Sciences
Department: School of Exercise Science

Abstract

Introduction
Bradykinesia and rigidity, common motor-symptoms in PD, can lead to reduced head-trunk control and impaired gait performance, resulting in increased fall risks. Control of the head and trunk motion is critical for maintaining dynamic stability by integrating visual, vestibular, and somatosensory inputs to generate an effective walking pattern. Increased bradykinesia and axial rigidity in PD individuals likely contribute to declines in damping accelerations from ground impacts.

Methods
Twenty-five older adults with PD and 25 healthy controls walked at their preferred speed (PWS). A 20 ft protokinetics mat was used to measure spatio-temporal gait parameters, and 3-D accelerometers were placed on lower trunk and head segments to assess acceleration. Root mean square (RMS) acceleration amplitudes were calculated in three dimensions (anterior-posterior: AP, mediolateral: ML, and vertical: VT). Physiological Profile Assessment (PPA) was used to determine fall risks. The relationship between fall risks, RMS acceleration and PWS was assessed using simple linear regression for each group. Differences in PWS and acceleration magnitude between groups were assessed using independent t-tests.

Results
Fall risks were associated with PWS in PD group but not healthy elderly. Individuals with PD preferred to walk slower than healthy controls, but there were no significant group differences in trunk or head accelerations. The magnitude of accelerations for all three dimensions at the trunk and the VT dimension at the head were strongly related to the PWS for both groups, with accelerations increasing with speed. The slope of the relationship between VT accelerations at the trunk and head with PWS was smaller for the individuals with PD. In contrast, the slope of the relationship between ML acceleration and PWS was smaller at the trunk and more negative at the head for healthy elderly controls.

Conclusion
Individuals with PD demonstrate altered trunk and head control compared with healthy controls. The larger increase in ML accelerations of the trunk and head with speed may be associated with reduced gait stability. Individuals with PD may prefer to walk slower as a strategy to mitigate large trunk and head accelerations and a less stable gait in order to reduce risks of fall.

Abstract Title: Gastrointestinal symptoms associated with sodium bicarbonate supplementation protocols: A systematic review

Investigator: Ian P Winter
Mentor: Patrick B Wilson, PhD
Co-Investigators:

Department: Exercise Science

Abstract

Introduction
Sodium bicarbonate positively impacts performance in many sports. However, gastrointestinal symptoms (GIS) secondary to sodium bicarbonate supplementation may limit its use. This systematic review aimed to synthesize literature that has evaluated GIS associated with sodium bicarbonate supplementation and to offer suggestions to mitigate the onset of these undesirable, limiting side effects. This review provides suggestions to mitigate the onset of undesirable GIS with sodium bicarbonate supplementation, as well as serves a guide for subsequent research to address shortcomings in the literature.

Main Body
Searches of PubMed, SPORTDiscus, and Web of Science and two previously published systematic reviews were performed between February and December 2024. Eligible studies were those that provided ≥5 grams of sodium bicarbonate in a 24-hour period or, if a multi-day protocol, at least one day involving ≥5 grams dosing. Included studies needed to have a placebo group/condition or a comparison group/condition that created a contrast in terms of sodium bicarbonate delivery method, form, or dose. Ninety-one investigations were included in six categories: acute single dosing (n=33); acute spread dosing (n=23); chronic dosing (n=7); acute vs. chronic dosing (n=5); delivery form (n=15); and other (n=8). Existing literature suggests that the most common acute dose (0.3 g/kg), along with doses near it (0.2-0.4 g/kg), elicits mild-to-severe GIS for some individuals. Additionally, GIS seem to increase in a dose-dependent manner (from 0.2 to 0.5 g/kg) when sodium bicarbonate is ingested in a single dose. Strategies to reduce GIS with acute dosing include spreading intake over several hours, using enteric-coated capsules/tablets, and ingesting a product made of sodium bicarbonate mini-tablets within a hydrogel (Maurten Bicarb System). However, direct comparisons of these strategies are nonexistent. Consuming a carbohydrate-containing meal/snack alongside acute supplementation was reported to reduce GIS in one study, but research to date is limited. Multi-day dosing may offer some defense against GIS, but symptom documentation throughout the entire supplementation period has been poorly characterized. Variations in number and types of GIS measured, timing and frequency of measurements, scale used, and statistical analyses make direct comparisons between studies difficult.

Conclusion
Making clear recommendations about optimal sodium bicarbonate supplementation strategies to minimize GIS remains challenging despite the plethora of published literature. Specific GIS should be clearly described, and if confusion may exist regarding a particular symptom's nature, an operational definition should be provided. GIS assessments should be collected at regular intervals after supplementation (e.g., every 15-30 minutes) in addition to baseline pre-supplementation assessments. When summarizing GIS as a total or aggregate score, details of the calculation should be provided. Further, the range of possible values on the calculated variable should be described so that readers can make their own judgements about severity. Methods of evaluating the distribution of GIS data should be explained, along with any data transformations that are applied to deal with non-normality. Given high individual variation, reporting peak GIS severity for individual participants may be valuable. Major needs remain for direct comparisons between supplementation protocols meant to minimize GIS and improved consistency in data collection, reporting, and analysis.

Abstract Title: In Vitro Assessment of ABJ-1-195, a Novel BRCA1-Mimetic Drug, in Breast Cancer Cells

Investigator: Devra Catarena Athanasiadis
Mentor: Kan Wang, MD
Co-Investigators:
Andrew Mun, Medical Master's Program
Jack Campbell, MD Program (M2)
Department: Biological and Translational Sciences

Abstract

Introduction
To expand treatment opportunities and drug discovery for drug-resistant breast cancers, this study conducts in vitro assessments of a novel BRCA1-mimetic drug, termed ABJ-1-195, using breast cancer model cell lines. Breast cancers are classified by the presence or absence of estrogen receptors (ER), progesterone receptors (PR), and human epidermal growth factor receptor 2 (HER2). In cancers that are ER positive, there has been a development of resistance to treatments such as Tamoxifen, which utilizes the estrogen receptor pathway as its mechanism of action. BRCA1 (breast cancer susceptibility gene 1), a tumor suppressor involved in DNA repair and estrogen receptor alpha (Erα) regulation, can lose function due to mutation. ABJ-1-195, as a BRCA1 mimetic, is designed to overcome resistance to therapies like tamoxifen, an estrogen antagonist. Tamoxifen treats ER-positive cancers but develops resistance over time, as demonstrated in the cell line LCC9, which proliferates independently of estrogen. ABJ-1-195 in vitro efficacy is assessed using cancer cell lines to model ER-positive cancers. This study aims to evaluate the efficacy of ABJ-1-195 as a BRCA1 mimetic in Tamoxifen-sensitive and in ER-resistant breast cancer models.

Methods
Three ER-positive breast cancer cell lines, MCF-7, LCC9, and T47D, were used to evaluate ABJ-1-195. MCF-7 and T47D are estrogen-sensitive, while LCC9 models cancer with active ERα and tamoxifen resistance. T47D cells stably expressed a luciferase gene under estrogen response elements (EREs), enabling real-time monitoring of ERα transcriptional activity. Cells were treated with ABJ-1-195 at concentrations ranging from 0.01 to 10 μM for 3 to 10 days under various conditions: drug alone, drug with 10 nM estradiol (E2), E2 alone, and no treatment. All treatments were replicated for statistical accuracy. Luminescence, measured via dual-luciferase assay to analyze ABJ-1-195's anticipated disruption of ERα signaling. Cell viability and proliferation were assessed using the MTT assay, with absorbance measured spectrophotometrically to evaluate growth inhibition. Total RNA was extracted post-treatment, reverse-transcribed, and analyzed using TaqMan qPCR targeting Cathepsin D, a protease linked to tumor growth and poor prognosis. GAPDH (glyceraldehyde-phosphate-dehydrogenase) was used as an internal control, enabling quantitative analysis. The integration of functional and molecular assays enabled a comprehensive evaluation of ABJ-1-195, focusing on its effects on viability, hormone response, and the expression of genes associated with metastasis.

Results
Results across LCC9, MCF-7, and T47D cell lines indicate that ABJ-1-195 reduces viability in a concentration-dependent manner in the presence of E2, consistent with BRCA1-like tumor suppression. Ongoing qPCR in the MCF-7 model is expected to show downregulation of the target gene in the presence of the drug with E2 treatment. Expression of the GFP protein in MCF-7 cells, achieved through plasmid transfection, enabled us to track motility and study proliferation in different types of mixed cell organoids. These findings are early and ongoing data collection aims to further characterize ABJ-1-195's therapeutic potential.

Conclusion
The data obtained support ABJ-1-195 as a BRCA1-mimetic that reduces proliferation in endocrine-resistant breast cancer via tumor-suppressive pathways, validating a new ERα antagonist class with a mechanism to overcome treatment resistance, and laying the groundwork for future development.

Abstract Title: Cocaine Increases Glycolysis Activity in Microglia in Vitro and in Vivo

Investigator: Kelly Carter
Mentor: Ming-Lei Guo, MD PhD
Co-Investigators:
Dominique Blair, Biological and Translational Science
Department: Biological and Translational Science

Abstract

Introduction
Cocaine, one of the most abused drugs throughout the world, is capable of activating microglia (Mg) in vitro and in vivo. However, the detailed mechanisms underlying cocaine-mediated Mg activation remain much elusive. Recently, accumulating evidence showed that glycolysis is inherently involved in immune responses in Mg (immunometabolism). Increase in anaerobic glycolysis activity could promote Mg activation under various stimuli. Whether cocaine can modulate glycolysis activity in Mg has never been explored. In this investigation, we explored the effects of cocaine on glycolysis activity by determining the expression levels of glucose transports (Glut) 1, 3, 5 and hexokinase (HK) 1/2 in BV2 cells and primary microglia (PM). Also, we determined the effects of cocaine on Glut1 in Mg in vivo.

Methods
BV2 cells were maintained and cultured in vitro. PM were isolated from the new-born mouse pups (24 hours) and cultured in vitro for 10 days. BV2 and PM were treated with cocaine (10 μM) for varying time periods or for 24 hours with different doses (1, 10, 100 μM). After the treatments, the cells were collected for protein extraction. The samples were prepared to determine the expression of Glut1, 3, 5 and HK and hypoxia inducible factor 1 alpha (HIF1a) by Western blots. Wild type (C57BL/6) mice (3-month-old, male) were injected with saline or cocaine (20 mg/Kg, daily) for three weeks and sacrificed for brain removal. Followed, the brain cryosections were prepared for double immunostaining of Iba1 (Mg marker) and Glut1. The immunofluorescent images were captured by the Zeiss inverted fluorescent microscopy and processed/analyzed by Zenlite software or ImagJ. The results were analyzed by one-way ANNOVA and * $p < 0.05$ were considered significantly different among groups.

Results
Our data shows that cocaine can increase Glut1 and 5 in BV2 cells and PM in both time-course and dose- dependent manners. Cocaine also increases HK2 expression in vitro. For in vivo experiments, cocaine significantly increases Glut1 levels in Mg.

Conclusion
Our findings demonstrate that cocaine can increase glycolysis activity in Mg implying glycolysis is implicated in cocaine-mediated Mg activation. For further experiments, we will use Glut1 specific inhibitor or siRNA-Glult1 to knock down Glut1 to explore whether Glut1 inhibition can mitigate cocaine-mediated Mg activation.

Abstract Title: Long-term cardio-kidney-metabolic (CKM) outcomes in living kidney donors with prediabetes

Investigator: Imani Jami
Mentor: Mansai Shah, MD
Co-Investigators:
Fang Fang (PI), Research and Infrastructure Service Enterprise (RISE)
Department: Medicine

Abstract

Introduction
Prediabetes and kidney donation are independent risk factors for chronic kidney disease (CKD). In the US, roughly one-third of adults have prediabetes, with 70% projected to develop diabetes. 40% of diabetics progress to CKD, and 7-8% develop end-stage renal disease (ESRD). Due to the kidney shortage, prediabetic individuals are increasingly accepted as donors, yet their long-term risks remain unclear. This study compared 10-year cardiometabolic outcomes among prediabetic donors (Cohort 1), donors without prediabetes (Cohort 2), and prediabetic non-donors (Cohort 3).

Methods
This retrospective cohort study utilized the TriNetX U.S. Collaborative Network to analyze outcomes from the time of index event (kidney donation for cohort 1 and 2, prediabetes for cohort 3) between June 2005 and June 2015. Prediabetes was defined as having impaired fasting glucose, impaired glucose tolerance, or elevated hemoglobin A1c (5.7-6.4%). Patients with diabetes at or before the index event were excluded. Each pair of cohorts underwent 1:1 propensity score matching (PSM) based on demographics, comorbidities, medications. Outcomes included diagnoses of diabetes, hypertension, CKD, proteinuria, hyperlipidemia, diabetic retinopathy, diabetic neuropathy, heart failure, acute myocardial infarction, stroke. Analyses were performed on TriNetX using Kaplan-Meier curves, log-rank tests, and Cox proportional hazards models on matched samples.

Results
TriNetX queries identified 989 patients in Cohort 1, 16,430 patients in Cohort 2, and 2,362,048 in Cohort 3 in the US. PSM resulted in 977 patients per cohort.

Survival analyses indicated no significant differences in cardiometabolic outcomes between Cohort 1 and Cohort 2 over 10 years. Compared with Cohort 3, Cohort 1 demonstrated significantly lower risk of diabetes (HR, 0.28; 95% CI, 0.22-0.35), hypertension (HR, 0.61; 95% CI=0.53-0.71), hyperlipidemia (HR, 0.71; 95% CI, 0.61-0.83), but higher risk of CKD (HR, 3.02; 95% CI, 2.38-3.84) and proteinuria (HR, 1.92; 95% CI, 1.30-2.82).

When compared to Cohort 3, Cohort 2 showed lower risk of diabetes (HR, 0.26; 95% CI, 0.24-0.27), hypertension (HR, 0.33; 95% CI, 0.32-0.35), hyperlipidemia (HR, 0.34; 95% CI, 0.33-0.36), diabetic retinopathy (HR, 0.72, 95% CI, 0.60-0.86), diabetic neuropathy (HR, 0.36; 95% CI, 0.29-0.41), heart failure (HR, 0.32; 95% CI, 0.29-0.35), acute myocardial infarction (HR, 0.32; 95% CI, 0.27-0.37), stroke (HR, 0.24, 95% CI, 0.20-0.28) but elevated risk of proteinuria (HR, 1.25; 95% CI=1.12-1.40) and CKD (HR, 1.44; 95% CI, 1.37-1.53).

Conclusion
No significant differences were seen in cardiometabolic outcomes over a 10-year period among kidney donors with or without prediabetes, indicating that kidney donation does not inherently put pre-diabetic donors at a greater risk of developing diabetes. Surprisingly, prediabetic kidney donors had lower risk than prediabetic non-donors, suggesting lasting benefits of early diagnosis, lifestyle changes required for donor eligibility and follow-up care. However, increased risk of proteinuria and CKD in donors independent of diabetes implicate the role of single kidney. Limitations include retrospective study of 10-years, confined to US; prospective studies of longer duration are needed to confirm these findings.

Abstract Title: Study of BRCA-1 Mimetic Drugs in Breast Cancer Organoids

Investigator: Andrew Mun
Mentor: Kan Wang, MD
Co-Investigators:
1. Devra Athanasiadis, Medical Masters Program
2. Dr. Milton Brown, Macon and Joan Brock Virginia Health Sciences at Old Dominion University
Department: Biomedical and Translational Science

Abstract

Introduction
Breast cancer stem cells (BCSCs) are a distinct subpopulation that possesses the ability to self-renew and differentiate into various types of cancer cells, thereby maintaining tumor growth. They also have the ability to differentiate and can give rise to more specialized cancer cells. Some BCSCs can undergo epithelial-mesenchymal transition (EMT), gaining migratory and invasive capabilities that enhance metastatic potential. Their unique properties also make them resistant to conventional therapies.

Research has highlighted interest in the BRCA-1 molecule due to its inhibitory role in estrogen receptor α (ER-α) activity in BCSCs by binding to the ER-α protein, thereby blocking estrogen-stimulated gene expression required for cell proliferation. Our lab has developed several compounds that mimic the function of BRCA-1. These BRCA-1 mimetics not only suppress the upregulation of ER-α activity but also overcome the drug resistance found in Tamoxifen, with little to no risk of systemic toxicity, which is an encouraging sign for future use. More importantly, these compounds inhibited activity for both antiestrogen-sensitive and antiestrogen-resistant breast cancer cells. These findings reveal a novel class of ER-α modulators that employ a distinct mechanism from conventional antiestrogens, such as Tamoxifen and Fulvestrant. Moreover, these mimetics can treat Tamoxifen-sensitive and non-sensitive cells. Our lab will generate organoids from the MCF-7 cancer stem cells, which are 3d structures mimicking the complex microenvironment of real tumors present in the human body. Once the organoids are generated, we will use our BRCA-1 mimetics on the organoids to assess their efficacy in inhibiting cell growth.

Methods
We cultivated MCF-7 cancer cells and used this cell line to create MCF-7 CSCs. These cells were grown in an anchorage-free environment using stem cell media with DMEM. Mammospheres created from stem cells were collected and combined with VitroGel®, a synthetic ECM-like hydrogel, to generate 3D organoids. We also incorporated TGF-β1 to study the efficacy of our compounds in inducing stem cell proliferation and differentiation. We formed one droplet as the control, which only contained the cell suspension and hydrogel. Another droplet was formed with the addition of TGF-β1, a growth factor that assists stem cells in undergoing EMT while differentiating into organoids. The first group of plates is treated with estradiol in combination with the drug, the second group receives the drug alone without estradiol, and the final group serves as a control, containing neither estradiol nor the drug. We will measure the size of the mammospheres after several weeks. E-cadherin and N-cadherin will be used as histochemical biomarkers of differentiation, with E-cadherin marking epithelial cells and N-cadherin marking mesenchymal cells. The relative expression of these markers is considered the gold standard for assessing EMT and cellular differentiation.

Results
The study is ongoing. Organoid generation is being optimized to yield viable, reproducible models suitable for testing our BRCA-1 mimetics.

Conclusion
We hope to establish MCF-7 organoids as a platform for subsequent testing and analysis of BRCA-1 mimetic compounds, with the 3D structure of the organoids expected to provide more physiologically relevant insights into drug activity within the human body.

Abstract Title: Dermatologists' and Dermatopathologists' Views on Artificial Intelligence in the Clinical Setting: A Systematic Review

Investigator: Bailey Paige Sullivan
Mentor: Alice Roberts, MD PhD
Co-Investigators:
1. Madison Williamson, Medical Masters 2024
Department: Dermatology

Abstract

Introduction
Artificial intelligence (AI) emerged in the second half of the twentieth century, but a significant milestone in 2018 was the introduction of GPT-1, the precursor to ChatGPT. AI has transitioned from theoretical to practical applications in a clinical setting, including analyzing images, drafting visit notes, educating patients, and personalizing treatment plans. However, barriers, such as providers' education and acceptance of new AI developments, hinder the implementation of AI innovations. Dermatologists' views on AI are not well documented. We aim to analyze clinicians' perceptions of AI based on current awareness of its use in the clinical setting and opinions on its role in patient-provider relationships.

Main Body
Following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines (PRISMA), publications were systematically reviewed from PubMed, Web of Science, Academic Search Complete, Science Direct, CINAHL, and Google Scholar. The search strategy included keywords pertaining to AI, dermatologists, perceptions, and surveys. Two independent reviewers (MW, BS) using Rayyan software blindly conducted the title and Abstract review but were not blinded during the full text review. The studies were evaluated according to our inclusion criteria. Two independent reviewers performed the data extraction with minor assistance from ChatGPT. Data analysis was performed using Excel. The risk of bias assessment will be performed by two independent reviewers using ROBINS-I criteria. 4,370 articles were generated in the systematic search. The 32 included studies were published between 2020-2025 and consisted of 32 observational studies, including 24 cross-sectional survey studies. Included studies represent participants from 21 countries, not including one survey study which collected data from 92 countries. Though data interpretation and analysis are currently ongoing, the consensus that AI will have a positive impact in the dermatological field in the next decade appears to exist among most dermatologists.

Conclusion
Preliminary findings from this ongoing systematic review suggest that the majority of dermatologists and dermatopathologists generally view the potential role of AI in dermatology positively. However, despite this optimism, the widespread implementation of AI in clinical settings remains limited. The literature currently provides little insight into the disconnect between these favorable perceptions and real-world adoption. This gap presents a significant opportunity for future research to investigate the underlying barriers, such as workflow integration, costs, ethical considerations, and trust in AI outputs that may hinder the translation of positive sentiment into practice. Addressing these challenges will be crucial for ensuring that AI progresses from a promising adjunctive tool to a widely adopted element of dermatological care.

Abstract Title: The Impact of Prior Covid-19 Infection on Airway Complications in Pediatric Patients Undergoing Tonsillectomy

Investigator: Gabriella Marie Adams
Mentor: Yifan Guo, BA MD
Co-Investigators:
Michael Baroody, MS2, c/o EVMS MD 2028
Department: CHKD Plastic and Oral Maxillofacial Surgery

Abstract

Introduction
Tonsillectomy is a common surgical procedure in the U.S. with over 500,000 cases performed annually in children under fifteen. A retrospective study found that perioperative respiratory complications were three times higher in children with airway disease, but was conducted prior to the pandemic (Katz, 2020). This study aims to determine how prior COVID-19 infection impacts the development of respiratory complications in pediatric patients after tonsillectomy.

Methods
This study was conducted using the TriNetX research database, utilizing all available data at a national level from all participating healthcare organizations and included all patients undergoing tonsillectomy from January 2020 to January 2024. Patients were grouped into cohorts based on COVID-19 history, excluding those with pre-existing respiratory conditions. The primary outcome included diagnosis of postoperative respiratory complications, identified by ICD-10 codes J95-J96.92, Z99.1, or Z99.11, within 90 days after tonsillectomy.

Results
After propensity score-matched analysis, each cohort included 53,156 subjects. In the non-COVID-19 cohort, 1,713 subjects experienced respiratory complications compared to 2,323 subjects in the COVID-19 cohort. The risk difference between the two groups was +1.202% ($p<0.0001$, 95% CI [0.97%, 1.434%]). Kaplan-Meier analysis showed a 1.17% decrease ($p<0.0001$) in survival probability of those with a prior COVID-19 diagnosis compared to those without at 90 days post-op.

Conclusion
Prior COVID-19 infection was associated with an increased risk of developing respiratory complications, including respiratory failure and pneumothorax, after tonsillectomy. Subjects with a prior COVID-19 diagnosis also had a significantly lower survival probability at 90 days post-op, possibly due to COVID-19 related damage to the respiratory system. While these findings are significant, it is important to consider the limitations of the TriNetX network, such as data inconsistencies and unique coding practices. Nonetheless, these results contribute to a greater understanding of the impact of COVID-19 on postoperative respiratory outcomes and may be useful in guiding preventative strategies.

Abstract Title: Progression of Type B Aortic Dissection to Type A Dissection and Aortic Rupture Following Endoleak

Investigator: Rishab Agarwal
Mentor: Jace Bradshaw, MD
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Abstract

Introduction
Retrograde Type A aortic dissection (RAAD) is a rare but devastating complication following thoracic endovascular aortic repair (TEVAR) for complicated Type B aortic dissection (TBAD).

Case Information
We present the case of a 44-year-old male with hypertension, end-stage renal disease (ESRD), and recent TEVAR for TBAD complicated by a Type II endoleak from the left subclavian artery. Despite surgical correction with subclavian ligation and bypass one month prior, he presented to the emergency department pulseless after a prehospital decline. Resuscitative efforts included airway management, high-quality chest compressions, and empiric treatment for hyperkalemia given his ESRD.

Clinical Findings
Point-of-care ultrasound revealed pericardial effusion concerning for tamponade and intra-abdominal free fluid. Multiple pericardiocentesis attempts drained 300cc of blood from the pericardium without hemodynamic improvement or resolution of the pericardial effusion, consistent with ongoing hemorrhage from suspected RAAD and aortic rupture. Despite aggressive resuscitation, the patient was declared dead after 35 minutes.

Conclusion
This case underscores the potential relationship between prior endoleak and subsequent RAAD, highlighting the importance of vigilant surveillance after TEVAR and the need for emergency physicians to recognize these catastrophic complications for timely diagnosis and intervention.

Abstract Title: Oxygenator Failures During Cardiopulmonary Bypass: MAUDE Database Analysis Using Natural Language Processing

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Department: Departments of Anesthesiology and Emergency Medicine

Abstract

Introduction
Cardiopulmonary bypass (CPB) oxygenators provide essential intra-operative gas exchange. Although rare, failures can cause severe morbidity or mortality. CPB-specific analyses of the FDA's Manufacturer and User Facility Device Experience (MAUDE) database are limited.

Methods
We retrospectively reviewed MAUDE reports (April 2015-April 2025) of CPB oxygenator failures resulting in injury or death. ECMO events, malfunctions without harm, and duplicates were excluded. Manufacturer, device problem, and patient problem were compared between injury and death cohorts using chi-square or Fisher's exact tests. Narrative reports underwent natural language processing (TF-IDF, n-gram analysis, non-negative matrix factorization) to identify clinical themes.

Results
A total of 388 events met criteria: 279 injuries (71.9%) and 109 deaths (28.1%). Three manufacturers accounted for 88% of reports. MAQUET devices were more often associated with deaths (43.1% vs. 11.1%, $p<0.001$), TERUMO with injuries (60.6% vs. 22.9%, $p<0.001$). "Unexpected Device Operation" occurred more often in deaths (7.34% vs. 1.43%, $p=0.0054$), "Device Use/Human Factors" in injuries (11.83% vs. 4.59%, $p=0.0356$). Thromboembolic events were more frequent in deaths (9.17% vs. 3.58%, $p=0.0381$). NLP identified intra-operative performance/monitoring failures, hemolysis and thromboembolic events, and post-procedural evaluation/quality management as common descriptions of device failure situations.

Conclusion
CPB oxygenator failures causing harm show distinct manufacturer, device problem, and outcome patterns. Sudden operational failures and thromboembolic complications are more often fatal. NLP enhances detection of clinically relevant patterns, supporting targeted safety strategies and device improvements.

Abstract Title: Overlooked Systemic Contributors to Sexual Dysfunction: Emerging Roles of POTS, Ehlers-Danlos Syndrome, and Mast Cell Activation Syndrome

Investigator: Janvi Agrawal
Mentor: Rachel Rubin, MD
Co-Investigators:
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Abstract

Introduction
Unexplained sexual dysfunction is a frequently reported concern in urology, gynecology, and sexual medicine clinics. While psychosocial, hormonal, and local genitourinary factors are commonly investigated, systemic contributors are often overlooked. Dysautonomia, hypermobile Ehlers-Danlos syndrome (hEDS), and mast cell activation syndrome (MCAS) are chronic disorders associated with urogynecologic complaints and may plausibly increase the risk of sexual dysfunction through overlapping pathophysiological mechanisms. Each affects key domains relevant to sexual health, including autonomic regulation, connective tissue integrity, vascular dynamics, and inflammatory signaling. Understanding these associations is essential to improving comprehensive evaluation and care for patients presenting with sexual concerns.

Main Body
Ehlers-Danlos syndromes (EDS) frequently manifest with pelvic floor symptoms such as incontinence, pelvic organ prolapse, vulvodynia, and chronic pelvic pain, many of which impair sexual function. In a community-based case-control study, women with hEDS or hypermobility spectrum disorders demonstrated significantly lower Female Sexual Function Index (FSFI) scores across desire, arousal, lubrication, orgasm, and satisfaction domains compared to controls, independent of depressive or autonomic symptoms. These findings highlight the intrinsic impact of connective tissue disorders on sexual health.

MCAS has been implicated in sexual dysfunction through mast cell-mediated neuroimmune pathways. Mast cell-related vestibular neuroproliferation has been linked to vestibulodynia and dyspareunia, even without increased mast cell density. In mastocytosis, an MCAS-related disorder, nearly one-quarter of patients reported sexual dysfunction. Non-clonal MCAS has similarly been associated with genitourinary pain syndromes. Furthermore, case reports suggest that mast cell-directed therapy may alleviate neuropsychiatric symptoms in patients with comorbid POTS or EDS, underscoring mast cell mediators as contributors to dysautonomia, neuroinflammation, and potentially sexual dysfunction.

Postural orthostatic tachycardia syndrome (POTS), a disorder of autonomic dysregulation, is frequently comorbid with EDS and MCAS and has been independently linked to sexual dysfunction. In a cross-sectional study of 189 patients with POTS, women exhibited significantly reduced sexual desire, arousal, and satisfaction, while men demonstrated impaired erectile function, orgasm, and overall satisfaction. Autonomic symptom severity predicted dysfunction in women, while age was a key determinant in men. Together, these findings emphasize that autonomic disturbances have a measurable impact on sexual outcomes.

Conclusion
Although preliminary evidence links hEDS, MCAS, and POTS to sexual dysfunction, systematic study of their collective impact is lacking. These conditions often co-occur, suggesting shared pathophysiological pathways that may exacerbate sexual symptoms. Recognition of these associations highlights a gap in sexual medicine research and clinical practice. Greater awareness could enable earlier identification of systemic contributors to sexual dysfunction, promote interdisciplinary collaboration, and support the development of more holistic diagnostic and therapeutic strategies. Future investigations should define prevalence, predictors, and mechanistic underpinnings of these conditions in sexual medicine populations to improve patient care and quality of life.

Abstract Title: Novel Use of Fish-Derived Acellular Dermal Matrix for Dural Reconstruction Following Subdural Empyema

Investigator: Adam Nasser Akari
Mentor: Ramon DeJesus, MD
Co-Investigators:
Adam Evans, MD, PGY-4, Division of Plastic Surgery
Department: Division of Plastic Surgery

Abstract

Introduction
Subdural empyema is a rare, but life-threatening intracranial infection with an incidence of 0.1 cases per 100,000 person-years and a mortality rate of 12.2%. Surgical drainage is essential, with craniotomy achieving lower recurrence than burr hole drainage. Following debridement of the dura and scalp, coverage and a neodura are required to prevent cerebrospinal fluid (CSF) leak and worsened infection. Autologous options are limited by donor morbidity, whereas synthetic non-dissolvable products cannot be used in contaminated fields. Kerecis™ is an acellular dermal matrix (ADM) made from wild Atlantic cod skin that contains antimicrobial properties and completely integrates, which may reduce the risk of infection recurrence.

Case Information
A 51-year-old male with insulin-dependent diabetes (HgbA1c 15) was transferred to our level one trauma center with right hemiparesis after one week of antibiotics for a 4×4 cm necrotic scalp lesion. Imaging revealed a left subdural empyema with calvarial osteomyelitis. He underwent serial drainage of the empyema, debridement of scalp, pericranial tissue, and osteomyelitic bone, with initial dural repair using Surgicel™, Tisseel™, and DuraGen™. Cultures grew Staphylococcus spp., Lactobacillus spp., and Candida glabrata. Despite these measures, infection progressed, requiring excision of 200 cm^2 of scalp and 3×1.5 cm of nonviable dura. Definitive reconstruction was performed with Kerecis™ ADM for dural closure and a 7.5×30 cm free anterolateral thigh flap for scalp coverage using the superficial temporal vessels. The patient recovered without CSF leak or wound complications and was discharged with improved strength and ambulation.

Discussion / Clinical Findings
This case highlights the need for surgical debridement and reconstruction when antibiotic therapy fails. Craniotomy remains the preferred approach for subdural empyema given higher clearance than burr hole drainage. Biologic substitutes such as Kerecis™ offer advantages over synthetic materials in contaminated fields. The extracellular matrix of Kerecis™ provides a scaffold that supports cellular adhesion, neovascularization, and fibroblast proliferation. In animal models, fish collagen scaffolds have demonstrated successful dural repair with prevention of adhesions, minimal inflammation, and effective CSF leak prevention. These properties suggest that Kerecis™ may promote rapid integration and neodura formation, consistent with the favorable outcome in this patient.

Conclusion
This case demonstrates the novel use of fish-derived ADM for dural repair in a contaminated intracranial wound. Kerecis™ ADM may represent a valuable option for achieving neodura formation. Further research is needed to assess its safety, durability, and broader applicability in neurosurgical reconstruction.

Abstract Title: Upper and lower Free Flap Revision Procedures: A Systematic Review and meta-analysis

Investigator: Adam Nasser Akari
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Co-Investigators:
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Adam Evans, MD, PGY-4 Division of Plastic Surgery
Department: Plastic Surgery

Abstract

Introduction
Free flap reconstruction is widely considered the gold standard for managing complex soft tissue defects requiring durable coverage. Fasciocutaneous and myocutaneous flaps often undergo secondary procedures such as direct excision, suction lipectomy, or skin grafting to improve contour and achieve better size match with the contralateral extremity. This is the first systematic review and meta-analysis evaluating the indications, timing, complication rates, and quantity of secondary debulking procedures in extremity free flap reconstruction.

Main Body
This PRISMA-compliant systematic review and meta-analysis included studies from four databases and is registered with PROSPERO (CRD420251076748). Retrospective and prospective studies that specifically evaluated secondary debulking, contouring, thinning, or aesthetic refinement of free flaps for upper and lower extremity reconstruction were included. Studies focused on primary thinning or debulking, or those reporting fewer than 10 revised flaps, were excluded. Extracted data included demographics, the average number of revisions per free flap, the percentage of patients with revised flaps, and the number of revision procedures per revised flap. Meta-analyses were performed using a random effects model.

Results
A total of 26 retrospective studies and one prospective study were included, encompassing 3,887 patients and 3,751 free flaps. The mean ages in the upper extremity (UE) and lower extremity (LE) cohorts were 33.93 ± 11.06 years and 45.96 ± 15.01 years, respectively. Meta-analyses found that 46% ± 40% ($I^2 = 0\%$) of UE flaps and 16% ± 8% ($I^2 = 0\%$) of LE flaps underwent a revision procedure. On average, 0.48 and 0.17 revision procedures were performed per free flap in the UE and LE cohorts, respectively. Among revised flaps, 1.04 procedures were performed per flap in the UE cohort and 0.23 in the LE cohort.

Conclusion
Meta-analysis findings show that secondary debulking procedures are commonly performed following free flap reconstruction, with higher revision rates in the upper extremity and higher complication rates in the lower extremity. Future research should investigate factors contributing to these regional differences and strategies to reduce complications.

Abstract Title: Bridging the Gap: An Observational Study of Medical School Applicants with Rural Backgrounds

Investigator: Brianna Elaine Armentrout
Mentor: Amanda K Burbage, BS PhD
Co-Investigators:
Department: Medical & Health Professions Education

Abstract

Introduction
Although 20% of the United States population lives in rural areas, only 9% of physicians practice in rural communities, reflecting the decline of rural medical school applicants in recent years. Research show that the single best predictor of where a doctor will practice is the individual's rural or urban identity Moreover, the success of rural hospitals depends upon the region's ability to both recruit and retain medical doctors. Yet, the population of rural medical school applicants is not well understood beyond the single dimension of rurality.

Methods
This observational study of 259,369 medical school applicants from 2017 to 2022 uses data procured by agreement from American Academy of Medical Colleges to describe the characteristics of the rural applicant demographic, including descriptions of racial and ethnic identities, socioeconomic distribution, priorities as future physicians, and standardized test scores.

Results
Although white applicants make up the plurality of rural applicants, the abundant racial and ethnic diversity of rural applicants overall offers opportunities for diversity and inclusion initiatives and to mitigate disadvantages faced by rural UriM students. Regarding matriculation odds, rural students are overrepresented in lower MCAT quartiles, but demonstrate higher overall GPA compared to non rural applicants. Additionally, ural applicants and their matriculation rates are influenced by socioeconomic status, availability of research and volunteer opportunities, and MCAT prep.

Conclusion
Our results conclude that rural medical school applicants are an exceptionally diverse demographic and suggest that additional research is warranted to address advantages and disadvantages of rurality in applying to medical school, particularly through the interdependent and overlapping demographics they possess. Such possible interventions include those aimed at MCAT preparation and provision of research and volunteer opportunities.

Abstract Title: Role of CD45 Dependent Signaling in B-cell Subsets in Atherosclerosis

Investigator: Aravindan Balaguru
Mentor: Elena Galkina, PhD
Co-Investigators:
1. Shelby Ma, Microbiology
2. Elena Galkina, Microbiology
Department: Microbiology

Abstract

Introduction
Atherosclerosis is an inflammatory disease characterized by the deposition of oxidized lipids within medium and large-sized arteries. A chronic inflammatory environment is indispensable in the progression of atherosclerosis. The existence of antibodies against LDL, oxLDL, and ApoB suggests a spectrum of different antigens that can activate the immune system in atherosclerosis. B cells play a subset specific role in atherosclerosis with marginal zone (MZ) cells and B1 B cells playing an atheroprtective role and follicular (FO) and innate response activator (IRA) B cells playing an atherogenic role. While the role of B cell subsets in atherosclerosis is well-established, the mechanisms by which B cell subsets are activated are unclear. B cell activation can occur through antigen binding and signaling through the B cell receptor (BCR) along with activation of toll-like receptors (TLR). CD45 is a protein tyrosine phosphatase that supports BCR signaling. Currently, it is not well understood how CD45 functions in TLR induced B cell in atherosclerosis.

Methods
We utilized a transgenic mouse model that express low levels of CD45 (CD45 L/L) and examined B cell subset specific activation in response to BCR and TLR stimulation. Flow cytometry was used to analyze Ca2+ flux responses after stimulation. To test the effects of low expression of CD45 in CD45L/L B cells in atherosclerosis, we performed adoptive transfer of CD45L/L or WT B cells into B cell-deficient atherosclerotic prone mice (uM-/-Apoe-/-) and fed a high fat diet for 23-28 weeks. Hearts were collected and MOVAT stainig was performed to assess lesion formation.

Results and Conclusion
We demonstrate that LPS stimulated TLR activation of B cells occurs in a subset specific manner and is affected by expression of CD45. MZ and B1 B cells are the most sensitive to LPS stimulation as indicated by increased Ca2+ flux. Reduced CD45 expression attenuates TLR induced B cell activation in all B cell subsets. In atherosclerosis, CD45 L/L recipients had increased lesion formation. This suggests that CD45 impacts TLR induced B cell activation in a subset specific manner. Attenuated MZ and B1 B cell activation expressing low CD45 levels suggest an atheroprotective role of TLR signaling.

Abstract Title: Malignant Phosphaturic Mesenchymal Tumor, a Case Report

Investigator: Madison Baldauf
Mentor: Shannon Lorimer, DO
Co-Investigators:
1. Madison Baldauf, BS, EVMS MD class of 2028
2. Karolina A. Serhan, MD (LT, MC, USN), Department of Orthopaedic Surgery, Naval Medical Center Portsmouth
3. Shannon Lorimer, DO, (CDR, MC,USN), Department of Orthopaedic Surgery, Naval Medical Center Portsmouth
Department: Orthopaedic Surgery

Abstract

Introduction
Phosphaturic mesenchymal tumors (PMTs) are rare neoplasms arising from bone or soft tissue. With less than 500 cases reported, approximately 35 are defined as malignant versus polyostotic. We present the case of a 44-year-old male with a pathologic fracture of the right femoral neck secondary to a malignant PMT with evidence of a metastatic lesion at the right proximal radius.

Case Information
The 44 year old male initially presented in October 2023 for right knee pain that progressed over nine months to include groin pain. There were no gross deformities, masses, swelling, or erythema. The patient, previously very active, had limited motion secondary to pain but was distally neurovascularly intact. Radiographs of the knee were unremarkable, however, hip films revealed a lucent lesion at the femoral neck with a pathologic fracture. Further imaging, biopsy, and a gene fusion panel were obtained, revealing a diagnosis consistent with PMT. Further PET-CT imaging revealed a secondary lesion at the right proximal radius, and several satellite lesions at the ribs. Biopsy at the radius was also consistent with PMT. The patient underwent surgical management with wide excision of the femoral tumor and proximal femoral replacement. Final pathology confirmed the diagnosis of malignant phosphaturic mesenchymal tumor. The patient has had an unremarkable postoperative course; currently he is scheduled for a proximal radius resection with subsequent radial head replacement and reconstruction with fibular-strut autograft to manage the secondary lesion.

Discussion
Phosphaturic Mesenchymal Tumors often present as tumor-induced-osteomalacia due to production of Fibroblast growth factor 23 (FGF-23). Diagnostic factors that may suggest malignancy are progressive increase in serum FGF-23, change in tumor size, and presence of multiple tumors, though multiplicity has been reported in benign cases as well. This benign multiplicity along with the vague symptoms such as generalized weakness make diagnosis very difficult. In this case, the patient's diagnosis was only delayed a few months after initial presentation, compared to an average delay of 5-7 years. The standard treatment of PMTs is complete surgical resection with wide margins. Based on previous case studies, resection alone has a 90% curative rate for benign and malignant PMTs. If the procedure is successful, serum values of FGF-23 and phosphate will normalize within one week and symptoms will resolve within 3-6 months. Post-operative phosphate and FGF-23 levels correlate with recurrence and should be used to monitor the patient.

Conclusion
If a malignant or benign PMT is suspected, an extensive history and physical along with whole-body PET-CT is essential for making a diagnosis. A gene fusion panel should also be considered as approximately 42% of phosphaturic mesenchymal tumors harbor a fibronectin 1-fibroblast growth factor receptor 1 (FN1-FGFR1) fusion. This may, in the future, be an avenue for targeted therapy. Continued documentation of these rare cases is vital in order to understand the behavior and optimal management of malignant PMTs.

Abstract Title: Medical Malpractice Trends Amongst Plastic Surgeons in Virginia

Investigator: Madison Baldauf
Mentor: Yifan Guo, MD
Co-Investigators:
1. Madison Baldauf, EVMS MD class of 2028
2. Jillian Jetmore, EVMS MD class of 2028
3. Alyssa Wilkinson, EVMS MD class of 2028
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5. Dr. Yifan Guo MD, Children's Hospital of the King's Daughters Department of Plastic Surgery
Department: Plastic Surgery

Abstract

Introduction
Prior studies have suggested that the most common reasons for litigation against plastic surgeons involve dissatisfaction with cosmetic outcomes, postoperative complications, and lack of informed consent. The aim of this project is to explore the medical malpractice claims made against plastic surgeons in Virginia to determine which occur most frequently.

Methods
Using the Virginia Board of Medicine's website, we identified all plastic surgeons in Virginia. This website allowed us to obtain all of the desired information including name, license number, city of practice, public versus private hospital, years in practice, board certifications, medical malpractice charges and outcomes, and paid claims information. The boundaries for this study include charges or claims from Jan 01 2010 to Dec 31 2024.

Results
Of the 291 plastic surgeons identified on the Virginia Board of Medicine's website, 25 (8.6%) had reported convictions or paid claims. Of these 25 physicians, 11 (44.0%) had records of paid claims only, 7 (28.0%) reported 1 or more convictions without any paid claims, and 7 (28.0%) had history of both actions on their records. Of the 14 physicians who have a report of malpractice conviction, 11 had only 1 charge, 2 had 2 charges, and 1 had 3 charges for a total of 18 convictions in the state of Virginia during this time period. The breakdown of the 18 charges are depicted in the Figure below, displaying drug related charges as the most frequent. There was no correlation between location of practice (i.e. rural vs city) and incidence of a conviction or claim, however 93% (n=27) occurred at a private practice.

Conclusion
Though the overall number of plastic surgeons charged with medical malpractice in Virginia is quite low, the most common charge is related to proper handling and prescribing of drugs. This point should incline plastic surgeons to take extra precaution to avoid a potential malpractice charges, especially if operating at a private practice. Going forward, we will obtain this data from other states to compare trends with Virginia. This information will allow plastic surgeons to develop strategies to mitigate risk and better understand patient values. Future study will replicate this project for other fields of practice and allow us to compare and contrast frequent malpractice charges amongst physicians in different specialties.

Abstract Title: Prospective Randomized Trial of Three-Dimensional Exoscope versus Conventional Tonsillectomy: Evaluating Surgical Ergonomics and Education

Investigator: Michael Baroody
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Co-Investigators:
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Abstract
Prospective Randomized Trial of Three-Dimensional Exoscope versus Conventional Tonsillectomy: Evaluating Surgical Ergonomics and Education

Introduction
Tonsillectomy is one of the most common procedures in otolaryngology. This surgery is typically performed by using electrocautery to remove the tissue. Due to the intraoral nature of the procedure, visualization of the surgical site can be challenging. The exoscope is a novel tool that provides 3D visualization of the surgical field. This study aimed to evaluate the ergonomics and teaching effectiveness of exoscope-assisted tonsillectomy compared to traditional tonsillectomy.

Methods
In this prospective, randomized trial, pediatric and adult patients underwent one-sided conventional tonsillectomy and contralateral exoscope-assisted tonsillectomy. We assessed surgeon ergonomics using the Rapid Upper Limb Assessment (RULA) instrument. Both residents and attending physicians also completed postoperative surveys that evaluated teaching quality (SETQ), perceived exertion (Borg CR10), and visualization quality. We analyzed RULA scores using linear mixed-effects models with surgeon and patient as random factors. We used Wilcoxon signed-rank tests to compare the survey data.

Results
RULA scores were significantly lower for exoscope-assisted tonsillectomy compared to conventional tonsillectomy ($p < 0.01$), indicating better ergonomics. Postoperative survey responses also favored the exoscope in several areas, including perceived exertion, quality of visualization, and teaching effectiveness ($p < 0.05$).

Conclusion
Exoscope-assisted tonsillectomy may have ergonomic benefits and improve the intraoperative educational experience as reported by both trainees and attending surgeons. Additional data collection through ongoing patient enrollment will allow for a better understanding of the utility of this novel device.

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Abstract Title: The expanding role for peripheral nerve stimulation for patients with malignancy related bone pain

Investigator: Casey Hadley Barry
Mentor: Matthew Chung, MD
Co-Investigators:
Department: Department of Pain Medicine, Division of Anesthesiology, Critical Care Medicine, and Pain Medicine

Abstract

Introduction
Improving quality of life for cancer patients, especially those suffering from cancer-induced bone pain (CIBP) depends upon effective pain management. CIBP management is complicated by its multifactorial etiology, both neuropathic and nociceptive, frequently resulting in persistent pain. Conventional CIBP management encompasses pharmacologic and interventional therapies as outlined by the World Health Organization (WHO) analgesic ladder. Insufficient outcomes from conventional management have generated increasing demand for supplementary interventional options to control CIBP.

Peripheral nerve stimulation (PNS) represents one potential alternative to conventional management and alleviates pain through targeted neuromodulation of affected nerves. Although PNS is an established treatment modality for certain chronic pain conditions (e.g., mononeuropathies, occipital neuralgia, CRPS, etc.), its utility in cancer-related pain, particularly CIBP, remains largely untested.

Case Information
This retrospective case series describes five patients who underwent PNS implantation for unresolved CIBP despite conventional management. Participants included in this case series were all over 18 years old, had radiographically confirmed osseous metastasis, and presented to clinic with intractable CIBP. Patients had received PNS leads under anesthesia and were percutaneously implanted at predetermined nerve targets corresponding with the pain distribution. As part of their care all patients had pain intensity (Numeric Rating Scale, NRS), pain-related symptoms (Edmonton Symptom Assessment Scale, ESAS), opioid consumption (Morphine Milligram Equivalents, MME), subjective pain reduction, and functional status that had been assessed at baseline and at regular intervals following PNS implantation.

Discussion/Clinical Findings
Due to early patient demise, one patient was excluded from data analysis. Three of the four remaining patients reported a reduction in pain intensity following PNS implantation, with a mean decrease in NRS of 2.7. Furthermore, all four evaluable patients reported substantial percentage reduction in pain ranging from 60-100%.

Conclusion
In conclusion, this case series suggest that PNS can provide significant pain relief and improvements in functional status/quality of life for patients with uncontrolled CIBP. Consequently, PNS represents a valuable alternative therapeutic option for patients whose CIBP has previously been difficult to control. While promising, these findings are limited by the small sample size and retrospective design. Future studies involving larger, prospective, randomized control trials are necessary to further evaluate the efficacy of PNS in CIBP patients.

Abstract Title: The potential role of peripheral nerve stimulation for focal cancer pain in hospice patients.

Investigator: Casey Hadley Barry
Mentor: Matthew Chung, MD
Co-Investigators:
Department: Department of Pain Medicine, Division of Anesthesiology, Critical Care Medicine, and Pain Medicine

Abstract

Introduction
Effective pain management is crucial to improving quality of life in hospice patients, particularly those suffering from cancer. Numerous factors, such as mobility, transportation access, comorbid conditions, and medication interactions complicate cancer-related pain management in hospice patients, often leading to persistent, unresolved pain. Conventional pain management is guided by the World Health Organization (WHO) analgesic ladder, which espouses a stepwise approach to pharmacological and interventional therapies. The persistent experience of cancer-related pain in hospice patients, despite current modalities, underscores the urgent need for supplemental pain management strategies. Peripheral Nerve Stimulation (PNS) is a potential alternative therapy that utilizes targeted neuromodulation of affected nerves to alleviate pain. While PNS use is well-described in some chronic conditions (e.g., mononeuropathies, occipital neuralgia, and CRPS), its use in hospice patients for focal cancer-related pain is largely unexplored.

Case Information
This retrospective case series explores the use of PNS to treat three hospice patients with focal cancer-related pain refractory to conventional management including traditional targeted nerve blocks. Inclusion criteria included being at least 18 years of age, active enrollment in hospice for palliative care, and confirmed diagnosis of focal cancer-related pain. Temporary PNS leads were implanted percutaneously under local anesthesia, with appropriate nerve targets selected based on pain distribution. Patient monitoring was conducted at regular intervals following implantation in both inpatient/outpatient settings to assess pain intensity (NRS), quality of life (ESAS), opioid consumption (MME), and functionality.

Discussion/Clinical Findings
Although long-term follow-up was limited by the nature of the patients' hospice status, consistent reports from patients and their families describing improved clarity of thinking and focus-attributed in part to marked reductions in pain intensity, pain-related symptoms, and overall opioid use-suggest that PNS may provide meaningful short-term palliation when appropriately selected.

Conclusion
Hospice patients and their families often encounter substantial barriers to effective pain management, including stigma surrounding opioid use and limited education about alternative strategies. These obstacles can result in inadequate pain control, diminishing quality of life in a patient's final days. This case series highlights a minimally invasive option-peripheral nerve stimulation-that warrants greater awareness for managing focal cancer pain in a population often overlooked due to their hospice status. Nonetheless, careful patient selection is essential, given the relative frailty and shortened life expectancy in this group. Ideal candidates may include those for whom preserving clarity of thought is paramount, particularly when current pharmacologic regimens compromise cognitive function in the pursuit of palliation.

Abstract Title: Assessing Cardiopulmonary Resuscitation Knowledge within the Community: A Survey of the Public's Perception

Investigator: Joshua C Betancourt
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Co-Investigators:
Sarah Parks, EVMS M1
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Abstract

Introduction
Cardiopulmonary resuscitation (CPR) is a critical tool for saving lives, however prior studies have shown that the public believes that CPR has an unrealistically high success rate. With these misconceptions in mind, patients and family members routinely opt for all CPR interventions even when low probability of survival and intact neurological outcome exists. This lack of understanding places additional strain on healthcare resources and often results in protracted grief amongst family members in difficult situations. Simultaneously, with the expansion of the internet and the rise of social media, free access to information has become much more accessible. This study will assess the current knowledge of CPR survival rates within the community, to assess if the public's perception of CPR has shifted since previous similar studies.

Methods
Individuals encountered during community outreach events were invited to complete an anonymous, voluntary survey assessing layperson knowledge of CPR related outcomes. This 14-question electronic survey was administered via REDCap software. Questions included sliding scale options for estimating survivability, multiple choice options for background knowledge, and basic demographic information. Survivability response averages were compared to the American Heart Association's reported 2023 statistics to calculate percent error.

Results
Thus far, 57 responses have been recorded (n=57). Average estimated survival of in-hospital cardiac arrest was found to be 65.61% (Actual=23.6%, Percent Error=178.01%), survival of out-of-hospital cardiac arrest was found to be 37.68% (Actual=10.2%, Percent Error=269.41%), good functional status, defined as no new serious impairment (i.e. cognitive impairment, speech issues, weakness/immobility, etc.), following an out-of-hospital cardiac arrest was found to be 50.49% (Actual=8.1%, Percent Error=523.33%). 82.5% (47/57) of participants reported having taken a CPR course in the past. 80.7% (46/57) of participants reported that they would want CPR performed on themselves, and 17.5% (10/57) of participants reported having discussed their CPR preferences with a healthcare professional. Average age of respondents was 42.96 (Range: 18-90, Median: 32), and the majority highest level of education completed was "More than 4-year college degree" at 47.4% (27/57).

Conclusion
Initial results of this survey study demonstrate that a considerable knowledge gap remains amongst the pubic regarding CPR related outcomes. On average, participants in the survey overestimated each category, with the most pronounced error apparent when estimating good functional status following OHCA. A wide age range of participants has been included, with many individuals having taken a CPR course in the past and having received substantial education. From these initial results, however, there appears to be ample opportunity for further public health education to closer align the publics' perception of CPR with the actual survival rates.

Abstract Title: Inferior Turbinate Reduction in Children Undergoing Adenotonsillectomy for Sleep Disordered Breathing

Investigator: Shreyas Srinath Bhalle
Mentor: Cristina Baldassari, MD
Co-Investigators:
1. Suhas Bharadwaj, MD; Dept. of Otolaryngology - Head & Neck Surgery
Department: Otolaryngology - Head and Neck Surgery

Abstract

Introduction
Pediatric sleep disordered breathing (SDB), which impacts up to 5% of school-aged children, can have profound negative impacts on quality of life. Although the pathophysiology of the disorder is multifactorial, adenotonsillar hypertrophy is common in children presenting with SDB. While adenotonsillectomy provides improvement in symptomology, symptoms of obstruction may continue to persist in children treated for SDB. Nasal obstruction, often due to turbinate hypertrophy is a common contributing factor. There are few prospective studies assessing treatment outcomes in children with SDB treated with inferior turbinate reduction (ITR). The objective of the study is to assess whether the addition of ITR to adenotonsillectomy results in greater improvement in symptoms and quality of life compared to adenotonsillectomy alone in children with SDB.

Methods
Children between the ages of 3 and 12 with nasal congestion or mouth breathing and greater than ≥75% turbinate obstruction on anterior rhinoscopy are enrolled in one of two groups of 40 participants. Standardized, validated questionnaires including the PSQ, the OSA-18 survey, as well as the NOSE survey were assessed at the visits. Acoustic rhinometry and rhinomanometry flow are performed pre-operatively, and at 3 and 6 months post-operatively. Measurements are taken before and after administration of oxymetazoline.

Results/Discussion:
Recruitment for the study is ongoing. Preliminary analysis of patients with completed baseline and 3-month visits (and some with 6-month follow-up) shows improvement in OSA-18, PSQ, and NOSE scores in both groups. Objective measures of nasal airflow, including acoustic rhinometry and rhinomanometry, also demonstrate improvement postoperatively.

Conclusion
Although recruitment for the study is still ongoing and few patients have completed the study, preliminary data from patients is promising. Patients report significant symptomatic improvement following adenotonsillectomy as well as those with ITR alongside adenotonsillectomy. While early findings are promising, additional enrollment and data collection are needed to determine whether the addition of ITR confers a statistically and clinically significant benefit over AT alone in improving symptomatology and quality of life.

Abstract Title: Neuropsychiatric Effects of Watershed Infarction: A Case Report

Investigator: Jake Blendermann
Mentor: David Spiegel, MD
Co-Investigators:
Department: Psychiatry

Abstract

Introduction
Watershed infarctions are strokes that occur in the junctions between the three major cerebral arteries. These regions are particularly vulnerable to infarction in cases of systemic hypotension or embolisms because of severe carotid artery disease. Previous literature points to a variety of behavioral and cognitive symptoms such as executive dysfunction and neurotransmitter imbalances. A notable sequelae of right parietal lobe infarction is agnosia, which is the inability to process sensory information despite preserved sensory and intellectual functioning. Watershed strokes in this region can disrupt key networks involved in visuospatial processing and body awareness. This case describes a patient who developed persistent visuospatial agnosia following a right parietal watershed infarct, with a supporting review of the literature.

Case Information
following a right parietal watershed infarct, with a supporting review of the literature.

Methods
We report the case of a 64-year-old female with no reported prior psychiatric history presented with confusion, impaired object recognition, and delirium after a documented right parietal watershed stroke associated with an aortic dissection. Comprehensive neurologic, neuropsychological, and imaging assessments were performed. A literature review was conducted to examine prior cases linking agnosia with watershed or parietal lesions and further expand on potential treatments for infarct-induced agnosia and related symptoms.

Discussion
Neuropsychological testing revealed marked visuospatial deficits and impaired recognition of objects and body schema, consistent with features of visual and asomatognosia agnosia. MRI confirmed ischemia within the right parietal watershed territory. Literature review identified several relevant cases and discussions, including described how frontal-parietal disconnection contributes to apathy and stimulus-bound behavior, both seen in agnosia, and relevant behavioral changes, such as apathy and depression, can accompany post-stroke agnosia. Other psychosocial impacts of neurobehavioral disabilities like agnosia, including frustration, social withdrawal, and loss of independence, can also occur.

Conclusion
This case reinforces the link between right parietal watershed infarcts and agnosia. Recognizing agnosia as a stroke sequela is essential, as it contributes significantly to functional disability and could be mistakenly identified as or conflated with other primary cognitive or psychiatric disorders. Early identification through targeted neuropsychological testing, along with multidisciplinary rehabilitation, may improve outcomes. Further research is needed to establish best practices for screening and managing agnosia in post-stroke populations.

Abstract Title: Real-World Interventional Outcomes for Cardiogenic Shock Complicating Acute Myocardial Infarction

Investigator: Zachary Bouker
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Department: Sentara Health Research Center

Abstract

Introduction
Acute myocardial infarction with cardiogenic shock continues to be a major concern. Cardiogenic shock (CS) occurs in 10% of patients with ST-elevation acute myocardial
infarction (STEMI) and is associated with a 30-day mortality of approximately 40%. With persistently high mortality rates, clinicians use interventions with marginal benefit and some evidence of harm. In this study, we examined the outcomes among AMICS patients treated with mechanical circulatory support (MCS) using a micro-axial left ventricular assist device and intra-aortic balloon counter-pulsation (IABP).

Methods
This observational study utilized the Cath PCI Registry v4.4/5.0 from the NCDR, with data augmented by the Xper Information Management System and Sentara EHR. We included patients undergoing acute PCI for STEMI from January 1, 2017, to December 31, 2022, and identified 505 patients with cardiogenic shock across 8 hospitals using registry coding. Primary outcomes were 30 and 180-day mortality, with secondary outcomes including in-hospital complications such as major bleeding, vascular access site injury, new requirement for dialysis, stroke, and sepsis. Statistical analysis was performed with an emphasis of comparing outcomes between 160 patients treated with IABP and 73 patients treated with MCS, as well as outcomes between MCS-inclined and IABP-inclined hospitals.

Results
Of the 505 AMICS patients, 73 were treated with MCS and 160 with IABP. Baseline characteristics were similar between treatment groups except infarct location. 34 (46.6%) of the 73 patients treated with MCS died during hospitalization, as compared with 50 (31.3%) of the 160 patients treated with IABP counter-pulsation ($p=0.035$). MCS was associated with 1.92 (CI=1.10-3.37) times higher 30-day mortality risk and 2.03 (CI=1.17-3.57) times higher 180-day mortality risk. MCS patients (81%) were predominantly treated at 3 of the 8 hospitals (MCS-inclined hospitals) in the region, while IABP use was almost evenly distributed among the MCS-inclined and IABP-inclined hospitals (52.5% versus 47.5%). When comparing MCS-inclined hospitals with IABP-inclined hospitals, patients had significantly higher 180-day mortality (45.3% versus 33.9%, $p=0.017$), and bleeding rates (15.1% versus 1.3%, $p<0.001$), with trends toward higher 30-day mortality (41.4% versus 32.6%, $p=0.064$) and access site injury (4.7% versus 1.3%, $p=0.063$).

Conclusion
MCS use with a micro-axial left ventricular assist device was associated with reduced survival and higher complication rates in AMICS patients undergoing emergency percutaneous coronary intervention. Before using this device for AMICS, tight selection criteria should be considered to minimize harm and maximize overall benefit.

Abstract Title: Risk Factors and Outcomes of Ambulatory Central-Line Associated Bloodstream Infections in Pediatric Hematology/Oncology Patients

Investigator: Renee Scott Brown
Mentor: Eric J. Werner, MD M.M.M
Co-Investigators:

Department: Division of Pediatric Hematology/Oncology CMQ&WO

Abstract

Background: Pediatric hematology/oncology (PHO) patients are at increased risk of central line-associated bloodstream infections (CLABSIs) due to toxic effects of their illness and treatments. While inpatient CLABSIs are a defined hospital quality metric with proven reduction strategies, ambulatory CLABSIs (A-CLABSI) are much less studied than inpatient CLABSI events. The goal of our project is to further identify risk factors and outcomes of A-CLABSI in PHO patients.

Methods

A retrospective chart review using contemporaneous huddle forms and electronic medical records, from A-CLABSI events identified in PHO patients in a single institution from 2011-2024 was conducted.

Results

112 A-CLABSI event huddle forms were located. Data collection has been completed for 44 events. 37 CLABSI infections met the A-CLABSI definition (84%), and 7 were single positive blood cultures (16%). 93% of infections occurred in oncology patients. Patient ages ranged from 12 months to 19 years. All infections resulted in hospitalization, and 11% of patients with A-CLABSIs died within 6 months. 30% of A-CLABSI events resulted in removal of the central line (CL). Of all the A-CLABSIs, 81% had their CL last accessed at the PHO clinic, 16% had their lines last accessed at home and 3% had their lines last accessed at the Emergency Department. 84% were administered IV therapy within 7 days of the event, and 78% of CLABSIs occurred within 6 days of CL access. 24% of CLs with CLABSIs had a prior history of CLABSI. The absolute neutrophil count ranged from 0 to 13,436 with 62% <500 cells/μL at the time of the A-CLABSI.

Conclusion

Preliminary findings show risk factors including cancer diagnosis, neutropenia, line access timing, and prior infection. The fact that 81% of CLs were last accessed in the PHO clinic indicates that this setting may be the most appropriate focus for QI interventions. The hospitalization rate, frequent need for CL removal, and other complications confirm that A-CLABSIs are costly and have significant morbidity. Ongoing analysis of all 112 records is expected to provide further insight to guide potential interventions.

Abstract Title: Identifying and De-Labeling Inappropriate Penicillin Allergies at a Primary Care Clinic: A Student-Driven Feasibility Study

Investigator: Robert Christian Busch Jr
Mentor: John E. Snellings, MD
Co-Investigators:
Gordon W. Theisz MD, Department of Community Medicine
Department: Family and Community Medicine

Abstract

Background
Penicillin is one of the most common reported drug allergies in the U.S., though evidence shows many cases are not true IgE-mediated reactions. Mislabeling often stems from factors such as misattributing infection symptoms, over reliance on family history, or non-IgE reactions from rapid drug administration; even true IgE-mediated penicillin allergies diminish over time. All these factors contribute to worse health outcomes for patients and poor antibiotic stewardship. Recent efforts have focused on expanding penicillin allergy de-labeling initiatives into primary care settings. This student-led initiative evaluated the feasibility of primary care based de-labeling and the role of medical students in coordinating such efforts.

Methods
Patients with documented penicillin related antibiotic allergies were identified on the daily schedule of the EVMS Ghent Family Medicine clinic. During the visit, consenting patients completed a standardized allergy questionnaire administered by a medical student, including the PEN-FAST tool to assess risk of future IgE-mediated penicillin reactions. Patients with a score of 0 were considered very low-risk (<1%) for true penicillin allergy if their reaction was non-severe, cutaneous only, occurred over 5 years ago, and required no treatment. These patients were deemed eligible for de-labeling without further testing. Patients with PEN-FAST scores of 1-2 (<5% risk) were considered low-risk and eligible for future direct oral challenge (DOC) with amoxicillin to confirm their status.

Results
A total of 62 patients were approached, with 54 consenting to take the questionnaire (87.10%). Subjects with a very low-risk PEN-FAST score was the most common (n=20, 37.04%) followed by low-risk (n=18, 33.33%). Among those qualifying for DOC, 11 subjects expressed interest in DOC (61.11%). Logistic regression analysis showed that subject PEN-FAST score was not statistically significant as a predictor for patient openness to taking penicillin in the future ($p = 0.2413$). However, PEN-FAST score was a statistically significant predictor for openness to DOC, with each 1-point increase in PEN-FAST score associated with a 34% reduction in the odds of willingness to undergo DOC (OR = 0.66, 95% CI: 0.43-0.99, $p = 0.0485$). The overall model was significant ($\chi^2 = 4.18$, $df = 1$, $p = 0.041$), indicating that higher PEN-FAST scores are linked to greater hesitancy toward DOC.

Conclusion
These findings support the feasibility of a student-led penicillin allergy de-labeling initiative in a primary care setting, with 87.10% of patients consenting to participate and 61.11% of qualifying subjects open for future DOC. Furthermore, 57.41% of participants assessed with PEN-FAST were either safely de-labeled immediately or expressed willingness to undergo DOC, underscoring the potential impact of these efforts. While PEN-FAST scores stratify clinical risk, they did not consistently predict patient willingness to be open to taking penicillin. PEN-FAST scores did predict openness to DOC, however. This difference in predictability most likely is due to small sample size as this is a change from previous findings. Overall, the results demonstrate that medical students can successfully lead allergy de-labeling efforts, and a significant number of patients are willing to take the next steps, with potential for broader implementation in the future.

Abstract Title: Biplane vs. Standard Ultrasound for Vascular Access: A Performance Assessment in Novice Medical Students

Investigator: Hannah Call
Mentor: Barry Knapp, MD
Co-Investigators:
1. Hannah Call\School of Medicine
2. Mackenzie Peeke\School of Medicine
3. Peter Gahan\School of Medicine
Department: Emergency Medicine

Abstract

Introduction
Background Venipuncture and intravenous (IV) line insertion are essential procedural skills that medical students must master prior to residency. Ultrasound guidance has been shown to reduce failure rates and complications associated with IV placement. Biplane ultrasound, a recent advancement, provides simultaneous longitudinal and transverse views. Its potential benefit for novice users remains unclear.

Methods
First-year medical students participated in a brief training session, followed by a crossover-controlled assessment during their ultrasound lab. Participants attempted IV placement using both biplane and single-plane ultrasound imaging. Primary outcomes included overall success rate, time to successful cannulation, and incidence of back-wall puncture. Student preferences were assessed with a post-session questionnaire.

Results
There were no statistically significant differences in overall success rates, time to successful cannulation, or incidence of back-wall puncture between the biplane and single-plane modalities. Despite the lack of measurable performance differences, students expressed a strong preference for biplane imaging on the follow-up questionnaire.

Conclusion
Biplane ultrasound did not improve overall success rates for vascular access among novice users compared with single-plane imaging. However, students strongly favored biplane imaging, suggesting possible subjective or ergonomic advantages. Further research is warranted to explore the potential clinical utility of biplane ultrasound in vascular access.

Abstract Title: Investigating CD40 and CD40L Expression and Neuronal Synaptogenesis Following Glioblastoma Invasion in Culture

Investigator: Jack Conrad Campbell
Mentor: Alberto E. Musto, MD PhD
Co-Investigators:
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Susanna Dolci, University of Rome Tor Vergata, Department of Biomedicine and Prevention
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Abstract

Introduction
Glioblastoma (GBM), an aggressive brain tumor, is associated with seizures in up to 50% of patients, suggesting tumor-driven disruption of neuronal signaling and structure. GBM modifies its environment via immune signaling and direct neuronal effects, but the mechanisms are not fully understood. One potential interaction involves CD40 and CD40L, immune signaling molecules expressed on GBM cells. Concurrently, neuronal responsiveness to such cues may be regulated by internal pathways like PTEN, a key molecule in cell growth and polarity. This study examines (1) whether both GBM cells and neurons express CD40/CD40L, enabling potential signaling, and (2) how PTEN deletion in neuronal precursors alters neuronal structure in the presence of GBM.

Methods
U-87 human GBM cells (ATCC® HTB-14™ cell line) and rat cortical neurons (Gibco™ A1084001) were analyzed for CD40 and CD40L protein expression using immunocytochemistry and fluorescence microscopy. Wild-type (WT) or PTEN-deleted mouse neural stem precursor cells (NSPCs) were differentiated into neurons and co-cultured with either non-tumor glia or U-87 GBM cells. Morphological changes were assessed by ICC for TUBB3 (neurons) and DAPI (nuclei).

Results
Both U-87 GBM cells and rat cortical neurons expressed CD40 and CD40L, suggesting potential immune-like signaling at the tumor-neuron interface. WT neurons grown with glia displayed well-developed arborization, but co-culture with GBM caused reduced branching and clustering. PTEN-deleted neurons exhibited impaired neurite outgrowth with glia but paradoxically increased branching in the presence of GBM.

Conclusion
Glioblastoma and neurons both express CD40/CD40L, supporting the possibility of immune-mediated communication in the tumor microenvironment. Neuronal response to GBM varies by PTEN status, indicating that intrinsic signaling pathways influence tumor-driven remodeling of synaptogenesis. These findings suggest that extrinsic (CD40/CD40L) and intrinsic (PTEN) mechanisms together shape neuronal structure, excitability, and potentially tumor-associated seizures.

Abstract Title: Odds of Finding a Plastic Surgeon on TikTok and Instagram

Investigator: Aakash Reddy Chadive
Mentor: Yifan Guo, MD
Co-Investigators:
Bharadwaj Chintalapati, MS2
William Lee, MS3
Department: CHKD Craniofacial Department

Abstract

Introduction
Social media has increasingly become a primary source of medical information for users of all ages, especially regarding elective procedures such as cosmetic surgery. Given the growing role of platforms like TikTok and Instagram in shaping public perception, we aimed to evaluate the presence of plastic surgeons on these platforms.

Methods
Over five weeks, we queried TikTok and Instagram using the five most common cosmetic surgeries in the United States: "Eyelid Surgery," "Liposuction," "Breast Augmentation," "Breast Lift," and "Tummy Tuck." Analytics were collected, and each account was categorized as follows: U.S. plastic surgeons as "Plastic Surgeon," U.S. physicians from other specialties as "Non-Plastic Surgeon," international clinics or physicians as "International," and all remaining accounts as "Unrelated."

Results
The search term "liposuction" yielded the highest number of (5) plastic surgeons and (7) non-plastic surgeons, all of whom were out of scope. "Eyelid surgery" yielded the most non-plastic surgeons (16, $P < 0.01$), all of whom were considered in scope. "Breast augmentation" and "tummy tuck" yielded zero plastic surgeons. The proportion of plastic surgeon accounts was 2.2% on Instagram versus 0.40% on TikTok ($P<0.01$). "Unrelated" accounts comprised 94% of the results on TikTok and 70% on Instagram.

Conclusion
Plastic surgeons accounted for less than 1% of all accounts identified across TikTok and Instagram. This low representation raises concerns about medical credibility and potentially exposes patients to misinformation. Therefore, both platforms appear inadequate for users seeking professional guidance from plastic surgeons.

Abstract Title: Systems-Based Interventions to Reduce Resident Physician Burnout: A Systematic Review

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Mentor: Rehan Qayyum, MD MPH
Co-Investigators:
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2. Julianne Ghiorzi, Doctor of Medicine Program
3. Kelly Thomson MD, Department of Internal Medicine
4. Julie Sill PhD, Department of Academic Affairs
5. Hasiba Hallak MD, Department of Internal Medicine
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Abstract

Introduction
High prevalence of burnout is a major concern in the medical field and resident physicians are particularly vulnerable, as they are expected to carry heavier workloads, endure inconsistent schedules, and receive lower pay, all while still being regarded as trainees. A previous systematic review found that the prevalence of burnout in resident physicians is as high as 50%, which increased to 76% post-COVID-19. Residency programs responded by designing systems-based interventions to deter burnout development. This systematic review seeks to identify studies between July 2016 and September 2024 and assess the impact of these interventions on resident burnout.

Methods
A systematic review was performed following the PRISMA 2020 guidelines. Identical search on three major databases (PubMed, Embase, and Web of Science) was performed using the keywords "burnout" AND "residency" OR "residency" OR "intern." This identified 12,550 peer-reviewed articles. Studies were included if they met the following criteria: 1) peer reviewed articles, 2) published in English 3) original research, and 4) an intervention that aimed to improve, assess, and report 5) burnout outcomes for resident physicians. Duplicates were removed and data were extracted from each article. Study quality was assessed using the ROBINS-I tool for cohort studies and Cochrane RoB 2 for randomized controlled trials. Results were pooled using random-effects meta-analysis for both continuous and categorical outcomes, followed by a Grading of Recommendations Assessment, Development, and Evaluation (GRADE) framework to highlight the overall certainty of evidence.

Results
We found 14 non-randomized control studies, including a total of 1,002 residents, that implemented either structural or organizational systems-based interventions. Interventions included, but were not limited to, changes to call schedules, expanding outpatient time, protection of non-clinical time, and promotion of wellness initiatives. Thirteen of the 14 studies implemented passive interventions, while only 1 utilized an active approach. Pooled results from 5 studies, found a significant reduction in emotional exhaustion (pooled mean difference[PMD]=-0.38, CI: -0.52 to -0.23, p<.0001) and depersonalization (PMD=-0.28, CI: -0.42 to -0.14, p<.0001) and a significant increase in personal accomplishment (PMD=0.21, CI: 0.07 to0.34, p=.003). However, pooling of results from the 2 studies examining overall burnout did not find a significant effect (PMD= -0.25, CI: -0.26 to 0.25, p=0.33.). Moderate heterogeneity was noted among studies reporting with emotional exhaustion (I2=60%) and mild heterogeneity with depersonalization (I2=46%). No heterogeneity was reported in studies assessing professional accomplishment (I2=0%) or overall burnout (I2=0%).

Conclusion
Implementing systems-based interventions to address burnout has demonstrated promising outcomes, including a meaningful reduction in emotional exhaustion and depersonalization, along with an enhancement of personal accomplishment in residents. Overall burnout was not affected; however, this result may be limited by the inclusion of only 2 studies. These findings support the integration of systems-based interventions to confront resident burnout and suggest further investigation to delineate the most effective ways to structure them.

Abstract Title: Mitigating Resident Physician Burnout with Mentorship-Based Interventions: A Systematic Review

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Abstract

Introduction
Burnout is highly prevalent among resident physicians, driven by heavy clinical workloads, long and irregular hours, and limited autonomy. Prior reviews estimate burnout rates of 50%, rising to 76% after the COVID-19 pandemic. In response, residency programs have increasingly implemented mentorship-based interventions to support residents and foster resilience. However, the effectiveness of these interventions in mitigating burnout remains uncertain. Clarifying their impact is critical not only for resident well-being but also for sustaining the physician workforce and ensuring the quality and safety of patient care. This systematic review synthesizes studies published between July 2016 and September 2024 to evaluate the impact of mentorship-based programs on resident physician burnout.

Methods
A systematic review was conducted in accordance with PRISMA 2020 guidelines.Comprehensive searches of PubMed, Embase, and Web of Science were performed using the keywords "burnout" AND ("resident" OR "residency" OR "intern"), yielding 12,550 records.Eligible studies met the following criteria: (1) peer-reviewed publication in English; (2) original research; (3) inclusion of an intervention targeting resident physicians; and (4) reporting of burnout outcomes. References were imported into Covidence for deduplication, screening, and data extraction. Risk of bias was assessed using the Cochrane RoB 2 tool for randomized controlled trials and ROBINS-I for observational studies. Where appropriate, study findings were quantitatively synthesized using random-effects meta-analysis, conducted in Review Manager(RevMan 5.4), with pooled estimates generated for both continuous and categorical outcomes. The overall certainty of evidence was appraised using the Grading of Recommendations,Assessment, Development, and Evaluation (GRADE) framework.

Results
Eighteen studies, encompassing 1,818 resident physicians, evaluated mentorship-based interventions delivered through mentorship, coaching, or structured therapeutic approaches. Of these, six employed randomized controlled trial designs, while twelve utilized non-randomized designs. Pooled analyses from five eligible studies demonstrated that mentorship-based interventions did not significantly reduce emotional exhaustion (pooled mean difference [PMD]= -0.16; 95% CI: -0.33 to 0.01; p = 0.07), depersonalization (PMD = -0.14; 95% CI: -0.31 to0.03; p = 0.10), or enhance professional accomplishment (PMD = 0.18; 95% CI: -0.01 to 0.36; p= 0.06). A modest but statistically significant reduction was observed for overall burnout (PMD= -0.18; 95% CI: -0.35 to -0.01; p = 0.04). All categorical outcomes found no benefit of mentorship-based interventions. Substantial heterogeneity was identified for emotional exhaustion (I^2 = 73%), professional accomplishment (I^2 = 93%), and overall burnout (I^2 = 94%),with moderate heterogeneity for depersonalization (I^2 = 39.8%).

Conclusion
Mentorship-based interventions did not demonstrate significant efficacy in alleviating emotional exhaustion and depersonalization or advancing professional accomplishments. However, the marginal decrease in overall burnout suggests mentorship may have a role in influencing burnout. Although the observed effects were limited, further examination is recommended to more clearly establish its impact.

Abstract Title: Review: EEG-guided anesthesia in patients with Neurological Disorders

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Co-Investigators:
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Abstract

Introduction
Successful anesthesia administration relies on various real-time monitoring, such as heart rate and respiratory rate, to adjust treatment for how a patient may respond to a specific anesthetic medication. This insight into the physiological state of the patient allows for more informed anesthesia administration.
EEG utilization potentially provides another line of insight into the state of a patient under anesthesia, by giving real-time insight into the electrical activity of a patient's brain. EEG-guided anesthesia has been implemented variably in the past in populations that may be at higher risk or have more stringent anesthetic needs, such as children, but the use of EEG during anesthesia administration is currently unstandardized. It can be a valuable asset in providing individualized dosages and treatment regimens by providing another stream of data, and anesthesiologists can monitor for reactivity to administered anesthetics. In this review, we are examining how EEG has been applied in patients with specific neurological conditions, such as TBIs or Alzheimer's disease, with a goal of identifying its role as real-time monitoring method in this higher-risk population.

Main Body
This scoping review project aims to examine EEG-guided anesthesia in patients with pre-existing neurological conditions with the aim of identifying its potential to improve perioperative outcomes. We conducted a search using multiple databases on topics relating to anesthetic complications, EEG-guided anesthesia, or patients with select neurological disorders.

A preliminary review on relevant literature suggests that EEG-guided anesthesia could benefit patients with certain neurological conditions that have a higher likelihood of anesthetic complications than the general population, such as increased postoperative confusion and delirium. In healthy patients, general anesthesia affects the EEG by causing dose-dependent slowing of rhythms, with higher dosing showing burst suppression patterns, which can be used as markers to guide dosing. Neurological disorders can impact baseline EEG readings, such as having a lower alpha/theta ratio in patients with Alzheimer's Disease compared to healthy patients at rest.

Conclusion
EEG-guided anesthesia may provide benefits in accurate dosing of anesthetics to minimize the risk of over-sedation or under-sedation and their associated complications, but disease-specific considerations are necessary to be able to practically improve outcomes in patients who present with altered baseline EEG readings. As part of our continued approach, a systematic search using multiple databases, including PubMed, will be done and articles will be included and excluded based on relevance. Articles will be synthesized to map the current state of EEG-guided anesthesia integration and benefit for patients with select neurological disorders. Overall, this research project will seek to synthesize current knowledge on EEG-guided anesthesia in patients with neurological disorders to potentially more accurately adapt to real-time fluctuations in patients' responses to anesthetic agents.

Abstract Title: The Role of Neural Cell Adhesion Molecule (Ncam) in The Recognition and Killing of Tumor by Car T Cells

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Abstract

Background
Chimeric antigen receptor (CAR) T cell therapy achieves remission in 60-90% of pediatric patients with refractory hematologic cancers but has shown limited efficacy in solid tumors. Neuroblastoma (NB), responsible for 15% of pediatric cancer deaths, has a five-year survival of <50% for high-risk patients. A key difference between hematologic and solid tumors is adhesion molecule biology. Blood cancers often express intercellular adhesion molecule-1 (ICAM-1), which stabilizes T cell activation via leukocyte function-associated antigen-1 (LFA-1). In contrast, NB expresses neural cell adhesion molecule (NCAM), which has been observed being incorporated into the immunological synapse of anti-NB CAR T cells. We hypothesize that the binding of NCAM on activated CAR T cells enhances NB killing in vitro

Methods
Four SH-SY5Y neuroblastoma cell lines were generated expressing GFP, full-length EGFR, and varying NCAM expression: (1) parental SH-SY5Y-EGFR, (2) ICAM-1 knock-in (ICAM+), (3) NCAM knockout (NCAM KO), and (4) NCAM KO with ICAM+ (NCAM KO ICAM+). Constructs were introduced via lentiviral transduction. EGFR-specific CARs included CD8 hinge and transmembrane domains with 4-1BB/CD3ζ signaling and mCherry reporter. Adhesion molecule expression was validated by flow cytometry. GFP-labeled NB cells were co-cultured with CAR or non-transduced T cells at effector-to-target ratios of 1:1 and 5:1 for 72 hours. Cytotoxicity was quantified by live-cell imaging (IncuCyte S3, Sartorius).

Results
NCAM expression on NB cells did not affect their growth rate when co-incubated with non-transduced CAR T cells. CAR T cells demonstrate less cytotoxicity on NB cells with no NCAM surface expression. Importantly, NCAM on tumor cells lead to increased cytotoxicity when co-incubated with 2224T CAR T cells expressing NCAM.

Conclusion
NCAM enhances CAR T cell cytotoxicity in neuroblastoma, likely by stabilizing immune synapse formation. These findings identify NCAM as a potential modulator of CAR T activity in solid tumors lacking ICAM-1. Targeting NCAM may improve CAR T therapy for pediatric solid tumors, and further studies could elucidate NCAM's mechanistic role in CAR T cell activation.

Abstract Title: Case Report: Post-Infarct Ventricular Septal Defect Closure

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Abstract

Introduction
Ventricular septal defect (VSD) following acute myocardial infarction is a rare but deadly complication that carries mortality rates exceeding 90% when left untreated. Interventricular septum rupture typically arises 3-5 days post-infarction when myocardial tissue is most friable. The sudden development of a left-to-right shunt leads to volume overload of the right ventricle, pulmonary vasculature, and left atrium, precipitating severe biventricular failure and cardiogenic shock.

Case Information
A 65-year-old female with hypertension, uncontrolled type 2 diabetes, and obesity presented to a local emergency department with acute onset of shortness of breath and chest discomfort. An electrocardiogram showed anterolateral ST-segment elevations and a portable chest x-ray displayed an enlarged cardiac silhouette and increased pulmonary vascular markings concerning for cardiogenic shock. She was intubated and transferred to a tertiary care center where coronary angiography demonstrated total thrombotic occlusion of the left anterior descending artery. Emergent PCI was performed, but despite successful intervention, the patient developed worsening cardiogenic shock. Transesophageal echocardiography revealed a post-infarct VSD, prompting intra-aortic balloon pump (IABP) placement.

During hospitalization, the patient developed ventricular tachycardia arrest (hospital day 8), acute kidney injury requiring continuous renal replacement therapy (CRRT), and ventilator-associated pneumonia, and she remained in refractory shock despite vasoactive inotropic support. On hospital day 12, percutaneous VSD closure was undertaken with fluoroscopic and echocardiographic guidance. Hemodynamics improved as Qp:Qs fell from 2.5 to 1.6 after placement of a 24-mm Amplatzer occluder device. Echocardiography confirmed stable device position with minimal residual shunt. The IABP was replaced during the procedure and removed successfully on hospital day 14.

Postoperatively, the patient developed worsening sepsis and lactic acidosis despite broad-spectrum antibiotics and CRRT. On day 16, her condition deteriorated further, and comfort measures were initiated before she expired on hospital day 17.

Discussion
This case highlights the challenges of managing a post-infarct VSD, one of the most feared mechanical complications of acute coronary artery occlusion. Historically, untreated post-infarct VSD carries a mortality rate exceeding 90% within two weeks, reinforcing the need for urgent intervention. Closure can be achieved surgically via a patch repair with infarct exclusion or percutaneously using a transcatheter occluder device. Optimal timing of post-infarct VSD repair remains controversial. Immediate repair within 7 days of infarction, usually within 24-72 hours of VSD diagnosis, is required in patients with refractory cardiogenic shock. Delaying intervention to ≥ 7 days after infarction, however, allows infarcted myocardium to fibrose, strengthening tissue for suturing or device anchoring and has been associated with improved procedural success and reduced mortality rates. In this patient, delayed percutaneous closure successfully reduced shunting and enabled IABP removal, but systemic complications ultimately dictated prognosis.

Conclusion
This case demonstrates both the potential and limitations of delayed percutaneous closure of post-infarct VSD. Although the intervention successfully reduced left-to-right shunting and allowed for weaning of IABP support, progressive sepsis and cardiogenic shock resulted in mortality. Early recognition, prompt initiation of mechanical circulatory support, and nuanced decisions regarding timing and modality of repair remain essential in managing this fatal complication of acute myocardial infarction.

Abstract Title: Identifying cause of PRES in a patient with sepsis and chronic anemia requiring blood transfusion.

Investigator: Alexandra Crawford, MS
Mentor: Timothy Chiang, MD
Co-Investigators: Imadul Haque, MD
Department: Radiology

Abstract

Introduction
Posterior Reversible Encephalopathy Syndrome (PRES) is a rare condition with debated pathophysiology. The leading theories include a hyper-perfusion model, where elevated, fluctuating arterial pressures cause disruption in the blood brain barrier leading to vasogenic edema in a preferential parieto-occipital distribution. However, roughly 30% of cases of PRES have been in normotensive patients where it is theorized that circulating toxins, either endogenous (from septic response) or exogenous (such as chemotherapeutics), lead to direct endothelial dysfunction and resultant edema. Given a wide range of possible radiographic and clinical manifestations, PRES is a challenging diagnosis requiring better characterization.

Main Body
A 39-year-old female with a history of polysubstance use, anemia, and chronic extremity wounds presented with fever and limb swelling. Her initial labs were significant for anemia and leukopenia for which she received 1 unit of packed red blood cells. She was started on broad spectrum antibiotics due to concern for sepsis. Further workup revealed sacroiliac joint osteomyelitis confirmed by IR-guided joint aspiration. Her hospital course was complicated by seizure-like activity prompting an EEG which showed focal neuronal dysfunction in the right posterior quadrant. Subsequent MRI head revealed bilateral cerebral cortical/subcortical hyperintensities and patchy irregularities in the cerebellum on T2/FLAIR imaging. Considering the neurological and radiographic findings, her presentation was most consistent with PRES. She was discharged on long term antibiotics and levetiracetam maintenance therapy with a favorable prognosis.

Discussion/Clinical Findings
PRES is a rare diagnosis with unclear pathophysiology making diagnosis and prevention challenging. Two leading theories attempt to explain the vasogenic edema seen in PRES. One theory is that fluctuations in blood pressure overcome the posterior circulation autoregulation. The other instead theorizes there is direct cytotoxic damage to the endothelium. In this septic patient who was largely normotensive, the latter theory seems more explanatory. She also required a blood transfusion due to anemia, further increasing the risk of mounting a systemic immune response from donor immunoglobulins or cytokines. Few cases have also theorized an association between blood transfusions and PRES. This patient's presentation supports the direct cytotoxic damage theory of PRES and brings up the potential of multiple risk factors compounding together to lead to unique or atypical cases.

Conclusion
Currently, there is a lack of understanding of PRES and its exact pathophysiology. Leading theories have prompted certain measures in care, such as controlling blood pressure and preventing large fluctuations. However, as in this patient, PRES can still present in patients with other primary conditions such as sepsis and anemia, giving support to alternative theories in its pathophysiology. It is worth considering in this patient if the combination of anemia and systemic inflammation led to a hemodynamic state pre-disposing her to PRES. Further collection of cases of PRES may offer commonalities that can aid in understanding its pathophysiology with the goal of faster diagnosis and prevention.

Abstract Title: Scalp Schwannoma Masquerading as a Pilar Cyst

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Mentor: Alberto E Musto, MD PhD
Co-Investigators:
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Abstract

Introduction
Scalp masses are frequently encountered in dermatology and primary care, with pilar cysts and epidermal inclusion cysts being a common diagnosis. Schwannomas are benign peripheral nerve sheath tumors that are rarely found in the scalp and are often overlooked due to their nonspecific clinical presentation. Their resemblance to the common pilar (trichilemmal) cyst may lead to misdiagnosis and unexpected findings on pathology. This case highlights the importance of histopathological, immunohistochemical evaluation, including schwannoma in one's differential, ensuring diagnostic accuracy and safe management.

Case Information
A 21-year-old male with no significant past medical history presented with a slowly enlarging, mobile, subcutaneous nodule on the right vertex scalp. The lesion was initially diagnosed clinically as a pilar (trichilemmal) cyst by a separate clinician two months prior. The patient reported mild discomfort associated with the lesion, which had been present for two years. Relevant family history included skin cancer in both paternal and maternal grandfathers. On examination, the lesion measured 1.5 cm, was firm but nontender, and showed no overlying skin changes, alopecia, or inflammation. The patient underwent a standard procedure for cases like these, excision under local anesthesia. Gross pathology revealed a 1.0 x 1.0 x 0.9 cm tan nodule. Histological evaluation demonstrated interlacing bundles of spindle cells with elongated, tapered nuclei. Immunohistochemical staining showed strong S100 positivity and actin negativity, confirming schwannoma. The patient recovered uneventfully, and follow-up at two weeks showed complete healing without recurrence.

Discussion/Clinical Findings
This case demonstrates the diagnostic challenge of distinguishing schwannomas from more common scalp lesions based solely on clinical features. The lesion's appearance and mobility were consistent with a benign cyst, underscoring the risk of misclassification in the absence of histological evaluation. Scalp schwannomas, though rare, should be considered in the differential diagnosis for subcutaneous nodules, particularly when lesions are long-standing, slowly enlarging, or atypical in presentation. The patient's family history of skin cancer, while not directly related to schwannoma, added clinical relevance in the context of evaluating scalp masses. Histopathology remains the diagnostic gold standard, and immunohistochemical staining further aids in confirming the neural origin of the lesion.

Conclusion
This schwannoma presentation is a rare case in dermatology; it is important to include it in the differential diagnosis of scalp masses that appear clinically benign. Early recognition ensures accurate surgical management, which can be especially dangerous if not diagnosed as one while doing a procedure. Definitive diagnosis requires histopathological and immunohistochemical confirmation. Overall, using modalities like these prevents complications while providing valuable learning opportunities for clinicians and residents to maintain a broad differential of such rare cases when evaluating scalp lesions.

Abstract Title: Pan-American group of studies in epilepsy: A multinational mentorship series to promote neuroscience education and research collaboration

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Abstract

Introduction
Neurological research requires international collaboration, but access to infrastructure, resources, and mentorship remains uneven. In the Pan-American region, barriers include economic inequality, language differences, bureaucratic delays, and limited mentorship. Professional meetings are costly, excluding students and early-career investigators, while a lack of resources hinders access to equipment, journals, and feedback. Language barriers further restrict publishing and networking. These challenges reduce opportunities for collaboration and professional growth. Prior mentorship initiatives show that structured support improves productivity, confidence, and outcomes such as Abstracts and publications. To address these disparities, neuroscientists from the USA, Argentina, and Peru launched the Pan-American Group of Studies in Epilepsy (2025), aiming to foster neuroscience education, collaboration, and mentorship through culturally responsive approaches.

Methods
- Monthly 60-90-minute virtual seminars provided a safe, bilingual space for dialogue across experience levels and countries.
- Rotating presentations from labs in Argentina, Peru, and the USA showcased diverse perspectives.
- Presentations were delivered by mentees (PhD, medical students, postdocs) and video-recorded for reflection and asynchronous access.
- Senior faculty offered feedback, guiding discussion on significance and methodology while encouraging student input.
- Seminars created opportunities for collaboration through shared research interests, protocol exchange, and potential student visits.
- Students shared experiences, challenges, and lessons learned, while receiving guidance to transform presentations into Abstracts, posters, or manuscripts.
- International exposure was provided without requiring travel or funding.
- The model was built without centralized sponsorship, demonstrating scalability for low-resource settings.

Results
Eight seminars have been held, covering topics such as drug-resistant epilepsy, GABA excitatory/inhibitory shifts, high-frequency oscillations, dendritic spine pathology, and much more. Each session engaged 20-30 participants, including physicians, neuroscientists, pharmacists, and students from Argentina, Brazil, Canada, Colombia, Mexico, Peru, and the USA. Student participation has been enthusiastic, with many presenting early-stage research and gaining confidence in scientific communication. The supportive, low-pressure setting allowed refinement before formal conferences. Feedback consistently described the series as intellectually stimulating, accessible, and motivating, particularly for those new to neuroscience. Several participants reported increased interest in research careers and presenting at professional meetings.

Conclusion
The Pan-American Group of Studies in Epilepsy seminar series fosters mentorship, collaboration, and visibility for early-career researchers. By prioritizing student-led research and cross-cultural exchange, it addresses disparities in training and builds capacity in underserved regions. This scalable, low-cost model can be adapted to other disciplines, with future directions including expansion to additional countries, stronger institutional partnerships, and regional epilepsy-focused public engagement.

Abstract Title: Selpercatinib Resistance in RET Fusion Positive NSCLC Mediated by MAPK Pathway Reactivation

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Mentor: Romel Somwar, BS PhD
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2. Tom Zhang, New York Medical College
3. Christopher Zorn, Department of Pathology and Laboratory Medicine\Memorial Sloan Kettering Student Summer Research Fellowship
4. Marc Ladanyi, Memorial Sloan Kettering Department of Pathology and Laboratory Medicine
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Abstract

Background
RET (REarranged during Transfection) is a proto-oncogene that lies on chromosome 10q11.21. It encodes a single-pass receptor tyrosine kinase (RTK) whose signaling regulates the growth and development of the nervous system and other tissues. Importantly, ligand binding and dimerization with other regulators across the cell membrane regulate its signaling and kinase activity. In cancer, oncogenic RET kinases result from either somatic mutations in the kinase domain or fusions of that domain with other genes at its 5' end. These partner genes typically contribute a protein-protein interaction motif that allows RET to dimerize and thus remain constitutively active.

These RET fusions are primary oncogenes in cancers of multiple histologies including papillary thyroid cancer and lung adenocarcinomas (LUAD). Currently, the only clinically approved treatment for patients with RET-dependent cancers are the RET inhibitors selpercatinib (any histology) and pralsetinib (lung and thyroid cancers), both of which have been shown to result in improvement of overall survival.

Resistance to RET therapy, however, develops invariably and coincidentally with activating mutations in RAS, RAF (upstream activators of MEK1/2 and ERK1/2) or other alterations. Still, the mechanism(s) by which the MAPK pathway adapts to drug treatment and its role in dampening therapeutic response has not been explored in lung cancer. Consequently, we aimed to systematically characterize the involvement of the MAPK pathway in driving RET therapy resistance and develop a viable therapeutic strategy to overcome it.

Methodology
We examined MSKCC molecular diagnostic data to identify patients with RET fusion and MAPK pathway alterations. We generated cell lines from both RET fusion LUAD patient samples and lentiviral mediated expression of RET fusion cDNAs. Oncogenic KRAS (G12D) was expressed under the control of a doxycycline-inducible promoter in a RET fusion-driven cell line. Protein phosphorylation was determined via Western blotting in cells treated with selpercatinib for 0,3,6,12, 24 and 48 hours. Cell growth was determined using a viability dye.

Results
We found multiple patients with RET fusions and activating KRAS or BRAF mutations. Expression of KRASG12D in cells with RET fusion reduced sensitivity to selpercatinib. Additionally, treatment of RET fusion-driven cell lines with selpercatinib resulted in rapid downregulation of growth and survival signals (AKT, ERK1/2, MEK1/2, S6) and subsequent reactivation of the MAPK pathway (ERK1/2 and MEK1/2) within 12 hours. Concomitantly, negative MAPK pathway regulator (eg. DUSP4/6, SPRY2, SPRED1) expression was depressed, likely accounting for the rebound of MAPK phosphorylation. Additionally, the transcription factor capicua (CIC), which suppresses negative MAPK regulator expression, remained localized to the nucleus following selpercatinib treatment. Furthermore, growth of RET fusion-driven cell lines was reduced by inhibitors of MEK1/2 (binimetinib), ERK1/2 (ulixertinib) and RAS (RMC6236) and combinations of these drugs with selpercatinib were synergistic in blocking cell growth.

Conclusion
Lung adenocarcinoma cell lines with RET fusion adapt to RET therapy by rapidly reactivating the MAPK pathway, likely via CIC-mediated suppression of negative MAPK pathway regulators. Combinations of selperacatinib with other inhibitors at different nodes within the MAPK pathway represents an effective therapeutic strategy to improve response in patients afflicted with RET fusion NSCLC.

Abstract Title: Mitochondria Targeted Dicarbonyl Scavenging with Mito2HOBA Reduces Atherosclerosis by Enhancing Plaque Stability and Suppressing Inflammation in Hyperlipidemic Ldlr^{-}/$^{-}$ Mice

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Co-Investigators:
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Abstract

Introduction
Atherosclerosis is a chronic inflammatory disease driven by lipid accumulation, immune cell activation, and oxidative stress. Recent evidence indicates that macrophage mitochondrial dysfunction contributes to the development and progression of atherosclerosis. This dysfunction leads to increased reactive oxygen species (ROS) production, promoting immune cell recruitment, inflammation, and, ultimately, the formation and disruption of atherosclerotic plaques. Mito2HOBA is a mitochondrial targeted scavenger of reactive dicarbonyls that has been shown to reduce inflammation. We hypothesized that Mito2HOBA treatment would reduce atherogenesis and promote plaque stability in hyperlipidemic Ldlr^{-}/$^{-}$ mice.

Methods
Ldlr^{-}/$^{-}$ mice were fed a Western diet to induce atherosclerosis and were treated with either Mito2HOBA or vehicle (water) control during the lesion development and progression phase. Various assays and evaluative methods were then used to determine the effect of Mito2HOBA on atherogenesis, plaque stability, and mitochondrial inflammation and function.

Results
Mito2HOBA treatment significantly reduced atherosclerotic lesion area without impacting serum cholesterol or triglyceride levels compared to the controls. In addition, Mito2HOBA treatment reduced necrotic core area, and increased collagen deposition, indicating improved plaque stability. Moreover, Mito2HOBA treatment inhibited oxidized lipid (OX-PC, MDA and 4-HNE) formation in both mice and macrophages, and preserved macrophage mitochondria integrity and functions, decreasing macrophage pro-inflammatory cytokine (IL-1β and TNF-α) formation.

Conclusion
Mito2HOBA inhibits atherogenesis and enhances plaque stability by reducing macrophage driven inflammation and preserving mitochondrial integrity. These findings support the therapeutic potential of Mito2HOBA in preventing the development and progression of atherosclerosis and promoting plaque stabilization.

Abstract Title: Pediatric Injury Epidemiology: National Evidence and the Case for Regional Analyses in Hampton Roads

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2. Co-A-2, Kristin Dornstauder
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Department: Emergency Medicine

Abstract

Introduction
Children's health outcomes in the United States have worsened, and injury remains a leading cause of pediatric emergency department (ED) visits, hospitalization, and death. Falls, motor vehicle collisions, sports-related trauma, and firearm incidents affect children differently depending on age, sex, race, and care setting. National datasets provide valuable epidemiologic data but lack pediatric-specific detail and regional granularity. Hampton Roads, Virginia, is a diverse region with both pediatric and general EDs, yet little has been published on its local pediatric injury burden. Without such data, prevention strategies, hospital preparedness, and resource allocation remain constrained.

Main Body
The literature shows that most pediatric injuries are preventable, though mechanisms evolve with age and context. Over the past decade, firearm-related injuries have risen sharply, surpassing motor vehicle collisions as the leading cause of injury-related death among U.S. children and adolescents. Firearm injuries have increased while blunt-force and pedestrian injuries have declined. Motor vehicle crashes remain a major source of severe trauma but have plateaued in fatal cases, even as overall trauma-related ED visits have grown. Falls continue to be common, especially among younger children, with more trampoline and playground injuries. The COVID-19 pandemic further shifted patterns, with decreased overall trauma volume but greater injury severity and higher rates of penetrating trauma.

Disparities in injury outcomes are well documented. White adolescents sustain higher rates of sports- and vehicle-related head trauma, while Black adolescents more often experience assault and weapon-related trauma. Self-inflicted harm is rising in younger girls, while assault remains common in older boys. Black, Hispanic, Pacific Islander, and rural children bear disproportionate burdens of severe trauma and worse outcomes.

Regionally specific analyses reveal substantial variability shaped by demographics and urban-rural differences. Some trauma centers reported >100% increases in penetrating injuries during the COVID-19 pandemic, while others saw declines. Urban centers more often report firearm and intentional trauma among socioeconomically disadvantaged children, whereas rural regions experience higher rates of motor vehicle trauma with limited access to specialized care.

Conclusion
This literature review highlights national trends and disparities, as well as regional variability in pediatric injuries. Large, multicenter cohort studies have shown that working towards improved readiness is independently associated with lower in-hospital mortality, even after adjustment. However, geospatial analyses link regional disparities in outcomes to variability in ED readiness and survival, particularly in rural and underserved areas, likely due to lack of regional data.

It is unclear based on this review alone which specific injuries Hampton Roads hospitals need to be most prepared. National-level datasets do not fully capture the specific epidemiology of regions like Hampton Roads with enough detail to assess local trends. This review suggests the need for further study using local database resources to provide granular data to guide trauma system planning and support community-level prevention strategies. By bridging the gap between national evidence and local context, this work can provide the data needed to reduce preventable injury and inform local practice.

Abstract Title: Cutaneous Portal: Recurrent Vibrio parahaemolyticus Septicemia in Decompensated Cirrhosis with Chronic Venous Stasis Ulcer Following Marine Exposure

Investigator: Luke Iacovoni Ekdahl
Mentor: Mark Flemmer, MD
Co-Investigators:
1. Tasniem Tasha, MD, Internal Medicine
2. Joshua Dolsen, MD, Internal Medicine
3. Hira Sarfraz, MD, Internal Medicine
Department: Internal Medicine

Abstract

Introduction
Recurrent Vibrio parahaemolyticus (V. parahaemolyticus) septicemia is a rarely reported but life-threatening complication in patients with cirrhosis, who are uniquely predisposed to severe bacterial infections due to cirrhosis-associated immune dysfunction and impaired barrier defenses. In this report, we present a unique case of middle-aged patient with decompensated cirrhosis and a chronic venous stasis ulcer who developed recurrent episodes of V. parahaemolyticus septicemia following cutaneous exposure, underscoring the heightened risk of invasive Vibrio infections in this population, particularly for those with frequent estuarian exposure.

Case Information
A 53-year-old male crabber with alcohol-related decompensated cirrhosis (Child-Pugh C), chronic venous stasis, and a history of V. parahaemolyticus septicemia presented with fever, hallucinations, and altered mental status. Vitals were notable for fever, tachycardia, and tachypnea. Labs showed elevated lactate, thrombocytopenia, hyperammonemia, and positive blood cultures for V. parahaemolyticus. Empiric antibiotics were initiated and streamlined to ceftriaxone and doxycycline following sensitivity testing. Workup for septic emboli and endocarditis were negative. The patient subsequently improved with clearance of bacteremia and resolution of encephalopathy.

Discussion/Clinical Findings
V. parahaemolyticus is a halophilic gram-negative bacterium found in brackish and coastal waters and is the most common cause of seafood-related gastroenteritis in the U.S. While it typically causes mild gastrointestinal illness, invasive infections such as cellulitis and septicemia may occur in immunocompromised individuals, particularly those with liver disease. Climate change and the spread of virulent serotypes have led to an increase in both geographic distribution and infection incidence. Unlike the better-known Vibrio vulnificus (V. vulnificus), reports of V. parahaemolyticus septicemia secondary to cutaneous exposure-especially recurrent cases-are rare. While no large-scale studies have been performed for V. parahaemolyticus bacteremia, the antibiotic selection was expanded upon current data for complicated Vibrio infections more broadly, including V. vulnificus septicemia.

Conclusion
This case highlights the need for heightened clinical suspicion for Vibrio species in cirrhotic patients presenting with soft tissue infections or sepsis, especially with relevant environmental exposures, and reinforces the importance of early empiric coverage for Vibrio in at-risk individuals. Awareness of this association is critical for timely diagnosis and intervention, given the fulminant course and high mortality associated with Vibrio bacteremia in cirrhosis. Likewise in the absence of large trials, we provide one example of the use of a third-generation cephalosporin and doxycycline, the regimen for V. vulnificus septicemia, in a complicated V. parahaemolyticus infection.

Abstract Title: IgG4 Related Disease Processes and Their Radiologic Findings

Investigator: Randa Eldosougi
Mentor: Frances Lazarow, MD
Co-Investigators:
Kevin Nguyen, MD, Department of Radiology
Department: Radiology

Abstract

Introduction
Immunoglobulin G4-related disease (IgG4-RD) is an autoimmune-mediated fibro-inflammatory condition capable of involving almost any organ, most common in men aged 60-70. It often presents with painless swelling and tumefactive lesions and is frequently misdiagnosed due to its resemblance to malignancy or infection. Diagnosis involves clinical, serologic, imaging, and histopathologic findings, with the ACR/EULAR, Japanese Comprehensive Diagnostic Criteria, and Mayo Clinic HISORt commonly used. While histopathology showing storiform fibrosis, obliterative phlebitis, and IgG4+ plasma cells remains the gold standard, imaging plays an important role in early recognition. This exhibit aims to serve as a consolidated resource to highlight common imaging patterns of IgG4-RD across organs and differentiate them from conditions with similar appearances.

Body
Head and Neck: Common manifestations involve the salivary and lacrimal glands, meninges, and thyroid. IgG4-related sialadenitis presents with painless bilateral swelling of the submandibular glands. Imaging shows symmetric, homogeneous enlargement of the salivary glands with loss of fatty hilum. These findings are similar to those seen in Sjogren's syndrome, however IgG4-related sialadenitis typically spares the parotid glands and lacks SICCA symptoms. Dacryoadenitis presents with upper eyelid edema and proptosis, with imaging demonstrating bilateral lacrimal gland enlargement extending into orbital tissues. Hypertrophic pachymeningitis refers to focal or diffuse dural thickening, often causing headaches and neurologic deficits. Contrast-enhanced MRI shows enhancing dural thickening. A rare but severe manifestation is Riedel's thyroiditis, presenting with a firm thyroid and compressive symptoms. CT shows hypoattenuation with invasive fibrosis into adjacent tissues, while ultrasound demonstrates a hypoechoic, fibrotic gland.

Chest, Abdomen, and Pelvis: Type one autoimmune pancreatitis (AIP) is the most common abdominal manifestation and often the initial feature. It presents with abdominal pain, nausea, and vomiting. On imaging the pancreas appears diffusely enlarged and "sausage shaped" with loss of lobulations and delayed homogenous enhancement. A rim of peripheral hypoattenuation is common. Sclerosing cholangitis is often found with AIP, showing concentric wall thickening and smooth symmetric strictures in the intrapancreatic bile duct. IgG4-related sclerosing cholangitis can mimic cholangiocarcinoma, but produces long, smooth strictures rather than irregular, abrupt ones. IgG4-related retroperitoneal fibrosis encases the abdominal aorta and its branches, with imaging showing homogeneous soft-tissue density surrounding the infrarenal aorta and iliac arteries.

Symptoms include back pain and hydronephrosis from medial ureteral displacement. It can be distinguished from malignancy as it usually spares the posterior periaortic space. Pulmonary involvement is also frequent, with CT showing nodules, ground-glass opacities, septal thickening, and bronchovascular bundle thickening. The multifocal, often bilateral nature of these findings, along with extrapulmonary disease, helps distinguish IgG4-related lung disease from infection or malignancy.

Conclusion
IgG4-RD can mimic malignancy, infection, or other autoimmune conditions; however, manifestations often follow distinct patterns on imaging. Recognizing these patterns is crucial for correct diagnosis and timely biopsy. Imaging also plays a significant role in monitoring response to therapy and during tapering. This exhibit consolidates some of the most common manifestations of IgG4-RD and highlights recognizable patterns found on imaging to improve diagnostic confidence for these manifestations and other organ system involvements.

Abstract Title: Sequelae of Eating Disorders on Imaging

Investigator: Randa Eldosougi
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Co-Investigators:
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Department: Radiology

Abstract

Introduction
Feeding and eating disorders (EDs) are defined by the Diagnostic and Statistical Manual of Mental Disorders as "a persistent disturbance of eating or eating-related behavior that results in the altered consumption or absorption of food and that significantly impairs physical health or psychosocial functioning." EDs cause the highest mortality of any mental health condition, with anorexia nervosa carrying a 5-10% mortality rate within 10 years of diagnosis. Females are approximately ten times more likely to be affected than males, though incidence in males is increasing. Risk factors include genetic predisposition, body image disturbances, and comorbid psychiatric conditions such as anxiety or depression. Disorders such as anorexia nervosa and bulimia nervosa lead to multisystem complications, many of which can be detected on imaging before clinical recognition. Patients may deny symptoms, minimize severity, or be misdiagnosed, placing radiologists in a pivotal role for early detection. Familiarity with subtle imaging clues is therefore essential to guide timely management and multidisciplinary intervention. This review was conducted by searching PubMed for literature on common imaging findings in eating disorders, which were then cross-referenced with Radiopaedia and RSNA RadioGraphics to identify representative imaging examples.

Body:
Restricting Behaviors: The systemic effects of restrictive eating largely result from chronic malnutrition, electrolyte imbalances, hormonal dysregulation, and metabolic alterations. Musculoskeletal findings are common, with osteopenia and osteoporosis predisposing patients to insufficiency fractures, particularly in the spine and pelvis. Central nervous system abnormalities, including brain atrophy with ventricular enlargement and widened sulci, can mimic early neurodegenerative disease, though these changes are often reversible with nutritional rehabilitation. Gastrointestinal complications include dysmotility and superior mesenteric artery syndrome, which arises due to loss of mesenteric fat. Cardiac imaging may reveal "small heart syndrome," pericardial effusions, or mitral valve prolapse, reflecting cardiovascular strain. Cross-sectional imaging often demonstrates diffuse subcutaneous fat loss, providing an indirect marker of malnutrition. Renal and hepatic complications, such as nephrolithiasis, electrolyte-related injury, and hepatic steatosis, may also be observed.

Purging Behaviors: Purging behaviors, including self-induced vomiting, laxative use, or diuretic abuse, produce additional organ-specific complications. Repeated vomiting increases the risk of esophageal rupture and Mallory-Weiss tears. Gastrointestinal manifestations can also include acute gastric dilatation following binge episodes, which may progress to necrosis or perforation. Pulmonary complications such as aspiration and emphysema-like changes may occur secondary to connective tissue damage. Classic dental and ENT findings include enamel erosion and parotid gland enlargement, particularly in bulimia. Imaging can provide clues to these subtle but characteristic changes, alerting radiologists to the presence of an eating disorder. Integration of findings from both restrictive and purging behaviors is critical, as patients may present with vague or nonspecific complaints.

Conclusion
EDs produce subtle but characteristic imaging findings across multiple organ systems that may mimic other pathologies such as malignancy, chronic infection, or sequela substance-related disease. Radiologists must synthesize clinical context with imaging findings to detect these disorders early. Timely recognition not only improves diagnostic accuracy but can redirect workup, facilitate life-saving psychiatric intervention, and positively influence long-term outcomes.

Abstract Title: Preferred Gait Speed Predicts Mild Cognitive Impairment in Community-Dwelling Older Adults

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Co-Investigators:
Department: HS Physical Therapy

Abstract

Introduction
Mild cognitive impairment (MCI) describes subtle, but measurable deficits in memory or thinking that exceed expected age-related changes. MCI is often a precursor to the development of dementia. By age 70, nearly two-thirds of adults experience some degree of cognitive decline. Early identification of MCI is therefore critical. The Montreal Cognitive Assessment (MoCA) is widely used for screening but requires training and approximately 10 minutes to administer, which may not be feasible in fast-paced clinical settings. Gait speed has been proposed as a "sixth vital sign," reflecting overall health and functional reserve. Slower gait speed is associated with falls, hospitalization, morbidity, and poor discharge outcomes. The aim of this study was to identify whether gait speed could accurately predict MCI classification.

Methods
A secondary analysis of deidentified data from a community-based fall risk assessment program was conducted. The sample included 208 participants (70±7 years, 67% female). Assessments included the long form physiological profile assessment (PPA), MoCA, Modified Falls Efficacy Scale (MFES), and five 20-foot overground walking trials on a pressure-sensitive walkway at both preferred and maximal gait speeds. A participant was classified as having MCI if their MoCA score was ≤ 25.

Results
A binomial logistic regression was conducted to examine whether preferred walking speed predicted cognitive risk status (intact vs. MCI). The model was statistically significant, $\chi 2(1,208) = 13.969$, $p<.001$, indicating that walking speed reliably distinguished between groups. The regression coefficient for preferred walking speed was negative and significant (B=-3.79, SE=1.07, Wald=12.61, $p<.001$). The odds ratio indicated that for each centimeter per second increase in preferred walking speed, the odds of being classified as having MCI decreased by 97.7% (OR=0.023, 95% CI [0.003,0.183]). The overall classification accuracy of the model was 62.2%. Sensitivity was 87.8% (correctly classifying MCI cases), whereas specificity was 16.7% (correctly classifying intact cases).

Conclusion
Routine screening for MCI is essential but challenged by limited visit times and the need for training in cognitive screening tools such as the MoCA. Preferred gait speed, already used in clinical practice to evaluate frailty and fall risk, may also serve as a rapid screening tool for cognitive impairment. This analysis demonstrates that a slower preferred walking speed is significantly associated with increased odds of MCI classification. While the model was more effective at identifying MCI than intact cognition, these findings highlight the potential for gait speed to complement traditional cognitive screening, offering clinicians a time-efficient means of detecting patients at risk for cognitive decline.

Abstract Title: Influence of Food Order on Appetite and Satiety Responses in Vegetarian Meal Contexts: A Randomized Parallel-Group Study

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Abstract

Introduction
Understanding how the influence of meal food order on subjective appetite and satiety is critical for developing dietary interventions that address obesity and metabolic disorders. Previous studies primarily examined the impact of food order on appetite, hunger, and satiety ratings on omnivorous diets. The impact of food order within vegetarian meals on real-time hunger, appetite, satiety, and fullness perceptions remains underexplored.

Methods
An unblinded, randomized parallel-group study evaluated the effect of vegetarian meal food order on perceptual ratings. Fasted participants underwent body composition measurements, followed by baseline assessments of blood glucose and perceptual responses (hunger, appetite, satiety, fullness; 0-10 Likert scale). A standardized vegetarian meal with two components (150 g edamame mixed with 10 g butter and 1/8 tsp salt; 150 g long-grain white rice) was provided in a randomized sequence. The same variables were measured postprandially at 30, 60, and 90 minutes. Perceptual data were analyzed using the area-under-the-curve (AUC) trapezoidal method. 60 participants are planned for participation (n=34/60). Mann-Whitney U testing was used to evaluate between-group differences.

Results
There were no statistically significant between-group differences in AUC for perceptual data (all $p > .05$). Satiety indicated a greater difference between groups without any statistical significance ($U=123.5$; $p=0.474$). Satiety AUC was 508±143 for rice first and 551±203 for edamame first. Postprandial blood glucose peaked at 30 minutes with no between-group differences (rice first: 124±26 mg/dL; edamame first: 119±28 mg/dL; $p > .05$).

Conclusion
These findings indicate that there is no clear significant influence of meal ordering on subjective appetite and satiety among current participants. This could be due to a lack of differences in glycemic and insulin responses. There is a need to complete this study and to conduct further research to better understand vegetarian eating patterns on appetite and hunger perceptions.

Abstract Title: Rare Bronchoesophageal Fistula in Crohn's Disease: A Radiological Perspective:

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Mentor: Robert McClure, BS MD
Co-Investigators:
1. Marie Mack MD, Radiology
Department: Radiology

Abstract

Introduction
Crohn's disease (CD) is an idiopathic inflammatory bowel disease that most often involves the ileum and colon. Esophageal disease is rare, affecting 0.2%-1.8% of symptomatic adults, and can lead to stricture, pseudopolyps, and, rarely, fistula formation. Bronchoesophageal fistula (BEF) is an exceedingly uncommon complication, with fewer than 20 reported cases. We present a case of CD complicated by BEF and pulmonary abscess, emphasizing diagnostic imaging findings.

Case Information
A 71-year-old woman with CD, diabetes, and hypertension presented with fatigue, cough, fever, chills, and pleuritic chest and epigastric pain. She described months of malaise, dysphagia, exertional dyspnea, and weight loss. Exam revealed decreased breath sounds and rhonchi at the left lung base.

Laboratory studies showed leukocytosis and lactic acidosis. CT chest and abdomen demonstrated a large loculated pleural collection with air-fluid levels consistent with pulmonary abscess and extraluminal oral contrast extravasation concerning for esophageal perforation. Endoscopy revealed chronic esophagitis with a benign pseudo polyp, mid esophageal stricture, and a fistula versus contained perforation. A covered esophageal stent was placed, and subsequent esophagogram showed no active leak. Despite the presence of a large pulmonary abscess, the patient declined interventional drainage and was discharged.

On follow-up, CT revealed resolution of the pulmonary abscess but persistent features of BEF. Later stent removal demonstrated distal esophageal polyps, stricture, and raw mucosa at the suspected fistula site. Five months later, repeat contrast esophagogram confirmed a persistent tract between the distal esophagus and a left basilar bronchus, with irregular mucosa and a thoracic stricture.

Discussion
In adults, BEFs are typically acquired from malignancy, infection, trauma, or surgery; CD is a rare cause. Radiologic evaluation is central to diagnosis. Contrast esophagography remains the initial study, with the hallmark finding of contrast extravasation into the tracheobronchial tree. However, small or intermittently patent tracts may be missed. CT provides critical complementary information: direct visualization of the fistulous tract in many cases, as well as indirect signs such as mediastinal inflammation, endobronchial debris, aspiration changes, and associated abscesses. CT also guides surgical planning by delineating fistula extent and adjacent complications. Endoscopy confirms mucosal disease and allows for biopsy or therapeutic intervention.

Management of BEF is complex. Esophageal stents can reduce aspiration but rarely provide durable closure. While anti-TNF agents and immunomodulators are established in other fistulizing CD, evidence for esophageal fistulas is limited to case reports. Endoscopic sealants, including Onyx polymer, have been reported in refractory cases, though esophagectomy with gastric pull-through remains the most definitive treatment. Our patient demonstrates the limited durability of medical or endoscopic therapy and the key role of radiology in both initial detection and longitudinal assessment.

Conclusion
BEF is a rare but serious complication of CD. Radiology is essential for diagnosis, with CT and contrast esophagography together providing complementary evidence of fistulae and complications. While medical and stent-based therapies may palliate symptoms, surgery remains the most reliable treatment for refractory disease. Early recognition and multidisciplinary collaboration are critical for optimal outcomes.

Abstract Title: Cystic Neck Masses: Differential Etiologies and a Case of Suspected Fourth Branchial Cleft Cyst

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Co-Investigators:
Virang Kumar MD, Macon & Joan Brock Virginia Health Sciences at Old Dominion University
Radiology
Department: Department of Radiology

Abstract

Introduction
The branchial apparatus is the embryological precursor to many of the structures in the head, face, palate, and anterior neck. It consists of paired arches, pouches, and clefts. When the branchial clefts fail to involute, a cyst, sinus, or fistula can form along its tract. Branchial cleft anomalies account for approximately 20% of congenital cysts in children, with the second branchial cleft being the most common, representing approximately 95% of branchial cleft cysts. The first branchial cleft accounts for approximately 1-4% of branchial cysts. Cysts arising from the third and fourth cleft are considered extremely rare. We report a case of an adult patient with a cystic structure located anteromedially to the left sternocleidomastoid muscle. Based on the location of the cyst, its anatomical relationships, and lack of secondary inflammation there is suspicion for a fourth branchial cleft cyst.

Case Information
A 33-year-old female with a no significant past medical history presented to the emergency department with a painful swelling on the left side of her anterior neck, first noticed approximately one year prior. She endorsed progressive enlargement of the mass for the past month, as well as subjective fevers within the past 3 days. Associated symptoms include dysphonia and neck stiffness. On presentation, the patient had stable vital signs. Physical exam revealed a smooth and immobile left anterior neck mass without erythema. She denies any history of thyroid disease or weight loss. Contrast-enhanced head and neck CT demonstrated a multiseptated 2.4 x 2.2 x 4.5 cm cystic structure anteromedial to the left sternocleidomastoid muscle spanning the C2-C5 cervical levels with associated posterior displacement of the left internal jugular vein and common carotid artery. Pertinent negatives include unremarkable parotid and submandibular glands, no diffuse lymphadenopathy, and clear lungs.

Discussion/Clinical Findings
Branchial cleft cysts are frequently diagnosed in younger individuals and may be asymptomatic initially though may enlarge and predispose to superimposed infection. Many etiologies for lateral neck masses exist, so a broad differential should be considered. In this case, the lack of secondary inflammation lowers suspicion for an infectious etiology. Other etiologies of lateral cystic neck masses include branchial cleft cysts, necrotic lymphadenopathy, vascular malformations, lymphangioma, carotid body tumors, lymphoma, and other malignancies. There are no pathognomonic features of branchial cleft anomalies, which necessitate an understanding of their anatomical relationships and tracts. The fourth branchial cleft tract begins at the apex of the piriformis sinus and descends inferiorly toward the thyroid gland, passing below the superior laryngeal nerve and above the recurrent laryngeal nerve. In this case, the findings are suggestive of a fourth branchial cyst, though definitive anatomical relationship may be definitively evaluated with MR or with surgical correlation.

Conclusion
Branchial cleft cysts can be rare depending on the structure they originate from, and require knowledge about their anatomical relationships, tract, image features, and common presentations to accurately diagnose them. This case demonstrates the anatomical relationships and clinical presentation needed to suspect a fourth branchial cleft cyst.

Abstract Title: Polypharmacy and Rising Medication Use in the United States: 25-Year National Trends

Investigator: Juan Emilio Ferrando
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Co-Investigators:
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Department: Department of Medicine

Abstract

Introduction
Prescription medication use has increased globally, driven by aging populations, rising prevalence of chronic diseases, and expanding therapeutic options. In the United States, monitoring trends in medication use is critical for understanding the implications for patient safety, health equity, and healthcare costs. While prior studies have described medication use at single time points, there is limited evidence on long-term population-level changes across demographic and socioeconomic subgroups. In particular, polypharmacy (the concurrent use of multiple medications) is increasingly recognized as a public health concern given its association with adverse drug events, hospitalizations, and diminished quality of life. Understanding temporal patterns in both overall medication use and polypharmacy is therefore essential to guide policy and practice. This study examined 25-year national trends in prescription medication use, with emphasis on differences by sex, race/ethnicity, and socioeconomic status.

Methods
We analyzed data from seven continuous cycles of a nationally representative health survey spanning 1999-2023. Prescription medication use was defined as current use of ≥1 prescription drug, and polypharmacy as use of ≥5 drugs. Demographic and socioeconomic information was obtained via structured interviews, including sex, age, race/ethnicity, and family income-to-poverty ratio (FIPR). Survey-weighted generalized linear models with log links and binomial distribution were used to estimate prevalence ratios (PRs) and assess temporal trends. Interaction terms were incorporated to evaluate differences in trends by subgroups

Results
A total of 119,389 participants were included (51% women, 23% Black, 29% Hispanic, 14% aged ≥65 years). The weighted prevalence of any prescription medication use was 48.7% (95%CI: 48.1-49.2), while polypharmacy prevalence was 11.1% (95%CI: 10.8-11.4). Both outcomes increased significantly over the 25-year study period ($p<0.001$ for trend). Women reported higher prevalence of any medication use compared with men (PR=1.12; 95%CI: 1.10-1.14; $p<0.001$) and higher prevalence of polypharmacy (PR=1.15; 95%CI: 1.10-1.20; $p<0.001$). However, temporal increases in both outcomes were steeper among men than women (interaction $p<0.001$). Racial differences were also observed: Black adults had lower prevalence of medication use (PR=0.90; 95%CI: 0.88-0.92; $p<0.001$) and polypharmacy (PR=0.92; 95%CI: 0.87-0.97; $p=0.001$) compared with White adults. Despite this, Black adults experienced a 1% per year greater increase in prevalence of any medication use ($p<0.001$), narrowing the racial gap over time; polypharmacy trends followed a similar trajectory. Across income levels, both medication use and polypharmacy were inversely associated with higher FIPR ($p<0.001$ for both), though temporal increases were consistent across strata.

Conclusion
Over the past 25 years, prescription medication use and polypharmacy have increased substantially in the U.S. adult population, with notable differences by sex, race/ethnicity, and socioeconomic status. Women remain disproportionately exposed to polypharmacy, while Black adults, although historically less likely to use prescription medications, are experiencing faster increases in use. These findings underscore the growing scope of medication exposure and its potential impact on population health, health equity, and healthcare resource utilization. Future research should evaluate drivers of these trends, including clinical guidelines, prescribing practices, and access to care, and assess strategies to optimize medication use while minimizing risks associated with polypharmacy.

Abstract Title: Mindfulness-Based Interventions as a Tool to Combat Resident Physician Burnout: A Systematic Review

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Abstract

Introduction
Burnout among physicians is a pervasive and growing concern, with implications for clinician well-being, patient care, and healthcare system performance. Resident physicians may be particularly vulnerable due to unique stressors encountered during training, including relocation, extended work hours, escalating clinical responsibilities, and the administrative burden of documentation. In response, residency programs have increasingly implemented mindfulness-based interventions (MBIs) as a strategy to mitigate burnout and promote resilience. While prior studies suggest potential benefits of MBIs, the evidence specific to resident populations remains fragmented. This systematic review synthesizes published literature between July 2016 and September 2024 to evaluate the effectiveness of MBIs in reducing burnout among resident physicians.

Methods
A systematic review was conducted in accordance with updated PRISMA guidelines. Comprehensive searches of three electronic databases (PubMed, Embase, and Web of Science) were performed using the terms: ("resident" OR "residency" OR "intern") AND "burnout." The search yielded 12,550 records. References were imported into Covidence for screening and duplicate removal. Eligible studies met the following criteria: (1) published in English; (2) original research (excluding reviews, commentaries, or Abstracts); (3) incorporated MBI; and (4) reported burnout outcomes. Two independent reviewers screened titles/Abstracts, conducted full-text reviews, extracted data, and assessed the risk of bias, with a third reviewer resolving disagreements at all stages. Where appropriate, results were synthesized quantitatively using inverse variance-weighted random-effects models. The certainty of evidence across studies was evaluated using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) framework.

Results
We identified 19 eligible studies, comprising 11 randomized controlled trials and 8 observational pre-post designs. A range of MBIs were evaluated, including meditation, journaling, silent retreats, relaxation techniques, and breathing exercises, delivered in both virtual and in-person formats. Across 13 studies, MBIs were associated with significant reductions in emotional exhaustion (pooled mean difference [PMD] = -0.61; 95%CI: -0.72 to -0.50; $p<0.001$) and in depersonalization (12 studies; PMD= -0.55; 95%CI: -0.65 to -0.44; $p<0.001$). Eleven studies reported a modest but significant improvement in personal accomplishment (PMD= 0.12; 95%CI: 0.01 to 0.22; $p=0.02$). In contrast, eight studies that assessed overall burnout demonstrated no significant effect of MBIs (PMD= -0.15; 95%CI: -0.32 to 0.02; $p=0.08$). Substantial heterogeneity was observed among studies reporting emotional exhaustion ($I^2=88\%$), depersonalization ($I^2=95\%$), and personal accomplishment ($I^2=80\%$), whereas studies reporting overall burnout showed low heterogeneity ($I^2=19\%$). Visual inspection of funnel plots suggested potential publication bias for emotional exhaustion, depersonalization, and personal accomplishment outcomes. Based on GRADE, the certainty of evidence was rated as moderate for reductions in emotional exhaustion and depersonalization, low for improvement in personal accomplishment due to inconsistency and possible publication bias, and low for overall burnout given the null effect and imprecision.

Conclusion
MBIs are associated with meaningful reductions in emotional exhaustion and depersonalization and modest improvements in personal accomplishment among resident physicians, although effects on overall burnout appear limited. These findings suggest that MBIs may be a valuable, though not comprehensive, strategy to address specific components of resident burnout, underscoring the need for larger, rigorously designed trials to clarify their role.

Abstract Title: An Analysis of Curriculum-Based Interventions on Burnout Outcomes in Resident Physicians: A Systematic Review

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Abstract

Introduction
Physician burnout represents a critical and growing concern across the medical profession, with residents at heightened risk due to the demanding nature of training, frequent transitions, extended duty hours, increased clinical responsibility, and substantial documentation requirements. To address this challenge, residency programs have implemented structured curricula designed to reduce burnout. However, the true effectiveness of such curricular interventions remains unclear, and prior evaluations have been limited in scope and rigor. A comprehensive and up-to-date synthesis of the evidence is therefore needed. This systematic review examines studies published between July 2016 and September 2024 to evaluate the impact of curriculum-based interventions on resident physician burnout.

Methods
A systematic review was conducted by a six-member investigator team in accordance with updated PRISMA guidelines. A comprehensive search strategy was applied to PubMed, Embase, and Web of Science, using the terms ("resident" OR "residency" OR "intern") AND "burnout," yielding 12,550 records. All citations were imported into Covidence for duplicate removal and systematic screening. Studies were eligible if they met the following criteria: (1) published in English; (2) original research (excluding reviews, commentaries, and conference Abstracts); (3) evaluated a curriculum-based intervention; and (4) reported burnout outcomes. Screening was conducted in two stages (title/Abstract and full-text) by two independent reviewers, with a third reviewer adjudicating disagreements. Data extraction and risk of bias assessments were likewise performed in duplicate. Where feasible, data were pooled using inverse variance-weighted random-effects meta-analytic models. The overall strength of the evidence was appraised using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) framework.

Results
A total of 47 studies met inclusion criteria, including 6 randomized controlled trials and 41 observational studies. Curricular interventions addressed diverse domains, most commonly leadership training, narrative medicine, resilience and stress reduction, medical humanism, empathy, mindfulness, compassion, and self-acceptance. Several incorporated Balint-style group case discussions, while others focused on electronic medical record efficiency or patient-centered communication. Across 27 studies, curriculum-based interventions were associated with a modest reduction in emotional exhaustion (pooled mean difference [PMD] = -0.15; 95%CI: -0.31 to -0.00; p=0.05; GRADE: low certainty). No significant effects were observed for personal accomplishment (26 studies; PMD= 0.00; 95%CI: -0.12 to 0.13; p=0.95; GRADE: low certainty) or depersonalization (27 studies; PMD= -0.09; 95%CI: -0.23 to 0.06; p=0.23; GRADE: low certainty). Nine studies assessing overall burnout likewise demonstrated no significant effect (PMD= -0.16; 95%CI: -0.43 to 0.12; p=0.26; GRADE: very low certainty). Heterogeneity was substantial for emotional exhaustion (I^2=76%), depersonalization (I^2=73%), and personal accomplishment (I^2=66%), while overall burnout also showed high heterogeneity (I^2=78%). Funnel plot asymmetry suggested possible publication bias across all domains.

Conclusion
In summary, curriculum-based interventions for resident physicians demonstrated only modest benefits, with a small reduction in emotional exhaustion and no significant improvements in depersonalization, personal accomplishment, or overall burnout. The certainty of evidence was rated as low to very low across all domains due to methodological limitations, heterogeneity, and potential publication bias. These findings suggest that while wellness curricula remain a widely adopted strategy, their effectiveness in meaningfully reducing burnout is uncertain.

Abstract Title: EBV Reactivation After Allogenic Hematopoietic Stem Cell Transplantation with PTCy-based GVHD Prophylaxis

Investigator: William Christopher Glembocki
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Co-Investigators:
1. Brian Shaffer, Memorial Sloan Kettering Cancer Center Adult Bone Marrow Transplant Service
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3. Yuxuan (Rachel) Li, Memorial Sloan Kettering Cancer Center Infectious Diseases and Allergy Service
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Abstract

Introduction
Epstein-Barr Virus (EBV) reactivation after hematopoietic stem cell transplantation (HCT) may lead to the development of Post-Transplant Lymphoproliferative Disease (PTLD), a potentially lethal condition. Post-Transplant Cyclophosphamide (PTCy), a form of selective T-cell depletion, is increasingly used for preventing Graft-Versus-Host Disease (GVHD) after HCT but has been associated with an increased risk for viral infections. We report Memorial Sloan Kettering Cancer Center's institutional experience with EBV reactivation in HCT with PTCy-based GVHD prophylaxis.

Methods
We conducted a retrospective cohort study of adult patients who received initial HCT from January 2017 to June 2024 with PTCy-based GVHD prophylaxis and were monitored routinely for EBV by quantitative polymerase chain reaction (qPCR). EBV reactivation severity was categorized as 1) viremia, 2) viremia requiring preemptive treatment with rituximab, and 3) viremia with probable or proven PTLD by PET scan or biopsy, respectively. We used R for statistical computing in evaluating cumulative incidence of EBV viremia, assessing the spectrum of reactivation, and univariate logistic regression analysis of factors relating to PTLD development.

Results
There were 412 patients in our study, and 65 of these patients developed EBV viremia within one year of HCT. We found the total cumulative incidence of EBV viremia after one year was 15.78%, with a 95% confidence interval of 12.25% - 19.30%. The spectrum of EBV reactivation was observed as follows: Out of 65 patients who developed EBV viremia, 18 received rituximab, 10 patients had probable PTLD, and 0 patients had proven PTLD. Univariate logistic regression analysis demonstrated Anti-Thymocyte Globulin (ATG) was a significant risk factor for both receiving rituximab treatment and probable PTLD ($p < 0.01$), with respective odds ratios of 8.56 and 18.7. Receiving a transplant from an unmatched or haploidentical donor versus a matched donor was a significant risk factor for developing EBV viremia ($p < 0.01$), with an odds ratio of 4.44.

Conclusion
In our cohort of 412 HCT patients treated with PTCy, the total cumulative incidence of EBV viremia was 15.78%. 4.4% of all patients in the study received treatment with rituximab, and 2.4% developed probable PTLD. We found no cases in which PTLD was refractory to treatment with rituximab, nor were any deaths attributed to PTLD. Patients receiving ATG prophylaxis were more likely to receive rituximab treatment, and patients transplanted with an unmatched/haploidentical donor were more likely to develop EBV viremia. This single-institution study was limited by following patient outcomes for one year after HCT and by a lack of proven PTLD based on biopsy findings.

Abstract Title: Risk factors for non-accidental ocular trauma and retinal hemorrhage in children

Investigator: Zachary R Goodrich
Mentor: Eric Crouch, MD
Co-Investigators:
1. Michael Foster, MD PGY-2 Department of Ophthalmology
Department: Ophthalmology

Abstract

Introduction
This study aimed to investigate the clinical and demographic characteristics of pediatric patients with non-accidental ocular trauma, with an emphasis on retinal hemorrhages (RH).

Methods
We performed a retrospective electronic medical record (EMR) review.
Subjects, Participants, and/or Controls: Patients aged ≤18 years presenting to the emergency department at Children's Hospital of The King's Daughters (CHKD) from December 2015 to November 2020, with a final diagnosis of child abuse, child neglect, or child mistreatment

Variables collected included age, sex, race/ethnicity, disability status, abuse/neglect noted in history, identified perpetrator, and ophthalmologic findings. Statistical analyses of demographics and histories compared the total population with those who underwent a formal ophthalmic investigation and those diagnosed with RH. Similar investigations compared those diagnosed with child abuse, neglect, and mistreatment. Differences in rates of male vs. female perpetrators were calculated when sex of the perpetrator was known.

Main Outcome Measures: P-values were calculated to determine significance between the percentages of the above demographics and clinical histories of subjects between groups. A p-value ≤0.05 indicated significance.

Results
189 children were included in the study, with 44 receiving a formal ophthalmic evaluation and 34 being diagnosed with RH. The RH cohort was significantly younger (mean age 0.69 years) than the total population (mean age 4.97 years; $p<0.0001$). No significant differences in sex, race/ethnicity, or disability status were observed between cohorts. Abuse was explicitly documented less frequently in the RH cohort (14.7%) compared to the total population (59.3%; $p<0.0001$). The RH cohort also had higher rates of an unclear perpetrator (58.8%) compared to the total population (21.7%; $p<0.0001$). Male perpetrators were significantly more common than female perpetrators in the total population (64.1%, $p=0.00079$), ophthalmic cohort (81.8%, $p=0.0028$), and RH cohort (80.0%, $p=0.020$).

Conclusion
Young age, unclear perpetrator identity, and no mention of abuse in the clinical history were significant risk factors for non-accidental ocular trauma and RH. In contrast, sex, race/ethnicity, and disability status were not associated with increased risk. Male perpetrators were disproportionately responsible for abuse-related ocular injuries. These findings highlight the importance of considering age and historical context when evaluating non-accidental ocular trauma in children.

Abstract Title: Comparative Analysis of Cystoid Macular Edema Incidence Following Cataract Surgery: Dextenza® vs. Topical Prednisolone Acetate

Investigator: Zachary Goodrich
Mentor: Jennifer Schneider, MD
Co-Investigators:
Matthew Jackson, BS, MS3
Sravani Sunkara, BS, MS2
Department: Ophthalmology

Abstract

Introduction
Cataract surgery is one of the most common procedures in the United States, and while outcomes are generally favorable, cystoid macular edema (CME) remains a leading cause of suboptimal vision. To reduce CME risk, patients are often prescribed postoperative anti-inflammatory drops, typically corticosteroids and/or NSAIDs, for up to six weeks. However, adherence can be difficult for older patients due to drop frequency and instillation challenges. Sustained-release alternatives, such as the dexamethasone intracanalicular insert (Dextenza®), provide a "dropless" option by delivering medication over 30 days and dissolving without need for removal. The purpose of this study is to compare CME incidence following cataract surgery between patients treated with Dextenza® versus prednisolone acetate drops, and evaluate risk factors for CME.

Methods
A retrospective chart review was performed for all cataract surgeries at a single institution between January 4, 2022, and November 19, 2024. All surgeries were performed by one surgeon using standard technique. CME was diagnosed between weeks 2-8 postoperatively by fundoscopic exam or macular optical coherence tomography (OCT). Variables collected included treatment type, CME diagnosis, age, sex, race, intraocular pressure, diabetes status (with or without retinopathy), prostaglandin analog use, and visual acuity change. Chi-square tests were used for categorical variables and t-tests for continuous variables, with significance set at $p<0.05$.

Inclusion criteria: Patients aged 18-89 undergoing phacoemulsification with posterior chamber intraocular lens (PC IOL) implantation, treated with either Dextenza® or prednisolone as monotherapy.

Exclusion criteria: Patients <18 or >89 years, those using additional anti-inflammatory drops, crossover between treatment groups, or incomplete/non-institutional follow-up.

Results
A total of 1,931 eye surgeries met inclusion criteria, with 716 (37.1%) treated with Dextenza® and 1,215 (62.9%) with prednisolone. The incidence of CME was 5.92% in the Dextenza® group and 4.47% in the prednisolone group, a difference not statistically significant ($p=0.192$).

Within the prednisolone group, CME-positive patients were significantly older on average ($p=0.038$). Significant racial differences in CME incidence were observed between White and Black individuals in the prednisolone group ($p<0.0001$) and across both groups combined ($p<0.0001$). Among Dextenza®-treated patients with diabetes, those with retinopathy were more likely to develop CME ($p=0.01$). Prostaglandin analog use was associated with increased CME rates across both groups ($p=0.01$).

Patients with prior CME in the fellow eye were significantly more likely to develop CME in both the Dextenza® ($p=0.01$) and prednisolone ($p<0.0001$) groups, as well as the combined cohort ($p<0.0001$). Mean intraocular pressure was higher in CME-positive patients in the Dextenza® group ($p=0.029$) and combined cohort ($p=0.037$).

A history of CME was the strongest predictor of postoperative CME (OR 60.5, 95% CI 29.0-130.8, $p<0.0001$). Prostaglandin use at surgery was also associated with increased risk (OR 2.1, 95% CI 1.2-3.9, $p=0.012$).

In CME-positive cases, the mean deviation in visual acuity from expected outcome was 0.21 LogMAR, equivalent to two Snellen chart lines.

Conclusion
Dextenza® demonstrated comparable efficacy to prednisolone drops in CME prevention. Several demographic and clinical risk factors-including age, race, history of diabetic retinopathy, prostaglandin use, prior CME, and higher IOP-were associated with increased CME risk and warrant further investigation.

Abstract Title: Prognostic factors for patients under 45 with colorectal liver metastases following surgical resection: a SEER population-based study

Investigator: Gabrielle Grob
Mentor: Winifred Lo, MD
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Abstract

Introduction
Colorectal cancer (CRC) has been on the rise in adults under the age of 50. Surgical resection is a potentially curative treatment option for patients with colorectal liver metastases (CRLM). The aim of this study was to analyze factors associated with disease-specific survival in young patients (<45 years) vs older patients (≥45 years) with isolated CRLM.

Methods
The SEER database was queried for patients with CRLM who underwent primary tumor resection and liver resection from 2010-2021. Patients under age 20, with metastases beyond the liver, or who had not had surgery for liver metastases were excluded. Cox regression was used to analyze prognostic factors.

Results
2,828 patients were included in this study, with 391 patients less than 45 years old and 2,427 patients at least 45 years old. Between groups, there was no significant difference in sex, race, income, rural location, T staging or pre-op CEA. Younger patients had more positive regional lymph nodes from primary resection (3.8 vs 3.1, $p<0.01$). There was a significant difference in chemotherapy and surgery order between groups, with older patients more likely to have received adjuvant chemotherapy and younger patients more likely to have received perioperative chemotherapy. Based on Kaplan-Meier analysis and log-rank test, the younger group had higher overall survival ($\chi 2(1)=10.54$, $p=0.001$) and disease-specific survival ($\chi 2(1)=7.03$, $p=0.008$) than the older group. In the older group, multiple factors had prognostic value including household income (HR 0.97, CI 0.95-0.99, $p<0.01$), elevated preoperative CEA (HR 1.34, CI 1.18-1.52, $p<0.001$), positive regional lymph nodes (HR 1.06, CI 1.04-1.07, $p<0.001$), and neoadjuvant (HR 0.56, CI 0.41, 0.75, $p<0.001$) and perioperative chemotherapy (HR 0.30, CI 0.22-0.42, $p<0.001$). In the younger group, positive regional lymph nodes was associated with lower disease-specific survival (HR 1.03, CI 1.00-1.06, $p<0.05$), but no other factor had prognostic impact.

Conclusion
For older patients with CRLM undergoing liver resection, there are a greater number of prognostic factors associated with disease-specific survival as compared to younger patients. Further study is warranted to better understand patient and tumor selection for surgical resection of colorectal liver metastases in young patients. Limitations include lack of liver information on margins, ablation vs resection, and recurrence-free survival.

Abstract Title: Prognostic Value of KRAS Mutation for Patients Undergoing Hepatectomy for Advanced Colorectal Cancer

Investigator: Gabrielle Grob
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Department: Surgery

Abstract

Introduction
Over the last two decades, genetic data has increasingly guided clinical decision-making among patients with advanced colorectal cancer. KRAS mutation has been generally understood to portend worse survival. The aim of this study was to analyze the prognostic value of KRAS mutation status on overall survival among patients undergoing hepatectomy for advanced colorectal cancer.

Methods
The National Cancer Database was queried for patients aged 18-90 with advanced colorectal cancer who underwent primary tumor resection and liver resection between the years 2018-2021. Kaplan-Meier analysis was used to calculate overall survival and a Cox Proportional Hazards Model analyzed prognostic factors.

Results
2,882 patients were identified. 80% of patients were white, 13% black, and 7% other races. 53% of patients had wild type KRAS and 47% of patients had mutated KRAS. Patients with mutated KRAS were more likely to be Black, female, and older. Receipt of chemotherapy was similar between wild type and mutated KRAS patients at 94%. 5-year overall survival among patients with wild type KRAS was 57% [53%, 61%] with a median survival of 68 months. This was significantly different from patients with mutated KRAS codon 12, 13, or 61 who had a 5-year overall survival of 43% [37%, 49%] and median survival of 50 months. 5-year overall survival for other mutated KRAS codons was 44% [39%, 50%]. In African American patients, presence of mutated KRAS was also associated with decreased 5-year survival (55% vs 39%). Based on the Cox Proportional Hazards model, female gender, Black race, older age at diagnosis, KRAS mutated codon 12, 13, or 61, and other mutated KRAS codons were associated with higher relative risk of mortality ($p<0.001$). Receipt of chemotherapy was associated with lower relative risk of mortality with hazard ratio 0.28 ($p<0.001$).

Conclusion
Patients with advanced colorectal cancer with KRAS mutation had worse overall survival as compared to patients with wild type KRAS which supports recent literature. For the sample as a whole, chemotherapy was shown to significantly lower mortality risk. As the study of cancer genomics continues to evolve, national databases will need to collect more granular data on specific codon mutations in order to optimize treatment planning for patients.

Abstract Title: Investigating the effects of membrane-bound CX3CL1 on microglial migration using alternative transgenic models

Investigator: Austin David Grove
Mentor: Jennifer Ness-Myers, PhD
Co-Investigators:
Department: Biological Sciences

Abstract

Introduction
Fractalkine (CX3CL1, FKN) is a transmembrane chemokine produced by neurons in the central nervous system (CNS). It binds to its respective receptor (CX3CR1), which is expressed on the surface of microglia, the innate immune cells of the CNS. Fractalkine plays an important role in activating pro-inflammatory pathways in microglia in response to tissue injury. This signaling is elicited by both the soluble (cleaved) form and the membrane-bound form of fractalkine. The soluble form of fractalkine is released from the neuronal surface following neuronal injury, which elicits a pro-migratory response in microglia. The neuron-microglial communication through the membrane-bound form is less well understood. The purpose of this study is to develop a cell culture model to compare microglial migration and signaling responses to membrane-bound and soluble fractalkine.

Methods
We transfected 293FT cells (a human kidney cell line) and B6/scl-7 cells with a rat CX3CL1-OFPSpark (C-terminal tag) expression plasmid (Sinobiologicals) to express membrane-bound fractalkine. Primary rat microglia were co-cultured with transfected 293FT cells, B6/scl-7 cells, or treated with soluble rat fractalkine (Peprotech).

Results
293FT cells were successfully transfected using Fugene 6®, but B6/scl-7 cells were not. Alternatively, B6/scl-7 cells were electroporated using Neon® Transfection System, but resulted in cell death. Microglia plated with FKN-expressing 293FT cells interacted favorably with the transfected cells, while those plated on untransfected 293FT cells exhibited unfavorable interactions and were rounded.

Conclusion
These findings suggest transfecting B6/scl-7 cells with another method such as Lipofectamine 3000®. These models interact favorably with microglia compared to untransfected controls, showing these are viable models. Once stable transfections are achieved for both cell lines, these models will be used to: visualize cell-cell interactions of microglia in response to fractalkine signaling, quantify these interactions with Boyden chamber migration assays and CyQuant GF Fluorescent dye, and observe the regulation of NFκB in the signaling pathway of fractalkine.

Abstract Title: Acute Milk-Alkali Syndrome After Calcium Supplementation Post-Thyroidectomy

Investigator: Zi Guo
Mentor: Amanda Brooke Hooper, MD
Co-Investigators:
Department: Internal Medicine

Abstract

Introduction
Milk-alkali syndrome (MAS) is characterized by the triad of hypercalcemia, metabolic alkalosis, and acute kidney injury, historically linked to the "Sippy regimen" for peptic ulcer disease. The incidence declined with the advent of modern ulcer therapies but has re-emerged due to widespread calcium and vitamin D supplementation. We present a case of acute MAS precipitated by postoperative calcium/vitamin D therapy following thyroidectomy, highlighting the importance of monitoring calcium levels in the postoperative setting.

Case Information
A 35-year-old woman underwent total thyroidectomy, thymectomy, and median sternotomy for removal of a substernal goiter. The right superior parathyroid gland, devascularized during surgery, was autotransplanted into the left sternocleidomastoid. She was discharged on levothyroxine, calcitriol, calcium acetate, and calcium-vitamin D due to postoperative hypocalcemia. Ten days later, she developed nausea, vomiting, malaise, diarrhea, cold intolerance, and 10 lb weight loss. Outpatient labs showed calcium 17.0 mg/dL (ionized 7.4 mg/dL), prompting ED transfer. Vitals: afebrile, BP 112/72 mm Hg, HR 107 bpm. Physical exam was unremarkable except for well-healed surgical scars. Labs showed metabolic alkalosis (CO_2 36 mmol/L), creatinine 2.3 mg/dL (baseline 0.7), BUN 23 mg/dL, suppressed PTH (<1 pg/mL), and elevated phosphorus (5.1 mg/dL). Chest radiograph was normal. She received IV normal saline boluses followed by maintenance fluids, with calcium supplements discontinued. Over several days, calcium and creatinine levels normalized with fluid resuscitation. A headache during hospitalization resolved with symptomatic therapy. She was discharged with outpatient endocrinology follow-up.

Discussion
While primary hyperparathyroidism and malignancy account for most hypercalcemia cases, suppressed PTH and negative malignancy evaluation directed attention to medication-induced causes. This patient's high calcium/vitamin D intake and calcium acetate ingestion created the conditions for MAS. Pathophysiology involves excessive calcium intake overwhelming homeostatic suppression, vitamin D-enhanced absorption, and renal vasoconstriction leading to reduced glomerular filtration. Contraction alkalosis from hypovolemia further enhances calcium reabsorption, perpetuating the cycle. This case illustrates the acute "toxemic" phase of MAS, which occurs within weeks of initiating excessive supplementation. Literature emphasizes that MAS is preventable with careful dosing and monitoring of calcium therapy, especially in patients with altered parathyroid function postoperatively.

Conclusion
MAS should be considered in postoperative patients receiving calcium and vitamin D who present with hypercalcemia, metabolic alkalosis, and renal impairment. Prompt recognition and withdrawal of supplementation, coupled with aggressive hydration, are effective. Post-thyroidectomy protocols should include close monitoring of calcium levels to prevent this complication.

Abstract Title: Mind the Gap in Acute Pancreatitis: Alcoholic, Triglycerides, or Kabadi?

Investigator: Zi Guo
Mentor: Matt Slief, MD
Co-Investigators:
Michael Eason, Portsmouth Naval Hospital, Internal Medicine
Department: Internal Medicine

Abstract

Introduction
Ketoacidosis is characterized by the accumulation of ketone bodies resulting in metabolic acidosis. While diabetic ketoacidosis is the most frequent form, in the case of pancreatitis, non-diabetic causes such as alcoholic ketoacidosis, starvation ketoacidosis in the setting of hypertriglyceridemia, and the less-recognized Kabadi syndrome must also be considered. Distinguishing between these entities is essential, as their underlying mechanisms and etiologies differ.

Case Information
A 31-year-old male with a history of heavy alcohol use presented with severe, progressive midepigastric pain radiating to the back with associated reduced oral intake, beginning two days after his last alcohol drink. He reported binge drinking ~12 standard drinks several times per week and denied chronic medical conditions.

Initial labs: WBC 15.3 $\times 10^9$/L, lipase 673 U/L, ALP 124 U/L, bilirubin 1.3 mg/dL. CT abdomen/pelvis revealed peritoneal fluid around the pancreas, duodenum, and right paracolic gutter. He received 2L Lactated Ringer's and was admitted for acute pancreatitis, meeting 3/3 diagnostic criteria.

Further labs included triglycerides 2401 mg/dL and ethanol level <0.01 g/dL. Although the patient's initial anion gap was normal, ketoacidosis was identified 8 hours later with an anion gap of 22 (HCO_3^- 12) and β-hydroxybutyrate 7.5 mg/dL. Triglycerides spontaneously declined from 2401 mg/dL to 1275 mg/dL, coinciding with the development of the anion gap. Plasmapheresis, insulin, and dextrose were later initiated, resulting in further reduction of triglycerides to 382 mg/dL, resolution of the anion gap, and significant clinical improvement.

Discussion/Clinical findings
Physiologic principles were reviewed in efforts to diagnose the source of the patient's ketoacidosis. Alcoholic ketoacidosis typically occurs in chronic alcohol users after binge drinking followed by fasting. This results in glycogen depletion and an increased NADH/NAD^+ ratio with impaired gluconeogenesis, leading to ketone accumulation. Hypertriglyceridemia in the setting of starvation may also contribute to ketoacidosis as abundant triglycerides are broken down into free fatty acids and metabolized to ketoacids in the liver. Kabadi syndrome is a rare form of ketoacidosis associated with severe acute pancreatitis. It has been proposed that Kabadi syndrome is driven primarily by pancreatic lipase-mediated accelerated lipolysis, correlating with pancreatitis severity.

In this case, the diagnostic challenge centered on the source of the transient anion gap.

While historical features including binge drinking, fasting, and profound hypertriglyceridemia support alcoholic and starvation mechanisms, the severity of the pancreatitis and lipase elevation could support Kabadi syndrome as well. Ultimately, it is not feasible to definitively determine whether the sharp triglyceride decline (2401 → 1275 mg/dL) and subsequent anion gap was mediated by lipase-driven lipolysis or hormonal effects. Base rate supports alcoholic and starvation contributions; however each process may have contributed and the mechanisms driving pancreatic ketoacidosis remain incompletely understood.

Conclusion
This case highlights the diagnostic challenge of differentiating Kabadi syndrome from alcoholic and starvation ketoacidosis in patients with alcohol use and acute pancreatitis, particularly when the source of the transient anion gap is unclear. All three mechanisms-alcohol-induced shifts in glucose metabolism, hypertriglyceridemia with conversion to ketoacids, and pancreatitis-driven lipolysis as described in Kabadi syndrome-can result in increased ketone production leading to ketoacidosis.

Abstract Title: Standardizing and Improving Blood Pressure Processes in General Academic Pediatrics

Investigator: Elizabeth Garnett Harvie
Mentor: John Harrington, MD
Co-Investigators:
1. Lindsey Hill BS, EVMS MD c/o 2028
2. Sarah Mohiuddin BS, EVMS MD c/o 2028
Department: Quality/Safety and Clinical Integration

Abstract

Introduction
Elevated blood pressure (BP) in pediatric patients is a major risk factor for future serious health complications. Despite its established importance, elevated BP and a subsequent hypertension diagnosis are often missed or poorly documented, particularly in pediatric populations. Within the General Academic Pediatrics (GAP) practice, inconsistent BP reporting has led to suboptimal patient care, highlighting an opportunity for quality improvement (QI).

Methods
A QI framework was used to process map current BP acquisition and reporting, identify areas of improvement, and implement a standardized process.

Results
Initial observations highlighted several areas for improvement within GAP. Primarily, the current electronic medical record (EMR) fails to account for a patient's height when flagging abnormal BP readings. There was also significant variation in procedures for both obtaining and documenting BPs in the practice. Interventions included (1) the creation and distribution of user-friendly nomograms that providers and nurses could use to clarify abnormal BP readings, (2) in-services with nursing staff, residents, and attendings to review and create an optimal process map, and (3) collaborations with information services (IS) to streamline documentation procedures within the EMR. There were notable increases in the number of correctly repeated and documented BP readings, longitudinal tracking using the patient problem and diagnosis lists, and inclusion of elevated BPs in patient notes, with preliminary results indicating an increase in overall process accuracy from 30% to 41%.

Conclusion
Standardizing BP measurements and documenting them in the problem list when elevated proved challenging in the context of a busy academic pediatric practice. Using QI tools and education, we have created a process that we can now track and continue to improve upon. The 11% improvement in accuracy precipitates earlier identification of hypertension in pediatrics and is just the first step in this longitudinal QI project.

Abstract Title: Defining the Post-Translational Ubiquitination Landscape of PID1

Investigator: Neel C Herfarth
Mentor: Anat Epstein, MD PhD
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Department: Pediatric Hematology Oncology

Abstract

Introduction
The Epstein lab has shown that Phosphotyrosine Interaction Domain-containing protein 1 (PID1/NYGGF4) has inhibitory effects in malignant brain tumors. Consistent with this, they also showed that higher PID1 mRNA levels were correlated with better outcomes in patients with medulloblastoma (MB) and glioblastoma (GBM). Cisplatin, a chemotherapy used in therapy of some brain tumors, diminished PID1 protein in a manner that was inhibitable by bortezomib, a proteasome inhibitor. Consistent with this, they found that PID1 has a short half-life of 1-2 hours. In my summer project, I hypothesized that PID1 undergoes ubiquitination and is subject to proteasomal degradation.

Methods
HEK293T cells were transiently transfected with PID1 fusion proteins V5.PID1 or mEGFP.PID1 or their controls in RDAV vector, together with HA-tagged ubiquitin (HA-Ub) or HA-tagged small ubiquitin-like modifier (HA-SUMO). In some conditions, cells were treated with 100 nM bortezomib or vehicle for four hours. Cytoplasmic lysates were collected and subjected to anti-HA co-immunoprecipitation (co-IP) using anti-HA-affinity beads or IgG controls. Eluted proteins and the originating lysates were resolved by SDS-PAGE, transferred to nitrocellulose, and probed by western blotting using anti-PID1 and anti-HA antibodies.

Results
Lanes containing eluates of anti-HA IP of cells expressing one of the PID1 fusion proteins, V5.PID1, or mEGFP.PID1 showed a ladder of anti-PID1-reactive bands when co-expressing HA-Ub, but not those co-expressing control non-PID1 plasmids and/or non-Ub HA. This indicates that PID1 is poly-ubiquitinated. This laddering was not seen in cells co-expressing PID1 and HA-SUMO, strengthening the conclusion that PID1 undergoes ubiquitination rather than SUMOylation. Finally, treatment with the proteasome inhibitor bortezomib increased the signal intensity of the PID1 laddering in HA-IPs, supporting that ubiquitinated PID1 undergoes degradation by the proteasome.

Conclusion
These experiments demonstrate that PID1 is ubiquitinated, and the amount of laddered PID1 increases in the presence of proteasomal inhibition. This supports the idea that the amount of PID1 protein is regulated, at least in part, through the ubiquitin-proteasome system. Next experiments will examine if this also occurs in brain tumor-derived cell lines and whether endogenous PID1 is also subject to the ubiquitin-proteasome degradation system.

Abstract Title: Not Just a Box to Click: Improving Fidelity of Pediatric Medication Reconciliation

Investigator: Lindsey Hill
Mentor: John Harrington, MD
Co-Investigators:
1. Elizabeth Harvie, EVMS MD2028
2. Sarah Mohiuddin, EVMS MD2028
Department: CHKD GAP and Quality Improvement

Abstract

Introduction
Medication reconciliation (MR) is a critical patient safety process designed to ensure accurate prescribing and reduce adverse drug events. In pediatrics, MR requires caregiver-reported histories, frequent adjustments of medications, and transitions between care teams. Although electronic health records often show high MR completion rates, these metrics may overstate the true accuracy of MR. At Children's Hospital of The King's Daughters (CHKD), internal review confirmed high MR documentation, yet provider observations indicated persistent discrepancies. This disconnect between completion and fidelity of MR prompted a quality improvement (QI) initiative to enhance MR accuracy in pediatric patients.

Methods
MR quality was measured by averaging the congruence of medication entries across three chart sources: the Medication List, External SureScripts Rx History, and the physician's reconciled list from the encounter. A baseline accuracy rate was established via retrospective review of 120 charts from patients taking more than three medications seen at the General Academic Pediatric (GAP) practice over a two-week period in May 2025. As interventions were implemented, charts meeting the same criteria were reviewed to assess changes in MR quality over time. Interventions included (1) updating forms for families to report home medications, (2) educating GAP attendings about MR expectations, and (3) delivering targeted education to rotating residents.

Results
Post-intervention, overall MR accuracy increased from a baseline of 70% to 83% ($p<0.001$). Reductions were observed across multiple common error types including unreconciled charts, omissions, duplicate entries, and outdated medications.

Conclusion
This QI initiative at CHKD demonstrated that targeted interventions can significantly improve MR accuracy. Enhancing provider awareness and standardizing documentation tools proved effective in reducing common sources of error and promoting safer, more accurate prescribing, especially for complex pediatric patients.

Abstract Title: A Diagnostic Challenge of Ring-Enhancing Intracranial Lesions: A Case Report

Investigator: Katherine Mary Horenstein
Mentor: James Wyant, MD
Co-Investigators:
1. Rebecca Fetter, EVMS\Medical Student
2. James Wyant, MD, Sentara Neurology\EVMS Residency Program Director
Department: Neurology

Abstract

Introduction
Ring-enhancing lesions are a common neuroimaging abnormality with diverse etiologies including infection, malignancy, inflammation and vascular disease. Identification of the underlying cause is crucial as misdiagnosis can lead to worse outcomes. However, diagnosis is often challenging due to overlapping clinical presentations and imaging features. We present a patient with two intracranial ring-enhancing lesions and a cavitary pulmonary lesion.

Case Information
Our patient is a 65-year-old male with multiple chronic conditions whose clinical course began with identification of a cavitary lung lesion after a new onset productive cough. A biopsy was positive for Streptococcus intermedius, and he was treated outpatient for pneumonia.

Months later, his symptoms persisted, and he developed worsening headaches prompting him to present to the hospital. Brain magnetic resonance imaging (MRI) revealed ring-enhancing lesions leading to admission. Physical exam was remarkable only for dental caries. Routine and fungal cultures/smears of serum, sputum and urine were negative. Cerebrospinal fluid (CSF) cytology showed elevated WBC, RBC, and protein, and normal glucose. Laboratory analysis was also unremarkable for opportunistic fungi (e.g., Cryptococcus, Coccidioides, Aspergillus, Blastomyces, Histoplasma), Strongyloides, Toxoplasma, Mycobacterium, syphilis, Human Immunodeficiency Virus, and Hepatitis. Immunoglobulin studies were significant for: IgA 195, IgG 497, IgM <25, IgE 1293. On hospital day 8, lumbar puncture was repeated for routine CSF serology (e.g., bacterial, fungal, mycobacterial) which was negative.

The patient clinically worsened on day 15, with new fevers, chills, and encephalopathy. Brain MRI revealed interval ependymitis. Subsequently, brain biopsy was performed. Purulent intra-lesional material was aspirated and sent for basic serology which was unremarkable.

On post-operative day 7 the patient had new onset confusion, agitation, and visual hallucinations. Repeat brain MRI showed new vasogenic edema. Standard serologic analysis was obtained with the addition of meningitis/encephalitis panel and serum bartonella panel. All were negative. On post-operative day 18 the patient was prepared for discharge to a skilled nursing facility for continued antibiotic treatment.

Discussion
Intracranial ring-enhancing lesions carry a broad differential, creating complex clinical scenarios. While intra-lesional diffusion restriction and smooth, evenly enhancing walls may suggest an abscess compared to other etiologies, these findings are not pathognomonic, and imaging cannot determine the causative organism. Ultimately, up to 25% of brain abscesses remain cryptogenic.

This case presents unique complexity in the setting of a pulmonary lesion as a possible infectious source as S. intermediately, which is a recognized cause of brain abscess. Similarly, an odontogenic process also provided a possible unifying etiology. However, only the pulmonary lesion was responsive to antibiotic therapy. Additionally, the clinical picture was complicated by intermittent steroid exposure prior to this admission and an abnormal immunoglobulin profile, suggesting immune dysfunction. This highlights how individual factors can significantly complicate diagnostic reasoning for ring-enhancing lesions.

Conclusion
We present an ambiguous ring-enhancing process with discordant extracranial-intracranial response and unclear etiology despite extensive laboratory testing, exposing limitations of current diagnostic approaches. This case may demonstrate a need for early escalation of care and caution against therapeutic inertia. We believe this case brings nuances to the management and diagnosis of ring-enhancing lesions.

Abstract Title: 'What the doctor orders...is NOT available to all patients who need it:' Investigating Transportation Equity for Medical Appointments in Hampton Roads

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Department: Department of Academic Affairs

Abstract

Introduction
Transportation is more than a ride. It is often the difference between receiving care and going without it. Social Determinants of Health (SDoH) impact the availability, reliability, and safety of transportation, yet these factors remain largely invisible to healthcare systems. To better understand the problem of transportation equity from the patient's perspective, a team of twenty-one **Investigator**s embarked on a Community Based Participatory Research (CBPR) study in Hampton Roads. Inspired by conversations with community members, this innovative research effort incorporated community member input and decision-making in all phases of the research process to investigate how patient transportation, and ultimately access to care, may be impacted by SDoH. This presentation highlights the qualitative findings of phase 1 of the CBPR project.

Methods
This prospective, mixed-methods study was conducted in partnership with the Hampton Roads Community Collaborative (HRCC), a community group predominantly representing historically underserved neighborhoods. To better understand the phenomenon of transportation equity for medical appointments, the team collected three forms of qualitative data from both community members and EVMS patients. From June-December 2024, adults ≥18 years were recruited through convenience sampling at Hampton Roads, free community events, from EVMS-affiliated Medicine clinics, and the Ambulatory Care Center (ACC), a free clinic. Data sources included community questionnaires (n=252), semi-structured interviews (n=27), and public observations (n=24) of transportation to medical appointments. Qualitative data were coded via first (i.e., descriptive, In Vivo) and second rounds of coding (i.e., SDoH barriers, supports, and transportation equity terms) with iterative refinement and triangulation across three sources.

Results
Qualitative data analysis identified three major themes: Disconnection, Personal Strategy, and Human Assistance. Structural/system barriers were the most frequently reported challenges (192-interviews; 44-HRCQ; 9-observations). Human assistance and personal strategy emerged as key supports for helping patients get to medical appointments and to overcome the disconnection between the transportation system or other structural barriers.

Conclusion
Although systemic and structural barriers are challenging to address, the findings from this study highlight the immense difficulty in solving medical transportation disparities in the HR. In collaboration with the HRCC, the team will devise an intervention to target the most feasible and sustainable areas of disparity for EVMS patients. At a minimum, action items include sharing the data with public and private medical transportation companies, local government legislature, and retirement living facilities. As one participant emphasized, "The need is greater than the public is aware of… individuals who have unique needs, such as Parkinson's disease, diabetes, need more assistance with transportation and require a lot of appointments… leads to the fact that what the doctor orders is NOT available to all patients who need it." This quote highlights the gap between this dire need to address medical transportation disparities and the lack of urgency or awareness that exists among the public.

Abstract Title: Prevalence of Symptoms of Anxiety and Depression Among Medical Students at MACON & JOAN BROCK Virginia Health Sciences - Old Dominion University: A Cross-Sectional Study

Investigator: Jingru Huang
Mentor: Foroozan Afsharchi, MD
Co-Investigators:
Vera Hale/MD2
Kailash Ram/MD3
Department: Department of Family & Community Medicine

Abstract

Introduction
Medical students currently in training significantly influence the direction and quality of healthcare practices in the coming years, thereby shaping the overall landscape of the future medical field. The prevalence of symptoms of anxiety and depression among medical students is a phenomenon observed not only in the U.S. but worldwide. This study aims to investigate the prevalence of symptoms of anxiety and depression among medical students at our institution and to explore any demographic relationships with symptoms of these conditions. The findings will provide a foundation for future research. They may initiate reforms to alleviate the pressures and external stressors of these talented and hardworking individuals who will care for our families and communities in the future.

Methods
This cross-sectional study involved the medical students at our institution. The study utilized a sociodemographic questionnaire, the Generalized Anxiety Disorder-7 (GAD-7) questionnaire for anxiety, and the Patient Health Questionnaire-9 (PHQ-9) for depression. These instruments were administered to the students via the RedCap platform from September 2024 to November 2024.

Results
Out of around 600 medical students, 126 completed the survey. Among them, 18.3% screened positive for anxiety (moderate or severe symptoms), and 23.8% for depression (moderate or severe symptoms). Second- and third-year students had higher mean Generalized Anxiety Disorder (GAD-7) scores compared to first-year students (7.219 & 7.263 vs. 4.147, $p < 0.025$ & $p < 0.050$). There was no statistically significant difference in Patient Health Questionnaire (PHQ-9) scores between students of different years. Students with a prior history of anxiety and depression-whether treated or untreated currently-had significantly higher mean scores in GAD-7 and PHQ-9 (8.0909 & 10.1818 vs. 4.3115 & 4.7213, $p < 0.001$). Unlike previous studies, we found no significant gender differences in anxiety and depression scores. Additionally, students with school loan balances over $300,000 reported higher scores in GAD-7 and PHQ-9 compared to students with a balance of $10,000 to $49,999 (12.8000 & 13.400 vs 4.5000 & 6.538, $p < 0.004$ & $p < 0.035$).

Conclusion
Our findings highlight the need for reforms in U.S. medical school policies. We found that second and third-year medical students had higher Generalized Anxiety Disorder (GAD) scores, likely due to the rigorous Step 1 and Step 2 exams taken during this period, which could have exacerbated stress. More research is needed to confirm the link between these exams and anxiety levels.

Additionally, we discovered a direct correlation between medical school loan burdens and student anxiety. Students with loans exceeding 300,000 reported significantly higher GAD scores, indicating that financial stress adds to the challenges of medical training.

Our initial hypothesis was rejected, as we did not observe a decrease in anxiety and depression symptoms as students advanced. This indicates a need for sustained mental health support in medical education. Moreover, students with a history of depression and anxiety, regardless of treatment continuation, still exhibited higher symptoms, suggesting that ongoing treatment may not prevent increased anxiety and depression during medical school.

Abstract Title: Food Order Influence on Postprandial Glucose and Fuel Use in Vegetarian Meals

Investigator: Michael James Hurst
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Co-Investigators:
1. Bradley Eppinger, EVMS
2. Morgan Beauchamp, EVMS
3. I-Chia Ko, EVMS
4. Nicole Knight, ODU
5. Ian Winter, ODU
Department: School of Exercise Science

Abstract

Introduction
Consuming carbohydrate-rich foods after protein-rich foods in a meal has been shown to reduce postprandial blood glucose (BG) levels and maintain fat oxidation. However, prior studies mainly fed individuals mixed meals of meat and plant-based foods with little known about how food order impacts postprandial responses to vegetarian meals. This randomized study examines how the order of foods eaten in a vegetarian meal impacts BG and substrate use at rest.

Methods
This study used a randomized, unblinded, parallel-group design. Participants completed baseline assessments including demographics, height, weight, and body composition followed by resting gas exchange and BG. Participants were then offered a vegetarian meal consisting of two components randomized in order of consumption: 1) 150 g edamame plus 10 g butter and 1/8 tsp salt, and 2) 150 g long-grain white rice. Postprandial respiratory gases were measured from 25-30, 55-60, and 85-90 minutes after meal completion followed by BG measurement. Up to 60 participants will be recruited; 34 were in the current analysis. Three participants with Respiratory Exchange Ratio (RER) greater than 1.0 were excluded from analysis.

Results
BG and RER observed showed expected increases over the postprandial period ($p < .001$ for time). Average BG for edamame-first and rice-first, respectively, were as follows: Baseline: 84.6±3.2, 87.2±2.8; 30 min: 118.7±6.7, 124.1±6.4; 60 min: 103.4±6.7, 107.2±4.9; 90 min: 94.5±4.8, 100.4±4.5. Average RER for edamame-first and rice-first, respectively, were: Baseline: 0.80±0.02, 0.79±0.03; 30 min: 0.78±0.02, 0.78±0.02; 60 min: 0.81±0.02, 0.80±0.02; 90 min: 0.83±0.03, 0.81±0.01. Changes secondary to ordered eating were not statistically significant ($p > .05$ for group and group x time interactions).

Conclusion
No clear large differences in ordered eating of listed vegetarian components have been observed. Current results warrant the study's completion and further research into vegetarian ordered eating postprandial effects.

Abstract Title: Aniridics with PAX-6 Mutations Display Increased Insulin Resistance Compared to Relatives Without Aniridia

Investigator: Andrew Phong Huynh
Mentor: Peter Netland, MD PhD
Co-Investigators:
Sravani Sunkara, MJBEVMSODU Medical Student 2nd Year
Department: EVMS Department of Ophthalmology

Abstract

Introduction
Aniridia is a rare disorder (incidence between 1 : 64000 and 1 : 100000) due to mutations in the PAX6, a highly conserved regulatory transcription factor. Mutations can be sporadic or familial, with lethal consequences for homozygous mutations. PAX6 plays a key role in the development of the eyes, pancreas, and brain. Ocular complications are primarily characterized by iris and foveal hypoplasia, and secondary complications can include keratopathy, glaucoma, cataract, and dry eye disease. Mice models have found links between PAX6 mutations and impaired glucose metabolism. In this study, we aim to explore the links between aniridia and human metabolism, with a focus on pro-insulinemia.

Methods
This prospective case-control study identified 12 aniridics and 12 controls who were non-aniridic relatives. Recruitment and data collection, including blood draws, demographics, and physical measurements, were conducted at the 2013 Aniridia Foundation International meeting. Blood samples were analyzed for various metabolic markers such as HbA1C, c-peptide, ghrelin, and GLP-1. Quantitative Insulin Sensitivity Check Index (QUICKI), was calculated from fasting glucose and insulin levels and used to assess insulin sensitivity. Statistical analysis was conducted using R.

Results
Aniridics compared to controls showed a higher C-peptide level, 4.00 ng/ml vs 1.85 ng/ml ($p=0.00352$). Aniridics also had decreased insulin sensitivity compared to controls ($p=0.00422$). A QUICKI analysis of overweight or obese aniridics and controls, as defined by the WHO BMI, also showed a statistically significant difference ($p=0.0136$).

Conclusion
The results confirm with existing literature and animal models that PAX6 plays a key role in human metabolism. PAX6 mutations are one of the few genetic conditions that have been associated with obesity. A deeper understanding of this mechanism could eventually lead to novel therapies.

Abstract Title: Outcomes of Surgically Managed Carpometacarpal Injuries

Investigator: Emilio Arduino Ihde
Mentor: Andrew Henebry, MD
Co-Investigators:
1.Thomas Berault, Department of Orthopedic Surgery/Naval Medical Center Portsmouth
2. Aaron Olsen, Department of Orthopedic Surgery/Naval Medical Center Portsmouth
3. George Balazs, Department of Orthopedic Surgery/Naval Medical Center Portsmouth
Department: Department of Orthopedic Surgery

Abstract

Introduction
To investigate the functional outcomes and complications of operatively managed CMC joint injuries in a young, active population

Methods
A retrospective chart review of all patients undergoing surgical treatment CMC joint injuries at a single institution over a 6-year period was performed. Patients were excluded if they had a 1st CMC joint injury, were under 18 years old, or had incomplete documentation. Injury radiographs were categorized as simple/extra-articular, partial articular, and complete articular. Electronic health records were searched for demographic information, mechanism, associated injuries, time to surgery, time to union, time to return to full-activity, complications, and need for revision surgery. Quick Disabilities of Arm, Shoulder, and Hand Score (QuickDASH) and Patient Reported Wrist Evaluation (PRWE) were collected at final follow-up.

Results
A total of 160 patients were included in the study, of which 89% were male. Punching was the most common mechanism of injury. Combined 4th and 5th CMC joint injuries and isolated 5th CMC joint injuries encompassed 90% of the injury patterns seen. Combined 4th and 5th CMC joint injuries had an associated distal carpal row fracture 54.7% of the time. There was a 29.4% complication rate with the most common complication being related to Kirschner wires (K wire) 16.3%. Final follow-up was obtained on 45/160 patients (28%). Median final QuickDASH score was 11.4 (range 0-45.5), with 65% of patients meeting the patient acceptable symptomatic state (PASS). Median PWRE score of 18.5 (range 0-67.5) with 76% meeting the PASS. Among the 133 active duty military patients included, 79/133 (59%) remained on active duty at a median of 3.3 years postoperatively.

Conclusion:
Despite relatively high surgical complication rates, operative management of CMC injuries results in good-to-excellent functional outcomes.

Abstract Title: A Unique Case of Aortic Dissection 5 Years after TAVR with Evolut Valve

Investigator: Matthew Guy Jackson
Mentor: Matthew Summers, MD
Co-Investigators:
1. Shirish Yasa, MD Class of 2028
Department: Cardiology

Abstract

Introduction
Aortic dissection (AD) following transcatheter aortic valve replacement (TAVR) is a life-threatening complication that occurs at an incidence of 0.2-1.0%. Though cases of delayed onset AD have been reported for 5 to 22 months post-procedure, the majority of incidents occur in the peri-procedural or early post-procedural period.

Case Information
A 75-year-old female with a history of ascending aortic aneurysm, atrial fibrillation, hypertension, and heart failure with reduced ejection fraction presented for evaluation of Stanford Type A AD following routine imaging. The patient had an extensive cardiac history including tricuspid regurgitation and mild mitral stenosis following mitral valve repair in 2020 and balloon valvuloplasty in 2024. She had an atrial valve repair in 2005 and a Valve-in-Valve TAVR with implantation of Evolut PRO+ 26 mm stent valve in 2020. An echocardiogram performed 1 year post TAVR demonstrated a well seated valve with a mean gradient of 10 mmHg and no paravalvular leak.

A 4.89 cm ascending aortic aneurysm was initially reported on chest CTA in 2020, 1 week prior to the TAVR. This was managed with observation, and subsequent imaging demonstrated an increase to 5.2 cm in 2023. She had another CT in 2025, which revealed aortic dilation to 6.5 cm. At this time, the patient was asymptomatic and exercising daily. She then underwent a CTA that showed a Stanford Type A AD beginning around the distal portion of the TAVR stent, and was admitted to cardiothoracic surgery.

Upon admission, she was hemodynamically stable with no chest pain, back pain, orthopnea, or dyspnea. The patient underwent a redo sternotomy with aortic dissection repair with replacement of the aortic root and ascending aorta utilizing a 23 mm KONECT RESILIA aortic valved conduit. Explant of the TAVR valve and surgical aortic valve was performed, as well as mitral valve replacement and tricuspid valve repair. Chest washouts were performed on the subsequent 2 postoperative days. The patient remained admitted for 3 weeks, and was hemodynamically stable, ambulating, and breathing well on room air when discharged home.

Discussion/Clinical Findings
This case is unique because of the extended duration between TAVR and presentation of AD. Delayed onset AD following TAVR is a very rare incident as most occur peri-procedurally or early post-procedurally. Currently, the longest documented delay between TAVR and onset of AD is nearly 2 years. Risk factors for AD include underlying aortic pathologies and mechanical injury from the implantation or valve itself. Our case reports the onset of AD approximately 5 years following TAVR, which is significantly longer than any published literature. During surgical repair, the AD appeared to be subacute versus chronic, with poor aortic tissue quality. The entry tear began at the Evolut valve and the dissection extended to the aortic root.

Conclusion
This case demonstrates the unique presentation of a subacute Stanford Type A AD nearly 5 years after TAVR with Evolut Valve. It is notable as it documents delayed onset AD that is approximately 3 years greater than the longest documented delay in current literature.

Abstract Title: Relationship Between Time-in-Range and Hemoglobin A1c in Patients with Diabetes in Pregnancy

Investigator: Jillian Wakefield Jetmore
Mentor: Marwan Ma'ayeh, MD
Co-Investigators:
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4. George Saade, MD., Department of Obstetrics and Gynecology, Eastern Virginia Medical School at Old Dominion University
5. Marwan Ma'ayeh, MD., Department of Obstetrics and Gynecology, Eastern Virginia Medical School at Old Dominion University

Department: Maternal Fetal Medicine

Abstract

Introduction
This study evaluates the relationship between blood glucose time-in-range (TIR) and Hemoglobin A1c (HbA1c) in pregnant individuals with Type 2 Diabetes (T2DM) or Gestational Diabetes (GDM).

Methods
Retrospective study of pregnant individuals with T2DM or GDM who were monitored with a continuous glucose monitor (CGM). CGM data was analyzed from the 4 weeks preceding a scheduled HbA1c measurement. TIR was defined as the percentage of time with a blood glucose in the 60-140mg/dL range. Univariable and multivariable analyses were used to evaluate the association between TIR and HbA1c of <6.5%. Receiver operating characteristic (ROC) analysis was performed to evaluate the performance of TIR alone versus a model including both TIR and diabetes type in predicting the subsequent HbA1c <6.5%.

Results
156 individuals were included: 129 with T2DM and 27 with GDM. There was a negative correlation between HbA1c and the TIR value in the preceding 4 weeks ($r = -0.67$, $p<0.001$). In the multivariable logistic regression, both a higher TIR (aOR 2.61, 95% CI 1.19-6.00; p=0.018) and a diagnosis of T2DM (aOR 0.22, 95% CI 0.05-0.74; p=0.023) were independently associated with a HbA1c <6.5%. The area under the curve (AUC) for TIR alone in predicting HbA1c <6.5% was 0.793 (95% CI: 0.723-0.864). The addition of diabetes type to the model resulted in a marginal, non-significant improvement in the AUC to 0.803 (95% CI: 0.736-0.870), which may be due to relatively lower number of GDM pregnancies in the cohort where TIR is better at predicting normal HbA1c. TIR >70% had a sensitivity of 86.4% and a specificity of 100% in GDM and a sensitivity of 69.7% and a specificity of 71.4% in T2DM for predicting a subsequent HbA1c <6.5%.

Conclusion
In pregnant individuals with T2DM or GDM, HbA1c is strongly correlated with TIR values in the prior 4 weeks. Our results confirm that TIR is as appropriate measure of glycemic control and that a 70% threshold is a valid target. TIR is also an independent predictor of achieving glycemic control as measured by HbA1c and may be obviate the need for HbA1c assessment.

Abstract Title: Clostridium Difficile Colitis in Divergent Colon

Investigator: Jonathan Jo
Mentor: Sarah Shaves, MD FACR
Co-Investigators:
Dylan Steffey, MD, Department of Radiology\Diagnostic Radiology
Department: Radiology

Abstract

Introduction
Pseudomembranous colitis describes colitis related to Clostridium difficile infection(CDI). CDI is one of the most common nosocomial infections and associated with substantial morbidity and mortality. Its occurrence typically follows disruption of normal gut microbes usually related to antibiotics. Other factors include advanced age (>65 years), recent hospitalization, gastrointestinal surgery, inflammatory bowel disease, and chemotherapy among others. Symptoms range widely from asymptomatic, to mild diarrhea, to fulminant disease with sepsis and toxic megacolon. Radiological findings are often nonspecific, demonstrating signs of colitis such as liquid stool within the colon, wall thickening, and pericolic stranding. More specific signs such as the "accordion sign" have been described on computed tomagoraphy (CT). This is a highly specific finding in which liquid material becomes trapped between thickened haustral folds, creating alternating bands of attenuation. Diagnosis of C. difficile as the causative agent can be made via positive NAAT followed by toxin enzyme immunoassay.

C. difficile enteritis (small bowel) has been well documented in patients following colectomy with ileostomy as have generalized diversion colitis and "pouch-itis". However, infectious colitis of the excluded colon such as in our case has been rarely reported.

Case Information
Patient is a 70-year-old female with a past medical history of diverticulitis and endometrial cancer status post total hysterectomy and bilateral salpingo-oopherectomy in 2019. She initially presented in early 2025 with worsening abdominal pain related to partial small bowel obstruction secondary to intra-abdominal masses. Initial treatment included extended right hemicolectomy with en bloc resection of a small bowel tumor implant and complex abdominal wall hernia repair. Her postoperative course was extremely complicated requiring multiple operative and procedural interventions. Most recently, course was further complicated by cardiogenic shock from massive pulmonary embolism requiring thrombectomy and ICU-level care with subsequent respiratory and urinary tract infections. This culminated in antibiotic treatment with cefepime. However, she developed fever, leukocytosis and hemodynamic instability by day 4 of cefepime. CT imaging was suggestive of colitis involving the oversewn mucous fistula of the residual colon. Her lactic acidosis, altered mental status, and abdominal distension worsened. Stool studies confirmed presence of clostridium and despite broad-spectrum IV and rectal antibiotics, she developed toxic megacolon. Emergent exploratory laparotomy revealed fulminant colitis of the diverted colon, necessitating further resection and additional antibiotics with care still on going.

Discussion/Clinical Findings
CT imaging demonstrated the residual, diverted sigmoid colon and rectum which would typically be relatively decompressed given their lack of inflow. However, in this case, the excluded segment was distended with liquid, showed mild wall thickening, and adjacent stranding suggestive of a nonspecific colitis. The classically described "accordion sign" of pseudomembranous colitis was not evident.

Conclusion
Infectious colitis of an excluded colon is rarely reported, and its clinical presentation, diagnosis, and management are not well established. Available cases also involve patients with history of inflammatory bowel disease or initially underwent colectomy for CDI related colitis. Neither of which were known to be present in this case.

Abstract Title: Regional Versus General Anesthesia in Total Hip Arthroplasty: A Meta-analysis of Randomized Controlled Trials

Investigator: Benjamin Edward Johnson
Mentor: Melissa Rusli, BS MD
Co-Investigators:
Mark Soliman, Lakeland Regional Medical Center/ Department of Medicine
Michael Sabina, Lakeland Regional Medical Center/ Department of Medicine
Department: Internal Medicine

Abstract

Introduction
The anesthetic technique used during total hip arthroplasty (THA) can significantly influence postoperative outcomes such as pain control, opioid use, and hospital length of stay (LOS). Previous studies have produced inconsistent findings, and prior meta-analyses often included mixed or non-elective procedures, limiting applicability to elective THA. This meta-analysis evaluates whether regional anesthesia (RA) provides measurable advantages over general anesthesia (GA) in adult patients undergoing elective primary THA.

Methods
A systematic review and meta-analysis were conducted following PRISMA guidelines. We searched PubMed, Embase, and Cochrane CENTRAL (2015-2025) for randomized controlled trials comparing RA and GA in elective THA. Outcomes included postoperative pain scores, opioid consumption, and hospital LOS. A random-effects model was used to pool mean differences. Risk of bias was assessed using the Cochrane RoB 2.0 tool.

Results
Eleven RCTs encompassing 894 patients were included. RA was associated with significantly lower pain scores (mean difference -1.42 VAS units; 95% CI: -1.67 to -1.17), reduced opioid use (-6.26 morphine milligram equivalents; 95% CI: -7.15 to -5.36), and shorter hospital LOS (-1.07 days; 95% CI: -1.24 to -0.90). Risk of bias was generally low across studies. Moderate heterogeneity was observed and attributed to differences in RA technique and perioperative protocols.

Conclusion
Regional anesthesia offers superior outcomes compared to general anesthesia for elective THA, with significant reductions in postoperative pain, opioid use, and hospital stay. These findings support the use of RA as a preferred anesthetic approach in hospital settings aiming to optimize recovery and resource utilization.

Abstract Title: Prognostic Impact of Homologous Recombination Deficiency in Triple-Negative Breast Cancer: A TCGA Analysis

Investigator: Ria Rathore Kapoor
Mentor: Luisel Ricks-Santi, PhD
Co-Investigators:
Department: Community Health, Education, and Training

Abstract

Introduction
Triple-negative breast cancer (TNBC) is an aggressive breast cancer subtype characterized by the absence of estrogen receptors (ER), progesterone receptors (PR), and HER2 amplification. Homologous recombination deficiency (HRD), resulting from mutations in homologous recombination repair (HRR) genes, impairs DNA repair and is proposed as a prognostic and predictive biomarker in TNBC. However, its clinical relevance across broader breast cancer populations remains unclear. This study aimed to evaluate the association between HRD status and survival outcomes in TNBC and all other breast cancer subtypes using The Cancer Genome Atlas (TCGA) and multi-study breast cancer datasets available on cBioPortal.

Methods
Three cohorts were developed using a multi-study query of breast cancer datasets on cBioPortal: an all-subtype breast cancer cohort (n = 15,118), TNBC cases (n = 467), and invasive ductal carcinoma (IDC) subtype TNBC cases (n = 281). HRD-positive tumors were defined by the presence of pathogenic mutations in any of the following HRR genes: BRCA1, BRCA2, PALB2, RAD51C, RAD51D, ATM, ATR, CHEK2, BARD1, BRIP1, FANCA, FANCC, FANCD2, NBN, MRE11, and RAD50. Kaplan-Meier survival analyses were performed to estimate 60-month overall survival (OS) and relapse-free survival (RFS), stratified by HRD status, stage, grade, and molecular subtype. Analyses were conducted using R (version 4.5.0; R Foundation for Statistical Computing), with p-values computed using the log-rank test. Exploratory analyses of survival by treatment class were limited due to sparse data.

Results
HRD status was significantly associated with overall survival (OS) in the full breast cancer cohort ($p < 0.0001$), suggesting prognostic relevance across subtypes. However, HRD was not significantly associated with OS or RFS in TNBC (OS $p = 0.42$, RFS $p = 0.11$) or in the IDC-TNBC subset (OS $p = 0.47$, RFS $p = 0.29$). Among all breast cancer patients, stage ($p < 0.0001$), grade ($p < 0.0001$), and molecular subtype ($p < 0.0001$) were also significantly associated with OS. Analyses by treatment class were limited due to lack of therapy annotation, particularly for platinum agents and PARP inhibitors.

Conclusion
HRD was significantly associated with OS in the broader breast cancer cohort, but not with survival outcomes in TNBC or IDC-TNBC subsets. These findings suggest that HRD may serve as a prognostic marker in breast cancer overall but is not predictive of survival in TNBC alone. Stage, grade, and molecular subtype remained robust prognostic indicators. The lack of treatment data in cBioPortal breast cancer datasets (e.g., platinum/PARP use) limits assessment of HRD's clinical utility in predicting therapy response.

Abstract Title: High-Risk, Low-Frequency: Pediatric Intubation Complications Across Care Settings (A Scoping Review)

Investigator: Alden Kaufman
Mentor: Donald Byars, MD
Co-Investigators:
Co-A-1 Justin Bhatla, Queens University School of Medicine\MD28
Department: Emergency Medicine

Abstract

Introduction
Pediatric endotracheal intubation is a high-risk, technically challenging procedure performed in PICUs, EDs, and by Emergency Medicine Services (EMS). Complications such as hypoxia, bradycardia, and esophageal intubation contribute to significant morbidity and mortality, particularly in younger children. First-pass success (FPS) is a key quality metric, as multiple attempts increase adverse events. Provider experience, training, and system infrastructure vary widely, as do reported complications across care settings, highlighting variability that directly impacts patient safety and underscoring the need to examine complication patterns across these environments.

Main Body
This scoping review was conducted according to the Population, Concept, Context (PCC) framework. Eligible studies included pediatric patients (0-18 years) undergoing endotracheal intubation, with complications such as hypoxia, bradycardia, esophageal intubation, cardiac arrest, and multiple attempts defined as primary concepts of interest. The context included EMS, Emergency Departments (EDs) (both general and pediatric), and Pediatric Intensive Care (PICU) settings. A literature search using PubMed and ResearchRabbit identified 32 peer-reviewed studies meeting inclusion criteria. Extracted data included provider type, patient age, number of attempts, use of rapid sequence intubation (RSI), intubation method (video versus direct laryngoscopy), data source (e.g., NEAR4KIDS, NEMSIS), reported complications, and FPS.

PICU studies demonstrated the most complete and structured complication tracking, particularly those using NEAR4KIDS registry data. Commonly reported complications included desaturation (16%), esophageal intubation (11%), and aspiration (9%), with tracheal intubation-associated event (TIAE) rates ranging from 17-30%. However, NEAR4KIDS does not report FPS or the total number of attempts; it only captures attempts greater than three. This limits analysis of how provider experience or procedural familiarity may influence outcomes across institutions and training levels. This is an especially important consideration in a low-frequency, high-risk procedure like pediatric airway management.

ED studies showed greater variability in reporting, influenced by whether the institution was pediatric-specific or general. Cardiac arrest (26%), aspiration (10%), and hypoxia (10%) were the most frequently mentioned complications. Pediatric EDs more often reported physiologic complications and intubation technique, while general EDs often limited documentation to procedural outcomes like FPS or total success.

EMS studies had the least comprehensive complication reporting, with many focusing solely on intubation success or cardiac arrest outcomes. Cardiac arrest was the most frequently reported complication (35%), followed by non-specific mentions of "complications" or vomiting. Physiologic complications such as hypoxia and bradycardia were rarely documented, and reporting standards varied significantly across studies.

Across settings, multiple attempts were present or inferable in 68% of studies and consistently correlated with increased adverse events. The use of RSI and video laryngoscopy was underreported in both EMS and general ED settings, limiting analysis of technique-related outcomes.

Conclusion
Pediatric intubation complications occur across care environments and are commonly underreported. The lack of standardized reporting, particularly in EMS systems, hinders benchmarking and quality improvement. Complication rates appear highest in EMS and general EDs, both in frequency and in reporting gaps. Future efforts should focus on improving the consistency and quality of intubation and complication reporting to support benchmarking, targeted training, and safer pediatric airway management.

Abstract Title: Evaluating the Ocular Safety Profile of Glucagon-Like Peptide-1 Receptor Agonists

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Abstract

Introduction
The use of glucagon-like peptide-1 receptor agonists (GLP-1RAs) has surged, yet their ocular safety profile remains inconclusive. Initial concerns were raised by the SUSTAIN-6 trial, which found that users of semaglutide had a significantly increased risk of developing retinal complications (HR, 1.76; 95% CI, 1.11-2.78; P= 0.02). However, the understanding of GLP-1RAs' association with diabetic retinopathy (DR), along with other ocular pathologies such as neovascular age-related macular degeneration (nAMD) and glaucoma remains inconclusive. We aimed to clarify the association between GLP-1RA use and ocular risk.

Methods
We conducted three parallel, retrospective, new-user, propensity-score-matched (PSM) cohort studies using the TriNetX Global Federated Health Research Network. New users of GLP-1RAs with type 2 diabetes were matched 1:1 to new users of SGLT-2 inhibitors (for nAMD and DR analyses) or DPP-4 inhibitors (for the glaucoma analysis). The models controlled for demographics, comorbidities, labs, and healthcare utilization proxies. Primary outcomes were based on diagnostic codes indicating disease progression, with confirmatory sensitivity analyses using procedure codes. Hazard Ratios (HRs) were calculated using Cox proportional hazards models.

Results
Matched cohorts included 1,026 pairs (nAMD), 215,429 pairs (glaucoma), and 8,412 pairs (DR). For nAMD and DR, there was no significant difference in the risk of diagnosis of progressed disease or requiring a procedure related to disease progression (all P >0.05). Glaucoma analysis revealed a significant, 34% lower risk of requiring a glaucoma-related procedure for GLP-1RA users (HR, 0.66; 95% CI, 0.55-0.80; P< 0.001), while showing no significant difference in the risk of a glaucoma diagnosis (P= 0.26).

Conclusion
The analysis supports the relative safety of GLP-1RA use and may suggest a potential slowing effect against glaucoma progression relative to active comparators that warrants further investigation.

Abstract Title: Not All Who Stagger are Drunk: Ocular and Gait Abnormalities in a Young Adult

Investigator: Jacob Givonetti Knapp
Mentor: Barry John Knapp, MD
Co-Investigators:
1. Lily Kauffman, MS3
2. Hanna Kulbeth, MD, Emergency Medicine
3. Kean Feyzeau, MD, Emergency Medicine
Department: Emergency Medicine

Abstract

Introduction
Wernicke encephalopathy is a debilitating neurological disorder caused by a depletion of Vitamin B1 (thiamine), which is a critical component of cellular metabolism. Namely, it plays a vital role as a coenzyme in the production of ATP. Wernicke encephalopathy most acutely affects the nervous system and can lead to widespread neuronal cell death. The most prevalent demographic affected are those with chronic alcohol use disorder, since alcohol impairs the dietary absorption of thiamine. Typical neurological symptoms include a triad of ocular dysfunction, uncoordinated muscle movements, and altered mental status. Nystagmus - the most common presentation ¬- is characterized by rapid, involuntary movement of the eye. In this case report, we investigate an atypical Wernicke encephalopathy patient: one who presents with prominent nystagmus but lacks a history of chronic alcohol use.

Case Information
A 31-year-old woman presented to the emergency department for the third time in four weeks with vomiting, unstable gait, and odd behavior. She had a history of chronic nausea and vomiting. She denied any history of alcohol use. Physical exam showed vertical nystagmus (Video), hyperreflexia, ataxia and an odd affect. CT and MRI of the brain were normal. Labs were normal except for a Vitamin B1 (thiamine) level of 30 nmol/L (reference range 78-185 nmol/L). The patient was diagnosed and treated for Wernicke's encephalopathy with thiamine 500 mg every six hours for five days. She was discharged on hospital day eight on oral thiamine supplementation.

Discussion
Wernicke encephalopathy presents a challenge for clinicians: it manifests most commonly as a consequence of chronic alcoholism, but its presentation is nearly indistinguishable from that of acute alcohol intoxication. The classic Wernicke encephalopathy triad is ocular dysfunction, ataxia, and altered mental status, but the complete triad is found in less than one third of patients. Therefore, a patient with known alcohol use disorder presenting with symptoms of altered mental status and uncoordinated muscle movements could likely be suffering from intoxication, but Wernicke encephalopathy cannot reasonably be excluded as a contributory factor without labs.

When nystagmus occurs in conjunction with altered mental status or ataxia - as in this patient - suspicion for Wernicke encephalopathy should be raised. In this patient, the nystagmus presents vertically (Video), but it can also present horizontally. Ocular dysfunction may be the only reliable clinical presentation that can readily be differentiated from alcohol intoxication.

Moreover, not all Wernicke encephalopathy patients have a history of alcohol use. In this patient, the thiamine deficiency manifested as a result of chronic malnutrition. Malnutrition is a less common cause of Wernicke encephalopathy in the United States and therefore may be under-recognized in this patient population by clinicians.

Conclusion
Wernicke encephalopathy is a severe neurological disorder that can result in irreversible cognitive impairment in the absence of early recognition and prompt thiamine replacement. Recognition of ocular dysfunction - such as nystagmus - in these patients is crucial to distinguish from alcohol intoxication. A history of chronic alcohol use is common, but Wernicke encephalopathy should not be disregarded in its absence, especially in the setting of severe malnutrition.

Abstract Title: Acromion stress fracture is associated with poor intraoperative bone quality and rotator cuff arthropathy following reverse shoulder arthroplasty

Investigator: Zachary Ross Krumm
Mentor: Justin William Griffin, MD
Co-Investigators:
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Department: Orthopedic Surgery

Abstract

Introduction
Reverse total shoulder arthroplasty (RSA) is the most commonly performed shoulder arthroplasty worldwide. RSA has been demonstrated to improve shoulder pain and dysfunction for those with various shoulder pathologies including rotator cuff arthropathy. A common complication of RSA is a stress fracture to the scapula, specifically the acromion process or scapular spine. Known risk factors for scapular stress fracture following RSA are rotator cuff arthropathy (RC arthropathy) as the primary diagnosis, female sex, osteoporosis, and inflammatory arthritis. The purpose of this study is to identify influence of intraoperative factors that increase the risk of scapular stress fractures following RSA so that better predictions can be made for who is likely to suffer an acromion stress fracture. This study hypothesizes that there will be an increased risk of stress fracture with poor bone quality, female sex, shorter height.

Methods
A retrospective analysis was performed of patients who underwent RSA by a single surgeon between 2017 and 2022. Patients with minimum 2-years of follow-up who underwent RSA with a lateralized 135 degree inlay design were included. Exclusion criteria include RSA indication of fracture, lack of 3-month minimum post-operative radiographs, revision arthroplasty, or those who sustained a postoperative traumatic fracture. Collected variables included patient age, sex, height, weight, BMI, smoking status, comorbidities, prior shoulder surgery history, operative diagnoses, implant characteristics, and intraoperative bone quality assessment. Statistical analyses were performed using JMP Student Edition 18 with alpha set at .05 to denote a statistically significant difference. Chi-square and Fisher's Exact Tests assessed the relationship between categorical variables and the development of a scapular stress fracture. Nominal logistic regression was performed for continuous variables. This study presents preliminary findings as part of an ongoing multicenter study.

Results
283 patients (age 73.7 ± 7.7 years, 59.7% Male, 40.3% Female) were treated with RSA and included in the final analysis. From 2017 to 2022, 11 patients (3.9%) suffered a scapular stress fracture (Acromion process, 10 patients, 3.5%; Scapular Spine, 1 patient, 0.4%). Notation of intraoperative poor bone quality where the bone was soft and/or could not support a press fit (P=.018) and primary diagnosis of RC Arthropathy (P=.037) were significantly associated with development of a scapular stress fracture. All other variables were found to not have statistical significance.

Conclusion
Intraoperative notation of poor bone quality is a measure by which surgeons can expect a patient to be at increased risk of developing a scapular stress fracture. Additionally, having the indication of rotator cuff arthropathy is a risk factor for developing scapular stress fractures. Aggregation of multi-site data may shed further light on risk factors associated with scapular stress fractures allowing surgeons to potentially vary factors to decrease risk.

Abstract Title: Administration of corticosteroid injection for treatment of degenerative meniscus tears helps increase perceived benefit from the initial phase of physical therapy.

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Abstract

Introduction
Meniscus tears are a common injury to the knee that can cause debilitating pain and symptoms. While sometimes these meniscus tears are repairable, many meniscus tears are more degenerative and cannot be repaired. In the case of degenerative, non-repairable meniscus tears (DMT), arthroscopy can be used to shave out unhealthy tissue; however, a non-operative approach with physical therapy and corticosteroids is often successful in relieving pain and symptoms. Studies have demonstrated the efficacy of both corticosteroid and physical therapy in isolation. This study aims to examine the efficacy of corticosteroid injections when followed by physical therapy to determine if injections provide benefit beyond what physical therapy provides for patients with DMT.

Methods
This study is a double-blind randomized control trial of a patient cohort aged between 35-70 with evidence of non-repairable DMT on MRI. Patients screened for candidacy based on having MRI findings of meniscus tear, appropriate age, no more than KL Grade 2 radiograph findings, and no prior surgical history on the affected knee, no diabetes, no concomitant ligamentous injury, no repairable meniscus tear, no physical therapy nor injection in the prior 3 months, no bucket handle meniscus tear, no locking of the knee, no known inflammatory arthritis, no open wounds, and no previously established allergy to corticosteroid injections. Patients were given informed consent and randomized into either an injection or saline category. To assess patient outcomes, an initial KOOS and Pain survey was administered. Subsequently, KOOS, Pain survey, and Patient perceived benefit surveys were administered at 4-8 week follow up, 3 months, 6 months, 1 year, and 2 years post injection. All collected data was analyzed ANOVA for equal variance findings or t-test for unequal variance findings on the JMP platform using an alpha=.05.

Results
13 patients have been recruited thus far to the study (Average age 54.8± 4.3 years, 9 (69%) Males, 4 (31%) Females, 4 (31%) right knee, and 9 (69%) left knee). Randomization has resulted in 8 patients (62%) receiving corticosteroid injection and 5 patients (38%) receiving saline injection. There was no difference between injection groups for baseline survey data. On follow up surveys, the 4-8 week Perceived Benefit from Physical Therapy demonstrated a that the corticosteroid injection group saw greater benefit from physical therapy than the saline injection group (p=.048). No other significant findings were demonstrated on follow up surveys.

Conclusion
This RCT preliminarily demonstrates that the use of corticosteroid injections may provide an acute benefit to patients receiving physical therapy for non-repairable degenerative meniscus tears among a homogenous group of participants. Because this finding is only present in the initial follow up, the data may suggest that corticosteroid injection assist patient with the initial aspects of physical therapy. While there were some significant findings, this study has a low number of patients enrolled and is likely underpowered. These results are preliminary, and we anticipate that further findings will reflect the current findings.

Abstract Title: Unmasking the Source: Spinal Epidural Lipomatosis as a Hidden Cause of Recurrent Chest Pain and Neurological Deficits

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Mentor: Bhargavi Madhu, BS MD
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Abstract

Introduction
SEL is a rare condition characterized by a pathologic accumulation of adipose tissue within the epidural space, often linked to excess corticosteroid use. Significant compression of the thecal sac can result in nonspecific symptoms of spinal stenosis such as in our case.

Case Information
A 59-year-old male with a history of hypertension, obesity, hyperlipidemia, heart failure, and lumbar spinal stenosis s/p numerous epidural steroid injections presented with sudden onset bilateral lower extremity weakness and neurogenic bladder. His symptoms began abruptly at 5 a.m. when the patient attempted to use the restroom, but was unable to get back up. His medical history was notable for recurrent chest pain that had prompted multiple cardiac catheterizations across different hospitals, all of which were negative for ischemic heart disease. On admission, thoracic MRI revealed a large epidural mass at T3, along with severe lumbar stenosis at L2-3 and L4-5. The patient underwent T2-7 laminectomy for decompression, biopsy, and mass removal. Pathology confirmed spinal epidural lipomatosis without evidence of malignancy.

The patient's chest pain was ultimately attributed to dermatomal radiculopathy involving the T3-4 nerve root. Following surgical decompression and rehabilitation, he experienced marked improvement in lower extremity strength, complete resolution of bowel and bladder dysfunction, and cessation of chest pain.

Conclusion
This case illustrates the diagnostic complexity of recurrent chest pain in patients with multiple comorbidities. After repeated negative cardiac evaluations, the patient's symptoms were ultimately linked to spinal pathology. The dermatomal distribution of his pain, combined with its resolution following decompression, supported a neurogenic rather than cardiac etiology.

SEL is an uncommon but important cause of spinal cord compression, often presenting with progressive neurologic decline or nonspecific pain syndromes. In this case, prolonged corticosteroid exposure from repeated epidural injections likely contributed to disease development. Recognition of SEL is critical because it may mimic more common pathologies and delay diagnosis.

Conclusion
This case emphasizes the need to broaden the differential diagnosis of chest pain when initial cardiac investigations are unrevealing. Physicians should consider spinal etiologies, including SEL, particularly in patients with chronic steroid use and dermatomal pain patterns. Comprehensive evaluation and a multidisciplinary approach are essential to avoid misdiagnosis and ensure timely intervention.

Abstract Title: Safety and efficacy of nebulized tranexamic acid in the treatment of pediatric post-tonsillectomy hemorrhage: a systematic review

Investigator: Meghan Lee
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Abstract

Introduction
Post-tonsillectomy hemorrhage (PTH) is a potentially serious complication occurring in approximately 3-5% of pediatric patients. PTH can result in significant clinical consequences including pain, patient and caregiver distress, prolonged recovery, need for blood transfusions, and, in severe cases, return to the operating room (ROR) for hemostasis. Standard emergency management relies on supportive care and topical agents, but their effectiveness is inconsistent. Nebulized tranexamic acid (nTXA), a non-invasive antifibrinolytic medication, has emerged as a promising alternative treatment. While its use is becoming increasingly common, no systematic evaluation of its safety and efficacy in the treatment of pediatric post-tonsillectomy hemorrhage has been conducted.

Main Body
A comprehensive literature search was conducted using six databases: PubMed, CINAHL, MEDLINE, Cochrane Library, ScienceDirect, and Web of Science. Search terms included combinations of "post-tonsillectomy hemorrhage," "nebulized tranexamic acid," and related phrases. Eligible studies included case reports, case series, cohort studies, and clinical trials involving patients aged ≤18 years treated with nebulized TXA for PTH. Primary outcomes were safety (e.g., adverse events) and efficacy (e.g. ROR rate). A total of 93 studies were imported into Rayyan for screening. Two independent reviewers screened titles and Abstracts, with conflicts resolved by a third reviewer. The systematic review has been registered into PROSPERO.

Eight studies met inclusion criteria, comprising case reports, case series, retrospective cohort studies, and one randomized controlled trial (RCT), with a combined total of 177 pediatric patients. Across these studies, the pooled incidence of return to the operating room (ROR) among patients receiving nebulized tranexamic acid (nTXA) was 24.3%. Seven of the eight studies reported no adverse events attributable to nTXA. The single RCT, which compared nTXA (n=37) with intravenous TXA (n=38), identified mild adverse events in a subset of nTXA recipients including nausea (n=10), vomiting (n=4), and abdominal discomfort (n=3); no serious adverse events were reported.

To evaluate efficacy, a pooled analysis was performed using data from three retrospective cohort studies that included non-TXA control groups (Erwin 2021, Spencer 2022, and Ojeaga 2025). Across these studies, nebulized TXA was associated with a 45% relative reduction in ROR risk compared with control (pooled relative risk [RR], 0.55; 95% CI, 0.40-0.75). This equated to a pooled absolute risk reduction of 22.7%, corresponding to a number needed to treat (NNT) of approximately five patients to prevent one return to the operating room.

Conclusion
Across eight studies involving 177 children, nebulized tranexamic acid (nTXA) was well tolerated, with seven studies reporting no adverse events and only mild, self-limited symptoms (nausea, vomiting, abdominal discomfort) in the single randomized trial. No serious complications were observed, supporting nTXA as a safe adjunctive therapy.

Although findings suggest nTXA is both safe and effective for post-tonsillectomy hemorrhage, the evidence is limited, relying largely on observational studies with only one randomized trial. Variability in dosing, timing, and concurrent interventions may limit generalizability. Larger, multicenter randomized studies with standardized protocols are needed to confirm these results and define optimal use.

Abstract Title: Diagnosing Systemic Sclerosis: Don't Buy the Buerger

Investigator: Rebecca Lee
Mentor: Matthew Slief, MD
Co-Investigators:
1. Victoria Partin/EVMS MD 2027
2. Jennifer Priessnitz, MD/EVMS Internal Medicine Resident
3. Imadul Haque, MD / EVMS Radiology Resident
Department: Department of Medicine

Abstract

Introduction
Limited cutaneous systemic sclerosis (lcSSc), formerly known as CREST syndrome, is a rare autoimmune connective tissue disease characterized by vasculopathy and fibrosis of the skin and internal organs. Its diverse and often subtle symptomatology contributes to frequent diagnostic delays, especially in early stages when treatment limits disease progression.

Case Information
We present the case of a 64-year-old woman whose initial presentation of digital ischemia was misattributed to Buerger's disease for over a decade. Diagnostic momentum persisted despite atypical features and lack of improvement following smoking cessation. Over the years, the patient underwent multiple digital amputations, developed worsening Raynaud's symptoms, significant weight loss secondary to esophageal strictures, pulmonary hypertension and ultimately was diagnosed with lung adenocarcinoma. Only after a hospitalization in 2025 for acute hypoxic respiratory failure secondary to advanced stage pulmonary hypertension and severe tricuspid valve regurgitation did multidisciplinary evaluation reveal classic findings of lcSSc. Her physical exam included taut, shiny skin, reduced oral aperture, and skin calcinosis. Further chart review showed prior x-rays with soft tissue calcification as well as documentation of symptoms suggestive of gastrointestinal dysmotility. These details prompted additional workup and rheumatologic consultation. Serologic testing demonstrated positive ANA (1:640), anti-Scl-70 (>8.0) and anti-centromere (>8.0) antibodies. A high-resolution chest CT scan showed chronic interstitial thickening with peripheral reticulations, consistent with interstitial lung disease. Based upon supporting clinical evidence and positive autoantibodies, the unifying diagnosis of lcSSc with skin, gastrointestinal, and lung involvement was made. Given her clinical condition with significant frailty and active malignancy pending treatment, the risks of initiating immunosuppression were considered too high in the hospital and the patient was advised to follow up with rheumatology outpatient.

Discussion
Although the majority of Raynaud's phenomenon cases are idiopathic, it is reasonable to start considering secondary causes like Buerger's or lcSSc when clinical manifestations of connective tissue disease arise or when Raynaud's progresses to gangrenes, ulcers, or ultimately amputations. With early diagnosis, screening for internal organ involvement (ie. skin sclerosis, GI symptoms, interstitial lung disease, cardiac involvement, renal crisis, etc) can be initiated. Screening processes are especially important in the context of lcSSc as approximately half of all realized symptoms begin to present within 2 years of Raynaud's manifestation. For this patient, under the initial impression of Buerger's disease, their constellation of symptoms was not recognized as part of a unifying diagnosis. Consequently, care efforts remained centered on smoking cessation, which may have delayed opportunities for earlier detection and intervention. No further evaluation was pursued despite multiple attempts at tobacco cessation, illustrating the dangers of anchoring bias on clinical decision-making.

Conclusion
While Buerger's disease and rheumatologic conditions like lcSSc may both present with Raynaud's phenomenon and ischemic complications, careful evaluation of disease progression and systemic features is crucial for diagnostic accuracy. This case emphasizes the importance of considering Buerger's disease as a diagnosis of exclusion as well as revisiting diagnostic assumptions when clinical trajectories deviate from the expected course. In the case of systemic sclerosis, these practices could enable earlier identification, potentially altering long-term outcomes.

Abstract Title: Surgical Management of Meralgia Paresthetica: A Case Series

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Abstract

Introduction
Meralgia paresthetica (MP) is a compressive neuropathy of the lateral femoral cutaneous nerve (LFCN) that may require surgery when conservative treatment fails. In diabetes mellitus (DM), chronic hyperglycemia impairs nerve function, and under the double crush syndrome hypothesis, this systemic dysfunction may heighten susceptibility to local nerve compression. This study evaluates surgical outcomes in MP, with a focus on the impact of DM.

Methods
This single-center, retrospective case series included patients with MP who underwent surgical decompression of the LFCN by a single surgeon.

Results
Sixteen limbs were included, comprising four DM and twelve non-DM limbs. The mean age was 45.4 ± 11.5 years in the DM group and 57.9 ± 20.0 years in the non-DM group. Mean BMI was higher in DM limbs (36.0 ± 3.0) compared to non-DM limbs (29.3 ± 7.4). Preoperative findings in DM vs. non-DM limbs included peripheral neuropathy (50% vs. 45%), pain (100% vs. 45%), numbness (75% vs. 55%), and a positive Tinel's sign (50% vs. 9%). All patients had failed prior conservative treatment, including LFCN blocks and corticosteroid injections. Intraoperative findings of LFCN compression and/or scarring were noted in 75% of DM limbs and 55% of non-DM limbs. Postoperative complication rates were comparable (25% DM vs. 18% non-DM). Symptom recurrence was significantly higher in DM limbs ($p = 0.035$). DM status was also significantly associated with reduced rates of partial symptom improvement ($p = 0.027$) and complete symptom resolution ($p = 0.038$), as well as increased need for revision neurectomy ($p = 0.007$). Among DM limbs, complete symptom resolution occurred in 3 of 4 cases-but only following revision neurectomy.

Conclusion
These findings suggest that surgical decompression may be insufficient for patients with DM due to underlying peripheral nerve dysfunction, consistent with the double crush syndrome hypothesis. Tailored operative strategies, including early consideration of neurectomy, may be more appropriate in this population. Larger, prospective studies are needed to confirm these results and guide optimal surgical management for DM patients with MP.

Abstract Title: Study of Efficiency and Quality of Rounding in Internal Medicine Teams

Investigator: Stephonda Lewis
Mentor: Rehan Qayyum, MD MS
Co-Investigators:
1. Elizabeth Batchelor, Department of Medicine
2. Aaron Mills, Eastern Virginia Medical School
3. Sarah Serji, Department of Medicine
4. Dr. Julie Sill, Department of Academic Affairs
5. Olivia Tran, Medical Student, Eastern Virginia Medical School
6. Michael Hurst, Medical Student, Eastern Virginia Medical School
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9. Mai Ly
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Department: Dept of Medicine

Abstract

Introduction
Rounding is a fundamental process in hospital-based care and a core educational experience for internal medicine teams. However, there is no universal definition of what constitutes effective or efficient clinical rounds, and variability in rounding practices has been influenced by institutional culture, technological advancements, and the COVID-19 pandemic. This study aims to characterize the practices, perceptions, and measurable elements that define effective and efficient rounds from the perspective of internal medicine attending physicians and trainees at Sentara Norfolk General Hospital (SNGH).

Methods
Using a mixed-methods explanatory sequential design, the study will integrate both quantitative and qualitative data. Data will be collected through a 27-item questionnaire, observational time-motion analysis of inpatient rounding, and follow-up focus groups. Key components assessed include rounding time, location, materials used (e.g., laptops, Workstations on Wheels), content, and participant composition. The study's four main objectives are to define effective and efficient team rounding practices, classify current rounding types at SNGH, and examine associations between rounding perceptions and demographic characteristics such as training level.

Quantitative data will be analyzed using descriptive statistics, chi-squared tests, and logistic regression. Qualitative data will be coded using descriptive and InVivo coding techniques to identify emergent themes, culminating in a proposed definition of "effective and efficient" rounds. A convergent mixed-methods approach will integrate both data types to provide a comprehensive understanding of rounding practices.

All data collection will maintain confidentiality, with no protected health information (PHI) recorded. Participation is voluntary, and focus group responses will be anonymous. Data will be securely stored within REDCap or locked facilities monitored by Eastern Virginia Medical School (EVMS) and Old Dominion University (ODU).

Results
As for preliminary results of the time-analysis, 67 rounds were observed with a total of 920 patients being seen. The average time per rounding session was 2h 37m with an average travel time of 19 minutes. The average presentation time was 4m 53sec. The average teaching time was 43 seconds. The average patient care time was 2m 1sec. The average multidisciplinary discussion time was 37 seconds, and the average administrative time was 16 seconds. The data is still being further analyzed.

Conclusion
Findings from this study are expected to inform future educational strategies and protocols for clinical rounding and may serve as a foundation for standardizing rounding practices across internal medicine training environments.

Abstract Title: Stratification and Management of Persistently Positive Urine Cultures in Urological Stone Surgery

Investigator: Ang Li
Mentor: Ilya Sobol, MD
Co-Investigators:
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Department: Urology

Abstract

Introduction
Persistently positive urine cultures despite antibiotic treatment pose significant management challenges in urological stone surgery. Current guidelines recommend obtaining preoperative cultures and treating positive results with antibiotics, prior to surgery, however they provide limited guidance on managing persistent bacteriuria. While stone culture best predicts postoperative sepsis, this laboratory outcome arrives too late for preoperative risk mitigation. Literature reports sepsis rates up to 18% in patients with positive preoperative cultures, highlighting the substantial risk in this population. This study aimed to identify the prevalence and risk factors for persistent positive cultures, develop a risk stratification scoring system to guide selective re-culturing, and evaluate whether risk-stratified mitigation strategies could reduce postoperative infectious complications below expected rates.

Methods
A retrospective review analyzed 195 patients with positive preoperative urine cultures who underwent urological stone surgery. All patients received antibiotic treatment with re-culture prior to intervention. All cultures were obtained via catheterization to minimize contamination. Persistent positivity was defined as any growth measuring >10K on subsequent preoperative urinary culture. Specific demographic and clinical risk factors were assessed using univariate and multivariate logistic regression to develop a risk stratification scoring system. Secondary outcomes included immediate and 30-day postoperative sepsis rates.

Results
Despite antibiotic therapy, 26.2% of patients demonstrated persistent positive cultures. Significant risk factors in univariate analysis included the history of urosepsis upon previous stent placement (Odds ratio, OR=6.73, $p<0.001$), multi-drug-resistant organisms (MDRO) (OR=4.64, $p=0.002$), history of recurrent urinary tract infections (UTIs) (OR=2.93, $p=0.002$), and presence of indwelling devices (OR=2.69, $p=0.004$). Our scoring system achieved 72% sensitivity and 61% specificity at ≥2 risk factors, potentially reducing repeat cultures by 59%. High-risk patients received intensified mitigation strategies including additional antibiotic/anti-fungal therapy, strategic surgical delay with extended antimicrobials, and surgery cancellation with intravenous treatment.

Conclusion
Despite treating a 100% culture-positive cohort with expected sepsis rates of 5-18% based on literature, our risk-stratified management approach achieved remarkably lower rates, maintaining comparable sepsis outcomes between persistent positive and no-growth groups (immediate: 3.92% vs 2.78%; 30-day: 5.88% vs 3.47%). This substantial reduction from expected rates suggests that tailored antibiotic strategies and vigilant perioperative management can effectively neutralize the elevated infection risk in patients with persistent positive cultures, particularly those with multiple risk factors or organism shifts following initial treatment. The protocol demonstrates that proportional risk mitigation based on culture persistence predictors may transform high-risk patients into standard-risk through targeted intervention.

Abstract Title: Systemic Air Embolism Following CT-Guided Transthoracic Lung Biopsy: A Rare and Life-Threatening Complication

Investigator: Nina Li
Mentor: Trenton Taros, MD
Co-Investigators:
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2. Erik Yannone MD, EVMS @ ODU Dept of Radiology
Department: Radiology

Abstract

Introduction
CT-guided transthoracic lung biopsy is a key diagnostic procedure in evaluating lesions suspicious for malignancy. While pneumothorax and hemorrhage are well known complications, systemic air embolism (SAE) is a rare but potentially fatal occurrence. We present a case of SAE following core needle biopsy of a right lung lesion, highlighting imaging findings and multidisciplinary management.

Case Information
A 53-year-old female with a history of left lung adenocarcinoma status post lobectomy, presented for biopsy of an enlarging right middle lobe lung mass measuring 5.3 cm x 1.2 cm. Under general anesthesia, she underwent CT-guided core needle biopsy with four 20G core samples obtained. Immediately post-procedure, the patient developed ST elevations and acute hypotension. CT of the chest and head revealed extensive air embolism involving both cardiac chambers, the aortic root, right cerebral hemisphere, coronary arteries, hepatic vasculature, and a concurrent right pneumothorax. The patient was placed into a severe Trendelenburg position and transferred to the vascular interventional suite for emergent aspiration thrombectomy and chest tube placement. She subsequently underwent hyperbaric oxygen chamber therapy and was admitted to the ICU under sedation. Patient was discharged home on hospital day 6 in stable condition with minimal residual effects noted at most recent follow up.

Discussion
Systemic air embolism can occur when air enters the pulmonary venous system and transits into the systemic circulation, resulting in myocardial infarction, cerebral ischemia, or other forms of end-organ damage. In this case, it is suspected to have occurred via a bronchial-pulmonary vein communication under positive pressure ventilation. Risk factors for SAE include air-filled lesions (cysts/cavities), larger gauge biopsy needles, positive pressure ventilation, patient coughing, and lesion positioning above the level of the left atrium.

Conclusion
This report presents rare emergent imaging of SAE occurring immediately after lung biopsy. With current literature often showing SAE to be fatal, this case underscores the importance of rapid recognition and multidisciplinary management to prevent lasting sequelae, even with the extent of embolized air shown.

Abstract Title: A Spine Out of Line: A Novel Vertebral Body Anomaly & Literature Review

Investigator: Nina Li
Mentor: Trent Taros, MD
Co-Investigators:
1. Zi Guo, MS4
2. Trent Taros, Dept of Radiology
Department: Radiology

Abstract

Introduction
Vertebral segmentation defects are congenital abnormalities caused by errors in fetal development, leading to incomplete bone formation or failure of separation. Classic examples include hemivertebrae, butterfly vertebrae, and block vertebrae, often associated with congenital scoliosis, Klippel-Feil syndrome, and spondylocostal dysostosis. These anomalies may also occur in broader syndromes such as VACTERL and Down syndrome. While segmentation defects are well-documented, an accessory transverse process of the lumbar spine represents an extremely rare anatomic variant that, to our knowledge, has never been previously described.

Main Body
A 76-year-old male underwent a radiographic KUB for evaluation of gastrojejunal tube placement. Imaging revealed a distinct osseous projection from the right L2 vertebral body, consistent with an accessory transverse process. Its morphology was clearly distinguishable from hypertrophy, osteophyte formation, or transitional lumbosacral anatomy. The patient also demonstrated partial sacralization of L5 on the right, but no additional segmentation defects, congenital syndromes, or scoliosis. The finding was incidental, and the patient remained asymptomatic. Accessory vertebral processes are exceedingly rare and, to our knowledge, have not been reported in the lumbar spine. This anomaly may reflect duplication during chondrification of the transverse process. While prior cases describe accessory articulations between cervical transverse processes (C5-C6, C6-C7), our report expands the spectrum of vertebral variants to the lumbar region. This entity differs from previously described vertebral anomalies such as hemivertebra (lack of formation of half a vertebral body), block vertebra (two or more bodies are fused), and butterfly vertebra (body appears to be divided into two distinct halves). Awareness of such anomalies is important to prevent misdiagnosis, as they may mimic fracture fragments, osteophytes, or transitional anatomy.

Conclusion
We present the first reported case of an accessory transverse process of the lumbar spine, a novel vertebral anomaly. Awareness of such variants is essential to avoid diagnostic confusion and to broaden the understanding of associated syndromes.

Abstract Title: Inner Medullary Collecting Duct Cells of the Kidney Synthesize Cholesterol

Investigator: Rachel Marie Lisner
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Co-Investigators:
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Department: Nephrology

Abstract

Introduction
Cholesterol biosynthesis occurs through a multistep pathway that converts acetyl coenzyme A into cholesterol, with 3-hydroxy-3-methylglutaryl-coenzyme A reductase (HMGCR) catalyzing the rate-limiting step. One function of cholesterol is to serve as a precursor for estrogen biosynthesis. Activation of the renal G protein-coupled estrogen receptor 1 (GPER1) by estrogen promotes sodium excretion and lowers blood pressure. It has not yet been tested whether the kidney can locally biosynthesize cholesterol, the precursor of estrogen. Given the vital role of the kidney's collecting duct (CD) in fine tuning sodium reabsorption and regulating blood pressure, we hypothesize that the CD cells, which are actively involved in the GPER1 pathway, exhibit an intrinsic capacity for local cholesterol biosynthesis.

Methods
To test our hypothesis, mouse inner medullary CD cells (mIMCD3) were cultured and allowed to reach confluency. Then, cells were starved for 3 hours and subsequently treated with vehicle, or the HMGCR inhibitor, rosuvastatin (1, 5 or 10 μM), or the precursor substrate for cholesterol biosynthesis, acetate (10 mM). Western blotting was used to assess HMGCR enzyme abundance in cell extracts. Amplex Red cholesterol assay was conducted on media samples to determine cholesterol levels. Serum-containing and serum-starved media samples were assayed to determine whether the detected cholesterol values were dependent on pre-existing serum in the media.

Results
Western blotting of mIMCD3 cell extracts revealed the presence of HMGCR. Media conditioned with mIMCD3 cells exhibited a statistically significant increase in cholesterol levels after 48 hours of culture compared to unconditioned media (67.33 ±1.73 vs. 23.73 ± 0.54 μg/ml, respectively; $n = 3$ per group; $P < 0.0001$). Treatment of mIMCD3 cells with 1 μM rosuvastatin significantly reduced the cholesterol levels in the conditioned media compared to vehicle-treated cells. Assessment of cholesterol levels for cells cultured in serum-starved media revealed that cholesterol was significantly higher in serum-starved media conditioned by mIMCD3 cells compared to serum-starved unconditioned media (3.97 ± 0.08 vs. 0.59 ± 0.041 μg/ml, respectively; $n = 3$ per group; $P < 0.0001$). Additionally, treatment of mIMCD3 cells with rosuvastatin (0, 1, 5, and 10 μM) resulted in dose-dependent decreases in the cholesterol levels in the media (33.46 ± 0.03; 32.70 ± 0.19; 32.53 ± 0.28 μg/ml; 31.39 ± 0.37 μg/ml, respectively; $n = 3$ per group), with a statistically significant difference between the 1 μM and 10 μM concentrations ($P = 0.025$). Lastly, western blotting of mIMCD3 cells treated with 10mM acetate displayed a greater HMGCR abundance than vehicle-treated cells.

Conclusion
Our data illustrated the presence of key cholesterol synthesis enzyme HMGCR in mIMCD3 cells. It also demonstrated increased cholesterol levels in both serum-containing and serum-starved media when conditioned with mIMCD3 cells compared to unconditioned media. Inhibition of HMGCR by rosuvastatin resulted in a dose-dependent decrease in cholesterol levels in cell media. Treatment of cells with acetate increased HMGCR abundance, demonstrating the ability of mIMCD3 cells to upregulate their cholesterol synthesizing machinery, and potentially their ability to synthesize cholesterol. Altogether, our results provide novel evidence that mIMCD3 cells have an endogenous capacity to biosynthesize cholesterol.

Abstract Title: Pre-Clerkiship Medical Student Preparedness for Patient Loss: A Qualitative Study

Investigator: Remy Claire Lloyd
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Gwendolyn George, MD2026
Rebecca Fetter, MD2026
Department: Internal Medicine

Abstract

Introduction
Often, medical students experience the death of a patient they've cared for during clinical rotations. Students may lack the time and/or tools to process these events and emotions in the context of a heavy academic load and clinical expectations, juggling extra-curricular activities, and maintaining good work-life balance. This study aims to proactively assess pre-clerkship medical students' attitudes towards patient loss and adverse outcomes to better understand their preparedness.

Methods
An anonymous survey was distributed to the EVMS MD Class of 2027. Responses were collected from the end of the pre-clerkship period until the end of the first clerkship rotation. Likert scale and free-text responses were analyzed for perceived confidence in ability to cope, anticipated coping skills to be used, concerns, perceived emotional effect, and emotions anticipated experiencing as a result of patient loss or adverse outcomes.

Results
A total of 21 students participated in the survey. More than half of respondents reported being pretty confident in their ability to cope with patient loss (52%) and 4.8% were completely confident. A wide variety of concerns regarding patient loss and adverse outcomes were expressed. These ranged from fear of crying in front of attending physicians or patient family members (9.5%) to not knowing how to care for the patient's family afterwards (9.5%). Respondents also reported fear of its effect on their ability to care for others and inability to let go of situations (9.5% each).

Further, 47.5% of respondents expect that experiencing patient loss will moderately or significantly emotionally affect them. Students most commonly expected to experience sadness/sorrow (57.1%), guilt, regret, or liability (38.1%), grief (33.3%), and anger (14.3%). Other responses included intellectualization, bewilderment, a feeling of being lost, sympathy, depression, and heaviness.

Taking this into consideration, respondents suggested a varied spectrum of coping tools to employ during their clerkship year. The most common responses included talking with loved ones, mentors, counselors, or physicians (33%), journaling (19.0%), meditation/reflection (19.0%), physical activity (14.3%), and sleeping (14.3%).

Conclusion
Evolving clinical responsibilities coupled with high academic demands create a unique environment during the clerkship year. Most students are likely to encounter the loss of patients they've cared for while adapting to this new environment. Despite most respondents feeling confident in their abilities to cope with patient loss and adverse outcomes, our findings suggest that pre-clerkship students still expect to be heavily impacted emotionally. Responses demonstrated a wide range of coping skills capable of bolstering resilience, with a network of loved ones or colleagues to talk to being predicted as the most important tool. Yet, most respondents still expect to feel sadness, guilt, or grief.

Though the clerkship year is already heavily supported by clinical curricula, introducing and addressing the emotionally demanding aspects of medicine could increase preparedness and confidence in pre-clerkship students' ability to handle adverse patient outcomes. Thus, we suggest that proactive institutional support of patient loss could be an important pillar in student well-being.

Abstract Title: Post-Ictal Psychosis Following Polysubstance Overdose

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Mentor: David Spiegel, BS MD
Co-Investigators:
Zachary Lawrence, VHS\MD2027
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Abstract

Introduction
We present a rare case of postictal psychosis (PP) arising after overdose-induced seizures in a patient without a history of epilepsy. While PP is classically described in individuals with chronic temporal lobe epilepsy, reports of PP specifically following overdose-induced new-onset seizures remain scarce; to our knowledge, no prior case describes PP after a mixed ingestion of quetiapine, hydroxyzine, sertraline, amlodipine, and atorvastatin.

Case Information
Case-based observational analysis. A 33-year-old male with a history of MDD, anxiety, and OCD presented to the emergency department after a suicide attempt involving laceration of his left wrist and ingestion of approximately 100 pills which included a mix of amlodipine, hydroxyzine, sertraline, quetiapine, and atorvastatin. Both BAL and UDS were unremarkable. He was hypotensive and required transfusion of two units of whole blood. He was initially aggressive with staff and intermittently endorsed seeing "a demon," though he denied auditory hallucinations. On hospital day 2, he experienced two generalized seizures attributed to toxic ingestion: the first seizure resolved spontaneously while the second was resolved with 2 mg midazolam. EEG performed later that day showed bifrontal sharp transients without epileptiform correlate, and MRI of the brain was unremarkable. Following the seizures, he developed acute kidney injury progressing to dialysis dependence, with creatinine peaking at 17.7 mg/dL. Over the subsequent days, he exhibited waxing and waning confusion, severe agitation requiring physical restraints, paranoid delusions, and visual hallucinations of demonic images.

This case highlights postictal psychosis (PP) as the most likely diagnosis. Despite broad infectious, autoimmune, and paraneoplastic workup, no alternative etiology was identified. Notably, NMDA and other neuronal antibody panels were negative, and lumbar puncture was nondiagnostic. By hospital day 16, his agitation subsided and all antipsychotics were discontinued. He was discharged home in stable condition, alert and oriented ×3, without recurrence of psychotic symptoms.

Discussion
Although our patient displayed some visual hallucinations prior to his seizures, his rapid progression to florid psychosis in the days immediately following the seizures, absence of infectious or autoimmune causes, and eventual full remission are consistent with the natural course of PP. In overdose scenarios, certain medications such as SSRIs, antihistamines, and antipsychotics can greatly lower the seizure threshold. Several of the agents ingested in this case are known to lower seizure threshold and provoke neuropsychiatric complications in overdose. Quetiapine overdose has been linked to late-onset generalized seizures, hydroxyzine toxicity has been associated with seizures, delirium, and hallucinations, and sertraline overdose has been implicated in seizures and serotonin-related agitation with visual phenomena. While seizure activity is a known complication of overdose with these agents, postictal psychosis remains a poorly understood phenomenon.

Conclusion
The report expands awareness of PP beyond epilepsy populations, highlights diagnostic challenges when psychiatric and toxicologic factors overlap, and emphasizes the need for clinicians to recognize PP as a potential complication in overdose presentations.

Abstract Title: Anesthesia in Patients with Select Neurological and Neuromuscular Disorders, A Scoping Review.

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Department: Biomedical and Translational Science, Neurology, Center for Integrative Neuroscience and Inflammatory Diseases

Abstract

Introduction
Patients with pre-existing neurological conditions, including prior stroke, epilepsy, paralysis, and Alzheimer's disease, are uniquely vulnerable in the perioperative setting for adverse outcomes. Stroke survivors face elevated risks of recurrent stroke, worsening deficits, and complications from comorbid conditions. Epilepsy patients require special considerations due to altered neuronal activity, susceptibility to intraoperative seizures, and interactions between anesthetics and antiseizure medications. Patients with Alzheimer's disease and related dementias are particularly susceptible to postoperative delirium and cognitive dysfunction. Those with neuromuscular disorders or paralysis face additional hazards, including hyperkalemia with succinylcholine and prolonged residual weakness with neuromuscular blockade. Although these risks are acknowledged, they are inconsistently considered in practice, and no standardized guidelines exist to inform pharmaceutical anesthetic management in these populations.

Main Body
This scoping review seeks to map and highlight knowledge gaps in anesthetic outcomes for these populations by contrasting recovery metrics with the general population and exploring the reported effects of anesthetic techniques and agents, thereby providing the foundation necessary for future guideline development.

We structured a multi-database search on criteria for population, anesthetic modality, adverse events, and outcomes. Our preliminary review of relevant literature noted that anesthesia in patients with neurological disorders are at a notably higher risk for complications that can significantly impact health outcomes, that current protocols have failed to specifically address. Patients with epilepsy, paralysis, prior stroke, and Alzheimer's disease each exhibit distinct perioperative vulnerabilities compared with general surgical cohorts. Epilepsy is associated with higher rates of postoperative delirium, cognitive dysfunction, delayed emergence, and readmission. Paralysis confers greater risk of cardiovascular instability, hyperkalemia with neuromuscular blockade, and ICU utilization. Stroke history predicts increased perioperative stroke, major complications, mortality, prolonged hospitalization, and discharge to higher levels of care. Alzheimer's disease is linked to greater postoperative cognitive decline, aspiration risk, unpredictable anesthetic responses, and reduced likelihood of returning to baseline function. These higher incidents of complications all represent potential areas of progress that tailored anesthesia protocols could target.

Conclusion
Our review concluded that there is a clinically significant disparity in the occurrence and severity of multiple anesthesia related side effects between patients with select neurological disorders and the general patient population. Our review aims to provide an overview of relevant literature to highlight the gaps in current research and spark further progress in the creation of guidelines for pharmaceutical anesthesia management in patient populations with neurological and neuromuscular disorders.

Abstract Title: Cutting Through Expectations: Single Institutional Insights from Students, Residents, and Faculty on the Third-Year Surgical Clerkship

Investigator: Ryan Mancoll
Mentor: Alexa Shaw, MD
Co-Investigators:
1. Rebecca Britt, M.D, VHS EVMS Department of Surgery
2. Brooke Hooper, VHS EVMS Department of Internal Medicine
3. Molly Britton, MS, VHS EVMS Department of Surgery
4. Rebecca Brown, M.D, University of Maryland Department of Surgery
Department: VHS EVMS Department of Surgery

Abstract

Introduction
With the changing culture within surgical education, specifically within the clerkship phase secondary to implications of Step 1 being pass/fail and shifting pressure on shelf exams and clerkship grades, there seems to be fundamental differences between students' expectations compared to residents and faculty. Surgical clerkships are known to have a demanding workload. This can place stress on students, limit study time compared to other rotations, and ultimately lead to discrepancies between expectations and the realities of the clinical environment. The purpose of this study is to perform a multilevel assessment of the learning environment and expectations during the third-year surgery clerkship.

Methods
Recruitment was done at institutional meetings for students, residents, and faculty using a QR code. All surveying was done using RedCap. Participants were assigned into a group: medical students, residents, or attendings and received the corresponding survey. Quantitative data analysis was done using JMP 18, and thematic analysis of qualitative data was done in a staged reflective fashion in NVivo 12. Two Investigators completed the analysis after the initial codes were made.

Results
100 participants completed the survey, comprised of 67 medical students, 23 residents, and 12 attending surgeons.

Quantitative analysis revealed descriptive and inferential trends in the questions proposed to participants. In terms of work hours and call expectations, a significant difference existed in the expectations of duty hours during clerkship ($p = .0335$), with attendings expecting more than residents and residents expecting more than students. The number of call shifts followed the same trend, with attendings having a mean (STD) of 4.25(1.49) and students reporting a mean (STD) of 2.63(1.3), with residents in the middle ($p = .0003$). This trend was reversed when asked about hours spent studying while not on duty, with students expecting the most ($p = .0142$). When asked how faculty view teaching students, most students saw themselves as inconveniences and faculty would rather have them on the team. Faculty inversely mirrored this, and residents fell in the middle. ($p < .0001$), ($p < .0001$).

Qualitatively, reflective thematic analysis revealed many themes with homogeneity, but also descriptive differences. When asked, what are the responsibilities of medical students on the floor, or what contributes to actual education, residents thought floor procedures should involve students, but students and attendings barely contributed. All groups felt that rounding and post-op care would contribute to education.

Discussion
Our results describe not only the expectations that these groups have in terms of surgical clerkship but also show key positional discrepancies are being seen in surgical education. This study allows clerkship directors to set expectations upfront to each group and hopefully align the clerkship for a better experience.

Abstract Title: Perceptions about Artificial Intelligence Use in Vascular Surgery: Insights from Healthcare Providers and Industry Professionals

Investigator: Ryan Mancoll
Mentor: David Dexter, MD
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2. Nicholas Bandy, M.D, Department of Surgery, Division of Vascular Surgery
3. Matthew Rossi, M.D, Department of Surgery, Division of Vascular Surgery
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Abstract

Introduction
Artificial intelligence (AI) and Machine learning have become widely used in healthcare for a multitude of tasks. Following this trend, AI research and use in vascular surgery have increased as the field navigates obstacles such as acceptance and access to training data. Current AI uses include note-writing assistance, imaging interpretation, and case planning in various disease states. This study seeks to evaluate vascular health care providers' and industry representatives' perceptions and concerns about this rapidly emerging technology.

Methods
We performed a prospective, mixed-methods, convergent parallel design cohort study via a quantitative survey and qualitative interview. Participants were recruited from the SVS member directory, as well as known contacts. Participants fell into two groups: a healthcare provider (HCP) in the vascular space (surgeon, trainee, APP), or vascular device industry professionals. The survey was primarily Likert-scale-based, comprising of sections on demographics, understanding, derivation/validation of AI, performance, and uses in vascular surgery. Surveying was completed using the secure online tool RedCap.

Results
The survey invitation was distributed to approximately 3,500 individuals, of whom 106 (~3.0%) completed the survey. Among them, 88 qualified for the health care provider group, 71 of those being surgeons, and 18 qualified for the industry group. Six participants agreed to be interviewed, and two followed up and completed the interview.

Both groups had comparable knowledge of AI terminology, interest, use, and evidence requirements for implementation. While large proportions of participants from both groups were at least mildly concerned about AI misuse in the clinical setting (31% HCP vs. 44% Industry) HCPs rated themselves more strongly/very strongly concerned (44% HCP vs. 17% Industry). The majority of HCPs (52%) felt that AI would bring notable or radical change to vascular surgery in the next 5 years, in comparison to 34% of industry. More respondents from industry felt that AI should perform better than health care providers prior to being put into practice (32% HCP vs. 61% Industry). While more HCPs felt comparable performance between AI and healthcare providers(44% HCP vs. 28% Industry) is an acceptable threshold. The usefulness of already established or proposed uses of AI in vascular surgery was also assessed and outlined, showing generally positive attitudes across both groups towards all uses other than direct surgical assistance. As well, Industry rated these indirect and direct applications of AI as marginally more useful than HPCs in all categories other than tracking patient complications and outcomes.

Conclusion
Despite the increasing prevalence of AI, evaluation of expectations and perceptions in vascular surgery remains largely absent. Our data shows overall homogeneity between vascular surgery health care providers and our industry partners in most aspects of AI evaluated, including knowledge, interest, use, and requirements. However, it also elucidates differences in aspects like levels of concern, perception of impact, performance requirements, and general application. Our findings suggest the necessity for discussion and collaboration between all groups in the field to support effective and accepted AI implementation in vascular surgery.

Abstract Title: Lithium's Masking of Thyroid Biomarkers in a Hyperthyroid State

Investigator: Baylee Elise Marin
Mentor: David Spiegel, MD
Co-Investigators:
Department: Psychiatry

Abstract

Introduction
Lithium is a mood stabilizing medication used primarily in the treatment of bipolar disorder I and II that is proven to be particularly useful in treating and preventing relapse of manic symptoms. There are many known side effects that require routine monitoring, including kidney damage, cardiac effects, and hypothyroidism. Lithium decreases thyroxine (t4) produced endogenously by the thyroid gland by building up to toxic levels in thyroid tissue, while also decreasing peripheral conversion of thyroxine (t4) to the active form triiodothyronine (t3) by deiodinases.

Case Information
A 62 year old female with a past medical history of schizoaffective disorder, bipolar disorder, multinodular goiter s/p total thyroidectomy, and substance abuse presented to the hospital for shortness of breath and altered mental status. On physical exam, the patient was found to be tachypneic, tachycardic, anxious, and suffering diffuse weakness and a tremor. The patient was on levothyroxine 125 mg after having a total thyroidectomy four months prior. Her thyroid stimulating hormone (tsh) was 0.01, so there was concern for levothyroxine overdose as her clinical presentation and tsh supported a hyperthyroid state, and she struggled to recall her medications and dosing. However, her t4 level was within normal limits at 1.4, and t3 was very low at 1.4. While t4 can often be normal in a hyperthyroid state, the t3 level was certainly incongruent. However, the patient had been chronically on lithium for her bipolar disorder, so it was suspected the lithium could be causing the low t3 level. The patient's lithium was discontinued on hospital day 2 after evaluation from psychiatry. The patient's levothyroxine dosage was also monitored, and her symptoms eventually cleared up.

Discussion/ Clinical findings:
This case highlighted the ability of lithium's effect on thyroid hormone to hide certain biochemical markers of hyperthyroidism. While it is well known that lithium can cause hypothyroidism in euthyroid individuals, there is paucity in research detailing how lithium can affect the thyroid biomarkers in an athyreotic patient taking supplemental t4, or a patient with potential thyroid overdose. This patient's low tsh and physical symptoms were consistent with hyperthyroidism, despite her t4 being within normal limits and her t3 being very low. Even with normal levels of t4, thyroid levels and feedback is very individualized and varying levels can lead to clinical symptoms and low tsh, however free t3 tends to rise before t4. Lithium, even at subtherapeutic levels, decreases the peripheral conversion of t4 to t3, explaining why her t3 was so low.

Conclusion
While it is standard practice to monitor the thyroid function of patients on lithium, the common concern with the medication is the toxic buildup of the medication in the thyroid tissue and its interference with endogenous production. This case showed that the effects of lithium on peripheral deiodination can greatly influence the thyroid function of athyreotic individuals on supplemental t4, and mask certain biomarkers in a patient experiencing thyroid overdose, further emphasizing the importance of monitoring thyroid function in patients taking lithium.

Abstract Title: Comparing suicide prevention policies across states: a systems science perspective

Investigator: Caitlyn Grace Martindale
Mentor: Philippe Giabbanelli, MS PhD
Co-Investigators:
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Department: Office of Enterprise Research and Innovation

Abstract

Introduction
Suicide is a leading cause of death in the United States (U.S.), ranking among the top ten causes across most age groups and contributing to significant public health and societal burden. Despite national efforts, suicide rates have remained persistently high over the past two decades. Prevention policies are largely developed and implemented at the state level, yet each state publishes policies in lengthy narrative formats that are challenging to systematically compare. This creates barriers to understanding how states align with evidence-based recommendations, such as the Centers for Disease Control and Prevention's (CDC) suicide prevention package, and to assessing whether policies reflect suicide's complexity as a system of interrelated determinants. The objective of this study is to develop and apply a framework for systematically analyzing state-level suicide prevention policies, with a focus on whether and how systems thinking is represented, and to identify similarities and differences in policy approaches across states.

Methods
We selected 15 U.S. states using purposive sampling to ensure diversity of geography, demographics, and policy context, and continued sampling until thematic saturation was reached. Guided by a systems map of suicide, we manually extracted policy initiatives from state policy documents. Each initiative was coded as a concept (e.g., "increase access to mental health treatment") and, when specified, causal relationships (e.g., "financial stability and access to care enable mental health treatment") were also identified. This approach enabled consistent extraction of both discrete policy levers and the connections among them, providing a structured basis for cross-state comparison.

Results
Across the 15 states, most suicide prevention policies demonstrated limited incorporation of systems thinking. Policies frequently focused on isolated interventions (e.g., restricting access to lethal means, improving mental health treatment, promoting safe messaging) without linking them to other interventions or to broader social, economic, or healthcare determinants. Causal relationships, when articulated, were sparse instead of accounting for the multiple factors that create or prevent risks. While several policy levers were commonly mentioned across states, their packaging varied considerably. For example, two states facing similar demographic and structural challenges often proposed different intervention sets, suggesting that policy construction could benefit from more evidence-based alignment.

Conclusion
Our framework illustrates the utility of applying systems mapping to narrative state policy documents, enabling structured comparisons that are otherwise difficult to achieve. The finding that most states emphasize isolated interventions rather than interconnected systems underscores a critical limitation in current policy design. Without explicit recognition of how factors such as social determinants, healthcare access, and economic conditions interact, state policies may miss opportunities for synergistic and sustainable impact, or they may ignore potential unintended consequences. By making policy structures and causal reasoning explicit, our approach can support more systematic and methodological policy development. This may, in turn, improve implementation fidelity, facilitate evaluation, and enhance cross-state learning. Ultimately, the framework highlights the need for suicide prevention policies that better reflect the complexity of suicide as a public health problem.

Abstract Title: Improving the Quality of Care for Children with Spinal Cord Injuries

Investigator: Khushie Matharoo
Mentor: Kyrie Shomaker, MD
Co-Investigators:
Jen Barboza CPNP, Pediatric Inpatient Rehabilitation
Department: Pediatric Hospital Medicine

Abstract

Introduction
Patients with spinal cord injury (SCI) exhibit a wide range of bodily dysfunction post-injury leading to secondary health conditions including para/quadriplegia, pressure ulcer, autonomic dysreflexia, venous thromboembolism, mental health issues, and bladder dysfunction. Specific to the genitourinary system, SCI commonly leads to urinary retention, which predisposes patients to urinary tract infection and upper urinary tract/renal injury. Therefore, timely consultation with multidisciplinary specialists is essential in achieving the best outcomes in patients with SCI. Our objective is to evaluate urological care for patients with SCI with bladder dysfunction, examine possible reasons for delayed urology consultation, and conduct a Plan-Do-Study-Act (PDSA) cycle to affect the specific aim of timely urology consult for this patient population within 48 hours of inpatient rehabilitation admission.

Methods
A cohort of 44 patients with SCI admitted to CHKD inpatient rehabilitation between 2020-2025 was analyzed to identify patterns in acute admission, timing of consultation, rehab stay, and urinary outcomes for the subset of patients with bladder dysfunction. An Ichikawa diagram and process chart were used to identify potential causes of delay in consultation. Pareto charts were used to stratify and target variables significantly contributing to negative urinary outcomes.

Results
Sixty-six percent of patients with SCI (n=29) had bladder dysfunction. Outcome measures included proportion of patients with urinary complications out of all patients with bladder dysfunction (58%, 17/29) and proportion of those with ≥ 1 urinary complication (17%, 3/17). Process measures included rate of urology consultation in patients with bladder dysfunction (31%, 9/29) and timeliness of consult within 48 hours of rehab admission (55%, 5/9). Process mapping and fishbone diagramming revealed that early urologic consultation is highly dependent on single individuals on the inpatient rehabilitation and urologic teams.

Conclusion
Key drivers of reduced negative urologic outcomes include facility/service line serving patient during acute injury admission and presence or absence of early urologic consultation. Other identified drivers were mechanism/level of injury, nursing procedures implemented during IPR, and presence or absence of an order set to systematize urologic consultation and implementation of an appropriate bladder protocol. PDSA cycles are currently underway to increase the proportion of patients with SCI-related bladder dysfunction with early urologic consultation. This project provides a framework for an informed and structured way to enact change in the inpatient rehabilitation unit to help decrease negative urologic outcomes in pediatric patients with SCI.

Abstract Title: The impacts of screen media exposure on sleep, physical health, and language development in children aged 0-11: A narrative review

Investigator: Naomi Thi Matsuno
Mentor: Sonia Khurana, PT PhD
Co-Investigators:
Department: HS Physical Therapy

Abstract

Introduction
Screens have pervaded daily life for all age groups, including children. The years from birth to age 11 represent a critical period of development, making it important to examine how screen time affects growth in multiple domains. While multiple studies evaluate the quantity of screen time on various aspects of development, there is limited cumulative evidence on the comparative impact of quality vs quantity of screen time on sleep, physical health and language development.

Main Body
The primary objective of this narrative review is to synthesize the evidence regarding the impact of the quality vs quantity screen time on the sleep, physical health, and language development of children aged 0-11. A secondary objective is to explore the role of factors such as context, supervision, and content quality in supporting or impeding development. To accomplish these, a comprehensive search of PubMed and Google Scholar was conducted from January 2010 to June 2025. Search terms included "screen time," "screen media," "quality vs quantity of screen time," "sleep," "physical health," and "language development." Studies were included if participants were 0-11 years old and if different forms of screen media (e.g., TV, tablets) were examined. Exclusions were systematic reviews, commentaries, editorials, studies focused solely on screen time quantity, and those involving children with neurodevelopmental disorders. Nine studies satisfied the defined inclusion and exclusion criteria: longitudinal cohort (n=1), longitudinal observational (n =2), cross-sectional observational (n=5), and prospective cohort (n=1) which were conducted in Australia, China, Hong Kong, Japan, Korea, Russia, Saudi Arabia, and the United States. Evidence on sleep came from two studies of children aged 1-9 years, which found that greater daily exposure to screens was linked to longer bedtime delays. The type of content moderated this association: educational or calming programming had more favorable effects on sleep compared to entertainment-focused media. Three studies of children aged 9-11 years investigated physical health and reported that longer screen time was associated with higher body mass index (BMI) ($p = 0.038$). Children who primarily engaged with entertainment content exhibited the largest BMI increases. Four studies addressed language development in children aged 1-7 years. Passive screen use, such as watching television, was linked to poorer outcomes in receptive language and science knowledge. In contrast, active screen use, co-viewing with caregivers, and exposure to educational content showed positive associations with receptive language and science knowledge.

Conclusion
This review suggests a positive association between screen time and adverse outcomes in children's development including disrupted sleep, elevated BMI, and language difficulties. Entertainment-oriented or passive screen use appears to increase the risk of poor sleep and language outcomes. In contrast, active engagement, co-viewing, and educational content are linked to improved language skills and science knowledge. These findings highlight the need to consider both the type and context of screen use when evaluating its effects on child development.

Abstract Title: Validating the prognostic utility of SIAHHigh/Low protein expression as a downstream readout of TNBC-driven EGFR/RAS pathway activation (ON)/inactivation (OFF) to risk stratify TNBC patients in the clinic

Investigator: Mark Matta
Mentor: Dr. Amy Tang, PhD
Co-Investigators:
Department: Leroy T. Canoles Cancer Research Center

Abstract

Introduction
Breast cancer is the 2nd leading cause of cancer death in women in the United States. Triple-negative breast cancer (TNBC) is an aggressive breast cancer subtype that disproportionately affects BRCA1 mutation carriers and young women. TNBC represents ~ 15-20% of all breast cancers. TNBC has high relapse rates and poor survival. With high genetic diversity, dynamic tumor heterogeneity, and genomic instability, many similarly treated TNBC patients with identical clinicopathological characteristics experience treatment disparity and disparate survival. Current methods fall short in predicting relapse/resistance/survival with reliable accuracy. Seven in absentia homologue (SIAH) is an evolutionarily highly conserved RING-domain E3 ligase that is the most downstream signaling gatekeeper identified in the EGFR/HER2/K-RAS/RAF/MEK/MAPK signaling pathway. We propose that SIAH is a new prognostic biomarker for patient risk stratification and relapse/survival prediction in TNBC post-neoadjuvant chemotherapy (NACT).

Methods
Chart review was conducted using Sentara MD Office/EPIC and VOA iKnowMedicine portals to update patient survival in a large cohort of 577 TNBC patients. The IHC staining of SIAH, Ki67, and EGFR were performed in TNBC primary and residual tumors. Representative IHC images were captured. Statistical analyses were conducted to determine whether SIAHHigh/Low expression pre- and post-NACT, and the NACT-induced changes of SIAH High/Low expression in the pair-matched TNBC tumor specimens can be used to predict relapse/resistance/survival in high-risk TNBC.

Results
Among 577 TNBC patients, 317 high-risk patients received NACT. 75 of them are pCR patients and 233 are pIR patients. 133 of them have both the primary and residual tumor biospecimens. The KM survival curves were performed. We found that high SIAH expression in residual tumors reflects ineffective NACT and persistent EGFR/K-RAS/SIAH pathway activation that predict high relapse, chemo-resistance, and poor survival. Conversely, low SIAH expression in residual tumors post NACT, reflects effective EGFR/K-RAS/SIAH pathway inactivation that predict tumor remission and improved survival.

Conclusion
High SIAH expression in TNBC residual tumors post-NACT was associated with high-risk TNBC malignancy. We aim to develop a SIAH-centered biomarker panel to risk stratify TNBC pIR patients and predict relapse/resistance/survival at 1st-line neoadjuvant settings. We aim to delineate the molecular underpinning of the EGFR/RAS/SIAH-driven treatment disparity in TNBC in Virginia.

Abstract Title: Shunt Happens: A Case of Ventriculoperitoneal Shunt Migration into the Lung

Investigator: Sarah Anne Aguilar Mayo
Mentor: Kyle Admire, DO
Co-Investigators:
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2. Xian Qiao, MD, Sentara Pulmonary, Critical Care & Sleep Specialists
Department: Pulmonary and Critical Care Specialists

Abstract

Introduction
Ventriculoperitoneal (VP) shunt placement is one of the most common neurosurgical procedures, typically utilized to avoid damage from elevated intracranial pressures in conditions such as hydrocephalus and idiopathic intracranial hypertension.1 Most complications occur within the first year and are usually related to infection or mechanical malfunction in the form of shunt disconnection, obstruction, or migration.2,3 Migration most commonly occurs with perforation of the bowel, representing 35% of cases. Chest and thorax migrations are less frequently reported.3

Case Information
Our patient is a 35-year-old female with a past medical history of idiopathic intracranial hypertension with a VP shunt placed 5 years prior to presentation which required a revision 1-month following insertion. She presented to an outside facility with symptoms of left upper quadrant abdominal pain, nonproductive cough, and subjective fever. She described no headache, weakness, or other neurological symptoms. Computed tomogram (CT) of the abdomen and pelvis revealed the VP shunt catheter traveling through the expected anterior subcutaneous course before traversing into the abdomen and then looping back through the spleen and diaphragm and into the left chest, however the tip was not captured. Subsequent chest imaging demonstrated that the distal tip of the VP shunt catheter was within the left lower lung abutting a left lower lobe subsegmental bronchus with patchy infiltrates of the left lower lobe and right upper lobe. Broad spectrum antibiotic therapy covering community and hospital acquired pathogens was initiated and transferred to our facility for shunt evaluation and surgical management. She underwent a multi-disciplinary shunt revision which was successful and had no immediate complications. CT head and shunt series showed appropriate position of the shunt with stable ventricular size. Her headache improved, and she was discharged home with plans to complete a course of oral antibiotics.

Discussion/Conclusion:
VP shunt migration frequently presents with vague symptoms and is often dependent on where the shunt migrates. Although migration into the chest/thorax is a rare complication, respiratory symptoms should raise clinical suspicion for shunt dysfunction and may warrant further evaluation.

Abstract Title: Facing Loss in Training: Factors Affecting Medical Students' Preparedness to Cope with Patient Death

Investigator: Caitlin M Mea
Mentor: Kelly A Thomson, MD
Co-Investigators:
1. Rebecca Fetter, MD Student
2.. Gwendolyn George, MD Student
3. Remy Lloyd, MD Student
Department: Internal Medicine

Abstract

Introduction
During the clerkship phase of medical school, students frequently are exposed to the death of patients for whom they have been caring. While many have previously experienced the death of a family member or other losses outside of the clinical setting, many students have not experienced the death of a patient and may feel unprepared to handle the complex emotions that accompany these situations. There are few studies that explore medical students' perceived confidence in coping with patient death and how this may be influenced by individual factors. We conducted a survey-based study to assess third-year medical students' sense of preparedness to cope with patient death and investigate possible correlations with previous experiences and demographic features.

Methods
An anonymous survey was distributed to third-year medical students at Eastern Virginia Medical School. Students responded to the survey between the end of their pre-clerkship curriculum and the end of their first clerkship. Likert scale and free-response questions were analyzed to explore correlations between previous experiences, demographic data, and any other factors that may contribute to students' perceived readiness to experience the death of a patient. Students indicated how prepared they felt in their ability to cope with patient death on a scale of 0 to 4 (0 = Not at all confident, 1 = A little confident, 2 = Somewhat confident, 3 = Pretty confident, 4 = Completely confident). Two-tailed t-tests were performed to investigate potential correlations.

Results
Twenty one students responded to the survey. On average, students reported feeling moderately confident in their predicted ability to cope with patient death, with a mean confidence score (CS) of 2.55. On average, those who had experienced the loss of a patient felt more prepared to cope, (CS=2.82 ± 0.75 vs 2.22 ± 0.67), though this was not statistically significant (p=0.06). Males also reported feeling more prepared to cope than females (CS=2.89±0.60 vs 2.30±0.67), though this result was not statistically significant (p=0.07). There was no significant correlation between personal religion or spirituality and perceived ability to cope with patient death (p=0.68).

Conclusion
In a study of medical students at the beginning of their clerkship phase, students report feeling moderately confident in their ability to cope with the death of a patient. Factors associated with being more prepared include previous experience with patient death and male gender, though these did not reach statistical significance. A significant limitation of this study was our sample size (N=21). Including a larger sample size and increasing the power of this study may further elucidate statistical significance. Follow-up studies are planned in order to investigate the impact of patient death during core clerkships and reveal the natural history of students' perceptions as they progress through their education.

Abstract Title: Improving the Use of Transition Readiness Assessment Questionnaire (TRAQ) in our General Academic Pediatric (GAP) Practice

Investigator: Sarah Mohiuddin
Mentor: John Harrington, MD
Co-Investigators:
1. Elizabeth Harvie, BA, MD 2028
2. Lindsey Hill, BS, MD 2028
Department: Pediatrics

Abstract

Introduction
Transition from pediatric to adult healthcare is critical, yet often difficult to initiate and prioritize in a busy practice. The Transition Readiness Assessment Questionnaire (TRAQ) is a validated tool that assesses an adolescent's preparedness for transition. Despite its value, integration into standard care is limited due to time constraints and perceptions of low clinical utility. In early 2025, TRAQ was piloted among a small cohort of autistic patients in the Children's Hospital of The King's Daughters (CHKD) General Academic Pediatric (GAP) practice, revealing widespread low readiness scores. This project aimed to improve TRAQ utilization and incorporate it into standard workflow for all well-child visits for patients aged 15 and older.

Methods
Several Plan-Do-Study-Act (PDSA) cycles were implemented. A shortened version of the TRAQ ("fast-TRAQ") using only the second half of the questionnaire was created. Providers were educated on TRAQ's purpose, and the form was embedded into pre-visit paperwork. Patients aged 15+ completed forms in the waiting room, and responses were manually entered into the electronic medical record (EMR) by nurses or attendings. Scores were analyzed weekly, with averages calculated by domain and patient age. The administration rate was monitored over eight weeks, excluding patients with developmental limitations.

Results
Embedding fast-TRAQ into pre-visit paperwork significantly increased completion. Provider education and improved documentation in EMR were essential to sustaining these gains. Age-stratified TRAQ data showed a bell curve distribution: lowest scores in 15-year-olds, peaking in 17-18-year-olds, and declining in 20-year-old. A subset of forms were incomplete, suggesting continued barriers to the process.

Conclusion
Modifying the TRAQ process and embedding it into clinic workflow improved utilization without burdening staff. Preliminary results highlight critical skill gaps that can guide patient education. The declining score in young adults may reflect increased complexity or support needs in older patients still seen in pediatric care. Next steps include administering the full TRAQ to patients scoring ≥3 on fast-TRAQ and expanding use to sick visits. We aim to continue data collection to support standardized, efficient, and patient-centered transition planning in the GAP practice.

Abstract Title: Comparing management of food insecure patients across two practice models within a health system in coastal Virginia

Investigator: Sarah Mohiuddin
Mentor: John Harrington, MD
Co-Investigators:
1. Simran Shah, BS, MD 2028
2. Mackenzie Kelley, BS, MD 2026
Department: Pediatrics

Abstract

Introduction
Food insecurity (FI) is a critical social determinant of health affecting pediatric populations. At Children's Hospital of The King's Daughters Health System (CHKDHS), FI is screened during well visits using the Safe Environment for Every Kid (SEEK) questionnaire. Prior work demonstrated higher FI prevalence among General Academic Pediatrics (GAP) patients, who primarily have Medicaid coverage, compared to Children's Medical Group (CMG) patients, who represent a mixed-insurance population. Previous findings also highlighted inconsistent documentation and limited interventions for FI-positive patients. Objective: This study compares referral patterns and follow-up care for food-insecure patients across two CHKDHS practice models: CMG and GAP.

Methods
Retrospective analysis was conducted using SEEK screening data from April 2022 to May 2024. The total number of screened patients, FI-positive cases, referrals, and follow-up data were extracted and analyzed for each clinic.

Results
At CMG, 51,740 patients were screened, identifying 2,238 (4.33%) as food insecure. At GAP, 14,615 patients were screened, with 1,110 (7.59%) positive for FI. Referral rates differed significantly: 24% of FI-positive CMG patients received a referral recommendation, compared to 63% at GAP. Only 12% of CMG referrals were actionable, whereas GAP used no handouts in place of referrals. Follow-up documentation was higher at GAP (38.5%) than CMG (23.8%). Social work was a common referral in both groups; however, CMG referrals emphasized community interventions, while GAP utilized private non-medical organizations. CMG providers frequently documented "referral given" rather than patient-specific concerns (15.2% vs 62.3% at GAP).

Conclusion
GAP providers were more likely to document FI-related concerns, recommend actionable referrals, and complete follow-up. In contrast, CMG providers relied more on handouts and had lower follow-up rates, likely reflecting higher patient volumes and fewer embedded social work resources. These findings suggest the need for standardized referral protocols, increased integration of social workers, and potential reimbursement enhancements to support SDOH interventions in outpatient pediatric settings.

Abstract Title: Serial Cross-Sectional Imaging of Necrotizing Pancreatitis secondary to Ozempic (semaglutide) use

Investigator: Kevin James Moran
Mentor: Frances Lazarow, MD
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Sawyer Miller, BS, Office of Medical Student Research, Eastern Virginia Medical School, Doctor of Medicine
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Department: Radiology

Abstract

Introduction
Necrotizing pancreatitis is a rare but well-documented complication of glucagon-like peptide-1 receptor agonists (GLP-1 RAs). In June 2021, the U.S. Food and Drug Administration (FDA) approved semaglutide (Wegovy) for weight loss, followed by tirzepatide (Zepbound) in November 2023. By 2025, an estimated 6% of U.S. adults, over 15 million Americans, are prescribed a GLP-1 RA for weight loss and obesity management. Between 2019 and 2024, prescriptions for GLP-1 agents increased by nearly 600%. Among patients prescribed GLP-1 RAs without type 2 diabetes, the diagnosis of co-occurring pancreatitis increased 80% from 2022 to 2024. Although prevalence remains low, this represents a concerning rise in pancreatitis diagnoses.
We present the case of a 66-year-old woman who developed fatal necrotizing pancreatitis secondary to semaglutide (Ozempic). This report emphasizes the radiologic progression of pancreatic necrosis on serial CT and MRI imaging during a protracted hospital course.

Case Information
A 66-year-old woman with uncomplicated T2DM well controlled on oral agents and mild hyperlipidemia presented with acute severe epigastric pain, nausea, and vomiting. She had no history of obesity, gallstones, alcohol use, pancreatotoxic medications, or hypertriglyceridemia. Notably, semaglutide had been initiated approximately six weeks earlier for glycemic optimization.

Laboratory evaluation confirmed elevated pancreatic enzymes. Cross-sectional imaging revealed extensive pancreatic and peripancreatic necrosis without biliary obstruction or cholelithiasis. Despite aggressive resuscitation, she developed infected necrotizing pancreatitis confirmed by positive cultures from peripancreatic collections. Her clinical course was complicated by recurrent sepsis, multi-organ failure, and multiple minimally invasive and surgical interventions. After a four-month hospitalization, she died from complications.

Serial CT and MRI documented the progression from interstitial pancreatitis to extensive necrosis, underscoring the central role of imaging in diagnosis and management.

Discussion
This case demonstrates a rare but catastrophic outcome of GLP-1 RA-associated pancreatitis in a patient without gallstones, obesity, alcohol use, or severe hypertriglyceridemia. The absence of conventional risk factors supports the possibility of direct drug-mediated pancreatic injury rather than an indirect effect of rapid weight loss or gallbladder dysfunction.

While semaglutide clinical trials in diabetes populations report pancreatitis rates comparable to placebo, real-world data suggest otherwise. A 2023 U.S. claims analysis of weight-loss patients indicated increased risk. The lack of traditional risk factors in this patient further supports the potential for GLP-1 RAs to precipitate direct pancreatic injury.

Radiology plays a critical role in both diagnosis and management of necrotizing pancreatitis. In this case, serial CT and MRI imaging documented the rapid transition to necrosis, guided drainage and surgical planning, and monitored complications such as infected collections.

Conclusion
This case illustrates the rising occurrence of pancreatitis in patients receiving GLP-1 RAs, demonstrated through detailed radiologic imaging. With the sharp increase in prescriptions from 2021-2025, prevalence of pancreatitis and related complications will likely continue to grow. Clinicians should remain alert to the potential for severe pancreatitis, including infected necrosis, even in patients without conventional risk factors. Prompt discontinuation, early recognition, and multidisciplinary management are essential.

Radiology is pivotal in recognizing necrotizing pancreatitis and guiding minimally invasive interventions. Ongoing pharmacovigilance, case aggregation, and additional studies are needed to further clarify the causal relationship between GLP-1 RAs and pancreatic injury.

Abstract Title: Using Physical Therapy (PT) to Investigate How Cancer Cachexia Impacts Function

Investigator: Sabrina Mundorff
Mentor: Ishan Roy, MD PhD
Co-Investigators:
1. Addison Barber/Shirley Ryan
2. Karras, Ioanna/Shirley Ryan
Department: Shirley Ryan

Abstract

Introduction
Cancer cachexia is a multifactorial syndrome characterized by progressive muscle wasting, often resistant to nutritional support, and associated with poor functional outcomes. While physical activity is a key component of multimodal cachexia management, its real-world application and impact on rehabilitation outcomes remain understudied.
Objective:
To evaluate how a diagnosis of cancer cachexia affects physical therapy (PT) referral patterns, goal achievement, and therapy completion among patients receiving outpatient cancer rehabilitation.

Methods
A retrospective chart review was conducted for patients with cancer seen at an outpatient cancer rehabilitation clinic between August 2022 and April 2025. Cachexia status was determined using the Fearon criteria. Data collected included PT referral status, evaluation dates, therapy location, goal status, and discharge outcomes. Statistical analysis was performed using Fisher's exact test with significance set at $p \leq 0.05$.

Results
A total of 113 patient charts were analyzed. No statistically significant differences were found between patients with and without cachexia across all outcome variables, including PT referral rates, evaluation rates, goal progression, and completion of long-term PT goals. Patients in both groups had low rates of fully meeting long-term physical therapy goals.

Conclusion
While this study did not find significant differences in PT outcomes based on cachexia status, the overall low rate of long-term goal completion highlights broader barriers to rehabilitation success in the cancer population. Future research should include larger, multicenter samples and control for confounding variables such as cancer type, stage, and baseline function. Evaluating earlier PT interventions and patient-centered outcomes (e.g., quality of life, strength) may clarify the therapeutic role of exercise in managing cancer cachexia.

Abstract Title: Sexual Orientation, Gender Identity, and Pronouns in the EMR: Impact of Education on Documentation

Investigator: Daiwik Prakash Munjwani
Mentor: Amin Yehya, MD MS
Co-Investigators:
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2. Rehan Qayyum MD MHS, Department of Medicine, Eastern Virginia Medical School

Department: Sentara Heart Hospital

Abstract

Introduction
Documentation of sexual orientation, gender identity (SOGI), and pronouns in electronic medical records (EMRs) is essential to providing inclusive, patient-centered care, yet these fields are often left incomplete. At our institution, a system-wide diversity, equity, and inclusion (DEI) educational program launched in September 2023 emphasized the importance of collecting and documenting SOGI and pronouns. Our objective was to evaluate the effect of a hospital-wide diversity-focused educational initiative on documentation of SOGI and pronouns in the EMR for patients discharged with heart failure.

Methods
This retrospective chart review included adults (≥18 years) discharged from a tertiary care heart hospital with a primary diagnosis of heart failure between August 14, 2022, and March 21, 2024. Data were extracted from the EMR (Epic) and entered into REDCap for analysis. Patients were categorized as pre-initiative (August 2022-August 2023) or post-initiative (September 2023-March 2024). Differences in documentation proportions for sexual orientation, gender identity, and pronouns before and after the initiative were compared using asymptotically normally distributed Z-test statistics.

Results
Of 1,489 eligible patients (449 pre-initiative, 1,040 post-initiative), documentation rates increased for sexual orientation (13.8% to 19.4%; +5.6%, $P = .009$), gender identity (81.5% to 93.5%; +12.0%, $P < .001$), and pronouns (12.3% to 18.5%; +6.2%, $P = .003$).

Conclusion
Implementation of a DEI-focused educational program was associated with modest but statistically significant improvements in documentation of SOGI and pronouns in patients with heart failure. Additional interventions beyond education may be necessary to achieve optimal documentation rates.

Abstract Title: Perceptions of Nicotine Vaping Prevention and Cessation Resources by Youth-Serving Professionals, Parents, and Adolescents

Investigator: Lillian Magdalene Needam
Mentor: Paul Harrell, PhD
Co-Investigators:
1. Amy Paulson, MPH, Pediatrics: Community Health and Research
2. Hannah Savage, MPH, Pediatrics: Community Health and Research
3. Kelli England, PhD, Pediatrics: Community Health and Research
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6. Jeik Yoon, M3, Eastern Virginia Medical School
Department: Pediatrics, Division of Community Health & Research

Abstract

Introduction
Despite recognizing of the dangers of youth tobacco use, most youth-serving professionals and parents report a lack of confidence in addressing e-cigarette prevention and cessation. Various resources are available but are not implemented widely. More work is needed to understand why.

Methods
Responders were presented with 6 vignettes featuring students varying by risk level (non-user, experimenter, regular user) paired with 2 resources per risk level. The vignettes were developed as part of a multi-stage feedback process with youth-serving professionals. Resources were evaluated based on 3 implementation science stakeholder factors: acceptability (the resource is agreeable, palatable, or satisfactory), appropriateness (perceived fit, relevance, or compatibility of resource for a given practice setting, provider, or consumer), and feasibility (can be successfully used or carried out within a given setting). Respondents rated the factors on a scale from strongly disagree ('1') to strongly agree ('5'). The survey was distributed to adolescents, parents, and professionals across Virginia.

Results
We collected responses from 60 adolescents (ages 12-17), 98 parents, and 60 professionals. Parents and professionals both felt the Virginia Department of Health Live Vape Free support and text messaging program was more feasible ($M = 4.00$, $SD = 1.01$; $M = 4.19$, $SD = 0.59$) for experimenting youth than the American Lung Association's INDEPTH alternative to suspension program involving in-person visits ($M = 3.77$, $SD = 0.84$; $M = 3.98$, $SD = 0.59$), both $p < .05$, Cohen's $d > .22$. Adolescents perceived Live Vape Free to be more appropriate than INDEPTH, $p < .05$, $d = .29$. They also indicated that the Truth Initiative's This is Quitting text messaging program was significantly more acceptable, $p < .05$, $d = .29$, and appropriate, $p < .05$, $d = .31$, than a local addiction counseling program. When respondents were asked about what is needed to help students avoid vaping, over half of the professionals and adolescents mentioned more education was needed. Other themes mentioned included support from others and skills to resist vaping.

Conclusion
Parents and professionals have concerns regarding the feasibility of interventions for youth involving in-person visits, favoring mobile interventions instead. Adolescents similarly have concerns regarding acceptability and appropriateness of face-to-face interventions. Addressing these factors can enhance real-world implementation and success.

Abstract Title: Beyond Licence Revocation: Causes, Career Pathways, and Transparency Challenges in Southeastern States

Investigator: Houston Nelson
Mentor: Yifan Guo, MD
Co-Investigators:
Mykela Bolar Student MD 2028
Department: Plastic Surgery

Abstract

Background
Physician license revocation is one of the most severe disciplinary measures, effectively ending a physician's ability to practice medicine in their current capacity. This loss carries profound financial and professional consequences, particularly for surgeons, whose highly specialized skills are uniquely tied to operative practice. The Open, Public, Electronic, and Necessary (OPEN) Government Data Act of 2019 encouraged states to make physician licensure data more publicly accessible to promote transparency. Despite this, little is known about physicians' career trajectories following revocation. Our study sought to examine post-revocation outcomes, with a particular focus on surgeons, by utilizing state medical board databases and supplemental sources such as LinkedIn, organizational websites, and social media. Individuals whose revocations resulted in incarceration were excluded.

Methods
We identified physicians with revoked licenses in Southeastern states by reviewing state medical board disciplinary databases. For each case, we documented the stated reason(s) for revocation. We then searched publicly available resources, including LinkedIn and other online platforms, to investigate subsequent career activities, with particular attention to surgeons.

Discussion
Florida demonstrated the highest level of transparency, allowing us to identify both the causes of revocation and post-revocation career patterns. Common reasons for revocation included substance misuse, fraud, malpractice, and professional misconduct. Among surgeons and other physicians, post-revocation trajectories frequently involved transitions into educational roles, business ventures, or healthcare consulting, where knowledge of medical systems could be repurposed. However, outside of Florida, data accessibility posed significant challenges. Many states lacked comprehensive or easily searchable databases, obscured details of disciplinary actions, or presented incomplete records, which limited our ability to identify broader trends.

Conclusion
This study provides insight into the professional pathways of physicians-particularly surgeons-following license revocation, with Florida serving as the clearest case example. Our findings highlight both the types of careers pursued after revocation and the systemic barriers to accessing disciplinary data. Improving transparency will require standardized, user-friendly reporting systems to ensure that the public can meaningfully access information intended to protect them.

Abstract Title: One Budget, Different Strategies: A Comparative Study of Community Healthy Priorities Across Asian American Ethnic Groups in Hampton Roads

Investigator: Emily Nguyen
Mentor: Honguyun Fu, PhD
Co-Investigators:
1. Emily Nguyen
2. Cynthia C. Romero, MD, M. Foscue Brock Institute for Community and Global Health
Department: Department of Pediatrics, CHKD

Abstract

Introduction
The Asian American population is one of the fastest-growing racial groups in the United States, yet the aggregation of key cultural distinctions in public health research may contribute to why this population remains underserved by mainstream health systems. This study addresses these gaps using qualitative data from a broader mixed-method Community Health Resources and Needs Assessment (CHRNA) to explore how four Asian American subgroups: Chinese, Filipino, Indian, and Vietnamese, in Hampton Roads, Eastern Virginia would allocate a hypothetical $100,000 health budget, revealing both similarities and differences in their health concerns, cultural contexts, and priorities.

Methods
A sample of 80 key-informants (24 Filipino, 23 Chinese, 17 Indian, and 16 Vietnamese) were recruited from April 2022 to July 2025, using purposive sampling and referrals from Asian community gatekeepers in Hampton Roads, Eastern Virginia. Screening criteria included: 1) persons of Chinese, Filipino, Indian, or Vietnamese descent; 2) between 18-85 years; and 3) residents of project cities. Semi-structured interviews were conducted via Zoom by trained medical student researchers, then transcribed, and coded into themes, guided by the grounded theory. Amazon e-gift cards ($25) were provided to compensate participants.

Results
Across all subgroups, participants emphasized culturally and linguistically specific health education, community health preventive screenings, and lifestyle programs. The most common health concerns shared by all subgroups included language barriers, unbalanced diet, and difficulty navigating the U.S. healthcare system. However, subgroup-specific priorities for health issues and cultural strategies were found: The Filipino subgroup prioritized mental health and surrounding stigma, and emphasized strategies involving mental health outreach and direct monetary donation to underserved individuals. The Chinese subgroup prioritized the lack of health insurance prevalent in their community as well as health misinformation via social media. Their strategies recommended preventative health information via platforms like WeChat. The Indian subgroup main priority was to address systemic delays for medical services and appointments, and strategized temple-based health fairs and exercise campaigns. The Vietnamese subgroup prioritized increased smoking and drinking habits inherent in social culture as well as financial stability, while strategizing outreach at religious organizations and community gatherings.

Conclusion
While common themes emerged across all subgroups, the significance of disaggregated, community-specific data illustrates how differences in preferred healthcare delivery methods and priorities reflect deep structural and cultural nuances that can be used for designing equitable health programs that enhance the impact of limited resources in underserved Asian American communities.

Abstract Title: Perceptions of a Diverse Group of U.S. Women on the Ease of Vaginal Self-Sampling for Cancer Detection

Investigator: Parker Catherine O'Connell
Mentor: Ozlem Equils, MD
Co-Investigators:
1. Roaa Rafat Mohamed, Miora
2. Amy Delicia Akinez, Miora
3. Arnaud Iradukunda, MD, Miora
4. Christina Burns, Miora
Department: President of MiOra

Abstract

Introduction
The recent FDA approval of a cervical self-collection method for HPV detection offers a promising opportunity to improve access to cervical cancer screenings. This study evaluates patients' perceptions of self-collection methods and identifies factors influencing their acceptance.

Methods
MiOra health educators conducted a pilot, cross-sectional, convenience sampling study in Los Angeles County, California, using an IRB approved Qualtrics electronic survey targeting low socioeconomic women. Participants evaluated the perceived ease or difficulty of at-home self-collection methods for vaginal and nasopharyngeal swabs. Associations between socio-demographic, behavioral, and contextual factors with self-sampling preferences were analyzed using chi-square test. Statistical significance was set at 5%, and data were analyzed in R version 4.4.1.

Results
A total of 213 women aged 18 years and older participated in the study, with no exclusions. The majority of participants were under 51 years old (83.6%), Hispanic/Latino (61.5%), and first-generation immigrants in the U.S.A. Women with a middle school or less education were significantly more likely to report perceived difficulty with vaginal self-collection as compared to women with a graduate or professional school education (85.7% versus 21.4% respectively, p=0.009).

Conclusion
Timely cervical cancer diagnosis is crucial for improving treatment outcomes. Findings from this pilot study suggest that formal education may influence women's comfort level with vaginal self-collection. Further research is needed to understand the role of formal education to close the gaps in timely cancer detection.

Abstract Title: Not All That Infiltrates Is Bacterial: A Case of Pulmonary Nocardiosis

Investigator: Samuel A. Opeke
Mentor: Cayleigh M. Blumrick, MD
Co-Investigators:
Anam Habib, MD, Macon & Joan Brock Virginia Health Sciences Infectious Disease Fellowship at Old Dominion University
Department: Macon & Joan Brock Virginia Health Sciences Infectious Diseases at Old Dominion University

Abstract

Introduction
Nocardia species is an aerobic actinomycete, catalase-positive, gram-positive bacillus, with a partially acid-fast branching filamentous form. Approximately two-thirds of Nocardia infections occur in immunocompromised individuals, with transmission typically through inhalation or cutaneous inoculation. Nocardial infections present insidiously over the course of several weeks, commonly involving the pulmonary, cutaneous, and central nervous systems in disseminated disease.

Case Information
A 43-year-old patient presented to the emergency room with several weeks of dyspnea, fever, cough with productive green sputum, and myalgias. Significant past medical history included a new diagnosis of neurosarcoidosis requiring high-dose steroids for several weeks, hypertension, insulin-dependent diabetes mellitus 2, a history of seizures, and a history of lymphadenopathy demonstrating non-necrotizing granulomatous changes.

At initial presentation, this patient was afebrile without leukocytosis or dyspnea at rest. Vital signs were as follows: 98.3°F, blood pressure 103/64, heart rate 103 beats per minute, respirations 16 breaths per minute on room air. A chest CT was taken due to concerns for pneumonia, revealing bilateral nodular and confluent airspace opacities. An MRI revealed diminished leptomeningeal enhancement compared to prior imaging. The patient was admitted and underwent extensive diagnostic evaluation, including respiratory cultures, acid-fast bacilli testing, fungal studies, and bronchoalveolar lavage. Initial empirical therapy included cefepime and vancomycin, later modified based on preliminary results showing Staphylococcus aureus colonization on sputum culture and elevated fungitell levels (>500), suggesting fungal etiology.

On hospital day 8, bronchoalveolar lavage cultures yielded Nocardia species, later identified as Nocardia veterana on day 18. The patient remained on combination therapy outpatient, including trimethoprim-sulfamethoxazole, linezolid, and imipenem until sensitivities returned on day 44, where the patient was de-escalated to TMP-SMX as monotherapy. She continued to follow up as an outpatient due to risk of antimicrobial-related adverse effects, including pancytopenia, hepatotoxicity, and nephrotoxicity.

Discussion
This case demonstrates the diagnostic challenges inherent in nocardiosis, where the broad differential diagnosis includes endemic mycoses, tuberculosis, and other opportunistic infections. Though uncommon, it primarily affects individuals with chronic lung disease or immunocompromising conditions, a growing patient population. This patient presented with risks including iatrogenic immunosuppression from high-dose steroids for neurosarcoidosis, poorly controlled diabetes, and granulomatous changes suggestive of possible inflammatory or immune dysregulation. The gold standard for Nocardia identification is via molecular biology, such as gene sequencing; however, this case illustrates the time-intensive nature of receiving diagnostic results. Nocardiosis management requires multidrug therapy to ensure coverage against the variable susceptibility profiles of different Nocardia species. TMP-SMX, linezolid, and carbapenems have proven effective against disseminated disease. Treatment typically lasts 6 months with extended courses of 9-12 months or longer recommended for disseminated disease or CNS involvement.

Conclusion
Nocardiosis represents a challenging opportunistic infection requiring high clinical suspicion in immunocompromised patients presenting with pulmonary symptoms. Early recognition, appropriate microbiological sampling with prolonged incubation, and multidrug antimicrobial therapy are recommended for successful management outcomes. This case demonstrates the importance of maintaining a broad differential and the time-consuming nature of nocardial diagnostics, emphasizing the need for empiric, multi-antimicrobial therapy in suspected cases while awaiting definitive identification and susceptibility results.

Abstract Title: Assessing the quality and reliability of videos on Tetralogy of Fallot: Youtube analysis

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Abstract

Introduction
Patients and families increasingly use online platforms to obtain information about unfamiliar medical diagnoses. YouTube has become a prominent source of health-related content. Given the complexity and variable clinical presentation of Tetralogy of Fallot, evaluating the accuracy of such publicly available information is critical. To date, no studies have assessed the quality, reliability, or engagement of YouTube videos addressing Tetralogy of Fallot. This study aims to systematically evaluate these videos using three validated scoring tools to determine their accuracy and reliability for patient education.

Methods
We conducted a Youtube analysis with the keywords: "Tetrology of Fallot," on August 11, 2025 in Norfolk, VA. We selected the top 50 videos on YouTube for further analysis. YouTube shorts, identical videos, multipart videos, videos not in English, and videos that did not address the primary concern were excluded from the study. A total of 36 videos were included in this study. The quality and reliability of these videos were evaluated by two raters using the modified DISCERN (m-DISCERN) questionnaire, the Global Quality Scale (GQS), and JAMA benchmark by two raters, blind to one another. Other qualitative data was also obtained such as the type of video, video presenter, and target audience. Quantitative data regarding video interaction was also obtained from each video including the number of views, likes, and the duration of the video.

Results
A total of 36 eligible YouTube videos on Tetralogy of Fallot were included in the analysis. The videos had a mean view count of approximately 156,910 views, with 14 of them having over 100,000 views. The average video duration was 8 minutes and 48 seconds with the mean number of likes being 1884. The majority of these videos were targeted directly towards patients and families (20 videos). Inter-rater reliability analysis demonstrated no significant differences between evaluators across the scoring tools. The mean (±SD) GQS (scale 1-5) was 2.94 ± 0.97, mean m-DISCERN score (scale of 0-5) was 2.36 ± 0.84, and the mean JAMA score (scale 0-4) was 2.07 ± 0.74.

Conclusion
YouTube videos on Tetralogy of Fallot demonstrate low overall quality, reliability, and transparency when evaluated using standardized assessment tools. Given the increasing reliance of patients and families on online resources for health information, these findings highlight the need for more accurate, high-quality educational content on Tetralogy of Fallot.

Abstract Title: Racial, Age, & Gender Disparities in the Prehospital Treatment of Pain

Investigator: Mackenzie Kaitlynn Leilani Peeke
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Abstract

Introduction
Acute pain relief has been recognized as a fundamental human right, yet up to 80% of patients in some settings receive inadequate treatment. Evidence consistently shows that racial and ethnic minorities are disproportionately affected by undertreatment of pain. However, little is known about disparities in prehospital pain management by emergency medical services (EMS) providers. This study aimed to retrospectively assess whether racial, age, or gender disparities exist in the administration of analgesia within a regional EMS system.

Methods
We conducted a retrospective review of a Tidewater EMS Council (TEMS) regional subset of the National Emergency Medical Services Information System (NEMSIS) database from June 1 to December 31, 2021. Consecutive patient records meeting regional pain management protocol criteria were included: pain score >5, traumatic or nontraumatic mechanism, Glasgow Coma Scale ≥13, systolic blood pressure >90 mmHg, and age ≥15 years. Data Abstraction was performed by state-employed epidemiologists blinded to study objectives, and provided as a de-identified CSV file. Analgesics permitted in the TEMS region included intravenous morphine, fentanyl, and ketamine. Multivariate logistic regression was used to evaluate associations between analgesic administration and patient age, gender, and race.

Results
A total of 14,454 patients met inclusion criteria. The cohort was 47.5% Black, 47.3% White, 2.6% Latino, 1.2% Asian/Pacific Islander, and 0.2% Native American; 56.8% were female and 43.1% male. Age distribution was 18-24 years (8.3%), 25-64 years (59.3%), and ≥65 years (32.4%).

Analgesic administration differed significantly by race ($p < 0.0001$) and age ($p = 0.0250$), but not gender ($p = 0.5193$). In multivariate models, Black patients had lower odds of receiving analgesia than White patients (OR 0.772, 95% CI 0.712-0.838), and patients aged 18-24 also had reduced odds (OR 0.713, 95% CI 0.609-0.834). Male patients were more likely than females to receive medication (OR 1.221, 95% CI 1.130-1.320).

After adjusting for potential confounders (pain score, trauma status, level of care, time of day, GCS, systolic blood pressure), these associations persisted: Black patients (OR 0.696, 95% CI 0.640-0.756) and younger patients (OR 0.821, 95% CI 0.699-0.965) had lower odds of receiving analgesia, whereas male patients had higher odds (OR 1.232, 95% CI 1.138-1.333).
Among patients with pain scores ≥7, adjusted models again showed reduced odds for Black patients (OR 0.686, 95% CI 0.624-0.756) and mixed-race patients (OR 0.425, 95% CI 0.228-0.795), and higher odds for males (OR 1.220, 95% CI 1.113-1.337). No significant differences were observed in other groups.

Conclusion
In this regional EMS cohort, significant disparities were observed in prehospital pain management. Black patients consistently had lower odds of receiving analgesia compared with White patients, even after adjusting for pain severity and clinical factors. Younger adults (18-24 years) were also less likely to receive pain medications, whereas males had higher odds of treatment compared with females. These disparities persisted in patients reporting high pain scores (≥7). The findings highlight the need for targeted interventions to address inequities in prehospital pain management and ensure guideline-concordant care for all patients.

Abstract Title: The effect of maternal factors on blood sugar control in patients with diabetes in pregnancy

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Abstract

Objective

To identify clinical and demographic factors associated with suboptimal glycemic control, as defined by Time in Range (TIR) from continuous glucose monitoring (CGM), in pregnant individuals with Type 2 or Gestational Diabetes (GDM).

Methods

The records of all type 2 diabetic and GDM patients who had CGM between 2016 and 2025 were reviewed and data Abstracted. Glycemic control was categorized based on third-trimester TIR into three groups: optimal (TIR ≥75%), suboptimal (TIR >50-75%), and poor (TIR ≤50%). We used multivariable multinomial logistic regression to identify factors associated with suboptimal and poor control. A sensitivity analysis was then performed exclusively on the Type 2 diabetes cohort to assess the impact of first-trimester HbA1c on third-trimester glycemic control.

Results

The analysis included 130 individuals with Type 2 diabetes and 27 with GDM. In the overall cohort, having Type 2 diabetes was the only significant independent predictor of not achieving optimal glycemic control and maternal baseline characteristics did not have a significant impact (Table 1). Compared to individuals with GDM, those with Type 2 diabetes had significantly higher odds of having suboptimal control (aOR 4.62, 95% CI 1.56-13.67; p=0.006) and poor control (OR 3.34, 95% CI 1.04-10.73; p=0.042). In the sensitivity analysis of individuals with Type 2 diabetes, a higher first-trimester HbA1c was the only factor significantly associated with poor glycemic control in the third trimester, after adjusting for maternal age, ethnicity, BMI, and chronic hypertension (aOR 1.46, 95%CI 1.10-1.93; p=0.009 for TIR ≤50% vs ≥75%).

Conclusion

Pregnant individuals with Type 2 diabetes are at a significantly higher risk for suboptimal glycemic control compared with those with GDM. Within this high-risk group, an elevated first-trimester HbA1c associated with worse blood sugar control later in pregnancy, highlighting a critical opportunity for early and intensified management.

Table 1: Multinomial multivariable regression evaluating the effects of patient variables on TIR

Variable	TIR >50-75% vs >75%			TIR 0-50% vs >75%		
	Odds Ratio	95% CI	p-value	Odds Ratio	95% CI	p-value
Intercept	0.39	0.04 - 3.58	0.398	0.32	0.09 - 1.19	0.088
BMI	1.00	1.00 - 1.00	0.894	0.97	0.93 - 1.02	0.279
Non-Hispanic/ Latino ethnicity	2.68	0.76 - 9.47	0.126	0.86	0.25 - 2.91	0.801
Maternal age	0.98	0.92 - 1.04	0.448	0.98	0.92 - 1.04	0.518
Chronic hypertension	1.03	0.46 - 2.31	0.951	0.52	0.18 - 1.47	0.214
First trimester HbA1c	1.15	0.90 - 1.47	0.258	1.46	1.10 - 1.93	0.009
R2 / R2 adjusted	0.057 / 0.050					

BMI: body mass index; CI: Confidence Interval; HbA1c: hemoglobin A1c; TIR: time in range

Abstract Title: Validating Blind Ultrasound Sweeps Performed by Non-Expert Ultrasound Operators in First Trimester Pregnancies

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Abstract

Introduction
Ultrasound is an essential imaging modality for providing quality obstetric care. However, the costs of equipment, need for trained sonographers, and costs of on-site radiologists present limitations in rural and under-resourced communities, contributing to a gap in care for pregnant patients. We tested a diagnostic framework involving standardized blind sweep imaging to address this gap in patients in their first trimester of pregnancy. This type of protocolized blind sweep obstetric ultrasound exam was previously investigated in both low-risk and high-risk second and third trimester pregnancies. Our objective was to assess the reproducibility of expert interpretation of blind ultrasound sweeps performed by non-experts using a low-cost, portable ultrasound (US) device to evaluate first trimester pregnancies.

Methods
In this multi-center prospective cohort study (2/28/2025-7/15/2025), first-trimester pregnant individuals underwent blind ultrasound sweeps by non-expert operators using a point-of-care probe. Operators received standardized instruction on an eight-step scanning protocol. Images were independently reviewed by six blinded experts: two generalist OBGYNs, two MFMs, and two MFM trainees. The primary outcome was inter-rater agreement on key early pregnancy findings (gestational sac, yolk sac, fetal pole, number of fetuses, fetal cardiac activity) using Fleiss' kappa. Secondary outcomes included examination and image quality rated by experts, with final classifications by majority vote. Analyses were conducted in R.

Results
Of 1,958 patients screened, 394 were eligible, and 109 were included in the final analysis (see Figure 1). Median BMI was 27.5 (IQR 8.6), and median gestational age at scan was 12.6 weeks (IQR 1.6). Among those scanned, 105 were singleton and 4 were multiple gestations. Inter-rater agreement was almost perfect for identifying a gestational sac ($\kappa = 0.86$), substantial for yolk sac ($\kappa = 0.66$), multiple gestation ($\kappa = 0.71$), and fetal cardiac activity ($\kappa = 0.78$), and moderate for identification of a fetal pole ($\kappa = 0.51$). Experts found the majority of images had excellent or acceptable image quality, but there were limitations of imaging in early pregnancies among individuals with abdominal adiposity (Table 1).

Conclusion
Blind US sweeps guided by external anatomic landmarks and performed by non expert US operators using a battery-powered handheld device produced images interpretable with moderate to almost perfect agreement by expert reviewers. This technique may provide a scalable, low-resource solution for expanding access to early pregnancy US. Further studies assessing diagnostic accuracy of this approach in first trimester pregnancies are warranted.

Abstract Title: Novel Repair of a Paravalvular Leak in the Mitral Annulus

Investigator: Hemish McAvelli Philip
Mentor: Matthew Summers, MD
Co-Investigators:
Spencer Chee, EVMS MD Graduate
Department: Sentara Heart Hospital

Abstract

Abstract
We describe a 63-year-old woman who presented with shortness of breath and lower extremity edema. Transesophageal echocardiography revealed severe mitral regurgitation that was paravalvular at the posterior mitral annulus rather than transvalvular. We planned repair with an Amplatzer Vascular Plug 4. This case is notable due to the location of the defect. The mitral annulus is an extremely uncommon site for paravalvular leaks (PVL), and its position presents unique challenges. This case highlights the rare presentation of PVLs and a successful transcatheter approach to management.

Introduction
Paravalvular leaks (PVL) in prosthetic heart valves are relatively common, occurring in 7-17% of artificial valves [1]. However, non-transvalvular regurgitation in native mitral valves is extremely rare. The mitral annulus, a fibrous ring, resists tearing or deformation under normal conditions. Compared to the aortic annulus, it experiences less hemodynamic stress, lowering the likelihood of leaks [2].

Case Presentation
A 63-year-old woman presented with shortness of breath, fatigue, and lower extremity edema. Her history included moderate posterior Mitral Annular Calcification (MAC), chronic diastolic heart failure with preserved EF (61%), and coronary artery disease with severe RCA stenosis (80%). Transesophageal echocardiography (TEE) demonstrated moderate-severe mitral regurgitation, with an eccentric posterolateral jet and anterior-medial course (Figure 1). Three-dimensional TEE with Doppler provided additional visualization (Figures 2, 3). She was diagnosed with a PVL in the native mitral annulus. Due to high surgical risk, the defect was treated percutaneously with an Amplatzer AVP4 plug. The procedure was uncomplicated. Intra-procedural TEE confirmed a well-seated device. She was discharged on hospital day 2 with transthoracic echocardiography showing no significant residual regurgitation.

Discussion
Mitral PVLs are often detected incidentally but can cause heart failure or hemolytic anemia. In this case, symptoms were from volume overload rather than hemolysis. Since her anemia was mild and labs unremarkable, we attributed her presentation to mitral insufficiency. Surgical repair was avoided due to comorbidities. While surgery remains the gold standard, percutaneous closure is increasingly favored for its minimally invasive nature and comparable efficacy [3].

We utilized an Agilis steerable sheath to cross the interatrial septum under 3D imaging guidance. Initial wiring was achieved with a 0.035" Glidewire, then exchanged for a 0.014" Sion Black coronary wire. This served as a rail for a CatRx coronary aspiration catheter. Once position was confirmed, an Amplatzer AVP4 was deployed while maintaining LV wire access. This wire-guided approach allowed stable access and precise deployment.

Early recognition of PVLs is crucial, as untreated cases may lead to progressive heart failure or hemolytic anemia [4]. Current ACC/AHA guidelines recommend periodic transthoracic echocardiography after valve replacement, with TEE reserved for unexplained symptoms, hemolysis, or suspected dysfunction [5]. Percutaneous closure is a safe, effective alternative to redo surgery for symptomatic PVLs, especially in high-risk patients.

Abstract Title: Strength and Balance as Determinants of Falls-Related Confidence in Community-Dwelling Older Adults

Investigator: Shannon Prakash
Mentor: Brittany Samulski, DPT PhD
Co-Investigators:
Department: Rehabilitation Sciences

Abstract

Introduction
Fear of falling has been identified as a strong and independent predictor of fall risk in community-dwelling older adults, in some cases, exceeding the predictive value of cognitive status.1 Reduced falls-related confidence, often termed "fear of falling," if associated with activity restriction, decreased quality of life, and increased likelihood of future falls. While psychosocial factors clearly play a role, it remains unclear whether physical impairments, such as weakness in the lower limbs or impaired balance, directly contribute to reduced confidence. Clarifying these relationships is essential for designing interventions that can be tailored toward cognitive-behavioral strategies, physical rehabilitation, or a hybrid approach. The aim of this secondary analysis was to identify whether leg strength and balance measures predict falls-related confidence as measured by the Modified Falls Efficacy Scale (MFES) in community-dwelling older adults.

Methods
A secondary analysis was performed using deidentified data from a community-based fall risk assessment program. The dataset comprised 166 participants (70±7years,67% female). Each participant completed the long-form Physiological Profile Assessment (PPA), Montreal Cognitive Assessment (MoCA), Modified Falls Efficacy Scale (MFES), and five 20-foot overground walking trials on a pressure-sensitive walkway at both preferred and maximal gait speeds.

Results
A binomial logistic regression was conducted to examine whether lower extremity strength (ankle dorsiflexion, knee extension, knee flexion), standing balance (measures of static and dynamic balance such as sway on floor and foam with eyes open and closed, as well as maximal balance range and co-stability), along with covariates (age, sex, fall history), predicted falls-related confidence status on the MFES (low concern vs. elevated concern). The full model was statistically significant, $\chi 2(9,166) = 52.489$, $p<.001$, indicating that stronger quadriceps (B=-0.082, SE=0.034, Wald=5.920, p=.015; OR=0.921, 95% CI [0.862, 0.984]) and greater balance range (B=-0.020, SE=0.006, Wald=10.122, p=.00; OR=0.980, 95% CI [0.968, 0.992]) were protective against elevated concern, while older age (B=-0.112, SE=0.032, Wald=12.098, p<.001; OR=0.894, 95% CI [0.840, 0.952]) was associated with reduced falls-related confidence. Ankle dorsiflexion strength, knee flexion strength, costability, static standing balance measures (sway on floor and foam with eyes open and closed), fall history, and biological sex were not significant predictors in the final model. The final model demonstrated good fit (Nagelkerke R2= .377; Hosmer-Lemeshow p=.754) and correctly classified 76.5% of cases, with high specificity (89.2% for low-concern individuals) but moderate sensitivity (50.9% for elevated-concern individuals).

Conclusion
Findings suggest that falls-related confidence is tied to both physical capacity and aging, with quadriceps strength and dynamic balance emerging as key protective factors. Older adults may accurately perceive their fall risk, as reduced confidence aligns with decrements in lower limb strength and balance. Therefore, interventions should not only target physical performance through strength and balance training, but also address self-efficacy related to these tasks. A comprehensive approach that integrates physical rehabilitation with confidence-building strategies may be most effective for reducing fear of falling and subsequent fall risk in older adults.

Abstract Title: Acute Dolutegravir Impact on Cocaine Induced Response in Mice

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Mentor: Brad Grueter, PhD MS
Co-Investigators:
Jinqi Ma, Department of Pharmacology
Department: Department of Anesthesiology

Abstract

1.2 million people in the United States are living with HIV. Dolutegravir (DTG) is a first line integrase inhibitor used for HIV treatment. Unfortunately there are well-documented neuropsychiatric adverse effects such as depression, anxiety, and substance abuse associated with chronic DTG administration that leads to treatment discontinuation. Understanding the mechanism behind these adverse effects is essential to combat drug non-compliance with DTG. Our primary goal is to assess the role of chronic DTG administration in the development of neuropsychiatric adverse effects, but we must first establish whether there is an impact from acute DTG administration. This strategy allows us to characterize immediate pharmacological responses before progressing to chronic treatment, which may involve more complex neuroadaptive effects. To study the interaction between chronic DTG administration and substance use disorder as a form of neuropsychiatric adverse effects, we measured cocaine-induced behavior in mice via locomotion activity. In addition, we measured physiological responses to cocaine and DTG through the expression of Immediate Early Genes (IEGs). We hypothesize that acute injections of DTG will not enhance the behavioral response to cocaine nor will strengthen the physiological response to cocaine in the hippocampus and striatum in mice.

Twelve 8-12 week old C57Bl/6J male mice were divided into 4 groups of n= 3: Vehicle + Saline, DTG (50 mg/kg) + Saline, Vehicle + Cocaine (15 mg/kg), and DTG + Cocaine. Intraperitoneal injections of the first treatment were given 2 hours prior to transcardial perfusion. 15 minutes after the first injection of DTG or vehicle, the mice were given their second injection of saline or cocaine and subsequently placed in an open field to measure their locomotive movement for 15 minutes. The mice were anesthetized using isoflurane and perfused using 4% PFA to fix their brain tissue. After perfusion, each brain was stored in 30% sucrose at 4°C before freezing and slicing the tissue at 40 microns using the cryostat to obtain samples highlighting the striatum and hippocampus. Then immunohistochemistry (IHC) protocol was applied with antibodies for IEGs, c-fos and Egr1, to estimate expression of neuronal activity.

Acute administration of DTG does not show a significant difference in cocaine-induced locomotive activity. As expected, the c-fos positive cell counts in the striatum increased due to the cocaine injection. Furthermore, acute DTG did not demonstrate any changes on cocaine-induced c-fos positive cell counts in the striatum or the Egr1 positive cell counts in the dorsal hippocampus.

The data supports our hypothesis that acute DTG injections will not enhance behavioral and physiological response to cocaine. Subsequent studies will focus on chronic DTG administration to further assess adverse effects in mice. The route of administration of DTG using intraperitoneal injections will also be evaluated because chronic, daily injections introduce additional stress to the mice. A reduced-stress oral route of delivery, such as gummies, may offer a better alternative for chronic DTG administration and thus a more accurate assessment of physiological and behavioral outcomes. In addition, we will use patch clamp electrophysiology to provide precise measures of neuronal activity.

Abstract Title: A year in review: Quality improvement of a new food insecurity team at a student-run free clinic

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Abstract

Introduction
In 2024, a food insecurity (FI) team was founded to assess and address FI as part of routine clinic operations at the HOPES student-run free clinic. During appointment check-ins, all patients were asked to complete the two-item Hunger Vital Sign screener and those who screened positive were seen by the FI team during their appointment. Based on patient needs and comorbid conditions, patients were provided resources that included local food assistance information and cost sensitive nutrition guides for chronic disease management. Clinicians on the FI team documented each patient's food insecurity status, a summary of counseling provided, and a record of educational handouts shared. The current project assessed the quality and consistency of the FI team operations during its first year of implementation.

Methods
This is a retrospective chart review of patients who attended HOPES primary care appointments between June 1, 2024, and May 31, 2025. We inputted the following information from patient charts into REDCap: age, sex, prior medical history of and number of medications for hypertension, diabetes, or dyslipidemia, the educational handouts provided by the FI Team, and the assessment and plan notes relevant to the FI discussion. Data were analyzed using SPSS (version 21, IBM Inc.). Descriptive statistics (means and standard deviations) were used to summarize patient characteristics.

Results
During the first year of implementing the FI team, 115 patients were seen at the primary and chronic care clinics at HOPES with 100% filling out the FI screener. Thirty-five patients (30%) screened positive for FI (average age of 43.9 ± 15.9 and 32% male). Among FI positive patients, 17 had hypertension (49%), 13 (37%) had dyslipidemia, and 11 (31%) had diabetes. According to chart notes by the FI team, 25 (71%) of the patients with FI were given the Bridge2Resources handout and 13 (37%) were given the Eat Right When Money's Tight handout. Of those with hypertension, three (18%) were given the nutrition for reducing blood pressure handout. Of those with dyslipidemia, three (23%) were provided a nutrition for reducing cholesterol handout. Of those with diabetes, two (18%) were provided a nutrition for reducing blood sugar handout.

Conclusion
Overall, this quality improvement project was successful in screening all clinic patients for FI as part of routine clinic flow and all patients who screened positive for FI were visited by the FI team during their appointment. However, distribution of educational handouts, especially the disease-specific handouts, was lower than hoped for. The FI team intake process did not include a review of patient charts for chronic conditions, and if patients did not volunteer that information, condition specific handouts were not provided. Going forward, we will do additional training to standardize the method of providing patients with resources and improving documentation in the chart notes.

Abstract Title: Valproic Acid for the Management and Treatment of Delirium and Delirium-Associated Symptoms in Patients with a History of Alcohol Use Disorder

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Co-Investigators:
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3. Bhavana Madhu, EVMS Medical Student
4. Rachael Dempsey, Pathology and Anatomy
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Abstract

Background/Significance:
Delirium is the most encountered psychiatric diagnosis in the general hospital setting and is associated with increased risk of patient institutionalization, dementia, and mortality (Witlox et al., 2010 & Sher et al., 2015). Valproic acid has been proposed as a potential adjunct in the management of delirium (Sher et al., 2015) in patients with Alcohol Use Disorder (Hammond et al., 2015). The primary objective of this study is to determine whether patients who have a history of or current Alcohol Use Disorder experiencing any cause of delirium (which can include alcohol withdrawal) respond as rapidly and effectively to pharmacological treatment with Valproic Acid as an adjunct when compared to current first line drugs.

Methods
A nonrandomized, non blinded, observational retrospective review of patients with Alcohol Use Disorder (AUD) who were treated with Valproic acid as an adjunctive therapy to delirium between 01/01/2013 and 12/31/2023 at the Sentara Norfolk General Hospital was performed using the Epic electronic database. The study included a sample size of 328 AUD patient charts, given by Sentara Analytics, based on the protocol inclusion criteria. 143 patients received Valproic Acid (VPA) and 185 who did not. Additional data analyzed included severity of delirium and agitation at diagnosis, side effects attributable to delirium, effectiveness of pharmacological therapy, and other medications used for the treatment of delirium such as antipsychotic, opioid, dexmedetomidine, and benzodiazepine.

Results
Chi-square analysis revealed significant differences in comorbidities, with a higher prevalence of hepatitis in the non-VPA group (28% vs. 17%, $p = 0.032$). Patients receiving VPA did not have significantly longer hospital stays (16.37 ± 21.67 days vs. 14.9 ± 55.34 days, $p = 0.766$) as determined by one-way ANOVA. Additionally, those in the VPA cohort were more likely to be prescribed antipsychotics (55.2% vs. 35.1%, $p < 0.001$), and benzodiazepines (60.8% vs. 49.7%, $p = 0.045$). The VPA cohort was not more likely to be prescribed opioids (28.7% vs 31.9%, $p = 0.53$) and dexmedetomidine (14.7% vs 18.9%, $p = 0.312$). Pearson correlation analysis within the VPA group demonstrated a strong positive correlation between the number of days on VPA and hospitalization length ($r = 0.677$, $p < 0.001$). There was a trend of improved RASS scores on VPA treatment: the average RASS scores of patients on VPA was 0.56 prior to VPA treatment, which improved to 0.22 and -0.3 on day 2 of VPA treatment and resolution of delirium respectively. No adverse effects were significantly associated with VPA use.

Discussion
Patients who received VPA were not associated with more days of hospitalization nor were they prescribed opioids and dexmedetomidine more often than patients who did not receive VPA. Patients who were prescribed VPA for more days spent more days in the hospital.

Conclusion/Implications:
Further research is needed to determine if there is a significant association between VPA use, hospitalization duration, and medication prescribing patterns in this patient population. There was a trend of improved RASS scores on VPA treatment. Additionally, no adverse effects were significantly associated with VPA use, indicating that VPA may be safe.

Abstract Title: Blood Selenium and Liver Health: Divergent Associations with Fibrosis and Steatosis

Investigator: Neda Rehan
Mentor: Rehan Qayyum, MBBS MHS
Co-Investigators:
Department: Internal Medicine

Abstract

Introduction
Metabolic dysfunction-associated steatotic liver disease (MASLD) represents a spectrum of hepatic conditions characterized by metabolic dysfunction and ranging from simple steatosis to steatohepatitis, fibrosis, and cirrhosis. Selenium, an essential trace element incorporated into 25 selenoproteins with key antioxidant and anti-inflammatory functions, has been implicated in metabolic and hepatic processes, including regulation of oxidative stress, apoptosis, and endoplasmic reticulum stress. Prior studies have suggested potential associations between selenium status and fatty liver disease or fibrosis, but findings remain inconsistent and limited, often relying on modest sample sizes. To address this gap, we examined the relationship between blood selenium levels and both liver steatosis and fibrosis, assessed by controlled attenuation parameter (CAP) and liver stiffness measurement (LSM) respectively using vibration-controlled transient elastography.

Methods
We performed a cross-sectional analysis of U.S. adults aged ≥19 years using publicly-available NHANES data from 2017-2023. Demographic, socioeconomic, lifestyle, and clinical characteristics were obtained through standardized interviews, examinations, and laboratory assessments. Liver steatosis and fibrosis were assessed using vibration-controlled transient elastography (using FibroScan® 502 V2 Touch). Liver stiffness measurement (LSM, expressed in kilopascals) was derived from shear wave velocity using the Young modulus, while hepatic steatosis was quantified with the controlled attenuation parameter (CAP, 100-400 dB/m). Blood selenium concentrations were measured by inductively coupled plasma-mass spectrometry. Covariates included age, sex, race/ethnicity, education, household income, smoking, alcohol consumption, body mass index, and diabetes status. Associations between blood selenium and liver outcomes were evaluated using sample-weighted linear regression models, with stepwise adjustment for demographic and clinical factors.

Results
A total of 13,241 adults were included. Participants in higher selenium quartiles were more likely to be male and of middle-age ($p<0.001$ for both). Median liver stiffness was modestly lower in quartiles 2-3 compared with the lowest quartile ($p=0.005$), whereas controlled attenuation parameter (CAP) increased progressively with selenium status ($p<0.001$). In sample-weighted regression analyses, higher selenium was inversely associated with liver stiffness, indicating lower fibrosis burden with higher selenium levels. Compared with the lowest quartile, adjusted differences in stiffness were −0.46 kPa (95%CI: −0.76, −0.17; $p=0.003$) for quartile 3 and −0.53 kPa (95%CI: −0.88, −0.19; $p=0.003$) for the highest quartile. In contrast, selenium was positively associated with hepatic steatosis. Adjusted CAP values were 9.00 dB/m (95%CI: 5.51, 12.50; $p<0.001$) higher in quartile 3 and 9.30 dB/m (95%CI: 5.59, 13.02; $p<0.001$) in the highest quartile relative to the lowest. Associations for quartile 2 were not significant.

Conclusion
Higher selenium status was independently associated with reduced liver stiffness, suggesting a potential protective effect against fibrosis, but concurrently with greater hepatic steatosis. These findings highlight a complex, bidirectional role of selenium in liver health and underscore the need for mechanistic and longitudinal studies to clarify causal pathways and inform targeted nutritional or therapeutic strategies.

Abstract Title: Robotic versus Laparoscopic Cholecystectomy in Emergency General Surgery: Do Older Adults Benefit More than Younger Adults?

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Abstract

Introduction
Robotic surgery is becoming more prevalent in emergency general surgery (EGS), with evidence showing reductions in postoperative length of stay and conversion to open surgery. However, recent studies suggest that, unlike other EGS procedures, robotic surgery does not significantly reduce postoperative length of stay for cholecystectomy. With the aging EGS patient population, robotic surgery may be particularly helpful for improving outcomes in older adults, who often face elevated surgical risks and longer recoveries. We sought to better understand differences between older and younger adults in outcomes of robotic versus laparoscopic cholecystectomy in an EGS setting. We hypothesized that employing robotic surgery over laparoscopy would yield greater improvements in postoperative length of stay, operating room charges, readmission rates, and mortality for older adults compared to younger adults.

Methods
This retrospective cohort study compared older (≥65 years) to younger adults (18-64 years) who were urgently/emergently admitted between 2016-2020 to undergo cholecystectomy using the Virginia Health Information Patient Level Database. Propensity score matching (1:10 nearest neighbor) analyzed the association between robotic versus laparoscopic approach and the outcomes of postoperative length of stay, operating room charges, readmission, and mortality, stratifying by older versus younger adults. Controls included demographics, insurance, Social Deprivation Index (SDI), comorbidities, and operative approach. Effect sizes were reported as average treatment effects (ATE) with 95% confidence intervals. P-values <0.05 were considered significant.

Results
Among 22,286 patients, 8,144 (36.5%) were aged ≥65 years, with robotic surgery utilized in 3.5% of cases across both age groups. Among both older and younger adults, patients who underwent robotic cholecystectomy were more likely to be admitted emergently and experienced longer preoperative lengths of stay compared to those operated on laparoscopically. After propensity matching, robotic surgery in older adults was associated with a significantly shorter postoperative length of stay (ATE = -0.60 days, 95% CI -0.87- -0.32 days), whereas no significant reduction was observed in younger adults (ATE = -0.01 days, 95% CI -0.29-0.26 days). Robotic surgery was linked to higher operating room charges in both groups, with a greater increase among older adults (ATE = $15,825, 95% CI $13,059-$18,590) compared to younger adults (ATE = $10,597, 95% CI $8,674-$12,520). There was no association between robotic surgery and readmission rates in either group. However, robotic surgery was associated with reduced mortality in both older (ATE = -0.8%, 95% CI -1.0%- -0.6%) and younger adults (ATE = -0.1%, 95% CI -0.2%- -0.1%), with older adults experiencing a more pronounced benefit.

Conclusion
Robotic cholecystectomy in EGS was associated with reduced postoperative length of stay and mortality among older adults, while also providing a significant, though smaller, mortality benefit in younger adults when compared with laparoscopy. However, these benefits were accompanied by higher operating room costs, especially for older adults. These findings build upon prior research by highlighting potential advantages specifically for older adults undergoing cholecystectomy in an EGS setting. While the potential for employing robotics in EGS is promising, efforts must focus on reducing costs and emphasizing clinical benefit to justify broader adoption of this emerging technology.

Abstract Title: Outcomes of Aseptic, Septic, and Occult Infected Index Nonunion Repair: A Retrospective Comparive Study

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Abstract

Introduction
The purpose of this program is to compare the effectiveness of index nonunion surgery for occult-infected nonunion (ON) with aseptic (AN) and septic nonunion (SN) in patients identified using the fracture-related infection (FRI) criteria. This study also compared success rate of achieving union of bone grafting versus no bone grafting in the treatment of occult infected nonunion.

Methods
Patients diagnosed with nonunion at a single level 1 trauma center between 2013-2023 were retrospectively reviewed. Patients with incomplete culture data, missing inflammatory labs, or lack of 6 month follow-up were excluded. Patients were categorized into AN, SN, or ON groups using FRI criteria. Successful union after nonunion surgery without need for additional surgical interventions was evaluated. ON patients were organized into bone graft (ONBG) and no bone graft (ONNBG) groups to compare successful nonunion surgery. Multivariate regression was used to compare outcomes while controlling for gender, ASA, and diabetes.

Results
A total of 208 patients with nonunion fractures were included in the analysis, 125 AN, 54 SN, and 29 ON. ON patients were significantly more likely to be infected by a low virulence organism (82.8% vs 9.3%, $p<0.001$). The overall success rate of index nonunion surgery was 67.8%. ON had the highest success rate (79.3%), followed by AN (72.8%) and SN (50.0%) ($p=0.004$). Recurrent infections were significantly lower in AN (16.0%) and ON (10.3%) compared to SN (35.2%) ($p=0.005$). Regression analysis demonstrated that surgery success was significantly lower in SN patients (OR=0.38, $p=0.009$); ON and AN had similar success (OR=1.58, $p=0.4$). Among ON patients, 21 underwent bone grafting while 8 did not, which may have contributed to the observed but statistically non-significant difference in union rates (ONBG 76.2% vs. ONNBG 87.5%; $p=0.65$).

Conclusion
Index nonunion surgery in SN patients is associated with worse outcomes compared to AN and ON patients identified with the FRI criteria. Surgery success in ON is comparable to AN cases, suggesting that low-virulence infections do not significantly compromise nonunion surgery effectiveness. Bone grafting in occult infections did not impair nonunion surgery success in this small sample.

Abstract Title: Retrospective Analysis of Peritoneal Dialysis Catheter Outcomes, Complications, and Surgical Techniques

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Abstract

Introduction
Peritoneal dialysis (PD) is an increasingly popular modality of renal replacement therapy for patients with end-stage renal disease, but catheter obstruction or migration can compromise patency. Prophylactic techniques to decrease catheter malfunction such as catheter-pexy (CP) and omentopexy (suturing the catheter or omentum to the abdominal wall, respectively) have been described as possible adjuncts but have yet to be studied in a large cohort. Therefore, this study investigates whether prophylactic CP improves PD catheter patency over a 1-year period.

Methods
This retrospective cohort study includes adult patients who underwent PD catheter placement at Sentara Norfolk General Hospital from 1/1/2016 to 11/1/2023. Data were obtained via electronic medical records. The primary exposure was CP during PD catheter insertion. The primary outcome was 1-year patency, defined as the absence of revision or removal surgeries within 1 year of insertion. Covariates included age, sex, race, ethnicity, BMI, comorbidities, surgery length, and omentopexy during insertion. Mann-Whitney-U and chi-squared tests were used to compare baseline differences between CP and no-CP groups. Risk-adjusted multivariable logistic regression was employed to analyze the association of CP with 1-year catheter patency. P-values <0.05 were considered statistically significant.

Results
Of 202 patients, 157 (77.7%) had prophylactic CP and 45 (22.3%) did not. Baseline characteristics were similar between groups ($p > 0.05$). Reoperation was required for 49 (31.2%) patients in the CP group, compared to 18 (40.0%) in the no-CP group ($p=0.270$). After multivariable logistic regression, CP was associated with a 55% decrease in reoperation within 1 year (OR 0.45, 95% CI [0.20-0.99]). The only other variable associated with reoperation was diabetes mellitus (OR 0.46, 95% CI [0.21-0.98]).

Conclusion
These findings suggest that CP during PD catheter insertion is associated with superior 1-year patency rates. Surprisingly, diabetes mellitus was also associated with improved patency, which may be due to greater medical surveillance and follow-up. Although this study's sample is limited, future analysis will include an expanded cohort of 591 patients with additional covariates that will provide more robust evidence regarding the use of prophylactic CP.

Abstract Title: Acute Valve Syndrome: Prognostic Indicators of All-Cause 1 Year Mortality

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Abstract

Introduction
Acute Valve Syndrome (AVS) identifies a high-risk cohort of aortic stenosis (AS) patients with poor outcomes following aortic valve replacement (AVR), but the spectrum of risk within this group is poorly defined. We sought to evaluate whether admission markers facilitated risk stratification of 1-year mortality in an AVS cohort.

Methods
In a retrospective cohort (MIMIC-IV v3.1), we identified 2,380 adults who underwent AVR between 2008-2019. Patients were classified as AVS or progressive valvular disease (PVD). AVS was defined by criteria of acute decompensation, including advanced heart failure symptoms, cardiogenic shock, or significant hyperlactatemia. The AVS cohort was further stratified by the number of admission risk factors: renal dysfunction (creatinine ≥2.0 mg/dL), high lactate (≥4 mmol/L), liver injury (AST/ALT >60 IU/L), elevated NT-proBNP (>1500 pg/mL), and preoperative vasoactive agent use. The primary outcome was 1-year all-cause mortality.

Results
Among 2,380 AVR patients, 1,216 (51.1%) met AVS criteria. One-year mortality was higher in AVS vs PVD (12.9% vs 5.4%; HR 1.97, 95% CI 1.47-2.64; $p<0.001$). Within AVS, mortality increased stepwise with risk-factor burden: 2.0% (0 factors), 6.5% (1 factor), and 25.1% (≥2 factors; $p<0.001$).

Conclusion
AVS is associated with significantly increased 1-year mortality. Admission markers of multi-organ injury effectively stratify risk within this heterogeneous population, identifying a high-risk subset with poor survival. This risk factor-based approach warrants prospective validation to facilitate clinical decision-making.

Abstract Title: Eosinophilic Vacuolated Tumor of the Kidney: A Case Report and Literature Review

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Mentor: Frances Lazarow, MD
Co-Investigators:
Philip Olivares, MD, MPH, EVMS Radiology Residency
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Abstract

Introduction
Renal Oncocytoma (RO) is a relatively rare benign neoplasm of the kidney. Eosinophilic vacuolated tumor (EVT) is a distinct subtype of RO, distinguished primarily by unique morphologic features. While typically benign, this lesion's clinical importance lies primarily in distinguishing it from renal cell carcinoma, which can be difficult in the preoperative setting due to similarities in the epidemiology, clinical presentation, and imaging features of these entities. The following is a case report of EVT followed by a literature review discussing the epidemiology, clinical presentation, imaging features, management, and prognosis.

Case Information
A 24 year old gravid female was admitted to the hospital for preeclampsia, where workup revealed an incidental 6.1 cm mass in the left kidney. A subsequent multiphase contrast enhanced-CT demonstrated heterogeneous enhancement and raised suspicion for renal cell carcinoma. The patient underwent a radical left nephrectomy, and pathological analysis classified the tumor as an eosinophilic vacuolated tumor of the kidney.

Discussion
EVT represents a solid neoplasm of the kidney, with higher prevalence in males than females and with an average age of onset is approximately 55 years. Patients are often asymptomatic at discovery, with the lesions often detected incidentally. Unfortunately, the imaging features of EVT are difficult to distinguish from renal cell carcinoma and they are typically resected. They usually appear as well-marginated lesions and are often large at presentation. They typically demonstrate homogenous enhancement on post-contrast images, with up to 1/3rd of cases demonstrating a characteristic "central-stellate" non-enhancing scar. The most reliable feature, however, is the presence of metastasis or local invasion of adjacent structures, in which case the diagnosis of renal cell carcinoma is favored. Given the overlap of imaging features with RCC, confident preoperative distinction is often not possible, and so most are resected.

Conclusion
Although EVT - and more broadly RO - are benign lesions, a definitive preoperative diagnosis is difficult to make as the epidemiology, clinical presentation, and imaging features overlap considerably with RCC.

Abstract Title: Subaortic Membrane Resection in a 71-Year-Old Woman With Severe Left Ventricular Outflow Tract Obstruction

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Mentor: Matthew Summers, MD
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2. Hemish Philip, EVMS at ODU, MD program
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Abstract

Introduction
Subvalvular aortic stenosis (SAS), also known as subaortic stenosis, is a rare, gradually progressive congenital heart defect that causes fixed obstruction to blood flow across the left ventricular outflow tract (LVOT). This case report examines the clinical course of a 71-year-old woman diagnosed with a subaortic membrane causing severe LVOT stenosis, which was treated with surgical resection of the subaortic membrane.

Case Information
The patient is a 71-year-old female with a history of hypertension, type 2 diabetes mellitus, and chronic kidney disease with renal artery stenosis, presenting with exertional dyspnea, shortness of breath, and exercise intolerance. Additional history includes pulmonary hypertension, neuropathy, and occasional paroxysmal supraventricular tachycardia (pSVT) without sustained arrhythmia. Initial transthoracic echocardiography (TTE) revealed a hyperdynamic LV ejection fraction (EF) of 72% using Simpson's biplane. Further transesophageal echocardiography (TEE) narrowed down the diagnosis to a severe LVOT stenosis secondary to a subaortic membrane. Surgical resection of the subaortic membrane was performed successfully. Post-bypass TEE displayed good biventricular function with a decrease in the LVOT gradient from 55 mmHg pre-op to 18 mmHg post-op, and EF decreased from 72% to 60%. The patient experienced expected post-operative complications of hypotension, narcotic-induced hypoventilation, and stress-induced hyperglycemia, which were managed with temporary pressors, weaning to room air, and temporary IV insulin, respectively. The patient was discharged 6 days post-op to follow up in the clinic and complete a 14-day course of amiodarone.

Discussion/Clinical Findings
This case highlights the unique presentation of a subaortic membrane in an elderly patient, providing an opportunity to explore the role of imaging in diagnosis as well as review effectiveness of currently adopted treatment protocols in the setting of multiple comorbidities. A transesophageal echocardiogram (TEE) played a pivotal role in differentiating between hypertrophic cardiomyopathy and LVOT obstruction due to a subaortic membrane. Current literature supports the use of transthoracic echocardiogram (TTE) as a standard for diagnosis, therefore utilization of additional TEE in the patient's diagnosis is noteworthy. The patient's advanced age and comorbidities necessitated careful surgical consideration due to increased perioperative risks. The observed post-operative reduction in ejection fraction and LVOT gradient, reflective of a positive outcome, broadens the understanding of treatment efficacy for subaortic membranes beyond younger adult populations that dominate current literature.

Conclusion
Overall, subaortic membrane resection in the setting of advanced age and additional comorbidities can still produce favorable outcomes. Additionally, utilization of TEE as a complementary imaging modality in the management of subaortic stenosis proves advantageous.

Abstract Title: A Gene Network Related to Epileptogenesis in Glioblastoma Multiforme

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Abstract

Introduction
Glioblastoma Multiforme(GBM) is a highly aggressive brain tumor with an extremely poor prognosis. Previous research has shown that GBM cells have the ability to form synapses with healthy neurons. Additionally, there is evidence that gene expression in the GBM peritumoral area is variable based on the presence of epilepsy in patients. Previous studies have identified multiple genes in the peritumoral region, but there is limited research that directly links specific genes to epileptogenesis in GBM. In this project, we sought to determine if there are genes in the peritumoral area of GBM that correlate with epilepsy.

Methods
481 genes across 19 patients were analyzed using in-situ hybridization data on the publicly available Ivy Glioblastoma Atlas Project(GAP) database. The genes were surveyed for their presence or absence at different distances away from the tumor boundary. Using de-identified clinical data provided from Ivy GAP, the patients were also divided based on whether or not they exhibited epilepsy during clinical presentation. Using a phi coefficient and Fisher's exact test analysis, a network of genes was created to elicit relationships between individual genes, genes and epilepsy, or genes and distance.

Results
The gene network identified 21 genes that have positive associations with other individual genes, 4 genes that are inversely correlated with the presence of epilepsy, and 3 genes that were inversely related with distance from the tumor at a significance level of $p<0.05$. The four genes that were negatively associated with epilepsy were integrin subunit alpha 6(ITGA6), nitric oxide synthase(NOS2), periostin(POSTN), and peptidase inhibitor 3(PI3).

Conclusion
The gene network highlights several potential genes that are present together in the peritumoral region, which can indicate a role in tumor invasion. It is suspected that given the proximity of these genes to the tumor boundary, they may be involved in tumor synaptogenesis, but further research is needed to reach this conclusion. The 4 genes negatively related to epilepsy were more likely to be present in patients without a history of epilepsy, and we hypothesize that there is an underlying mechanism contributing to this inhibition. Further exploration is also required to determine if these genes are directly related to epileptogenesis.

Abstract Title: Stereotactic Radiosurgery Outcomes on Brain Metastases in HER-2 Low Versus High Breast Cancer

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Abstract

Introduction
Personalized management according to molecularly defined subgroups is critical to improving outcomes among patients with metastatic breast cancer. Human epidermal growth factor Receptor 2 (HER2) status has been recently expanded to include the HER2 low categorization. We hypothesized that HER2 status (HER2 low versus HER2 high) is prognostic for survival and central nervous system (CNS) disease control after stereotactic radiosurgery (SRS) for brain metastases among patients with metastatic breast cancer.

Methods
We identified consecutive patients with HER2 low (immunohistochemistry (IHC) 1+ or IHC 2+ and in-situ hybridization (ISH)-negative) or HER2 high (IHC 3+ or ISH-positive) metastatic breast cancer with brain metastases treated with SRS at our institution. Overall survival (OS) and cumulative incidence of any CNS progression, distant progression, and leptomeningeal disease (LMD) were analyzed from time of SRS with Cox proportional hazards models for clinically relevant factors.

Results
We evaluated 407 treated brain metastases among 71 patients with metastatic breast cancer, including 35 patients (49%) with HER2 low and 36 (51%) patients with HER2 high disease. Median follow-up time was 16.9 months. Median age was 54 years, and 31 (44%) of patients underwent surgical resection prior to SRS. HER2 low patients were more likely to have extracranial disease at the time of SRS (94% vs 69%, $p = .007$) and HER2 high patients were more likely to receive HER2-directed therapy at the time of SRS (81% vs 14%, $p < .001$). Median OS after SRS was greater for HER2 high patients (25.7 vs 9.4 months, $p < .001$) with 12- and 24-month OS for HER2 low and HER2 high patients being 43%/26% and 72%/53%, respectively. The median time to LMD was shorter for patients with HER2 low versus HER2 high patients (6.3 vs 20.3 months, $p = .037$), and the 24-month rate of LMD was greater among patients with HER2 low disease compared to HER2 high (26% vs 11%). Risk of LMD was not significantly associated with prior surgical resection, receipt of HER2-directed therapy at SRS, or extracanial disease status. There was no difference in median time to distant (6.7 vs 7.5 months, $p = .370$) or CNS (6.1 vs 7.7 months, $p = .286$) progression for HER2 low and HER2 high patients. On univariable analysis, Karnofsky Performance Status (KPS) of 60 or lower (hazard ratio (HR) 6.57, 95% CI 2.23 - 19.3, $p < .001$) and Graded Prognostic Assessment (GPA) (HR 0.63, 95% CI 0.47 - 0.85, $p = .003$) were associated with OS. Lower GPA was also associated with decreased risk of distant (HR 0.51, 95% CI 0.36 - 0.72, $p < .001$) and any type of CNS (HR 0.54, 95% CI 0.38 - 0.75, $p < .001$) progression. Two patients (2.8%) developed symptomatic radiation necrosis.

Conclusion
HER2 status was prognostic among patients with metastatic breast cancer brain metastases treated with SRS. Patients with HER2 low disease had worse survival and increased risk of LMD compared to patients with HER2 high disease. Rates of symptomatic toxicity were low among all patients.

Abstract Title: Evaluating Weight Loss Following a Tailored Exercise Regimen in Obese African American Women with Prediabetes

Investigator: Simone Kathleen Schumaecker
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Abstract

Introduction
Physical activity is a well-established lifestyle intervention used to decrease weight and the risk of developing chronic medical conditions such as Type 2 Diabetes and Cardiovascular Disease. In an increasingly sedentary society, there is a need to discover new approaches to encouraging exercise in individuals at risk. This pilot study evaluated the effectiveness of a culturally sensitive exercise intervention in obese African American women with prediabetes.

Methods
A prospective cohort of 64 participants aged 18 to 70 not taking weight-loss medication was recruited into a tiered, supervised physical activity intervention. Of the 64 enrolled, 28 individuals completed the study. The intervention consisted of various exercises, increasing in intensity every phase, taught by faculty at Norfolk State University over the course of 24 weeks. Following the intervention, participants were encouraged to continue exercising independently for the remaining 24 weeks of the study. Participants were evaluated at the Strelitz Diabetes Center every 12 weeks for a series of clinical tests, with laboratory tests being obtained every other visit. The primary outcome was weight loss and its maintenance at Weeks 24 and 48. Additionally, descriptive statistics of the changes in blood pressure, heart rate, weight, BMI, body fat percentage, and laboratory values throughout the study were calculated using data from the Baseline, Week 24, and Week 48 visits.

Results
Throughout the course of the study, participant vitals improved. From the initial visit to Week 48, participants lost an average of 4.93±1.6 pounds. Interestingly, from Week 24 to Week 48 there was an average weight gain of 0.96±1.2 pounds. Additionally, among the laboratory tests conducted, there was an average increase in the fasting blood glucose and total cholesterol by 1.61±1.8 mmol/L and 0.14±4.2 mg/dL respectively. Further analysis revealed that these values were decreased in the supervised half of the study and increased during the unsupervised phase.

Conclusion
Overall, the exercise intervention led to modest improvements in vitals and laboratory values in high-risk individuals during the supervised phase. These findings warrant further investigation to improve long-term adherence in prediabetic and diabetic populations.

Abstract Title: Inferior Vena Cava Leiomyosarcoma: Case Report and Review of Radiologic Findings

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Abstract

Introduction
Inferior vena cava (IVC) leiomyosarcomas are rare, slow-growing primary malignancies of the smooth muscle of the IVC. They represent approximately 0.5% of adult soft tissue sarcomas, with a female-to-male ratio of 3:1 and a peak incidence in the sixth decade of life. As patients may be asymptomatic or present with only nonspecific symptoms such as abdominal pain, prompt and accurate radiologic characterization of these tumors is essential to ensure timely diagnosis and management.

Case Info
A 38 year old woman with past medical history of hypertension, gastroesophageal reflux disease, and endometriosis presented to the clinic with a 4-month history of progressively worsening centrally-located abdominal and back pain. The patient reported that the pain was initially post-prandial and nocturnal lasting for a few minutes at a time, but had progressed to lasting for hours at a time over the past 3 weeks. Associated symptoms included nausea, vomiting, and diarrhea. She was started on a heparin drip with some improvement in her pain and multiple imaging modalities were obtained, suggesting an intra-renal IVC thrombus with soft tissue lesion concerning for primary leiomyosarcoma. The patient's case was discussed at a multi-disciplinary tumor board with decision to proceed with surgical resection of the probable primary IVC leiomyosarcoma. During surgery, the IVC mass and peri-aortic tissue were biopsied to establish a definitive diagnosis, confirming grade 2 leiomyosarcoma.

Discussion/Clinical Findings
Radiologically, the presence of a soft tissue mass that is localized to and expanding into the IVC is suggestive of a leiomyosarcoma. IVC leiomyosarcoma can be visualized with ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI). On ultrasound, they often appear as hypoechoic intraluminal masses with high vascularity and abnormal flow. However, in our patient, there was limited evaluation on ultrasound due to overlying bowel gas. On CT, IVC leiomyosarcomas commonly present as filling defects will loss of visualization of the IVC wall at the site of tumor contact. Furthermore, there can be enhancing filling defects if there is an intraluminal component. In our patient, the initial CT showed distortion of the right renal artery with perivascular haziness posterior to the IVC and narrowing of the left renal vein. On subsequent CTA Abdomen/Pelvis, there was a notable juxtarenal IVC filling defect abutting the abdominal aorta and right renal artery with severe narrowing of the left renal vein. On MRI, IVC leiomyosarcomas typically appear as heterogeneous and irregular soft tissue masses. In our patient, her MRI showed peripheral enhancing lobular wall thickening with absence of central enhancement, and with confluent soft tissue abutting the anterior wall of the abdominal aorta. There was also notable markedly narrowed distal left renal vein adjacent to IVC. Taken together, these radiographic findings were most consistent with a diagnosis of IVC leiomyosarcoma, and facilitated timely surgical intervention.

Conclusion
Unfortunately, prognosis for IVC leiomyosarcoma is poor with five-year survival less than 50%. However, recognition and accurate radiographic characterization is critical, as this enables prompt intervention and may improve patient outcomes.

Abstract Title: VCD-Induced Model of Menopause to Study Effects of Sleep Fragmentation on Atherosclerosis Development

Investigator: Sarah Shackelford
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Abstract

Introduction
Atherosclerosis is a chronic disease characterized by plaque buildup within arteries, leading to cardiovascular diseases. Sleep fragmentation (SF), defined as less than seven hours of uninterrupted sleep, is a recognized risk factor and is commonly observed in menopausal women. Menopause causes a decline in estrogen and ovarian follicles, resulting in the loss of estrogen's protective anti-atherogenic effects. SF exacerbates atherosclerosis by promoting oxidative stress and inflammation. Since SF contributes to atherosclerosis, and menopausal women are particularly affected by disturbed sleep, we aim to examine how menopause affects atherogenesis in the conditions of disturbed sleep.

Methods
We used the 4-vinylcyclohexene diepoxide (VCD) model to mimic human menopause. Six- to eight-week-old Apoe-/- mice were injected intraperitoneally with VCD for 20 days to deplete ovarian follicles and produce a hormone profile comparable to natural menopause. Vaginal cytology, cell staining and microscopy were performed to assess menopausal transition. At day 52, mice were placed on a high-fat diet, and sleep fragmentation (SF) was induced. Aged mice also underwent cytology. Ovaries, aorta, and hearts were collected. Hearts were stained with Picrosirius Red and MOVAT to assess plaques, fibrous caps, and necrotic cores.

Results
SF increased plaque and necrotic core areas, and reduced collagen content in SF Apoe-/- mice compared to home cage controls. Aged mice displayed persistent diestrus, characterized by neutrophil and epithelial cell abundance. 20-day VCD-treatment caused irregular estrous cycles but not full menopause, whereas 25-day treatment induced persistent diestrus. Ovarian histology of 20-day VCD-injected Apoe-/- mice might show structural changes of follicles. Notably, at 40 days after VCD-injection for 25 days, Apoe-/- mice already exhibited constant diestrus. Atherosclerotic plaques were present in VCD-treated, SF mice.

Discussion
Our results indicate SF exacerbates atherogenesis by increasing plaque vulnerability, and the VCD model effectively mimics menopausal transition. Persistent diestrus after 25 days of VCD treatment reliably indicates menopause. These findings support using VCD and aged mice to study postmenopausal atherosclerosis and SF-related cardiovascular risk.

Abstract Title: Variations in Rotator Cuff Repairs: An Analysis of Concomitant Procedures Over Time and By Surgeon Volume

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Mentor: Kevin Bonner, MD
Co-Investigators:
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2. Ann M. Harper, MPH, Sentara Health, Norfolk, VA
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Abstract

Introduction
Surgeon training, experience, patient characteristics, tear patterns, and coexisting pathologies can lead to variations in surgical technique and concomitant procedure choice during rotator cuff repair (RCR). These variations can result in differences in outcomes and costs for individual patients. The purpose of this study was to assess trends in concomitant procedures during RCR across time and by surgeon case volume.

Methods
This was a retrospective cohort study of adult patients who underwent rotator cuff repair at a Sentara hospital in Hampton Roads between January 1, 2015, and March 31, 2021. Patients were identified using billing CPT codes and included if they underwent arthroscopic RCR (29827), open RCR (chronic) (23412) or open RCR (acute) (23410) during the timeframe. Variables were extracted from the EPIC electronic medical record and included surgeon case volume, total cost of hospital stay, time in operating room, patient sex, race, and age, year of surgery, concomitant procedures, ICD-10 diagnoses codes, and number of CPT codes billed per RCR. Patients were stratified based on mean annual surgeon volume as follows: 1-2, 3-5, 6-25, 26-50, and 50+ cases per year. Statistical analyses were performed using R Statistical Software (R Core Team 2021) to assess the effect of year and surgeon volume on dependent variables. ANOVAs were performed for continuous variables and Chi-square/Fisher's Exact Tests for categorical variables.

Results
In total, 4,313 RCRs across 98 surgeons were included in the final analysis. Overall, 96% (n=4010) of cases included at least one concomitant procedure, and the number of CPT codes per procedure averaged 2.08 ± 0.91. During the timeframe, there was a significant increase in the number of concomitant arthroscopic subacromial decompression (P=.02), debridement (P<.001), and biceps tenodesis/tenotomy (P<.001) procedures. The average number of CPT codes per RCR also significantly increased from 1.8 ± 0.84 in 2015 to 2.3 ± 0.89 in 2021 (P<.001). Regarding case volumes, surgeons averaging more than 50 RCRs per year performed a larger ratio of arthroscopic biceps tenodesis/tenotomy (55.3%), debridement (42.0%) and subacromial decompression (93.7%) procedures. Surgeons averaging 25-50 cases per year performed the greatest ratio of arthroscopic distal clavicle excisions (46.4%).

Conclusion
The results of the present study suggest that surgeon case volume/experience plays a role in identifying pathologies common to rotator cuff tears and concomitant procedure choice.

Abstract Title: Elucidating Fungal Laryngitis Associated with Inhaled Corticosteroid Use

Investigator: Simran Ketan Shah
Mentor: Benjamin Rubinstein, MD
Co-Investigators:
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2, Dr. Sara Sun, EVMS Otolaryngology
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4, Dr. Joshua Sill, EVMS Department of Medicine
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Abstract

Introduction
Inhaled corticosteroids (ICS) are a mainstay in the treatment of asthma and COPD due to their potent local anti-inflammatory effects. However, ICS use is associated with adverse effects, particularly dysphonia, which is the most frequently reported symptom. Fungal laryngitis, a potential underlying cause of dysphonia, often goes undiagnosed due to low clinical suspicion and underutilization of diagnostic tools such as laryngoscopy, videostroboscopy, and fungal cultures. This study investigates the relationship between ICS use and fungal laryngitis and seeks to improve diagnostic pathways for this condition.

Methods
The study will utilize a prospective observational cohort study to identify 50 cases (used ICS daily for one month prior) and 5 controls within Sentara Pulmonary, Critical Care & Sleep Specialists clinic. Participants are evaluated at the EVMS Otolaryngology Clinic using a combination of validated questionnaires-Voice Handicap Index (VHI), EAT-10, Reflux Symptom Index (RSI), and Newcastle Laryngeal Hypersensitivity Questionnaire (NLHQ)-as well as through fungal culture, flexible nasolaryngoscopy, and/or videostroboscopy. Concurrently, a retrospective chart review is being conducted to assess diagnostic patterns and further examine the association between ICS use and fungal laryngitis.

Results
As of September 2025, nine participants have consented to the prospective study, with eight completing clinic visits. Additionally, 234 patient charts have been reviewed and entered into REDCap for retrospective analysis, focusing on symptoms and test results before and after antifungal treatment.

Conclusion
Recruitment for the prospective cohort will continue through 2025. Data from both the prospective and retrospective components will be analyzed using multivariate regression and descriptive statistics. The combined findings aim to clarify the prevalence of fungal laryngitis in ICS users and evaluate and improve upon current diagnostic approaches.

Abstract Title: Renal Mass as the Initial Manifestation of Diffuse Large B-Cell Lymphoma: A Case Report

Investigator: Samir A Shaikh
Mentor: Frances Lazarow, MD
Co-Investigators:
1. Michael Finizio, MD, Department of Radiology
Department: Radiology

Abstract

Introduction
Lymphomas may present in many ways, but it is quite rare for diffuse large B-cell lymphoma to present primarily as a renal mass. Navigating the different presentations of lymphoma and keeping it on the differential for a renal mass allows for the proper sampling and treatment of the disease.

Case Information
A 60-year-old female with a history of gastric bypass and hypothyroidism, presented to the emergency department for epigastric and left upper quadrant abdominal pain that radiated into the left side of her chest. Physical exam was unremarkable except for significant abdominal tenderness in the epigastric and left upper quadrant. Labs were significant for anemia and dehydration. The chest radiograph was unremarkable. Computed Tomography (CT) imaging of her abdomen and pelvis with contrast demonstrated an ill-defined soft tissue infiltrative mass arising from the right kidney's lower pole measuring 9.1 x 8.8 x 7.7 cm (CC, AP, TRN) with low internal density and no definite invasion of the renal vein. Additionally, there was a bulky retroperitoneal soft tissue attenuating mass compressing the Inferior Vena Cava (IVC) and encasing the right renal artery and vein as well as possible compression of the duodenum causing outlet obstruction of the stomach. Initial differential diagnosis included Renal Cell Carcinoma, Renal Medullary Carcinoma, and possible lymphoma. Three days later, Interventional Radiology (IR) performed a CT guided drain placement into the gastric remnant to resolve the gastric outlet obstruction in addition to a biopsy of the right renal mass and retroperitoneal lymph node. Biopsy results of the right renal mass and associated lymph node concluded Epstein Barr Virus (EBV) positive diffuse large B-cell lymphoma (DLBCL), germinal center phenotype (GCB) with high proliferative index, Ki-57 100%; abnormal p53 expression. The Fluorescent In Situ Hybridization (FISH) analysis noted rearrangement of MYC gene, no rearrangement of BCL6, and monosomy 17 was noted. About two weeks later, IR performed a bone marrow biopsy as well as a mediport placement for systemic chemotherapy. Bone marrow biopsy redemonstrated EBV + DLBCL, GCB cell of origin, aggressive subtype (GCB2) with MYC gene rearrangement. Systemic chemotherapy with cyclophosphamide, hydroxydaunorubicin, vincristine, prednisone and Rituximab were initiated. An Fluorodeoxyglucose-Positron Emission Tomography/Computed Tomography (FDG PET/CT) of the skull base to mid-thigh was performed the following week which demonstrated hypermetabolic mesenteric and retroperitoneal mass/lymphadenopathy which was consistent with the diagnosis of lymphoma with a volume that had increased slightly from previous CT imaging. Additionally, the right renal mass was variably hypermetabolic, consistent with malignant involvement. Lastly, there was diffuse hypermetabolic activity throughout all the osseous structures. One month later, the patient decided to terminate chemotherapy and was transferred to hospice.

Discussion
The differential for renal mass can be narrowed by determining contrast enhancement on CT. Within enhancing lesions, renal cell carcinoma, transitional cell carcinoma, angiomyolipomas, and less commonly lymphomas.

Conclusion
Lymphoma presentation as a renal mass is fairly rare. Certain imaging characteristics can further narrow the differential, guiding the diagnosis towards the less common renal lymphoma.

Abstract Title: An educational case on bacterial rhinosinusitis and brain abscess formation; and a review of the pathophysiology of infection seeding through the sinuses.

Investigator: Zachary Adam Shally
Mentor: Timothy Chiang, BS MD
Co-Investigators:
Imad Haque, MD; Radiology
Department: Radiology

Abstract

Acute bacterial rhinosinusitis (ABRS) is a common diagnosis affecting about 12% of adults in the United States each year. While it is often a self-limited disease, it may evolve if left undiagnosed and untreated. A feared complication of ABRS is the development of a brain abscess. Prompt imaging and aggressive therapy are necessary to reduce mortality and morbidity of brain abscesses. Through this case, we attempt to identify unique presenting factors that may have pre-disposed this patient to brain abscess which may aid in future risk stratification of ABRS.

A 43 year old male with no significant medical history presented with 16 days of frontal headache, green nasal discharge, subjective fevers, nausea/vomiting, and left eye pressure. Physical exam in the ED revealed no neurological deficits. A CT sinus was performed which showed near complete opacification of all paranasal sinuses and features indicative of acute on chronic pansinusitis. Additionally, this scan revealed severe localized vasogenic edema with subfalcine herniation strongly suggesting a brain abscess. He was admitted to the neuro-ICU with a neurosurgery consult and started on aggressive antibiotic therapy and seizure prophylaxis. Two days after initial presentation, he was taken to the OR for open craniotomy and excision of the lesion with drainage. Repeat MRI showed worsening edema surrounding the site of excision. He returned to the OR for surgical aspiration that same day. Following clinical stabilization, he was discharged on a prolonged course of IV antibiotics.

Contiguous spread of bacteria from the sinuses is the most common pathway for brain abscess formation, accounting for about □ of cases. Brain abscesses may form after osteomyelitic destruction of bones around the sinuses resulting in seeding of infection from the sinuses to the brain. Brain abscess most commonly presents as headache, fever, and focal neurological deficit. Factors that increase the likelihood of brain abscess secondary to ABRS, including length of time between infection and treatment, anatomical defects, and immunosuppression to name a few. Delay of treatment for ABRS is the most common reason for brain abscess to occur. The diagnostic imaging of choice is a brain MRI as it is extremely sensitive for abscess, provides better image resolution, and detects brain abscess formation earlier than a CT of the head. CTH is the next choice and is still an excellent form of imaging to detect abscess. Treatment of brain abscess is aggressive empiric antibiotics. Surgery is indicated if there is evidence of increased intracranial pressure. Surgical aspiration or open craniotomy with excision are methods for treatment.

ABRS is a common clinical diagnosis often resolving after a short course of antibiotics. Rarely, as in this case, it can progress to life threatening cases of brain abscess requiring immediate surgical intervention and long term antibiotic therapy. Such a potential for rapid clinical decline prompts further investigations of these rare cases to determine prognostic factors to aid diagnostic considerations. Routine CT head/sinus exams in the ED for sinusitis would most likely add to an already overwhelming burden of pending emergency studies.

Abstract Title: A Quantitative Analysis of Transportation Equity in Outpatient Clinic Settings

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Co-Investigators:

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Abstract

Introduction
Healthcare disparities are often fueled by obstacles that patients face outside of healthcare. Transportation equity is a necessary factor to consider when evaluating this topic. Though not always obvious, Social Determinants of Health (SDoH) may impact the availability, reliability, and safety of transportation for medical appointments. This prevents patients from regularly accessing care & negatively impacting long-term population health outcomes. This community based participatory research (CBPR) effort incorporates community member input to investigate how patient transportation to healthcare appointments is impacted by SDoH in HR and highlights the quantitative results of a larger mixed methods project.

Methods
Aim: To Identify transportation used for medical appointments for patients in HR and barriers to outpatient healthcare that may be influenced by SDoH. Design: The prospective, CBPR study had a mixed methods convergent design and was implemented over a 6-month period. Eleven team members from EVMS/ODU partnered with community members from the Hampton Roads Community Collaborative (HRCC) to design and implement the study. HRCC team members participated in the design of survey materials, data collection, and dissemination. Inclusion criteria and sampling: The team recruited adults 18 years or older residing within the HR region to complete a community survey on the topic. Convenience sampling was utilized in EVMS/ACC outpatient clinics and at free, local community events in all 7 HR cities. Additionally, recruitment flyers with links to the questionnaire were strategically place in areas of high foot traffic on the EVMS/ACC healthcare campus and at local HR businesses. Data collection: Data was collected over a 6-month period via a 24-item questionnaire. The paper-based survey was also implemented via an electronic QR code in REDCap.

Results
A total of 252 responses were recorded. Seventy-five % of HRCQ participants reported their most common method of transportation to medical appointments was by car or truck (n=148) and 12.7% reported utilizing medical transport. A weak association noted that patients from Hampton were more likely to take the bus to appointments ($r= 0.266$ $p<0.001$) & use medical transportation ($r=0.164$, $p=0.012$) as compared to other HR regions. Additionally, patients from Portsmouth were more likely to ride a bike ($r=0.130$, $p=0.047$) while patients from Norfolk were more likely to walk to their appointments ($r=0.182$, $p<0.006$). When assessing barriers to primary care services, patients from Hampton reported less access to safe transportation ($r= -0.201$ $p=0.004$), less access to last minute or same day appointments ($r= -0.204$ $p=0.004$) & a lack of reliable transportation to medical appointments ($r= -0.165$ $p=0.018$). When evaluating SDoH, there was a weak correlation for Norfolk patients regarding the reliability of healthcare transportation ($r= -0.140$, $p=.045$), but they overcame challenges by utilizing the assistance of family or friends ($r=0.152$ $p=0.032$).

Conclusion
The quantitative results of the CBPR project highlight that patients from different regions in HR utilize varying methods of transportation & face different barriers when accessing healthcare appointments. Dissemination: Our data points to city-specific interventions to improve transportation for provider office visits to reduce healthcare disparities in HR.

Abstract Title: Bridging the PrEP Gap in Portsmouth, Virginia: A Patient-Centered, Systems-Based Approach to HIV Prevention

Investigator: Bailey Josephine Steelman
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Abstract

Introduction
HIV continues to pose a significant public health challenge in Portsmouth, Virginia, where the prevalence is more than twice the state average. This project aimed to increase the uptake of HIV Pre-Exposure Prophylaxis (PrEP), which is a highly effective way to prevent HIV acquisition by creating community-informed training after investigating key barriers to PrEP utilization.
Historical and structural barriers to PrEP utilization were examined, including stigma, low awareness, health literacy, and staff discomfort. In addition, systemic challenges such as limited staff training, fragmented infrastructure, and collaboration between public health entities and academic institutions. This project used an interdisciplinary training effort grounded in implementation science and stakeholder engagement. The timing of this project is critical, given the current uncertainties in preventive medicine and HIV.

Methods
The project was conducted at the Portsmouth Health Department (PHD), which serves high-risk populations through programs including Sexually Transmitted Infections (STI), Maternity, Family Planning, School Physicals, Immunizations, Refugee Health, Harm Reduction, and Woman Infant and Children (WIC) etc. Structured interviews were held with patients, PHD staff, leadership, PrEP navigators, and community partners to identify barriers and inform intervention design.
A three-module PrEP education and stigma-reduction training was delivered to 20 multidisciplinary staff, including clinical, administrative, and public health professionals. Each module addressed PrEP basics, access pathways, and inclusive patient communication, with clearly defined learning objectives. A 12-question pre- and post-training survey assessed changes in knowledge (via four multiple-choice questions) and comfort with PrEP-related discussions (via four Likert-scale items). Descriptive analysis was used to evaluate outcomes. The training was based on implementation science, quality improvement methodologies, and high-value care principles, with a focus on process adaptation and potential scalability.

Results
Of the 20 participants, 19 completed both the pre- and post-surveys. Among 18 who completed knowledge-based questions, the average scores increased from 77.6% to 94.4%. Seventeen staff completed the Likert-scale questions measuring communication confidence, with mean scores rising from 14.8 to 17.4 out of 20. The most significant gains were in self-perceived knowledge and the ability to use inclusive language. Feedback revealed increased confidence, appreciation for new tools, and enthusiasm for continued training. One STI staff member shared, "This helped motivate me with my interview techniques and word usage." Another participant emphasized learning "how to have the tough conversations with patients." Staff across departments expressed interest in integrating PrEP education into their existing services, reflecting broad relevance and buy-in across PHD.

Conclusion
This targeted, multidisciplinary intervention led to measurable improvements in PrEP-related knowledge and communication confidence among staff in a high-burden, resource-constrained public health setting. By addressing stigma and system-level barriers through patient-centered training, the initiative enhanced health department readiness to deliver equitable HIV prevention services. Most importantly, this project laid the foundation for a sustainable public health-academic partnership aimed at eliminating HIV transmission in Portsmouth.
It serves as a replicable model for integrating HIV prevention into routine services and building collaborative infrastructure to achieve long-term community impact aligning with CDC's Ending the HIV Epidemic goals: 95% diagnosed, 95% on treatment, and 95% virally suppressed.

Abstract Title: Aniridics with PAX-6 Mutations Display Elevated BMI and Impaired GLP-1 Response

Investigator: Sravani Sunkara
Mentor: Peter A Netland, MD PhD
Co-Investigators:

1. Andrew Huynh, Macon and Joan Brock Virginia Health Sciences Eastern Virginia Medical School at Old Dominion University\MD Program
2. Dr. Robert M. Grainger, University of Virginia\Professor of Biology

Department: Ophthalmology

Abstract

Introduction
Aniridia is a rare, congenital eye disorder characterized by hypoplasia or aplasia of the iris. Aniridia occurs approximately every 1.8/100,000 live births. Both familial and sporadic aniridia are caused by heterozygous mutations in the paired box 6 (PAX6) gene on chromosome 11. PAX6 is a key transcription factor in the development of the eye, pancreas, and brain. In the eye, PAX6 mutations are associated with panocular issues, such as nystagmus, foveal hypoplasia, aniridia-associated keratopathy, and cataracts. The literature indicates that PAX6 mutations are associated with metabolic changes, including pro-insulinemia and impaired glucose tolerance. This study aims to explore metabolic differences between aniridics with PAX6 mutations and their relatives without PAX6 mutations by assessing Body Mass Index (BMI) and pre-prandial to post-prandial Glucagon-Like Peptide-1 (GLP-1) percent changes.

Methods
This study is a prospective case-control study of 12 aniridics and 12 controls. The control group consists of non-aniridic relatives of the aniridics in the study. Data collection comprised blood draws, demographics, and physical measurements at the 2013 Aniridia Foundation International meeting. Blood was drawn from each study participant before and after the participants consumed a glucose solution (Ensure Nutrition Shake with 33 grams of glucose). Next, the blood samples underwent laboratory analysis of various aspects, including GLP-1, Hemoglobin A1C (HbA1C), glucose, insulin, ghrelin, and glucagon levels. After the blood sample results were processed, the data were statistically analyzed. BMI differences between aniridics and controls were assessed using an independent t-test. Due to the small sample size, paired data, and outliers, the Wilcoxon test was chosen to analyze the % change in pre-prandial to post-prandial GLP-1 in obese (BMI≥30) aniridics and obese controls.

Results
The independent t-test showed aniridics displayed significantly higher BMIs than controls ($p=0.009$). The Wilcoxon test showed obese aniridics had a significantly lower percent increase in pre-prandial to post-prandial GLP-1 compared to controls (p-value=0.035).

Conclusion
The results suggest aniridics may have impaired GLP-1 release in response to meals compared to controls. As GLP-1 is a satiety hormone that suppresses appetite, this may contribute to aniridics having higher BMIs than controls. These findings, coupled with the existing literature stating that aniridics display higher glucose intolerance compared with controls, demonstrate that aniridia may be associated with metabolic abnormalities. Due to this study's small sample size and large variability in participants' ages, further studies with larger sample sizes and less participant age variability are recommended to explore the role of PAX6 in obesity and post-prandial GLP-1 release.

Abstract Title: Internal Medicine Survey Perceptions of Inpatient Internal Medicine Rounding Practices

Investigator: Connor Tembe
Mentor: Rehan Qayyum, MD
Co-Investigators:
1. Elizabeth Batchelor, Department of Internal Medicine
2. Julie SIll, Department of Academic Affairs
3. Sara Serji, Department of Internal Medicine
4. Aaron Mills, Department of Internal Medicine
Department: Department of Medicine

Abstract

Introduction
Rounding practices on inpatient, internal medicine services, whether conducted at the bedside, in the hallway, or at the table, represent a cornerstone of both patient care and medical education. Each rounding style carries distinct implications for clinical efficiency, patient engagement, and trainee learning. Bedside rounding is often championed as a patient-centered approach that fosters communication, shared decision-making, and role modeling of clinical reasoning. However, faculty frequently express concerns about its time demands and perceived inefficiency compared with alternative formats. Despite the centrality of rounding to the inpatient experience, limited data exist on how faculty define and balance the concepts of efficiency and effectiveness in this context. To address this gap, we surveyed internal medicine (IM) faculty and trainees to assess perceptions and definitions of effective and efficient rounding practices in an academic setting.

Methods
We conducted a cross-sectional survey of internal medicine faculty and trainees using a 27-item mixed-format questionnaire designed to capture both quantitative and qualitative data for mixed method analysis. Survey domains included perceptions of goals of inpatient rounding, definitions of efficiency and effectiveness, preferred rounding formats, and perceived barriers to bedside rounding. Responses were collected anonymously to encourage candid feedback. Quantitative items employed Likert-type scales and categorical response options, while open-ended questions elicited narrative responses. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize quantitative data. Open-ended responses were reviewed and coded using a priori, descriptive codes and process codes and thematically categorized to complement quantitative findings.

Results
A total of 13 participants (11 faculty and 2 trainees) completed the survey (6.5% response rate). The most frequently identified purposes of rounding were to clarify/review treatment plan (33.3%), provide education and patient care (33.3%), and develop and teach trainees (33.3%). The majority of respondents employed a mixture of rounding styles (table, walk, bedside), with 69% utilizing all three and 23% utilizing two methods, and 92.3% incorporating bedside rounding in some capacity. Barriers to effective/efficient rounding included time (20%), location (20%), volume and complexity of patients (33.3%), and other distractions/logistics (26.7%). The majority of respondents agreed or strongly agreed that bedside-rounding facilitates more comprehensive patient assessments compared to table rounding (92.3%) and that it enhances patient engagement and satisfaction (76.9%). Nonetheless, most respondents disagreed or strongly disagreed that bedside rounding was more efficient than table rounding for task completion during rounding (61.5%) or that it facilitated more timely completion of rounding (53.8%).

Conclusion
While results are limited by low participation, responses of IM team members demonstrate multiple goals for rounds including clinical care, education, and teaching. While bedside rounding in particular is seen as valuable for patient engagement, comprehensive assessment, and learner development, it is felt to be less efficient for task completion as compared with table or hallway rounding, though all are limited by time constraints, logistical interruptions, and patient volume and complexity. These findings highlight a tension between educational and clinical priorities and underscore the need for targeted strategies to enhance the efficiency and uptake of bedside rounding during internal medicine training.

Abstract Title: Validating the clinical utility of a novel prognostic biomarker and an oncogenic k-RAS signaling gatekeeper, SIAH, to risk stratify pancreatic cancer patients at Sentara-EVMS-VOA

Investigator: Samantha Vos
Mentor: Amy Tang, BS PhD
Co-Investigators:
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Amy Tang Ph.D, Microbiology and Molecular Cell Biology\Biomedical Sciences
Department: Department of Microbiology and Molecular Cell Biology

Abstract

Introduction
Pancreatic ductal adenocarcinoma (PDAC) is a deadly cancer because it is often diagnosed at late stages where metastatic spread is common. Unlike other major cancer types, PDAC has an increased incidence rate, and is the 3rd leading cause of cancer death in the United States. Without early detection tools and curative regimens, PDAC is projected to become the 2nd leading cause of cancer death in 2030. Oncogenic K-RAS activation is a major driving force detected in >97% of PDAC cases, and is associated with rapid tumor relapse, chemo-resistance, metastasis, and dismal survival. KRAS is a small GTPase, and the oncogenic K-RAS pathway activation is multifaceted often rendering peotein inhibitors ineffective. SIAH is an evolutionarily conserved E3 ligase that is the most downstream signaling gatekeeper of the EGFR/K-RAS pathway whose function is indispensable in driving oncogenic K-RAS-driven PDAC malignancy. In this study, we aim to determine whether SIAH has prognostic value for patient risk stratification in the operable PDAC cohort to predict patient survival at Sentara. We predict that SIAHHigh expression may correlate with poor outcome and reduced survival in PDAC.

Methods
A cohort of 1,156 patients with PDAC, diagnosed at Sentara-EVMS-VOA between 2001-2016 was analyzed to determine the association of clinicopathological parameters with TNM staging, treatment efficacy, and survival prediction. SIAH expression was calculated by the average immunohistochemical (IHC) scores from two clinical pathologists in 148 operable PDAC patients, including 34 neoadjuvant chemotherapy (NACT)-treated residual tumors and 114 untreated primary tumors.

Results
354 PDAC patients were operable, and 802 patients were inoperable. 32.8% of the Caucasian patients and 27.4% of Black patients received surgical resection. Analysis of the SIAH expression in the 148 operable patients showed that low SIAH expression (< 5%) correlated with a longer survival than those with higher SIAH expression (>5%). The average SIAH expression in stage I/II and III/IV patients was recorded and SIAHhigh/low expression is correlated with the 1-2-3-4-5 years of survival post-diagnosis.

Conclusion
We found that persistent SIAH expression in residual tumors post-NACT is indicative of chemo-resistant tumor cells at 1st-line setting, and thus representative of high-risk residual tumors associated with high rates of tumor relapse/chemo-resistance/systemic metastasis and the worst survival.

Abstract Title: Galactic Cosmic Radiation Negatively Affects Rat Ovarian Follicles

Investigator: Mitch Chad Warren Jr
Mentor: Diane M Duffy, PhD
Co-Investigators:
1. Richard Britten, PhD, Radiation Oncology and Biophysics
2. Rebecca Duncan, MD '27
3. James Vettichira, MD '27
Department: Biomedical and Translational Science

Abstract

Introduction
Galactic cosmic radiation (GCR), the radiation found in space, is 3-100 times more potent than X-rays and poses a significant risk to astronauts. NASA will send female astronauts on Mars missions, but we currently have little information on the effects that space radiation has on female reproductive health. After birth, women do not generate new oocytes. As they age, progression through follicular stages and depletion of oocyte reserves leads to menopause. By assessing the four stages of follicular growth in the ovary, we can identify which stages are most vulnerable to GCR. Decreased follicle numbers could lead to operational issues, early menopause, and fertility issues. There may also be long-term health implications like osteoporosis and cardiovascular disease. We hypothesize that exposure to GCR will damage ovarian health by reducing the number of ovarian follicles and decreasing overall ovarian volume.

Methods
Female Wistar rats (7-months old) were exposed to space radiation (SR) at Brookhaven National Laboratory. After cognitive testing, the rats were euthanized (~4 months post exposure). Ovaries were recovered and fixed in 10% formalin. Sham rats travelled to and from Brookhaven but were not exposed to radiation. Ovaries from sham (n=4) and ovaries exposed to two types of SR (10 cGy of GCR/GCR (n=4) or 10 cGy of He/GCR (n=4)), were embedded in paraffin wax and sectioned at 5 µm. Every fifth slide was stained with hematoxylin and eosin. Follicles with a visible oocyte nucleus were counted, and counts were multiplied by five to account for assessing every fifth section. Antral follicles are larger than the other follicles and were counted without adjustment. Ovarian volume was calculated using the ellipsoid formula: $V = 4/3*\pi*rh*rl*rw$.

Results
Ovaries from sham animals contained all four follicle classes. Primordial follicles were present in large numbers, with smaller numbers of primary and secondary follicles, and fewer antral follicles. When compared to sham animals, irradiated animal ovaries contained similar numbers of primordial, primary, and antral follicles. Our preliminary data suggests that SR reduces the abundance of secondary follicles compared to that observed in sham rats. There were 95±21 secondary follicles in the sham group, whereas GCR/GCR had 61±18 secondary follicles, and He/GCR had 56±4 (ANOVA p=0.2280, n=4/group). There was also a trend towards decreased ovarian volume following radiation, with sham measuring 17.2±5.3 µL, GCR/GCR measuring 12.4±2.2 µL, and He/GCR measuring 13.2±3.8 µL.

Conclusion
These preliminary data support our hypothesis that space radiation negatively affects the ovary. Secondary follicle numbers were decreased by both types of radiation, and irradiated ovaries were smaller than the sham ovaries. The diminished secondary follicle counts could explain the difference in ovary size between radiation and sham groups, as larger ovaries are thought to be more active. Future studies could compare the size of antral follicles between irradiated and sham ovaries to assess whether the follicles are growing to adequate size for ovulation after radiation exposure. Moving forward, studies like this will help inform the need for protective measures against GCR exposure to prevent negative health consequences for female astronauts.

Abstract Title: Pictorial Essay Review of Malignancies with low FDG-avidity in PET/CT

Investigator: Frank Arthur Watson
Mentor: Kathy Byun, MD
Co-Investigators:
Dr. Kevin Nguyen, EVMS @ ODU Department of Radiology
Department: Radiology

Abstract

Introduction
18-Fluorodeoxyglucose-Positron Emission Tomography/Computerized Tomography (FDG-PET/CT) is a medical imaging technique which utilizes 18-FDG as a radiotracer to map out differences in cell function and metabolic activity for oncologic detection.

Main Body
One of the drawbacks of 18-FDG PET/CT is that the 18-FDG radioisotope is does not demonstrate avid uptake among every cancer type, and there are recognized factors deriving from both patients and tumors which elicit this phenomenon. We will discuss the factors that affect 18-FDG avidity, show various malignancies that typically present with low 18-FDG avidity, explain attributable factors causing low avidity and propose alternative imaging modalities.

Conclusion
This pictorial essay aims to provide a reference for different malignancies whose detection may potentially be missed or underdiagnosed with 18-FDG PET/CT.

Abstract Title: Postoperative Outcomes of Panniculectomy With and Without Concomitant Ventral Hernia Repair: A National Cohort Analysis

Investigator: Margaret Hope West
Mentor: Lawrence B. Colen, MD FACS
Co-Investigators:

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2. Lawrence Colen, MD, FACS, (P.I.), Macon & Joan Brock Virginia Health Sciences, Eastern Virginia Medical School at Old Dominion University\Division of Plastic & Reconstructive Surgery

Department: Division of Plastic & Reconstructive Surgery

Abstract

Introduction
Patients with obesity or massive weight loss often present with a symptomatic pannus and may also require abdominal wall reconstruction for concomitant ventral hernias. Previous studies compared panniculectomy with ventral hernia repair (PAN+VHR) to hernia repair alone, often noting higher complication rates. However, the more extensive intervention is typically the panniculectomy (PAN) itself. Direct comparisons between PAN alone and PAN+VHR remain limited, despite the morbidity associated with PAN. We aimed to compare postoperative outcomes of PAN versus PAN+VHR, hypothesizing that adding VHR would not increase complication rates.

Methods
We conducted a retrospective cohort study using the TriNetX National Health Research Network. Data were obtained through institutional access to TriNetX, a global federated health research network that aggregates de-identified electronic health records from 108 healthcare organizations. Adult patients undergoing panniculectomy with or without concomitant VHR between 2005 and 2025 were identified. Propensity score matching was applied across 13 demographic and clinical variables to create comparable groups (n=4,306 per cohort). Postoperative outcomes, including debridement, infection, wound dehiscence, and hematoma/seroma, were assessed at 30 days, 90 days, and 12 months. Risk analyses were conducted for each outcome at each timepoint.

Results
Debridement and infection rates were not significantly different between groups at any timepoint. At 12 months, infection occurred in 11.4% of PAN patients versus 12.3% of PAN+VHR patients (RD -0.91%, p=0.19, RR=0.93). In contrast, wound-related complications were more frequent with PAN+VHR. At 30 days, dehiscence was observed in 3.9% of PAN+VHR patients compared to 2.9% in PAN alone (RD -1.07%, p=0.006, RR=0.73), with differences persisting through 12 months (7.6% vs 5.6%, RD -1.95%, p=0.0003, RR=0.74). Hematoma/seroma rates were not statistically significant at 30 days (2.8% vs. 2.2%, RD -0.58%, p=0.08, RR=0.79), but by 3 months became significantly higher in the PAN+VHR group (4.5% vs. 3.6%, RD -0.91%, p=0.03, RR=0.80) and continued to 12 months (5.5% vs. 4.5%, RD -0.98%, p=0.04, RR=0.82).

Conclusion
In this large national cohort, combining panniculectomy with ventral hernia repair did not increase infection or debridement risk compared to panniculectomy alone. However, PAN+VHR is associated with a higher risk of wound dehiscence throughout all postoperative periods and an increase in hematoma/seroma formation by 3 months. These findings highlight the importance of careful patient selection and counseling when considering a single-stage combined operation. Limitations of retrospective database studies should be considered when interpreting results. Future studies are warranted to refine risk stratification.

Abstract Title: Association Between Preterm Birth and Neighborhood Socioeconomic Status

Investigator: Alyssa Lee Wilkinson
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Department: Obstetrics & Gynecology

Abstract

Introduction
Preterm birth, defined as delivery before 37 weeks of gestation, is a common pregnancy complication and a leading cause of infant morbidity and mortality. Mothers who deliver preterm may also face serious health complications. Previous studies have shown that racial disparities affect preterm birth rates, with Black individuals facing significantly higher odds of preterm birth than their white counterparts. While this disparity has been attributed to various social determinants of health, much regarding this difference is still not understood. In particular, neighborhood socioeconomic status, including food insecurity, neighborhood walkability, and housing instability, has not been investigated. This prospective case-control study examines how neighborhood socioeconomic status contributes to the risk of preterm birth, enhancing understanding of how patient environment impacts pregnancy outcomes.

Methods
Mothers who delivered live, singleton fetuses at twenty weeks or greater were considered eligible for the study. Study exclusion criteria included fetuses with known major anomalies or chromosomal abnormalities. The Accountable Health Communities Health-Related Social Needs (AHC HRSN) Screening Tool, which evaluates various unmet needs, was then administered to qualified and consenting individuals. Additional information was collected from patient charts to characterize each patient's neighborhood by area deprivation index, food access, walkability index, and maternal vulnerability index.

Preliminary Results
A total of 280 patients were recruited for the study using a 1:3 case-control ratio. The mean maternal age of delivery was 29.5 years and mean BMI was 37.1 kg/m2. Participants predominantly identified as white (48.2%) and Black (46.8%), with a smaller proportion identifying as Asian, Hawaiian/Pacific Islander, American Indian, or "other." The mean score for the HRSN Screening Tool was 2.30 ± 1.82 out of a maximum score of 13 for the preterm birth group; the mean score was 2.94 ± 1.99 for the term group. T-test analysis revealed a statistically significant difference in HRSN survey scores between groups, with a p-value of 0.013.

Conclusion
Preliminary data from the HRSN Screening Tool suggest findings that contradict the initial hypothesis that mothers living in neighborhoods of lower socioeconomic status are at higher risk for preterm birth. However, data on potential confounding factors have not yet been analyzed and may account for these results.

Abstract Title: Improving Referral Follow-Up Using EMR Protocols

Investigator: Anna Yang
Mentor: Richard M Bikowski, MD
Co-Investigators:
Richard M. Bikowski, MD, VHS Family and Community Medicine
Department: Family and Community Medicine

Abstract

Introduction/Background:
Student-run free clinics often face challenges maintaining continuity of care due to fragmented referral systems and turnover among student volunteers, resulting in missed or incomplete follow-up for patients. At Eastern Virginia Medical School (EVMS), referrals from the Street Health Clinic to the student-run HOPES Free Clinic were historically tracked via emails and manual chart review, resulting in inconsistent follow-up and variability in referral outcomes. Strengthening referral systems is essential to better meet patient needs and can help enhance clinic impact. On January 1, 2025, a standardized student training guide for referrals in the Practice Fusion EMR was implemented. This project evaluated whether this intervention improved referral efficiency, consistency, documentation, and patient follow-up.

Methods

This quality improvement (QI) initiative used a pre/post design comparing six months of referral data before (July 1, 2024-January 1, 2025) and after (January 1-July 1, 2025) implementation. The guide included step-by-step EMR referral guide and was paired with in-person training.
Pre-implementation referrals were tracked via weekly clinic emails and chart reviews; post-implementation referrals were recorded using the "Referrals" tab in Practice Fusion and cross-referenced with clinic summaries. Outcomes included total referrals, method of referral, and appointment status (completed, no-show, canceled, pending). Monthly data collection is being conducted by the project team using reports from Practice Fusion and clinic emails. These include the "Appointment Report and Eligibility," "Patient List," and "Referrals" tab, along with weekly clinic summary emails to track referrals. Data is stored in the REDCap database.
IRB Status: This initiative was determined to be a QI project, not human subjects research. IRB approval was not required (determination letter dated 4/25/2025).

Results

Three categories were reviewed for the results. First, the clinic the patient was sent to (HOPES Free Clinic, ACC (Ambulatory Care Center), and Ghent Family Medicine). Second, whether an appointment was made for the patient (made vs not made). Third, the status of the appointment (arrived, no-show, cancelled, unknown).
In the pre-guide period, six referrals were made - all to HOPES Free Clinic - and all via email. Of these appointments, 2 appointments were completed (arrived), 2 were no-shows, and 2 were never scheduled (not made). In the post-guide period, 24 referrals were made, with 96% (23/24) entered using the Practice Fusion EMR. Referral locations included HOPES (21), ACC (2), Ghent Family Medicine (1).
Completed referrals increased from 2 to 5, "not made" appointments stayed the same at 2, "no show" appointments increased from 2 to 12, and "cancelled" appointment increased from 0 to 1.

Conclusion

As anticipated, the post-guide period saw an increase in total referrals and a decrease in the proportion of unmade appointments. However, a rise in the no-show rate emerged, highlighting an important area for future investigation and underscoring ongoing unmet needs within the patient population. The structured referral guide -integrated with EMR functionality and supported by team training- improved referral management in our student-run clinics and streamlined referral tracking. This intervention may serve as a replicable model for strengthening continuity of care in similar settings.

Abstract Title: Hypopituitarism Resulting from a Right Internal Carotid Artery Aneurysm: A Case Report

Investigator: William Wittler Zak
Mentor: Peter Laplace, MD
Co-Investigators:
William Wittler Zak, Eastern Virginia Medical School MD
Department: Internal Medicine

Abstract

Introduction
Internal carotid artery aneurysms are very rare but are associated with high mortality rates due to the possibility of rupture. Patients may present with nonspecific symptoms such as headache, orbital pain, and diplopia due to mass effect and compression of surrounding structures. These aneurysms may erode surrounding bone leading to further complications, such as hypopituitarism due to invasion into the sella turcica and pituitary compression.

Case Infomation
A 76-year-old woman with hyperlipidemia presented to her primary care office with a persistent headaches and double vision. She was subsequently advised to go to the emergency department for further work up. She underwent CT scan which revealed a giant right internal carotid artery aneurysm with pressure erosion and protrusion into the sella turcica. She then underwent a pipeline flex-shield embolization, which led to correction of the aneurysm and resolution of her headache, as well as partial resolution of diplopia. She was later diagnosed with hypopituitarism leading to adrenal insufficiency and hypothyroidism that was treated with hydrocortisone and levothyroxine.

Discussion/Clinical Findings
While rare, patients who present with general, unspecific neurological symptoms should be assessed for internal carotid artery aneurysm as they require prompt evaluation, diagnosis, and treatment to prevent further growth, rupture, and complications. Surgical intervention with embolization has demonstrated to be a safe and highly efficacious treatment for internal carotid artery aneurysms. Hypopituitarism is a possible side effect, and patients may be treated with hormone therapy.

Abstract Title: The Importance of Clinical Suspicion in the Presence of Reported Lophomonas: A Case Report

Investigator: William Wittler Zak
Mentor: Catherine Derber, MD
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Department: Infectious Disease/Internal Medicine

Abstract

Introduction
Lophomonas blattarum is a protozoan that has been increasingly reported as a possible cause of upper and lower respiratory tract infections in humans. Previously reported cases have involved immunocompromised individuals presenting with non-specific respiratory symptoms such as cough, shortness of breath, and chest pain. There is uncertainty surrounding whether Lophomonas is truly the culprit of such symptoms in patients reported to be infected with Lophomonas. In contrast, Pneumocystis Jirovecii Pneumonia (PJP) is a well-established cause of pneumonia in immunocompromised patients. Both organisms may be detected in a patient through sampling of a bronchoalveolar lavage. Metronidazole has shown effectiveness against Lophomonas, and trimethoprim-sulfamethoxazole (TMP-SMX) is the established first-line treatment for PJP.

Case Information
A 58-year-old man with metastatic pancreatic cancer and stage 3 chronic kidney disease presented to the emergency department for progressive shortness of breath. He had received chemotherapy for pancreatic cancer, which led to chemotherapy-induced nephritis. Consequently, he was prescribed a prolonged course of high-dose prednisone. Shortly after his admission, he developed rapidly worsening respiratory distress of unknown etiology that required intubation. A subsequent chest CT scan revealed diffuse ground-glass and septal thickening in the lungs, with upper lobe predominance, and a new cluster of right upper lobe pulmonary nodules. A Fungitell test returned significantly elevated, and the patient underwent a bronchoalveolar lavage. The initial cytology report was positive for Lophomonas but negative for PJP, bacteria, or malignant cells. However, due to the patient's immunocompromised state and CT findings, clinical suspicion remained high for PJP, and he was started on metronidazole, trimethoprim-sulfamethoxazole, and posaconazole to cover Lophomonas, PJP, and endemic mycoses, respectively. Several days later, a PCR for PJP returned positive despite being negative on initial cytology.

Discussion/Clinical Findings
There is current debate both on whether reports of Lophomonas are true positives and whether a true positive finding would yield clinical relevance. While it has been identified as a presumed respiratory pathogen in samples globally, there is skepticism and limited available literature proving causation of clinical pathology. Therefore, other possible causes of infection should be explored for which there remains a high degree of clinical suspicion, regardless of initial cytology. Given the CT findings and clinical presentation of this patient, prescribing TMP-SMX was the correct clinical decision. Even with the identification of Lophomonas in cytology, clinicians should maintain a high degree of suspicion for alternative causes and seek to identify another primary pathogen.

Abstract Title: Sport-Type Variations in Baseline Salivary microRNA Profiles as Concussion Biomarkers

Investigator: Martina Zamponi
Mentor: Thomas R Campbell, PhD LAT
Co-Investigators:
1. Gabriel Rankin, Department of Biological Sciences, Biology
2. Peter A. Mollica, PhD, HCLD(ABB), MB(ASCP); Ellmer College of Health Sciences, School of Medical Diagnostic & Translational Sciences
Department: Ellmer College of Health Sciences

Abstract

Introduction
Concussions represent one of the most common sports-related injuries, yet many cases may go undiagnosed due to limitations in current clinical practices. Standard diagnostic approaches rely heavily on patient-reported symptoms and sideline assessments, which are inherently subjective. There is therefore a growing interest in the development of clinical diagnostics tools that can provide objective, reproducible, and clinically meaningful measures of concussion. Salivary microRNAs have emerged as potential biomarkers to improve concussion diagnostic accuracy. These small non-coding RNAs are stable in saliva, can be collected non-invasively, and have been shown to change in response to traumatic brain injury. However, the clinical utility of salivary microRNAs remains unproven, and it is necessary to understand the extent to which their expression is influenced by natural variation unrelated to injury. This study aimed to assess the effects of sport type on baseline salivary microRNA expression levels.

Methods
Following institutional guidelines, 212 baseline saliva samples were collected from NCAA Division I athletes. Samples were categorized into four sport-types: Non-contact (n=82), Limited-contact (n=63), Contact (n=36), and Collision (n=32). Expression levels of the following microRNAs were measured: 27a-5p, 30a-3p, 192-5p, 7-1-3p, 29c-3p, 26b-5p. Kruskal-Wallis tests were used to compare microRNA expression across groups, with Dunn's post hoc test applied for pairwise comparisons ($p < 0.05$).

Results
This study evaluated whether sport type affects baseline salivary microRNA levels. We found no statistically significant differences in the expression of the microRNAs 27a-5p and 30a-3p across all sport types. microRNA 192-5p was significantly increased in collision vs. limited and non-contact sports ($p = 0.0189$ and $p = 0.0007$) as well as in contact vs. limited and non-contact sports ($p = 0.0003$ and $p < 0.0001$). microRNA 7-1-3p was significantly increased in collision vs. limited and non-contact sports ($p = 0.0016$ and $p < 0.0001$). microRNA 29c-3p was significantly increased in collision and contact vs. limited contact sports ($p = 0.0004$ and $p = 0.0026$) but significantly decreased in limited contact vs. non-contact sports ($p = 0.0078$). microRNA 26b-5p was significantly increased in collision vs. limited contact and non-contact sports ($p = 0.0003$ and $p = 0.0267$).

Conclusion
Current concussion management relies on subjective symptom reporting, highlighting the need for objective diagnostic tools to facilitate decision making surrounding diagnosis and return-to-play. Salivary microRNAs show promise as potential biomarkers, however further research on the factors associated with their variability is warranted. The aim of this study was to determine whether observed changes in microRNA levels post-injury are due to concussion itself rather than natural sport-related variations. We found that several microRNAs-particularly 192-5p, 7-1-3p, 29c-3p, and 26b-5p-exhibit significant baseline differences based on sport type. Based on these findings, sport type should be considered to ensure accuracy and generalizability of research surrounding microRNA as concussion biomarkers.

Abstract Title: Geospatial Analysis of Primary Care Gaps and Syphilis Screening: Public Health Implications in the Hampton Roads Region of Virginia and North Carolina.

Investigator: Martina Zamponi
Mentor: Peter Anthony Mollica, PhD
Co-Investigators:

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   VHS Eastern Virginia Medical School, MD Program
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4. Thomas R. Campbell, PhD
   Ellmer College of Health Sciences, School of Rehabilitation Sciences

Department: Ellmer College of Health Sciences

Abstract

Introduction
Syphilis, caused by Treponema pallidum, has re-emerged as a major public health concern in the United States. Infection rates have been steadily increasing since the early 2000s and disproportionately affect marginalized populations and those with limited access to healthcare. In 2023, over 209,000 cases were reported nationwide, with Virginia experiencing a 22% increase since the previous year. The Hampton Roads region of Virginia and North Carolina is particularly affected, with 7 of its 9 independent cities exceeding the CDC's threshold for recommended screening. Social determinants of health, including low income, lack of health insurance, limited access to healthcare, and racial/ethnic minority status, have been consistently linked to increased rates of sexually transmitted infections. However, no prior study has examined the relationship between primary care access and syphilis outcomes in this region.

Methods
A retrospective cohort study was conducted using TriNetX data from the Sentara network. Electronic Health Record data from over 4 million patients were collected within the Sentara Healthcare Organization. This database was chosen due to Sentara's dominant presence within the Hampton Roads region, encompassing 12 acute care hospitals and over 300 care sites, providing a comprehensive representation of the local patient population. Patients diagnosed with syphilis between 2023-2024 were identified using ICD-10 diagnosis codes. These were then stratified by emergency department (ED) utilization: occasional ED users (<4 visits/year) and chronic ED users (≥4 visits/year), the latter serving as a proxy for limited access to primary care. Demographics, stage of syphilis at diagnosis, and tertiary syphilis complications were compared between groups. Age distribution was tested for normality, and chi-square analysis with odds ratios was used to assess statistical significance ($p<0.05$).

Results
Among 1,560 syphilis patients identified, 310 were chronic ED users. African American patients were significantly overrepresented in the chronic ED group (74.2% vs. 56.0%, $p<0.0001$). Chronic ED users were more likely to be diagnosed with late syphilis (OR=1.44, p=0.0076), latent late syphilis (OR=1.54, p=0.0283), and asymptomatic neurosyphilis (OR=4.13, p=0.0023). Age distribution was normal in the occasional ED group but skewed in chronic ED users group, with a higher proportion within the CDC's screening target of 15-44 years (55.2% vs. 50.8%).

Conclusion
Reduced access to primary care is associated with more advanced syphilis at diagnosis and greater risk of tertiary complications in Hampton Roads, disproportionately affecting African American populations. Expanding syphilis screening criteria to include markers of healthcare access rather than age may improve early detection, reduce disparities, and prevent long-term complications. Targeted public health interventions that integrate access-based screening with broader STI prevention strategies could help mitigate the ongoing rise of syphilis in high-burden regions.

Abstract Title: Associations Between Sleep Duration and Receipt of Mental Health Care Before and After the COVID-19 Pandemic in the US: NHANES Data (2017-2023)

Investigator: Amanda Lauren Banaag
Mentor: Mariana Szklo-Coxe, PhD MHS
Co-Investigators:
Department: Department of Health Behavior, Policy & Management

Abstract

Introduction
Short and long sleep duration (SD) have been associated with mental health risks. During the COVID-19 pandemic, US adolescents and adults experienced changes in SD and an increased mental health burden. Due to pandemic-related social isolation measures, many experienced barriers to accessing healthcare services. This study aimed to determine the associations of SD to mental health care utilization and changes in utilization pre and post COVID-19.

Methods
This study utilized NHANES pre- and post-pandemic questionnaire data, 2017-March 2020 and August 2021-August 2023 from a nationally-representative sample of adolescents (ages 13-18) and adults (≥19 years) reporting SD weekdays or workdays, categorized as short, long, and recommended, using AASM's age-specific recommended hours nightly: 8-10 hours for adolescents 13-18; 7-9 hours for adults. Mental health care utilization was defined as receiving care from a mental health provider (last 12 months). Weighted chi-square and multiple logistic regressions assessed mental health care utilization odds by SD. Regressions for adolescent and adult populations adjusted for age, gender, race/ethnicity, health insurance status, and depression symptom presence (defined as PHQ-9 score of ≥4, with 'trouble sleeping' excluded from score calculations).

Results
This study utilized NHANES pre- and post-pandemic questionnaire data, 2017-March 2020 and August 2021-August 2023 from a nationally-representative sample of adolescents (ages 13-18) and adults (≥19 years) reporting SD weekdays or workdays, categorized as short, long, and recommended, using AASM's age-specific recommended hours nightly: 8-10 hours for adolescents 13-18; 7-9 hours for adults. Mental health care utilization was defined as receiving care from a mental health provider in the last 12 months. Weighted chi-square and multiple logistic regressions assessed mental health care utilization odds by SD. Regressions for adolescent and adult populations adjusted for age, gender, race/ethnicity, health insurance status, and depression symptom presence (defined as PHQ-9 score of ≥4, with 'trouble sleeping' excluded from score calculations).

Conclusion
In adults, reporting long sleep was associated with a 1.7-fold significantly higher odds of receiving mental health care during pre-and post-pandemic periods. Findings regarding long sleep's relationship to increased mental health utilization extend the literature on adverse outcomes associated with long sleep to the health services utilization domain and warrant further investigation. Future analyses by these authors will assess the associations between social jetlag and receipt of mental health care.

Abstract Title: Fentanyl's Footprint: Mapping Virginia's Unequal Burden of Substance Misuse

Investigator: Omotomilola O Jegede
Mentor: Michele Kekeh, MS PhD
Co-Investigators:
Department: Epidemiology, Biostatistics & Environmental Health.

Abstract

Introduction
Substance misuse remains one of the most pressing public health challenges in Virginia, with opioid- and fentanyl-related overdoses driving record mortality rates. In 2023, the Virginia Department of Health reported over 2,000 fatal overdoses, with fentanyl implicated in more than 75% of cases. While these figures reflect national trends, the crisis manifests unevenly across Virginia's diverse urban and rural communities. This review examines statewide literature and surveillance data to provide context, identify disparities, and highlight emerging risks.

Main Body
A systematic review was conducted using peer-reviewed studies, state health reports, and surveillance data spanning 2019-2024. Key themes included alcohol and drug misuse patterns, opioid prescribing trends, and overdose mortality across regions. Results reveal widening disparities: urban centers such as Richmond and Norfolk face higher overdose rates driven by fentanyl and polysubstance use, while rural areas continue to struggle with limited treatment infrastructure and persistent prescription opioid misuse. Youth and young adults remain a critical population of concern, with rising rates of emergency department visits and hospitalizations. Despite statewide harm reduction and naloxone distribution initiatives, overdose mortality in several regions continues to exceed national averages.

Conclusion
Virginia's substance misuse crisis is characterized by both shared statewide drivers and stark local variations. Evidence from this review underscores the urgent need for comprehensive, geographically tailored public health approaches that expand access to treatment, strengthen harm reduction strategies, and target prevention efforts among vulnerable populations-especially youth and young adults. Building resilience and protecting progress will require coordinated, place-based interventions that respond to Virginia's unique public health landscape.

Abstract Title: Hidden Patterns, Urgent Realities: Uncovering Substance Misuse and Overdose Trends in Greater Hampton Roads

Investigator: Omotomilola O Jegede
Mentor: Michele Kekeh, MS PhD
Co-Investigators:
Department: Epidemiology, Biostatistics & Environmental Health.

Abstract

Introduction
Substance use remains a leading contributor to morbidity and mortality in Virginia, with local disparities shaping community health outcomes. The Greater Hampton Roads (GHR) region, encompassing both urban and suburban areas, faces a growing burden of alcohol and drug misuse, including opioid-related harms. Understanding geographic variation in these outcomes is essential to inform place-based prevention and intervention strategies.

Methods
Data were extracted from the publicly accessible GHR Community Indicators Dashboard for six localities: Chesapeake, Isle of Wight, Norfolk, Portsmouth, Suffolk, and Virginia Beach. Indicators included alcohol-impaired driving deaths, hospitalization rates related to adolescent and adult alcohol use, drug and opioid overdose deaths, emergency department (ED) admissions due to substance use, and fentanyl-related mortality. Comparative analyses were conducted across jurisdictions to identify disparities and emerging trends.

Results
Marked intercity variation was observed across the GHR region. Virginia Beach reported the highest percentage of alcohol-impaired driving deaths (36.7%). Norfolk demonstrated the highest hospitalization rates from adolescent (3.8 per 10,000) and adult (28.9 per 10,000) alcohol use, as well as the highest heroin overdose death rate (7.3 per 100,000). Portsmouth experienced the most severe outcomes, including the highest opioid overdose death rate (40.4 per 100,000), drug poisoning death rate (75.9 per 100,000), fentanyl-related death rate (78.3 per 100,000), and ED admissions due to opioids (81.0 per 10,000).

Conclusion
Findings reveal stark disparities in substance use outcomes across GHR, with Portsmouth and Norfolk bearing the heaviest burden. These results highlight the urgency of tailoring community-specific prevention, harm reduction, and recovery strategies to mitigate overdose deaths and substance-related hospitalizations. Regional data-driven approaches are critical to advancing health equity and resilience in Virginia communities.

Abstract Title: Unexpected Predictors of Back, Shoulder, and Knee Injuries in Fire Cadets: Insights from a 5-Year Retrospective Review

Investigator: Hillary Lee
Mentor: Eric Schussler, PhD MS
Co-Investigators:
Department: Rehabilitation Sciences

Abstract

Introduction
Shoulder, lower back, and knee injuries are among the most prevalent and costly musculoskeletal injuries (MSKIs) in the fire service. While risk factors for MSKIs have been studied in active-duty firefighters, little is known about predictors of injury during fire cadet training. Given that fire departments invest approximately $300,000 per cadet over a six-month academy-largely funded by taxpayer dollars-injuries during training represent not only a personal health risk but also a substantial financial burden. Moreover, injuries sustained in the academy can cause lasting damage and increase long-term injury risk throughout a firefighter's career. This study aimed to identify trends and potential predictors of these injuries in cadets over a five-year period.

Methods
Injury reports were analyzed retrospectively from a large urban fire department's academy, spanning 10 cadet class cohorts (2019-2024). Injuries were categorized as shoulder, lower back, knee, or other. Predictor variables included the daily training schedule (e.g., classroom instruction, exams, hands-on skills training) and parameters related to scheduled physical training (PT) sessions, defined as structured workout sessions conducted as part of the academy curriculum. Binary logistic regression was used to calculate odds ratios and assess the statistical significance of predictors.

Results
A total of 307 injuries were reported, with 43% involving the shoulder (n = 29; 9.4%), knee (n = 55; 17.9%), or lower back (n = 47; 14.3%).

- Shoulder injuries were significantly associated with training week ($p = 0.02$), occurring 3.7 times more frequently during weeks 8-14 of the 28-week academy.
- Lower back injuries were 4.1 times more likely to occur on days with classroom-based exams compared to non-exam days ($p = 0.02$), regardless of other factors.
- Knee injuries were significantly associated with the duration of PT sessions ($p = 0.03$), with injuries 3.1 times more likely to occur on days when workouts lasted 75 minutes or longer.

Conclusion
Injuries to the shoulder, back, and knee during cadet training can lead to medical disqualification and may increase future injury risk during active duty. While three significant predictors were identified, several others approached significance and warrant further investigation. Future research should include demographic and physiological variables (e.g., age, sex, fitness level, injury history) and more detailed analysis of physical training content and intensity. Identifying modifiable injury risk factors can inform prevention strategies to reduce MSKI rates in both cadets and career firefighters.

Abstract Title: Behind the Numbers: What Drives Racial Disparities in Uterine Cancer Outcomes

Investigator: Vonda Michelle McKeithan
Mentor: Catherine Derber Jane Derber, BS MD
Co-Investigators:
Department: Medicine

Abstract

Introduction
Stage at diagnosis is the strongest predictor of uterine cancer survival, yet racial disparities in early detection may contribute to the widening mortality gap between Black and White women. Understanding these disparities is critical as uterine cancer deaths among Black women have reached nearly twice the rate of other racial groups. This study examines racial and ethnic differences in stage at diagnosis for uterine cancer among non-Hispanic White, non-Hispanic Black, and Hispanic women using national surveillance data.

Methods
We analyzed Surveillance, Epidemiology, and End Results (SEER) Research Data (2010-2020) for female patients diagnosed with uterine cancer. Cases with known race/ethnicity and summary stage were included. Stage was categorized as early (in situ/localized) versus advanced (regional/distant). Logistic regression models estimated odds ratios (OR) for advanced-stage presentation, adjusting for age, year of diagnosis, and histologic subtype.

Results
Preliminary analysis revealed significant racial disparities in stage at diagnosis across all groups. Black women presented with advanced-stage disease at substantially higher rates than White and Hispanic women. Adjusted logistic regression demonstrated that Black women had significantly greater odds of advanced-stage diagnosis compared to White women, with Hispanic women showing intermediate risk. These disparities persisted after controlling for age, year of diagnosis, and histologic factors, indicating systemic barriers to early detection.

Conclusion
Substantial racial disparities persist in uterine cancer stage at diagnosis, with Black women facing a significantly higher likelihood of advanced disease even after accounting for age and tumor characteristics. These diagnostic delays likely contribute to the pronounced survival disparities observed nationally. Targeted interventions are urgently needed to eliminate barriers to early detection among Black women, including expanded access to gynecologic care, culturally responsive screening programs, and healthcare system reforms to reduce diagnostic delays.

Abstract Title: Burden of Dengue Infection in Bangladesh: Preliminary Findings of a Systematic Review and Meta-Analysis

Investigator: MD Estiar Rahman
Mentor: Abdullah Al-Tair, MD PhD
Co-Investigators:
May Salama, PhD student in Health Services Research, Joint School of Public Health, Old Dominion University
Department: Joint School of Public Health

Abstract

Background: Dengue is endemic in Bangladesh. It is critical to estimate the pooled prevalence to know about the disease burden, which ultimately helps to allocate resources for dengue control. Therefore, this systematic review and meta-analysis aimed to estimate the dengue infection burden in Bangladesh.

Methods

Literature search was performed across PubMed, Web of Science, and Hinari between December 2024 and February 2025, with manual searches from references of the retrieved studies. Pooled estimates were calculated using random-effects models due to the heterogeneity of studies and presented in the Forest plots. The analyses were performed by R (version 4.4.3) with 'Meta' package.

Results

The analysis included 16 of the 776 studies that were identified through database searches. The pooled estimates of dengue prevalence were 49% (95% confidence interval (CI): 33% - 66%; I^2: 99.7%) among suspected dengue patients, 52% (95% CI: 0% - 100%; I^2: 99.9%) among general population, and 51% (95% CI: 36% - 64%; I^2: 99.7%) among general patients. Pooled prevalence estimates were highest in studies conducted in Dhaka city (53%; 95% CI: 39% - 68%; I2:99.7%), and the DENV2 serotype accounted for the highest prevalence at 41%; (95%CI: 17% -64%; I2:98.8%).

Conclusion

This review identified significant heterogeneity among studies, which suggests conducting future research, such as hospital-based or community-based observational studies to generate reliable data about dengue prevalence in Bangladesh.

Abstract Title: Assessing the Impact of Maternal Oral Health Experiences on the Risk of Adverse Birth Outcomes: Findings from Virginia's PRAMS Survey

Investigator: May Salama
Mentor: Abdullah Al-Taiar, MD PhD
Co-Investigators:
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Abstract

Introduction
Preterm birth (PTB) and low birth weight (LBW) are significant public health challenges globally, contributing to neonatal morbidity, mortality, and long-term complications. Maternal oral health has been increasingly recognized as a potential contributor to PTB and LBW, yet there is inconclusive evidence about the effectiveness of dental cleaning in preventing PTB and LBW. This study examined the association between dental cleaning during pregnancy and the prevalence of PTB and LBW using data from the Virginia Pregnancy Risk Assessment Monitoring System (PRAMS).

Methods
We analyzed data from Virginia PRAMS Phases 7 and 8, spanning a 10-year period from 2012 to 2022. Oral health experiences, including dental cleaning during pregnancy, were self-reported. PTB and LBW were obtained from birth certificates. Weighted logistic regression models were used to examine the association between oral health and PTB or LBW, while adjusting for potential confounders. Missing data was addressed through multiple imputations.

Results
Among 8,820 women, 9.29%(95%CI:9.23-9.34%) experienced PTB and 7.13%(95% CI: 6.57-7.72%) delivered a LBW infant. In unadjusted analyses, dental cleaning during pregnancy was significantly associated with reduced odds of PTB (OR=0.79; 95%CI: 0.65-0.99) and LBW (OR=0.79; 95%CI: 0.65-0.96). After adjusting for potential confounders using both traditional multivariable models or propensity score, the associations were attenuated and lost statistical significance, although the direction of effect consistently suggested a protective role of dental cleaning.

Conclusion
Our findings, when considered alongside existing literature, highlight the importance of integrating dental services into the routine prenatal care, which may contribute to improved birth outcomes.

Abstract Title: Invisible Wounds of Motherhood: How Smoking During Pregnancy Fuels Postpartum Depression

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Co-Investigators:
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3. George R. Saade, Department of Obstetrics and Gynecology
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Abstract

Introduction
Postpartum Depression (PPD) is the most common mental health complication of childbirth. PPD has both short-term and long-term consequences for the mother and child alike. PPD is a function of several factors, including biological, social, behavioral, and environmental factors, which together predispose individuals to PPD. A major modifiable risk factor for PPD is prenatal exposure to nicotine (PEN), which can occur through Active Tobacco Smoking (ATS), Secondhand Smoking (SHS), or Electronic Nicotine Products (ENPs) use. This systematic review and meta-analysis aim to summarize and evaluate all current evidence regarding the relationship between all types of prenatal exposure to nicotine and PPD.

Main Body
We searched the following databases, PubMed, Medline, Cochrane, EMBASE, and CINHAL, for all studies published between Jan 1, 2000, and Sep 19, 2024, with the outcome PPD. The quality of the included studies was assessed using the Newcastle-Ottawa Scale for observational studies. Pooled prevalence was calculated using the Freeman-Tukey Double Arcsine Transformation method. The Pooled Odds Ratio (pooled-OR) was compared for women with prenatal exposure to nicotine compared to women with no prenatal exposure to nicotine using a random effects model. The sensitivity analysis was conducted using the leave-one-out technique.
Out of the 29 studies in the systematic review, 26 met the inclusion criteria for meta-analysis. The pooled prevalence of PPD was 0.15 (95% CI [0.12 - 0.17]; I2=99.80%, p<0.001). The pooled-OR was 1.74 (95%CI [1.44 - 2.12]; Z=5.59, p<0.001) for overall prenatal exposure to nicotine, 1.96, (95%CI 1.59 - 2.41; Z=6.46, p<0.001) for prenatal ATS, 1.22 (95%CI 0.69 - 2.18, Z=0.69, p=0.49) for prenatal SHS, and 1.14 (95%CI 0.82 - 1.58, Z=0.78, p=0.43) for prenatal ENPs use. Funnel plots and the Egger test showed no evidence of publication bias. Sensitivity analysis confirmed the robustness of the findings.

Conclusion
This meta-analysis reveals that the accumulated evidence shows a significant association between prenatal ATS and PPD; however, no clear conclusion could be drawn about prenatal SHS or ENPs use due to the limited number of studies. There is a need for future studies that prospectively assess the impact of SHS and ENP on PPD.

Abstract Title: Breaking Barriers, Building Knowledge: Delivering Evidence-Based and Trauma-Informed Sexual Health Education to Youth in Residential Care

Investigator: Luwam Abeselom, BS
Mentor: Hongyun Fu, MA PhD
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Sarah Wray, Tidewater Youth Services
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Abstract

Introduction
Adolescents in crisis or foster care often lack access to inclusive, developmentally appropriate sex education CSE) due to stigma, inconsistent instruction, and limited opportunities for trusted dialogue. These gaps are compounded by unstable living environments, limited access to trusted adults, and reliance on peers or online sources for information- often inaccurate or incomplete. To address this gap, the Teen Health 360 team at Eastern Virginia Medical School, in partnership with Tidewater Youth Services, piloted Get Real: Comprehensive Sex Education That Works in two Hampton Roads residential facilities as part of a quality improvement (QI) initiative to assess feasibility, acceptability, and educational outcomes.

Methods
In July 2025, six 90-minute sessions delivered 11 lessons at two residential care facilities in Portsmouth and Virginia Beach. A total of 17 adolescents (ages 13-17) participated, with 53% attending all sessions and 71% attending at least four. Lessons addressed anatomy, healthy relationships, gender identity, sexual orientation, consent, STIs, and contraception, with delivery methods including role-plays, demonstrations, stereotype-challenging activities, and anonymous Q&A. The final session at each site reviewed key content, held a focus group discussion (FGD), and recognized participants with certificates and take-home health resources. A mixed-methods evaluation was conducted using pre- and post-surveys to assess knowledge gains, alongside FGD to capture participant learning, engagement, and program experience and feedback on service delivery.

Results
Most participants self-identified as male (76%) and heterosexual (85%), with diverse racial/ethnic backgrounds: 39% White/Caucasian (n=5), 23% African American/Black (n=3), 7% Latino/Hispanic (n=1), 7% Native Hawaiian or Pacific Islander (n=1), and 31% did not report (n=4). Knowledge scores increased from 6.92 at pre-assessment (SD = 2.25) to 8.31 at post-assessment (SD = 4.09), with the percentage scoring ≥60% correct rising from 15.4% to 61.5% ($p = 0.02$). Post-survey findings indicated strong program reception: 77% felt engaged, 62% felt safe, 62% were comfortable asking questions, and 64% were glad they participated. FGDs revealed:

1. Limited prior exposure to sexual health education, often informal and peer-based
2. High appreciation for interactive methods, especially condom demonstrations, STI prevention content, and stereotype activities that prompted deeper discussion
3. Suggestions for improvement included more visual aids, increased hands-on learning, and slower pacing for complex topics.

Notably, students described the program as "helpful" and "eye-opening," with some acknowledging that "everything was surprising" due to low baseline knowledge. Enthusiastic responses, such as applause at session conclusions, reflected trust in facilitators and program acceptance.

Conclusion
This pilot shows the feasibility and positive impact of delivering trauma-informed, inclusive CSE in residential care settings. The interactive model fostered safe, nonjudgmental spaces where youth built knowledge, challenged stereotypes, and practiced communication skills. Knowledge gains and positive feedback highlight potential to improve sexual and reproductive health literacy among high-needs adolescents. Future adaptations will integrate more visual and experiential methods, adjust pacing for complex topics, and expand reach across similar settings, underscoring the value of medical-youth service partnerships in ensuring equitable education access.

Abstract Title: Analysis of subtelomere/telomere regions of cancer genomes using machine learning and high-performance computing

Investigator: Eleni Adam
Mentor: Harold Riethman, PhD
Co-Investigators:
1. Terry Stilwell, Computer Science
2. Desh Ranjan, Computer Science
3. Harold Riethman, School of Medical Diagnostic and Translational Sciences
Department: School of Medical Diagnostic and Translational Sciences

Abstract

Introduction
Cancer continues to affect millions of people worldwide, nearly 40% at some point in their lives, with around one-third of cases having potentially a lethal outcome. Many cancers impact specific populations more severely than others and a systematic analysis of genetic features is needed to understand these cancer health disparities. Analysis of patterns of changed genes and rearranged chromosomes characteristic of cancer types will lead to more effective therapies. Our purpose is to understand cancer mechanisms better and improve our ability in diagnosing cancer at an earlier stage, treating it with more specific and effective therapies before it reaches the metastatic stage.

Methods
To study genome maintenance in cancer, we use the TCGA (The Cancer Genome Atlas) dataset of 33 cancer types. The subtelomeric analysis of cancer genomes consists of three main parts. In the first part, we use computational methods to extract the telomeric and subtelomeric information out of the large genomic datasets. Thereafter, based on the extracted data, we define the telomere and subtelomere-associated features. Given these newly defined features, machine learning methods are used to correlate them to clinical data.

Results
We developed the first pipeline, extracting the reads that contain the telomere repeat tract variations, and the subtelomeric (duplicons, TERRA promoter) patterns. Subsequently, we investigated the location of their mate-pairs (with respect to a reference genome) and classified them as telomere, subtelomere, or intrachromosomal. In order to optimize the pipeline for its use with multiple cancer datasets, we are collaborating with the Amazon cloud services to effectively streamline it for the anticipated scale-up.

Conclusion
We have completed the development of our subtelomeric/telomeric computational pipeline and successfully applied it to the metastatic prostate cancer dataset of 101 normal/tumor paired individual genomes. Currently, we are in progress of optimizing it and refining it for the next step of feature identification.

Abstract Title: Preclinical Evaluation of Novel Sperm Ion-Channel-based Non-Hormonal Contraceptive Candidates

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Mentor: Gustavo F Doncel, MD PhD
Co-Investigators:
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Abstract

Introduction
With nearly half of all pregnancies being unintended, there is an urgent need for new contraceptive methods providing safe, effective, and user-friendly options for women globally. Hence, developing non-hormonal contraceptives (NHCs) that target key proteins essential for sperm function after ejaculation, while providing safe and effective on-demand contraception for women, would be a game-changer. We evaluated two novel NHC candidates, MB-C8, a Ca2+ channel (CatSper), and YLT-992, a K+ channel (SLO3) inhibitor that block sperm-specific ion channels required for hyperactivated motility following capacitation, a required step in fertilization.

Methods
Safety and efficacy of NHC active pharmaceutical ingredients (APIs) were evaluated using in vitro functionality assays with human and rabbit sperm to assess their impact on sperm viability, motility, and motion using computer-assisted sperm analysis. The protective effect of seminal plasma (SP) was assessed testing the inhibitory activity of NHC APIs in human and rabbit semen after a 2min exposure. To determine whether sperm immobilizing effects of both APIs were reversible, all samples were washed and underwent swim-up to separate motile from non-motile spermatozoa. Additionally, safety of NHC APIs was investigated using ex vivo viability assays in human cervicovaginal (CV) tissue explants obtained from surgical resections. APIs demonstrating >80% efficacy in human and rabbit sperm, as well as complete safety in human CV tissue, were advanced to a pilot in vivo rabbit contraceptive efficacy test (RCET).

Results
MB-C8 and YLT-992 significantly inhibited human sperm hyperactivity (HA) in a dose-dependent manner, without affecting sperm and CV explant viability. MB-C8 concentrations >3.1μM ($p<0.0001$) and >6.3μM ($p<0.0001$) irreversibly inhibited human sperm HA and progressive motility (PM) within 30sec of treatment, respectively. Similarly, in rabbit sperm, 10μM MB-C8 irreversibly inhibited both HA ($p=0.0121$) and PM ($p<0.0001$) after a short exposure. This inhibitory effect against human or rabbit sperm HA was maintained even in the presence of seminal plasma and persisted after washing. Following ex vivo mixing of semen with 10μM MB-C8 in a RCET, no implantation sites (100% contraceptive efficacy) were observed without affecting follicle development or ovulation, highlighting its potential as an on-demand NHC candidate.

For YLT-992, 0.01μM specifically inhibited human sperm HA by 90% ($p<0.0001$) with no change in PM ($p=0.93$) or general motility ($p=0.71$) after 2hrs of incubation. These effects were maintained in presence of human seminal plasma and even after the compound was washed off, indicating a lack of reversibility. However, YLT-992 was specific for human sperm and ineffective in inhibiting rabbit sperm HA or motility.

Conclusion
We validated the potential of MB-C8 and YLT-992 as promising NHC candidates due to their significant inhibition of sperm HA, a critical step for fertilization. Furthermore, zero implantation sites in a rabbit model highlight the exceptional contraceptive efficacy of MB-C8. Continued preclinical studies are needed to confirm long-term safety of both NHC APIs. Ultimately, NHCs that specifically target sperm function without affecting female reproductive tract physiology could significantly improve contraceptive technologies, providing women with safer and more acceptable options for preventing unplanned pregnancies.

Abstract Title: Epithelial Barrier Breakdown and Its Link to Luminal Macrophage Translocation in BPH

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Abstract

Introduction
Benign prostatic hyperplasia is a prevalent urologic condition in aging men that contributes to lower urinary tract symptoms. While its underlying mechanisms remain unclear, epithelial barrier dysfunction has emerged as a potential contributor. E-cadherin, a key cell-cell adhesion protein, plays a central role in maintaining epithelial morphology and barrier integrity. We hypothesized that downregulation of E-cadherin in BPH tissues contributes to epithelial weakening and increased permeability.

Methods
A total of 43 patients who underwent Holmium Laser Enucleation of the Prostate were included in this study. Prostate tissues were formalin-fixed and paraffin-embedded.Immunohistochemistry staining was performed using rabbit anti-E-cadherin as primary antibody (clone EP700Y, 1:10,000 dilution) following blocking with horse serum. A horse anti-rabbit secondary antibody was applied, and detection was carried out using HRP/DAB detection. Imaging was conducted using the Mantra Pathological Imaging System. Quantitative analysis of epithelial segmentation and E-cadherin staining intensity was performed using InForm and Prism software. Clinical variables included patient age, BMI, prostate-specific antigen levels, treatment type and histological tissue characteristics.

Results
Simple linear regression analysis showed no statistically significant correlation between E-cadherin staining intensity and patient age, BMI, or treatment type. When patients were grouped by treatment alpha-blockers, 5-alpha-reductase inhibitors, combination therapy, and other therapies no significant variation in E-cadherin intensity was observed. Additionally, E-cadherin staining intensity did not correlate with immune cell infiltration or prostate pathology markers, including CD68+, CD45+, and PSR. These findings suggest that E-cadherin intensity alone is not sufficient to differentiate clinical or treatment-related patterns in BPH pathology.

Conclusion
While epithelial barrier weakening remains a promising hypothesis in BPH progression, our results indicate that E-cadherin intensity may not correlate strongly with clinical variables or treatment history. Future work will focus on evaluating tight junction markers such as ZO-1 and β-catenin redistribution, as well as the spatial co-localization of CD68+ macrophages with epithelial defects, to further explore barrier disruption and immune infiltration mechanisms in BPH.

Abstract Title: Effects of Space Radiation on Freezing in Mice following Yoked Controllable and Uncontrollable Footshock

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Mentor: Laurie L Wellman, PhD
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Abstract

Introduction
The planned mission to Mars will pose significant known hazards to astronauts in a variety of areas including exposure to space radiation. Astronauts likely will also be exposed to unknown hazards. Space radiation could alter the ability of astronauts to manage stressful events and emergencies that lie outside their normal duties. Controllability is an important factor shaping behavioral and neurobiological responses that may impact the ability of astronauts to cope with stress. In this study, we investigated how space radiation impacts fear memory formation and extinction in a mouse model of controllable and uncontrollable stress.

Methods
C57BL/6 male mice (18 wks old) were exposed to either space radiation (15cGy GCRsim; SR; n=10) or served as non-irradiated controls (SHAM; n=6) at Brookhaven National Laboratory and were then shipped to Eastern Virginia Medical School for study. Three months following irradiation, mice were assigned to either escapable stress (ES) or inescapable stress (IS) conditions. All ES and IS mice were exposed to two consecutive days of shock training (ST: 20 footshocks, 0.5 mA, 5.0 s max. duration, 1 min intervals) in a shuttlebox. The ES group had the ability to learn they could behaviorally terminate the footshock by moving to the opposite shuttlebox chamber; the yoked IS group could not control the shock. Termination of shock for an ES mouse also terminated the shock to its yoked IS mouse. Thus, a pair of mice received identical shock, but it was characterized as either controllable or uncontrollable based on ability to escape. On day 7, the mice underwent context re-exposure (CTX; 30 minutes with no shock, same context) and on day 21, extinction (EXT; 30 minutes with no shock, same context). Each session was recorded, and freezing behavior (complete cessation of moving except respiration) was analyzed as an index of fear responses using EthoVision behavioral analysis software.

Results
In SR mice, there were significant differences in freezing behavior between ES and IS groups during CTX and EXT; ES mice showed lower freezing levels similar to those of sham mice. SHAM mice showed no significant differences between ES and IS groups across any of the days. Data analyses between groups are ongoing.

Conclusion
These data demonstrate that stressor controllability ameliorates freezing in irradiated mice. This suggests that being able to control stress may offset some of the negative effects of SR on stress-related fear learning and memory.

Abstract Title: The Lipid-Inflammation Link in Benign Prostatic Hyperplasia - a Correlation Analysis of Concurrent Pathologies in Enucleated Prostate Tissues

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Department: 1Department of Biomedical and Translational Sciences

Abstract

Introduction
Benign prostatic hyperplasia (BPH) is characterized by pathological changes including fibrosis, inflammation, smooth muscle dysfunction, and epithelial proliferation. Our previous studies identified lipid accumulation as a novel pathological feature of BPH, but its relationship to other pathologies, such as inflammation and fibrosis, remains poorly understood. Therefore, this study aimed to investigate how lipid deposition relates to pathological and clinical characteristics of BPH.

Methods
Prostate tissues from 44 BPH patients undergoing Holmium Laser Enucleation of the Prostate surgery were analyzed. Lipids were visualized with Oil Red O staining, immune cell infiltration quantified by $CD45^+$ (total immune cells) and $CD68^+$ (macrophages) immunohistochemistry, and collagen accumulation (fibrosis marker) assessed by Picrosirius Red staining. Glandular percentage was analyzed from H&E staining. Images were analyzed using Inform software, and associations between variables were evaluated by Spearman correlation.

Results
Lipid accumulation exhibited a strong positive relationship with PSA levels ($r = 0.78$, $p < 0.0001$) and glandular proportion ($r = 0.60$, $p < 0.0001$), and also showed a significant positive correlation with prostate size ($r = 0.51$, $p = 0.0007$), $CD45^+$ immune cell infiltration ($r = 0.50$, $p = 0.0009$), and $CD68^+$ macrophage presence ($r = 0.33$, $p = 0.037$). In contrast, collagen intensity was inversely correlated with lipid accumulation ($r = -0.52$, $p = 0.00046$).

Conclusion
These findings provide the first evidence that prostatic lipid accumulation is associated with both prostatic inflammation and prostate growth. In contrast, fibrosis appears to be primarily linked to a smaller prostatic BPH phenotype and is inversely correlated with prostatic lipid content. Our future studies will investigate the mechanistic connections between lipid metabolism and immune activation and assess whether targeting lipid pathways may provide new therapeutic strategies for BPH.

Abstract Title: Dysautonomia and Neuroinflammation as Early Drivers of Alzheimer's Disease Pathogenesis: A Systematic Review

Investigator: Moira Christine Offord
Mentor: Alberto E. Musto, MD PhD
Co-Investigators:
Co-Author: Ashley Nelson, M.S., Biology Department, Norfolk State University Faculty
Department: Neurology

Abstract

Introduction
Alzheimer's disease (AD) has been noted as progressive neurodegeneration followed by cognitive decline. However, potential neuroinflammatory biomarkers could hold the key to uncovering its pathogenesis.

Main Body
Through a systematic review conducted in accordance with PRISMA guidelines, PubMed and OVID Medline were searched for articles published between 2015 and 2026. Studies that were included reported original data with keywords associated with dysautonomia, neurofibrillary tangles, glymphatic clearance, and vagal nerve stimulation. Two independent reviewers screened Abstracts and full texts for consensus of the studies that encompassed genome-wide association studies, biomarker analyses, neuroimaging, and experimental models. Results concluded that the major distribution of affected regions from AD was brainstem degeneration, followed by major degeneration of the hippocampus. This included increased cerebrospinal fluid CSF involvement with the main cells affected, which were notably glial cells, followed by neurons. Inflammatory markers such as YKL-40 and cytokines TNF-α, TGF-β, and IL-6 were noted to impact signaling proteins FAF1 and caspase family proteins to increase neurodegeneration and the occurrence of amyloid-beta 42 (Aβ42) plaque deposition and neurofibrillary tangle (NFT) formation. Finally, the biological mechanism that primarily resulted was a neuroinflammation leading to microgliosis and astrocytosis, causing an increased occurrence of hyperphosphorylated tau preceding NFT formation and Aβ42 plaque deposition in the brain, as well as poor clearance of neurotoxic plaques from the brain through the CSF due to cellular stress. Further neurovascular damage from chronic hypertension from dysautonomia yielded a breakdown in the blood-brain barrier (BBB), leading to albumin leakage and further microgliosis, resulting in further Aβ42 accumulation, contributing to the patient's cognitive decline. Key genetic contributors include APOE v4, CNTNAP2, and HLA-DR/DQ polymorphisms, a family of neuroinflammatory markers that exhibit population-specific risk profiles and suggest ancestral biomarkers. Proposed treatments that were observed were glymphotherapeutics, transcutaneous vagus nerve stimulation (tVNS), natural compounds like Tanshinone IIA and Lycium barbarum extract, and lifestyle changes that contribute to sleep, diet, and hormonal fluctuations.

Conclusion
Conclusively, these studies show that potential dysautonomia observed in hypertensive states of AD patients are followed by neuroinflammation, an early occurrence of a cascade of symptoms observed in Alzheimer's disease, resulting in neurovascular damage, microgliosis and astrocytosis, therefore increased NFT and Aβ42 buildup in the brain, ensuing brainstem atrophy in the upper posterior region localized around the vagus nerve and hippocampal atrophy, with the result of cognitive decline and loss of episodic memory. Collectively, these studies underscore the need for integrative, personalized approaches to AD diagnosis and treatment, emphasizing early intervention through identification of potential ancestral markers linked to dysautonomia that could hold the key to the pathogenesis of Alzheimer's disease, and further treatment through direct vagal nerve stimulation as a result.

Abstract Title: pH-responsive Intravaginal Electrospun Fibers Containing CatSper Inhibitor and Tenofovir: A Novel Multipurpose Non-Hormonal Contraception and HIV Prevention Technology

Investigator: Deborah Aderoju Ogundemuren
Mentor: Gustavo Doncel, MD PhD
Co-Investigators:
1. Maimoona S. Bhutta CONRAD
2. Louise A. Ouattara CONRAD
3. Carolina Herrera CONRAD
Department: CONRAD

Abstract

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Introduction

Hormonal contraception is widely used in modern contraceptive practices to prevent unintended pregnancies; however, it is typically associated with menstrual bleeding irregularities that lead to discontinuation. Hence there is an urgent need for a non-hormonal contraceptive (NHC) option. Furthermore, no on-demand or topical HIV prevention method exists for women. For those at risk of HIV and pregnancy, multipurpose prevention technologies (MPTs) conferring contraception and HIV prevention are highly desirable. Electrospun fibers (EF) offer a promising platform for formulation of topical MPTs. For a proof-of-concept development, we chose two prototype active pharmaceutical ingredients (APIs), HC-056456, a sperm-specific Ca2+ channel (CatSper) inhibitor, as NHC, and tenofovir (TFV), a nucleotide reverse transcriptase inhibitor, FDA-approved in its prodrug forms, for HIV prevention. Here we present data on pH-responsive release of HC-056456 and TFV formulated in a multilayer EF construct.

Methods

EF were fabricated using cellulose acetate phthalate (CAP) for HC-056456 delivery and a CAP/polyvinyl alcohol blend for TFV delivery. Optimization and characterization of mechanical and stability properties were conducted by established methods. Safety and efficacy of EF-formulated HC-056456 and TFV were tested on human sperm (viability, motility, and hyperactivation) and in TZM-bl cells (single-round infection assay to assess anti-HIV-1 activity), respectively. Statistical analysis were performed using GraphPad Prism 9 (Graph-Pad Software). All data are shown as the mean ± standard deviation.

Results

Drug loading analysis confirmed successful incorporation of TFV and HC-056456 with encapsulation efficiency of 63.5% ($p<0.0001$) and 96% ($p<0.0001$), respectively. Well-formed fiber structures were observed with no impact on chemical integrity of active compounds. CAP fibers remained undissolved in simulated vaginal fluid (pH 4.2) but dissolved within 2 mins upon semen exposure (pH 7.4-8.4), releasing the encapsulated APIs. Preliminary in vitro experiments showed 77µg/mL of CAP-HC-056456 reduced sperm hyperactivation by 99.3% ($p<0.05$) within 30 sec of incubation without affecting sperm viability. CAP and TFV within the nanofibers effectively blocked HIV-1 infection in a dose-dependent manner, with a concentration of 1.16 µg/mL achieving 90% inhibition under pre-exposure conditions.

Conclusion

Multilayered EFs delivering a specific sperm-based NHC (HC-056456) and the antiretroviral, TFV, in a simulated vaginal environment in the presence of semen represent a first-in-class "smart" pH-responsive topical MPT for simultaneously prevention of unplanned pregnancy and HIV in women.

Abstract Title: Topical tenofovir alafenamide/elvitegravir insert for on-demand protection against mucosal HIV-1 infection: proof-of-concept from bench to clinic

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Abstract

Introduction
With 1.3 million new infections in 2024 , HIV/AIDS continues to have a major impact on global health. Several antiretroviral drugs (ARVs), mainly in oral and injectable forms, have received approval for HIV pre-exposure prophylaxis (PrEP). On-demand PrEP remains an important gap, especially for women. CONRAD has developed a user-centered, topical, on-demand, peri-coital, vaginal and/or rectal insert containing two ARVs exhibiting different mechanisms of action, tenofovir (TFV) alafenamide (TAF) and elvitegravir (EVG), for prevention of HIV under PrEP or post-exposure prophylaxis (PEP) conditions. Here, we present certain aspects of the preclinical and clinical evaluation of these inserts for vaginal administration.

Methods
Initially, TAF and EVG activity against HIV-1BaL was evaluated in vitro in a luciferase-reporter cell line, TZM-bl, and ex vivo in cervicovaginal (CV) tissues exposed to serial dilutions of TAF and EVG alone or in combination at different time points to mimic PrEP and PEP dosing. Next, after formulation development and in vitro testing, a pharmacokinetic (PK) study was performed in macaques, with different fixed-dose combinations of TAF and EVG in topical inserts administered vaginally, to select a dose compatible with prophylactic activity. Inserts were then advanced to a Phase I clinical study in women, evaluating safety and PK, and pharmacodynamics (PD). PD was modeled ex vivo by assessing anti-HIV-1 and anti-HSV-2 activity in vaginal fluid and CV tissues.

Results
In vitro cellular and ex vivo CV tissue models showed potent dose-dependent anti-HIV-1 activity of TAF and EVG under both PrEP and PEP conditions. Due to their complementary physicochemical properties, tissue penetration and mechanisms of action, when combined, TAF and EVG showed overlapping and synergistic antiviral activity providing an extended window of protection. Showing the highest vaginal tissue levels of EVG and TFV-diphosphate (TFV-DP), the active metabolite of TFV and TAF, a dose of 20mg/16mg TAF/EVG was selected for clinical advancement. A Phase I clinical trial, conducted at EVMS , showed that the TAF/EVG insert, when applied vaginally, was safe and well-tolerated, with high local drug levels in fluid and tissue lasting at least 72 hours after a single application. Vaginal fluids collected from participants significantly inhibited HIV-1 and HSV-2 replication in target TZM-bl and HEC-1A cells, respectively. Consistent with high CV tissue drug concentrations, ex vivo challenge of CV biopsies with HIV-1 was inhibited.

Conclusion
TAF/EVG-containing vaginal inserts, from concept to first-in-human clinical trial, were rationally designed and demonstrated excellent safety, PK and PD profiles, supporting a potential high efficacy preventing mucosal HIV infection under PrEP and PEP dosing regimens. Altogether these data support further clinical deve

Abstract Title: Limiting CD40-TRAF6 signaling reduces seizures

Investigator: Abheek Ritvik
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Co-Investigators:
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2. Madeline Smith, Randolph-Macon Undergraduate Research Intern
Department: Department of Biomedical and Translational Science

Abstract

Introduction
Neuroinflammation is recognized as a critical contributor to seizure susceptibility and progression to chronic epilepsy. CD40-CD40L system mediates neuroinflammation. Previously, we observed that downregulation of CD40 limits SE, seizure susceptibility, neuroinflammation and neuronal network hyperexcitability. CD40 recruits TRAF6 upon CD40L ligation, leading to downstream of NF-κB. We hypothesized that CD40-TRAF6 signaling axis, known for its role in immune regulation and neuroinflammation is implicated seizure-induced damage. The goal was to investigate the role of CD40-TRAF6 signaling in epilepsy.

Methods
Post-Status Epilepticus (PSE) and pentylenetetrazol (PTZ) models were used in adult mice. Seizures monitored by the Ethovision software using Racine's score. CD40-TRAF6 inhibitor (10 mg/kg) or vehicle was administered intraperitoneal two hours before PTZ. Brain samples were collected at different time points after PSE or PTZ. In a group of mice, CD40-TRAF-6 signaling, including markers for neuronal damage were analyzed using molecular and histological techniques.

Results
Preliminary results showed that in chronic epilepsy sCD40L increased in the brain compared to control. This outcome is associated with aberrant locomotion such as reduced activity and increased orofacial movement. CD40-TRAF6 inhibitor reduced seizure severity limited 50% of mortality and increased neuroprotection. In addition, CD40-TRAF6 showed no sedation or locomotor abnormalities within two hours of administration.

Conclusion
The CD40L-CD40-TRAF6 signaling in epilepsy can promote neuroinflammation and neuronal damage, thereby creating epileptogenesis. Moreover, spontaneous behavior after PSE predicts seizures, along with the sCD40L as a biomarker for epileptogenesis. CD40-TRAF6 inhibitor showed potential antiseizure effects that can be explored in chronic models of epilepsy.

Abstract Title: Ovulatory Signals Stimulate Active Theca Cell Migration

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Abstract

Introduction
Theca cells are an integral component of the ovarian follicle. Theca cells synthesize all androgens produced by the follicle. Androgens are then converted into estrogens by granulosa cells. After the ovulatory luteinizing hormone (LH) surge, oocyte release occurs concomitantly with the rapid transformation of the follicle remnant into the corpus luteum. During this process, theca cells integrate into the granulosa cell layer. Whether theca cell movement during ovulation is the result of passive relocation or if it is an active, intentional process of migration has not been investigated. We hypothesize that theca cells actively migrate during ovulation in response to hCG and/or hCG-stimulated local mediators of ovulation. Granulosa cells of the ovulatory follicle produce neurotensin (NTS) in response to the LH surge or the LH receptor ligand hCG, and local action of NTS is essential for ovulation to occur. Theca cells express receptors for LH/hCG as well as NTS, so either stimulus may alter theca cell migration.

Methods
To determine the role of hCG and hCG-stimulated NTS in theca cell migration in vivo, a vehicle control or a NTS receptor antagonist was injected into the adult female cynomolgus macaque ovulatory follicle (n=3-4/treatment), and hCG was administered systemically. After 48 hours, the ovaries were removed and fixed for immunofluorescent detection of theca cells. Primary theca cells isolated from monkey ovaries (n=3-4 lines/experiment) were cultured in vitro and allowed to migrate through a porous membrane towards hCG or NTS. Membranes were fixed and stained, and the number of migrated cells was quantified. Theca cells were also seeded onto beads and allowed to migrate through 3D-matrix in the presence of hCG or NTS. Migratory distance and number of migratory projections were determined. Theca cell-coated beads were fluorescently stained to assess cell morphology and migratory structures.

Results
In vivo, hCG stimulated theca cell invasion from the surrounding stroma into the ovulatory follicle. Follicle injection of a NTS receptor antagonist reduced the hCG-stimulated increase in theca cell invasion by 66%, demonstrating that both hCG and hCG-stimulated NTS can promote theca cell migration in vivo. In vitro, hCG and NTS increased theca cell migration 66% above basal migration and 71% above basal migration, respectively. NTS-stimulated theca cell migration was blocked in the presence of a NTS receptor antagonist in vitro. In 3D-matrix, NTS increased both theca cell migration distance by 77% and the number of theca cell projections by 74% over basal levels. In addition, NTS-treated theca cells formed more migratory structures such as filopodia.

Conclusion
Theca cells actively migrate in response to hCG and NTS during ovulation. These findings indicate that LH/hCG-stimulated theca cell migration in vivo may be dependent upon locally-produced NTS. Future investigation will query the mechanism by which theca cells migrate and the role of extracellular matrix in ovulatory migration. These studies will contribute to our overall understanding of theca cell function, and may shed light on the development of future fertility-improving treatments or contraceptive strategies. Supported by a generous product donation from Organon and NIH HD097675 to DMD and TEC.

Abstract Title: Genomic Characterization of Community-Associated Staphylococcus aureus Clinical Isolates to Inform Therapeutic Development

Investigator: Amanda Lynn Yermal
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Co-Investigators:
1. Katelyn D. Cranmer, Biomedical and Translational Sciences
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Abstract

Introduction
Staphylococcus aureus is a significant human pathogen capable of causing infections that range from mild to life-threatening. Pathogenesis is driven by S. aureus' adaptability, including the acquisition of antibiotic resistance genes and expression of virulence factors that facilitate immune evasion and host cell adhesion. Given this adaptability and increasing limitations of current treatments, ongoing surveillance and detailed characterization of circulating isolates are essential for identifying targets for novel anti-staphylococcal therapeutic development. Our lab maintains a library of over 200 community-associated S. aureus clinical isolates with associated metadata, 122 of which have previously undergone whole-genome sequencing. The present study aimed to further analyze these genomes and compare isolates across key group discriminators to better define the current S. aureus population and highlight potential therapeutic targets.

Methods
Whole-genome sequencing (WGS) datasets from S. aureus clinical isolates previously generated by the lab were used for genome assembly and analysis. Low-quality sequences were filtered and trimmed with Trim-Galore! (v0.6.10); contigs were assembled using SPAdes (v4.0.0). Contigs pre-generated with the Assembly module of the Local Run Manager (Illumina, San Diego, CA, USA) were used as references for contig scaffolding. Contig length and N50 values were used to gauge assembly quality. Custom AI-generated code was used to analyze and extract genomic information from the final assemblies, including strain-relatedness, presence of single nucleotide polymorphisms (SNPs), and characterize targeted genomic differences across multiple group discriminators. Analyses were extended to available genome sequences of select S. aureus isolates from the PubMLST database.

Results
Genome-wide analysis revealed phylogenetic relationships among isolates, conserved and emerging virulence factors, and enabled geospatial visualization alongside comparisons of other metadata.

Conclusion
WGS enables comprehensive analysis of S. aureus isolates, surpassing traditional typing methods that offer limited resolution and genomic coverage. Analyzing the genomes of S. aureus clinical isolates currently present in the community provides insight into the characteristics underlying virulence and adaptability and lays a foundation for the development of novel anti-staphylococcal therapies.

Abstract Title: Use of CTA in Diagonising Brain Death: Bilateral ICA Nonopacification

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Abstract

Introduction
Appropriately declaring patient brain death (BD) is crucial for maintaining realistic expectations, limiting unnecessary medical interventions, and facilitating organ donation. The current standard of declaring brain death includes a clinical evaluation and an apnea test. In cases when apnea testing cannot be performed, ancillary testing is required to confirm the diagnosis of BD. The current gold standard ancillary test is digital subtraction angiography (DSA), which uses an arterial catheter to inject contrast into cerebral vessels. Computed tomography angiography (CTA) has been proposed as a less invasive, cheaper, faster alternative to DSA. There is currently no scientific consensus about the reliability of CTA in diagnosing BD. This case demonstrates an example of bilateral ICA nonopacification on CTA, a finding highly suggestive of BD.

Case Information
A 36- year- old female presented to the ED after being found unresponsive at home. EMS resuscitated the patient and achieved return of spontaneous circulation. In the ED, the patient was unresponsive with fixed and dilated pupils. Her Glasgow coma scale score was 3. Initial workup revealed labs consistent with respiratory failure, a pan-positive urine drug screen, and a BAC of 0.16. Head CT showed massive subarachnoid hemorrhage, diffuse cerebral edema with sulci effacement, and intraventricular hemorrhage within the fourth ventricle. CTA head and neck showed bilateral nonopacification of the cerebral ICA and intradural segments of the vertebral arteries, a finding highly suggestive of BD. Apnea testing was performed at bedside the following day, and the patient was pronounced dead by neurologic criteria at this time.

Discussion/Clinical Findings
The patient's clinical workup was consistent with severe respiratory failure and cardiopulmonary arrest in the setting of SAH secondary to polysubstance abuse. Non-opacification of the ICAs was an unanticipated finding on this CTA. This finding is highly suggestive of BD, but is not currently an approved method of diagnosing BD. Instead, DSA or radionuclide perfusion scintigraphy (SPECT) would have typically been ordered to diagnose BD. DSA is reliable but technically challenging and expensive. SPECT is well validated and simpler to perform than DSA, but materials are expensive.

CTA is currently investigational and not a validated ancillary test for BD determination. Research evaluating the reliability of CTA in diagnosing BD has yielded mixed results. A recent meta-analysis highlighted that CTA may result in false negatives. False positives are rare but may occur in patients with very low perfusion pressures. All existing studies on this topic have small sample sizes, and further studies with larger sample sizes are needed before a conclusion is drawn about the reliability of CTA as an ancillary test. Our case underscores CTA's potential utility as a minimally invasive and readily available test for BD.

Conclusion
Utilizing CTA as an ancillary test to diagnose BD should be approached with caution, and more robust clinical evidence is needed before using CTA as a reliable indicator of BD. However, the finding of bilateral ICA non-opacification highlighted in this case is an excellent example of how CTA may be a cheaper, easier way to detect BD.

Abstract Title: Idiopathic Multicentric Castleman Disease with Severe Paraneoplastic Syndromes

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Abstract

Introduction
Castleman Disease (CD) is a rare constellation of diseases that has evolved in its definition since its first description in the 1950s by Benjamin Castleman. With broad presentation and low incidence of about 5,000 cases yearly, diagnosis can be delayed. CD consists of 4 main subtypes including unicentric CD (UCD), polyneuropathy, organomegaly, endocrinopathy, monoclonal plasma cell disorder and skin changes syndrome associated with MCD (POEMS-MCD), HHV8 associated MCD, and idiopathic MCD(iMCD). In this case we describe a severe case of iMCD with severe paraneoplastic syndromes in a young patient to include pemphigus vulgaris and eosinophilic pneumonia..

Case:
A 22-year-old male with a past medical history of type 1 diabetes mellitus (T1DM) presented to outpatient dermatology with chief complaints of progressive odynophagia, dysphagia, genital pain, and diffuse pruritic eruptions of the trunk of one month. Initial outpatient workup revealed spongiform dermatitis and colonization with methicillin sensitive staph aureus(MRSA). The patient was started with topical treatments to include oral doxycycline, topical mupirocin, topical triamcinolone, oral fluconazole. Despite therapy, the patient's clinical picture worsened over the next 6 months for which he was sent to the hospital for workup. Pertinent negative workup included HIV, HBV, RPR titer, VZV, Rheumatoid factor, anti-nuclear antibody, P-ANCA, dsDNA. Pertinent positives include IgE, IL-6 levels, thrombocytosis, elevated ESR/CRP. Direct immunofluorescence of repeat skin biopsy revealed pemphigus vulgaris. Computed tomography of neck, chest, abdomen, pelvis revealed epiglottitis with associated lymphadenopathy, apical ground glass opacification of bilateral lungs, and large pelvic mass initially believed to be possibly prostatic rhabdomyosarcoma. The patient was treated symptomatically for epiglottitis, underwent bronchoscopy of lungs revealing findings most consistent with eosinophilic pneumonia. 2 CT-guided biopsies of intraabdominal mass were performed without specific findings, FISH and EBV testing were negative and revealed non-specific follicular hyperplasia. Ultimately the patient underwent intrapelvic mass resection with pathology revealing polytypic plasma cells with follicular and paracortical hyperplasia most consistent with diagnosis of CD. Ultimately the patient was diagnosed with HIV negative and HHV8 negative iMCD not otherwise specified (NOS) with concurrent paraneoplastic pemphigus vulgaris and paraneoplastic eosinophilic pneumonia. The patient was started on the first infusion of weekly rituximab and pending full course treatment.

Discussion/Conclusion:
In this case we describe a severe presentation of a rare disease. Unique and highlighting features of this case include paraneoplastic pemphigus vulgaris, eosinophilic pneumonia, age at diagnosis, extent of pelvic mass, and absence of underlying identifiable cause.
MCD presents on average in those in their 6th decade of life and is often associated with HHV8 and HIV. It also has several associated paraneoplastic syndromes associated with the disease, which include: pemphigus vulgaris, eosinophilic pneumonia, thrombocytopenia, bone marrow fibrosis, and polyneuropathy. The etiology is believed to be due to clonal neoplastic disease associated with lymph node stromal dendritic cells. 5 year overall survival with treatment of iMCD is 100%. Recovery in this case will likely be complicated by the extensive involvement of his skin and mucosal lesions. Treatment response is currently pending evaluation, and the clinical course is being tracked.

Abstract Title: Not so friendly fire: Nivolumab induced immune related adverse event

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Abstract

Introduction
Nivolumab, an immune check point inhibitor (ICPi) is a fully human immunoglobulin G4 (IgG4) monoclonal antibody that selectively inhibits programmed cell death-1 (PD-1) activity by binding to the PD-1 receptor to block the ligands PD-L1 and PD-L2 from binding. The negative PD-1 receptor signaling that regulates T-cell activation and proliferation is therefore disrupted. This releases PD-1 pathway-mediated inhibition of the immune response, including the antitumor immune response. T-cells can turn against a person's own tissues, resulting in immune-related adverse events (irAE) that can affect almost any organ. We present a case of acute interstitial nephritis (AIN) induced by nivolumab.

Case Information
A 70-year-old man treated with Nivolumab for metastatic melanoma, presented with mild nausea and vomiting for a few days. He denied a change in urine output or appearance of urine, flank pain, or difficulty urinating Creatinine on admission was 8.9 mg/dl (baseline 0.8mg/dl). Urinalysis revealed mild proteinuria, 21-50 WBCs/hpf. Spot protein/creatinine ratio was 0.52. C3 and C4 and CPK were normal. Renal ultrasound was unrevealing. He had no eosinophilia on his CBC with differential but had a few eosinophils in the urine. He was given fluid resuscitation overnight without improvement in creatinine. At that point, AIN due to nivolumab therapy was suspected. He was treated empirically with high dose IV methylprednisolone 1 gram daily for three days. Over the next few days, his creatinine improved to 5.7 mg/dl. He was discharged home with a prednisone taper. Upon outpatient follow-up, his creatinine continued to improve close to his baseline.

Discussion
ICPi therapy is associated with an increased risk of irAEs in melanoma patients; however, severe renal complications are still rare. AIN should be suspected in a patient with an elevated serum creatinine and a urinalysis that shows white cells, white cell casts and eosinophiluria. Drug-induced AIN should be suspected in the context of characteristic laboratory findings that can be attributed to a drug that has been previously reported to cause AIN. Kidney biopsy can be considered but it is not necessary for the diagnosis if the patient has acute kidney injury and greater than 5 WBCs/hpf in the urine in the absence of an alternative cause as was the case in our patient.

There are a limited number of case reports for nivolumab-associated AIN. It can occur after weeks or months of therapy. Risk is increased with preexisting chronic kidney disease and concomitant use of agents that can cause AIN. Prompt response to treatment with steroids as we saw in our patient supports the diagnosis. It is unknown whether CPIs (checkpoint inhibitor) should be resumed after an episode of AIN. There have been reports of recurrence with resumption of CPI therapy. There are no established guidelines for the duration of steroid therapy. Generally, a prednisone taper of 3 months has been reported to be successful.

Conclusion
Although CPI agents are mostly considered non-nephrotoxic, this case report highlights a rare side effect of nivolumab as AIN. Close monitoring of renal function and electrolyte disturbance is crucial for early recognition of renal toxicities in patients receiving CPIs.

Abstract Title: Role of Gastric Scintigraphy in Evaluating Neuromodulatory Therapy for Refractory Gastroparesis: A Case Series and Brief Review

Investigator: Virang Ketan Kumar
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Co-Investigators:
Department: Department of Radiology, Eastern Virginia Medical School at Old Dominion University

Abstract

Introduction
Gastric neuromodulation, also referred to as gastric electrical stimulation, is a therapeutic intervention for gastric dysmotility disorders, such as refractory gastroparesis. This approach utilizes an implantable stimulator that delivers varying pulse frequencies to attune gastric contractions. Gastric emptying scintigraphy is a nuclear medicine study that assesses gastric emptying time to diagnose dysmotility. It has also been implemented in assessing response to gastric stimulation, though improved emptying can often be discordant to symptomatic relief. Thus, this study presents a case series and brief literature review to assess the utility and limitations of scintigraphy in evaluating gastric neuromodulation in refractory gastroparesis.

Case Information
Overall, 4 patients were included in this case series, all of whom had an established diagnosis of refractory gastroparesis with available pre- and post-implantation gastric emptying scintigraphy and reported clinical symptoms. All patients underwent concurrent pyloroplasty with gastric stimulator implantation except for patient 3. Patient 1 is a 38-year-old female presenting with nausea, vomiting, bloating, and early satiety with unsuccessful therapy involving recurrent botox injections prior to gastric electrical stimulation. Patient 2 is a 32-year-old female presenting with chronic nausea, vomiting, and bloating and did not respond to medical management with motility agents prior to stimulator implantation. Of note, Patient 2 required left colon resection with end-to-end anastomosis for chronic colonic dysmotility. Patient 3 is a 63-year-old female presenting with nausea, vomiting, dysphagia, and reflux. She has a history significant for esophageal perforation status post repair, chronic dysmotility, and unsuccessful botox therapy prior to electrical stimulator treatment for gastroparesis. Patient 4 is a 37-year-old female with a history significant for type 1 diabetes mellitus with insulin pump with chronic nausea, cyclic vomiting, and epigastric abdominal pain and unsuccessful medical management prior to stimulator implantation.

Discussion/Clinical Findings
All patients demonstrated delayed emptying prior to intervention with >10% retention after 4 hours, and subsequent improvement to <10% retention post-implantation. Frequent symptoms included nausea, vomiting, and generalized abdominal pain. Two patients demonstrated strong clinical improvement, while one patient demonstrated only partial improvement and another was refractory despite attempted optimization of stimulation. A review of current literature highlighted that variations in institutional protocols, comorbidities, glycemic control, use of motility agents, and non-standardized symptom reporting may confound correlation with clinical response. Conversely, instances of impaired emptying with clinical improvement have been observed, theorized to possibly be related to modulation of afferent nausea pathways.

Conclusion
This case review highlights the utility of scintigraphy in evaluating gastric neuromodulation, especially in cases of refractory gastroparesis. While responses can be drastically improved scintigraphically, findings may diverge from symptom outcomes for multiple reasons. Such discordance emphasizes the need for a standardized and multimodal approach to assess gastric neuromodulation and ideally incorporate scintigraphic findings with symptomatic reporting to guide therapy optimization. Future research aimed at better characterizing the discordance may be done involving prospective or retrospective studies, while also assessing varied standardization protocols for treatment response reporting.

Abstract Title: Emergency "Valve-in-Valve" TAVR for Severe Mixed Bioprosthetic Aortic Valve Dysfunction Complicated by Refractory Cardiogenic Shock

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Department: Cardiology

Abstract

Introduction
Bioprosthetic aortic valve dysfunction can present as a life-threatening emergency, such as refractory cardiogenic shock (CS). In high-risk patients with structural degeneration of a prior transcatheter valve, emergency valve-in-valve (ViV) transcatheter aortic valve replacement (TAVR) can be lifesaving by rapidly restoring hemodynamic stability.

Case Presentation:
A 71-year-old woman with hypertension and prior TAVR eight years earlier presented with progressive dyspnea over three months. Physical examination revealed JVD, a holosystolic ejection murmur with diminished aortic component, and bilateral pulmonary crackles.
TTE showed LVEF 46% and severe bioprosthetic degeneration with mixed dysfunction: mean gradient 79 mmHg, peak velocity 5.7 m/s, valve area 0.35 cm^2, and moderate regurgitation. Despite diuretics and vasodilators, she progressed to refractory CS with pulmonary edema and multiorgan failure, requiring mechanical ventilation, vasopressors, and inotropes. TEE showed severe prosthetic stenosis and severe aortic regurgitation, with LVEF decreased to 10%. Deemed inoperable due to prohibitive surgical risk, she underwent emergency transfemoral ViV TAVR with a 25-mm Navitor valve, leading to rapid hemodynamic improvement and weaning of vasoactive support. Post-procedural TEE showed LVEF recovery to 27% with no residual gradient or regurgitation.

On day 21, follow-up TTE revealed a mean gradient of 27 mmHg, raising concern for subclinical leaflet thrombosis. A vitamin K antagonist was initiated, and cardiac CT confirmed a 2-mm thrombus on the right coronary cusp. After 11 days of anticoagulation, repeat imaging showed complete thrombus resolution and restored prosthetic function. The patient was discharged in stable condition and remained asymptomatic at one-year follow-up.

Discussion
The ACC/AHA guidelines support ViV TAVR for severe bioprosthetic aortic valve dysfunction in patients at high or prohibitive surgical risk.[1] In CS, TAVR may stabilize hemodynamics despite the elevated procedural risk. The immediate improvement in blood pressure and LVEF suggests reversal of myocardial stunning through afterload reduction and preload optimization. Registry data from PARTNER-2 demonstrated 30-day and one-year mortality of 2.7% and 12.4%, respectively, in high-risk patients.[2]
Bioprosthetic valve thrombosis, often subclinical, is most common within three months post-implant. CT is the diagnostic modality of choice, and vitamin K antagonist therapy is recommended to restore function.[1]

Conclusion
Emergency valve-in-valve TAVR can interrupt the downward spiral of refractory CS in selected patients with severe bioprosthetic valve dysfunction. In this case, timely intervention led to rapid hemodynamic stabilization and myocardial recovery. Ongoing surveillance is critical for detecting early complications such as subclinical leaflet thrombosis.

Abstract Title: Approach to Major Secondary Causes of Hypertension in Young Adults: An Overlooked Condition

Investigator: Juan Munoz Moreno
Mentor: Martha Gulati, MD MS
Co-Investigators:
Department: Cardiology

Abstract

Introduction
Arterial hypertension is a chronic cardiovascular condition with high global prevalence and significant impact on morbidity and mortality. Though common in older adults, it also affects young adults (19-40 years), with up to 10% of cases being secondary, often due to endocrine, renal, or cardiovascular causes. Early recognition and management can prevent complications such as left ventricular hypertrophy, coronary artery disease, heart failure, stroke, and peripheral arterial disease. However, it is frequently overlooked, delaying diagnosis and increasing the risk of target organ damage (TOD) and adverse cardiovascular outcomes. This review presents a diagnostic algorithm and summarizes specific treatments for the main secondary causes in young adults.

Main Body
The most frequent endocrine causes of secondary hypertension in young adults include primary aldosteronism, Cushing's syndrome, pheochromocytoma and paraganglioma, thyroid dysfunction, hyperparathyroidism, and acromegaly. Each presents with specific clinical and biochemical hallmarks, requiring targeted hormonal assays and imaging for diagnosis. Renal causes are equally important, particularly renovascular disease, with fibromuscular dysplasia being the predominant etiology in younger populations. Other renal contributors include chronic kidney disease, polycystic kidney disease, and juxtaglomerular cell tumors. Cardiovascular causes such as coarctation of the aorta must also be considered, especially when hypertension is detected at very young ages or in the presence of differential pulses and murmurs. Additional relevant etiologies are obstructive sleep apnea, oral contraceptive use, anticancer therapies, and even dietary habits, such as chronic licorice consumption.

Screening for secondary hypertension is advised in young adults with resistant, severe (grade 2-3), abrupt-onset or rapidly worsening hypertension, hypertensive emergencies, disproportionate TOD, or clinical/biochemical features suggesting a secondary cause. Biochemical testing (e.g., plasma aldosterone-to-renin ratio, cortisol suppression tests, catecholamine metabolites, thyroid and parathyroid profiles), combined with imaging studies (CT, MRI, Doppler ultrasound, or echocardiography), play a central role. Early detection is essential, as several etiologies, including adrenal adenomas, renovascular lesions, and aortic coarctation, are amenable to curative surgical or interventional treatment.

Therapeutic strategies must be individualized. Non-pharmacological interventions include adherence to the DASH diet, sodium restriction, weight reduction, smoking cessation, and regular aerobic exercise. Pharmacological therapy should be tailored according to etiology and comorbidities, with angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, calcium channel blockers, thiazide diuretics, and beta-blockers being the most widely used. In endocrine hypertension, specific interventions such as mineralocorticoid receptor antagonists, surgical resection of hormone-secreting tumors, or disease-targeted therapy significantly improve outcomes. In renal and cardiovascular causes, angioplasty, surgical repair, or renal transplantation may be required. Overall, a multidisciplinary approach is critical to achieving blood pressure control and preventing long-term complications.

Conclusion
Secondary hypertension in young adults represents a clinically significant but frequently overlooked entity. Prompt recognition and systematic evaluation are essential for guiding appropriate therapy, reducing cardiovascular risk, and, in select cases, offering curative treatment. Raising awareness among clinicians regarding the diverse etiologies, tailored diagnostic strategies, and advances in management is fundamental to improving outcomes in this vulnerable population.

Abstract Title: From Pleural to Peculiar: An Unintended Tracheal Journey

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Mentor: Victoria Scicluna, MD MPH
Co-Investigators:
Kyle Admire, DO, Pulmonary/Critical Care Medicine
Department: Pulmonology/Critical Care Medicine

Abstract

Introduction

Pneumothorax (PTX) is a common problem across emergency departments in the United States, with an estimated 20,000-40,000 cases occurring annually. PTX is often one of the complications of gunshot wounds (GSW) to the chest and typically requires chest tube placement for resolution [1]. We present a case of small-bore tube thoracostomy, which was complicated by insertion into the trachea - the first report of such in the literature.

Case Presentation

We present a 22-year-old male with chief complaint of chest pain and dyspnea three weeks following a GSW to the chest previously requiring a right thoracotomy for tractotomy and right middle lobe wedge resection on initial injury. After visualization of a large, right-sided pneumothorax without tension physiology on chest radiograph, a small-bore chest tube was placed under ultrasound guidance. Upon insertion, a continuous air leak was noted in the atrium, which did not subside. A computed tomogram of the chest was obtained and demonstrated the chest tube coursing through a post-operative consolidation in the lung parenchyma before entering the bronchus intermedius and terminating within the trachea. This tube was subsequently removed, and replaced by a surgical chest tube, which was felt to be intraparenchymal with persistent PTX and air leak on repeat imaging. Finally, a third apical chest tube was placed outside of the lung tissue. He was transferred to a nearby center for thoracic surgery to discuss definitive treatment options for bronchopleural fistula, and at the time of submission of this Abstract, treatment is ongoing.

Discussion

Tube thoracostomy is a procedure in which a flexible tube is inserted into the pleural space within the chest. This procedure is most commonly performed to remove air or fluid that fills this potential space. Tube thoracostomy is typically pursued for those PTX that are recurrent, persistent, traumatic, large, under tension, or bilateral. Common complications include tube blockage, dislodgement, bleeding, infection, intercostal neuralgia, and malpositioning [2]. Malposition of the tube most often occurs within the lung parenchyma, in the lobar fissure, under the diaphragm, or subcutaneously. Malposition of tube thoracostomy means that the underlying pleural problem is not improved, but also can lead to bronchopleural fistulas which may require additional invasive interventions such as airway stents, coils, or Amplatzer devices to occlude the involved bronchus, along with VATS and pleurodesis [3]. Typically the first step in management of malposition of the tube is removal and replacement with a well-positioned chest tube for ongoing drainage. Often, the "triangle of safety" is used as a guide for chest tube placement, but may not always account for anatomic variability in a patient who has had a trauma or undergone prior surgical resections. Overreliance on standard anatomical approaches without additional scrutiny can lead to suboptimal placement as we demonstrated here.

Conclusion

This is the first documented case of iatrogenic bronchopleural fistula with termination of the small-bore catheter within the trachea. Bronchopleural fistulas are a challenging clinical scenario to navigate, with outcomes depending on each individual's etiology, anatomy, and background comorbid conditions. Individualized treatment planning is recommended.

Abstract Title: Recurrent Follicular Lymphoma Unmasking Common Variable Immunodeficiency: A Case Report and Review of Immunologic Links

Investigator: Tasniem Tasha
Mentor: Sami G Tahhan, MD FACP
Co-Investigators:
Department: Internal Medicine

Abstract

Non-Hodgkin follicular lymphoma (NHFL) is a common indolent B-cell lymphoma. Immunodeficiency, particularly common variable immunodeficiency (CVID), has been increasingly recognized as a predisposing factor for lymphoproliferative disorders due to impaired immune surveillance. CVID is characterized by defective B-cell differentiation, hypogammaglobulinemia, and impaired antibody responses, often resulting in recurrent infections, autoimmune manifestations, and malignancy. Up to 8-10% of patients with CVID develop lymphoma, predominantly NHL.

We report a case of a 68-year-old female with a history of NHFL, initially diagnosed during evaluation for left upper quadrant pain and retroperitoneal adenopathy. Biopsy confirmed follicular lymphoma. She was treated with rituximab and achieved remission. Nearly 20 years later, she relapsed with a chest wall mass, confirmed as follicular lymphoma. Following successful rituximab induction and maintenance therapy, she was diagnosed with CVID, based on persistent hypogammaglobulinemia-IgG 245 mg/dL (normal: 700-1600 mg/dL), IgA 58 mg/dL (normal: 70-400 mg/dL), IgM 18 mg/dL (normal: 40-230 mg/dL)-and an impaired response to vaccination. She was subsequently started on intravenous immunoglobulin therapy.

This case highlights the rare but clinically significant association between recurrent NHL and underlying CVID. While lymphoma is a recognized complication of CVID, diagnosis of CVID may be delayed when lymphoma precedes overt immunodeficiency. Given the critical role of the immune system in tumor surveillance, immune dysfunction in CVID likely contributes to both lymphoma development and recurrence. Since lymphoma may be the initial manifestation of CVID, routine screening for primary immunodeficiencies in patients with recurrent or atypical lymphoma presentations-especially in the presence of recurrent infections or autoimmune features-is crucial. Likewise, vigilant surveillance for lymphoma in patients with CVID is warranted. Long-term immunoglobulin replacement therapy in CVID reduces infectious complications, improves survival, and enhances quality of life. By stabilizing immune function and decreasing chronic antigenic stimulation, immunoglobulin therapy may also lower the risk of malignancy, although further studies are needed to confirm a direct protective effect against lymphoma.

This case underscores the importance of recognizing the association between CVID and non-Hodgkin's lymphoma. Understanding this interplay should prompt a lower threshold for evaluating one condition when the other is diagnosed. Early identification and treatment of either CVID or NHL can enable more timely interventions, reduce complications, and potentially improve long-term clinical outcomes.

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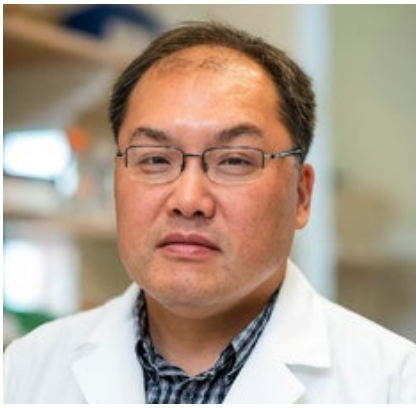

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