36th Annual
RESEARCH DAY

Friday, October 11, 2024

Support for research travel and publications for trainees are made possible by funding mechanisms managed by Macon & Joan Brock Virginia Health Sciences Office of Research and VHS Student Affairs at Old Dominion University. Of special note, we would like to highlight the following resources:

Community Faculty Designated Student/Resident Research Award Fund
Specifically created as a funding mechanism for student, resident, and fellow travel to present research findings, up to eight $1,500 awards are offered per fiscal year. To be considered for funding, applicants must submit an application and publication-quality manuscript for review. Through this fund, made possible by a Community Faculty donor, over 45 students and residents have been able to present their research at national conferences in a wide variety of specialties and areas of research.

Student Affairs Award: Travel and Publication Fees
Students are able to utilize this funding source for travel and publication fees. Travel awards of up to $1,500 per student are given to support attendance at a conference to present research findings. Managed by Student Affairs, this travel award can also be used to cover the conference registration fee for either virtual or in-person conferences. Additionally, through this mechanism, students are able to apply for separate funds to cover manuscript publication fees for submission to professional journals.

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

36th Annual Research Day
October 11, 2024
Timeline of Events

Connection information and more on the Research Day Website:
https://www.evms.edu/research/research_day/

Vendor, Service Provider, and Core Facility Exhibition

11:30-5:00 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

Monarch food drive in progress until Oct. 15 – collection bins are conveniently located in Waitzer Hall.

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

12:00-12:10 PM Paul Harrell, Ph.D., Research Advisory Committee Chair
Alfred Abuhamad, MD, Executive Vice President, Dean of EVMS
Milton Brown, MD, Ph.D., Senior Associate Vice President for Research

Presentation of Awards

12:10-12:30 PM IRB Service Award
Presented by Milton Brown, MD, Ph.D., Senior Associate Vice President for Research

Early Career Research Excellence Awards
Presented by Paul Harrell, Ph.D., Research Advisory Committee Chair

Excellence in Research Mentorship Award
Presented by Lifang Yang, MD, Ph.D., Research Advisory Committee Vice Chair

Junior Clinical Investigator Program
Presented by Juliana Martins, MD, Director of the Junior Clinical Investigator Program (JCIP)

Keynote Speaker

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

Lobat Tayebi, Ph.D.
Batten Endowed Professor, Director of the Institute for Engineering in Medicine, Health, & Human Performance (EnMed), Old Dominion University

Subject: ***Advances in Regenerative Medicine: Biomaterials, 3D Printing, and Vascularization Strategies***

Platform Presentations

1:15-1:29 PM Megan Sage, Biomedical Sciences Graduate Student
Title: Neurotensin Stimulates Theca Androgen Production in the Monkey Ovarian Follicle
Mentor: Diane Duffy, Ph.D.

1:30-1:44 PM June Choi, MD Student
Title: Investigating the potential contribution of TRIM72 to the mitigation of lung fibrosis by modulating ZEB1 signaling
Mentor: Nagaraja Nagre, Ph.D.

1:45-1:59 PM Taylor (Nikki) Drake, MD student
Title: Visual and Intraocular Pressure Outcomes with Advanced Technology Intraocular Lens Implants
Mentor: Constance Okeke, MD

2:00-2:14 PM Sonali Shirali, MD student
Title: Biomarker Analysis of Mechanically Ventilated Adults using Propofol or Dexmedetomidine
Mentor: Christopher Hughes, MD

Continued on next page

2:15-2:29 PM Kyle Admire, DO, Pulmonary and Critical Care Fellow
Title: Using Endobronchial Ultrasound-Guided Forceps Biopsy to Improve Yield of Rapid On-Site Examination During Bronchoscopy
Mentor: Joshua Sill, MD

Short Break
2:30-2:40 PM

Poster Presentations
In person: Waitzer Hall, rooms 100 & 200
Posters 1-100 are in Room 100, Posters 101-200 are in Room 200
Refreshments served in the 2nd floor lobby

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

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

Short Break
4:40-4:50 PM

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

4:50-5:00 PM Poster Awards from the Office of Research and Vice Dean for Academic Affairs
Presented by Dr. Paul Harrell and Dr. Li Fang Yang
Research Advisory Committee Chairs

Biomedical Sciences Programs Poster Awards
Presented by David Taylor-Fishwick, Ph.D.
Director, Biomedical Sciences Graduate Programs

Closing Remarks
Dr. Paul Harrell
Research Advisory Committee Chair

Save the Date! Research Day 2025 will be held on Friday, November 21, 2025.

2024
KEYNOTE LECTURE

Advances in Regenerative Medicine: Biomaterials, 3D Printing, and Vascularization Strategies

Lobat Tayebi, Ph.D.
Batten Endowed Professor,
Director of the Institute for Engineering in Medicine,
Health, & Human Performance (EnMed),
Old Dominion University

POSTER PARTICIPANTS

Biomedical Sciences Students

M.S. STUDENTS	PAGE
Britton-Jenkins, Asa	9
Parks, Sarah	10
Simpson, Jarris	11
Yermal, Amanda	12

Ph.D. STUDENTS	PAGE
Baker, Jonathan	13
Habisyasi, Basudha	14
Jensen-Wachspress, Mariah	15
Luyo, Zachary	16
Ma, Shelby	17
Mcguire, Samantha	18
McWilliams, Daniel	19
Miller, Jessica	20
Moriarty, Alina	21
Sage, Megan	22

MD Program Students

Abraham, Shoba	23
Adams, Gabriella	24
Adams, Parker	25
Adams, Parker	26
Afiadata, Carine, MD	27
Aggarwal, Aashri	29
Ahuja, Kripa	30
Aldrete, Aracelia	31
Allison, Claire	32
Armstrong, Chase	33
Armstrong, Chase	34
Bahhouth, Andrew	35
Bahhouth, Andrew	36
Baroody, Michael	37
Berry, Carter	38
Bhadri, Tarun	39
Bouker, Zachary	40
Bui, Y-Nhi	41
Burnett, Emily	42
Cazzell, Melissa	43
Chaw, Phyu	44
Choi, June	45
Chung, Hoon , MD	46
Cochrane, Finn	47
Cook, Thomas	48
Cornelius, Julia	49
Cottle, Hayden	50
Cranmer, Mia	51
Cranmer, Mia	52
Cunniff, Peter	53
Dashtizad, Isabel	54
Drake, Taylor	55
Drake , Taylor (Nikki)	56
Duncan, Rebecca	57
Eckstrom, Alexander	58
Eckstrom, Alexander	59
Ekdahl, Luke	60
Eldosougi, Randa	61
Eldosougi, Randa	62
Elliott, Samantha	63

Medical Students (cont.)

Elliott, Samantha **64**
Elzarea, Amira **65**
Ferrando, Juan **66**
Fiaz, Saif, DO **67**
Figgs, Taylor **68**
Figgs, Taylor **69**
George, Gwendolyn **70**
Ghiorzi, Julianne **71**
Ghiorzi, Julianne **72**
Godambe, Maya **73**
Goodrich, Zachary **74**
Gunawardena, Kasun **75**
Gupta, Neha **76**
Gupta, Neha **77**
Hale, Valicia **78**
Hasani, Amir **79**
Hayes, Eric **80**
Hernandez, Alexis **81**
Herron, Simone **82**
Hoffman, Jacob **83**
Hogge, III, Raymond **84**
Hooberman-Pineiro, Andrea **85**
Hubbard, Gregory **86**
Jackson, Andrus **87**
Jetmore, Jillian **88**
Jhandi, Angad **89**
Jhandi, Angad **90**
Jin, Paul **91**
Johnson, Katherine **92**
Jones, IV, George **93**
Jordan, Timeri **94**
Kanapareddy, Rajita **95**
Kauffman, Lily **96**
Kauffman, Lily **97**
King, Christiana **98**
Kouhestani, Mehron **99**
Laryea, Reuben **100**
Latifian, Amir **101**
Lawrence, Zachary **102**
Lee, Rebecca **103**
Lee, William **104**
Lerner, Aaron **105**
Li, Ang **106**
Li, Nina **107**
Li, Nina **108**
Lillard, Jonee **109**
Liu, Alex **110**
Lloyd, Remy **111**
Madhu, Bhavana **112**
Mancoll, Ryan **113**
Manga, Stephen **114**
Markert, Olivia **115**
Meester, Noah **116**
Minson, Nealy **117**
Munjwani, Daiwik **118**
Naranjo, Gerryl **119**
Nelson, Houston **120**
Newton, Savannah **121**
Park, David **122**
Park, Ryan **123**
Park, Sarah **124**
Partin, Victoria **125**
Patel, Dhruvi **126**
Patel, Dhruvi **127**
Patel, Himali **128**
Patel, Himali **129**
Patel , Urvi **130**
Peterson, Madeleine **131**
Phuyal, Simran **132**
Pierpoint, Gregory **133**
Pierpoint, Gregory **134**
Quan, Linh **135**
Ram, Kailash **136**
Ramanathan, Gautam **137**
Rao, Maya **138**
Rice, William **139**
Sadr, Nargiza **140**
Sadr, Nargiza **141**
Sage, Phavon **142**

Medical Students (cont.)

Sage, Phavon 143
Salem, Naser 144
Samberg, Benjamin 145
Samberg, Benjamin 146
Samoranos, Kaelan Nicholas 147
Schouten, Nicholas 148
Schroeder, Maren 149
Shally, Zachary 150
Shally, Zachary 151
Sheetz, Emily 152
Sheetz, Emily 153
Sheth, Anisha 154
Shimeles, Dagmawi 155
Shirali, Sonali 156
Sholi, Collette 157
Sholi, Collette 158
Sinha, Sejal 159
Smits, Elliot 160
Spiers, Liam 161
Stephens, Senah 162
Sunkara, Meghana Devi 163
Sunkara, Meghana Devi 164
Sweidan, Gorjeite 165
Sword, Maren 166
Temple, Austin 167
Toronka, Sheku 168
Torres-Gomez, Jhobani 169
Trivedi, Shikha 170
Trivedi, Shikha 171
Ukekwe, Chukwuka 172
Vuturo-Brady, Caitlin 173
Wagner, Madison 174
Walia, Jashanna 175
Yang, Anna 176
Yoon, Jeik 177
Zamponi, Martina, Ph.D. 178

Other Students

Colliver, Anneliese 179
Johnson, Nikia 180
Julianingsih, Dita 181
McKeithan, Vonda 182
Miller, Taylor 183
Owens, James 184
Wellman, Teagan 185

Resident/Clinical Fellow

Admire, Kyle, DO 186
Ahn, Jaeun, MD. 187
Fiaz, Saif, DO 188
Flathers, Ethan, DO 189
Gakhokidze, David, MD 190
Javed, Muhammad, MD 191
Kim, Minju, MD 192
Kumar, Virang, MD 193
Mathew, Anu , MD 194
Morris, Joshua , MD 195
Morris, Joshua, MD 196
Nguyen, Lily, MD 197
Nguyen, Lily, MD 198
Sadaieva, Diana, MD 199
Sakhamuri, Shalini , DO 200
Sarfraz, Hira, MD 201
Shahid, Lyeba, DO 202
Twist, Joanna, MD 203
Valle, Nicholas, DO 204
Yeshua, Arielle , MD. 205

Abstract Title: Molecular Docking of Novel Boronic Acid Bioisosteres of Combretastatin A-4 to α/ß Tubulin

Investigator: Britton-Jenkins, Asa
Mentor: Milton Brown, MD, Ph.D.
Department: Department of Medicine

Abstract

Introduction

Mitotic inhibitors have substantial implications in the prevention of cancer cell growth and proliferation by binding to α/ß -tubulin heterodimer to inhibit a multitude of cellular functions resulting in apoptosis. Colchicine, a compound originally extracted from Colchicum autumnale, is a mitotic inhibitor that binds at the interface of the α/ß tubulin heterodimer. Despite colchicine's anticancer properties, it has a narrow therapeutic index due to its nonspecific inhibition of tubulin polymerization in noncancerous cells 1. Combretastatin A-4 (CA-4), a natural product, extracted from Combretum caffrum, was found to be a highly potent antimitotic, antiproliferative, antivascular, antiangiogenic agent, binds at the colchicine binding site of α/ß tubulin, and inhibits multidrug resistant cancer cell growth1. Notably, greater cytotoxic potency is associated with the cis-CA-4 stereoisomer; however, it suffers from poor water solubility that prevents its further development into the clinic. We have discovered a unique boronic acid isostere CA-4 analog with the advantage in improved anticancer cell proliferation and water solubility compared to CA-4 2. Boronic acid containing compounds are normally stable and remain protonated under physiological conditions3. With the evidence of a FDA approved protease inhibitor, boronic acid containing dipeptide Bortezomib (VELCADE), we performed a molecule docking of a/ß tubulin-ligand interaction to guide the design and synthesis a novel series of CA-4 boronic acid derivatives. In our docking model, a boronic acid group is designed as an isostere group to replace the hydroxy group at the C-ring of CA-4. Various position of boronic acid substituted on the phenyl ring of CA-4, as well as replacement the phenyl ring with a pyridine ring were docked in our model. Binding energies were calculated and compared with CA-4. Docking was validated by in vitro evaluation of the synthesized novel boronic acid compounds including the assay of colchicine replacement, inhibition of tubulin polymerization and breast cancer cell MCF-7 proliferation. This study aimed to investigate protein-ligand interactions using molecular docking to establish how the analogues of CA-4 boronic acid containing compound interact with the colchicine binding pocket of the α/ß tubulin heterodimer. These interactions were then compared to the ability to inhibit tubulin polymerization and MCF7 cell growth, serving as a valuable tool in our drug discovery effort.

Methods

AutoDock Vina 1.2.0 was used to perform molecular docking of compounds into a high-resolution tubulin heterodimer structure (PDB ID: 6XER). Colchicine (CID: 2833), phenstatin (CID: 9948888), and cis-combretastatin A-4 (CID: 5351344) structures were obtained to perform docking. Docking boron-containing compounds remains a challenge due to a lack of reasonable parameters for boron in most docking software; thus, all boron atoms were changed to carbon atoms4. SMILES for the synthesized compounds were converted to mol files with 3D coordinates using OpenBabel. The tubulin heterodimer was edited to remove the second heterodimer, stathmin domain, and other compounds and ions (water, guanosine-5'-triphosphate, guanosine-5'-diphosphate, sulfate ions, and magnesium ions). Docking was performed using a box of x = 22.62383, y = 20.6082, z = 22.8357 size with a center x= -6.64202, y = -9.81822, z = 40.4171, capturing the colchicine binding pocket. The docking position with the lowest dock score and orientated in a similar manner as colchicine was chosen for each compound.

Results

Colchicine was re-docked to confirm the docking model. Both compounds 1 and 18 exhibited greater cytotoxic potency when compared to compounds CA-4 and phenstatin. CA-4 was found to form a hydrogen bond of 3.154 Å between the second methoxy oxygen of the A ring and cysteine 239 of the beta chain, this interaction resulted in a dock score of -7.0. Docking phenstatin produced 2 hydrogen bonds with ß tubulin-a 2.509 Å hydrogen bond between the second methoxy oxygen and cysteine 239, and the carbonyl oxygen interacted with lysine 252 which formed a hydrogen bond of 3.067 Å. This resulted in a dock score of -7.4. The docking study indicated that compounds 1 and 18 depicted greater stability than the original compounds, CA-4 and phenstatin. Compound 1's C ring methoxy groups formed two hydrogen bonds with cysteine 239 of the beta chain resulting in a dock score of -7.2. The second methoxy oxygen of the A ring of compound 18 formed a hydrogen bond with cysteine 239 of the beta chain (2.640 Å). Unlike phenstatin, hydrogen bonding was observed between asparagine 256 of the beta chain and the carbonyl oxygen of compound 18 (2.650 Å) and alanine 248 of the beta chain and the hydroxyl oxygen of the C ring of compound 18 (2.368 Å). Despite increased stability due a greater number of hydrogen bonds, compound 18 did not have improved tubulin polymerization inhibition when compared to phenstatin. This suggests the significance of the carbonyl oxygen hydrogen bonding with Lys 252 of the ß chain of tubulin. Despite this, no correlation was determined between compound binding energy and inhibition of MCF-7 cell growth or inhibition of tubulin polymerization, likely due to a low sample size. A strong correlation was found between compound inhibition of tubulin polymerization and MCF-7 cell growth.

Conclusion

Molecular docking indicates boronic acid bioisosteres of CA-4 have significant potential as mitotic inhibitors and tubulin polymerization inhibitors. The original CA-4 boronic acid derivative, compound 1, and compound 18 were found to dock with greater stability when compared to CA-4 and phenstatin. This docking model mirrored in vitro assessment of compound potency to inhibit tubulin polymerization and MCF 7 cell growth. These clinically relevant novel compounds may provide a new class of anticancer drugs and suggest the importance of investigating the use of boronic acids in drug design. Likewise, this docking model further suggests the relevance of molecular docking to characterize the colchicine binding pocket to design compounds with specificity to residues within the α/ß tubulin heterodimer that may be necessary for antimitotic effects.

Abstract Title: A binding assay investigating the binding potential of DCLK-1 as a carrier peptide to breast cancer stem cells for therapeutic targeting

Investigator: Parks, Sarah
Mentor: Kan Wang, MD
Department: Department of Biomedical & Translational Sciences

Abstract

Introduction
There is increasing evidence demonstrating that breast cancer tumorigenesis is initiated in breast-cancer stem cells (CSC). These early progenitor cells demonstrate both a self-renewal capability as well as Epithelial to Mesenchymal transition (EMT), which is a large contributor to metastasis and poor prognosis. The stem cell marker Doublecortin-like kinase 1 (DCLK-1) is a microtubule associated protein-kinase functioning in EMT that is upregulated in breast CSC and contains an extracellular domain that provides a target for highly specific homing sequences to directly target therapeutics to the breast CSC. Our lab created a homing peptide complementary to DCLK-1 that can act as a carrier for therapeutic agent to directly target breast cancer CSC. As DCLK-1 is expressed in other cell types, most notably neuronal cells, the carrier also has a highly specific cyclic nine-amino-acid breast homing peptide with the sequence CPGPEGAGC, referred to as PEGA homing peptide, known to home to breast cancer cells. The linear structures of DCLK-1 and PEGA will be combined into a single circular structure to act as the carrier that will be able carry therapeutics to target breast CSC and provide a more selective therapeutic option and maximal therapeutic potential. We propose that DCLK-1 homing sequence can act as a carrier to selectively deliver therapeutic agents directly to breast CSC.

Methods
i. To explore the potential use of DCLK-1 carrier peptide, we performed a binding assay on MCF-7, a tamoxifen sensitive line of breast cancer cells that is documented to have high expression of DCLK-1. Decreasing concentrations of DCLK-1 homing peptide tagged with the fluorophore tetramethyl rhodamine (TAMRA) will be added and fluorescence will be measured via the Synergy HT microplate reader. In addition, we will be using fluorescence microscopy to visualize the homing ability of DCLK-1 carrier to breast CSC. Breast cancer stem cells can be isolated and grown from their unique ability to proliferate while not adhered to the bottom of the plate. Thus, breast cancer stem cells will be grown on Polyhydroxyethylmethacrylate (pHEMA) coated plates to prevent adherence and allow the isolation of stem cells. To verify the stemness of the cell line, we used the fluorophore ALEXA (emission 488 nm) indirect antibody labeling using cancer stem cell marker CD 133 that will be visualized through fluorescence microscopy. Once stemness has been verified, DCLK-1 homing peptide linked to TAMRA (emission of 578 nm) will be allowed to bind with MCF-7 breast tissue cells to investigate DCLK-1 peptide homing potential and visualization will be done with fluorescence microscopy.

Results
The binding study indicates there is decreasing fluorescence as the concentration of the DCLK-1 homing peptide decreases. This result is in line with what we expected, as this indicates a directly proportional relationship in the concentration of DCLK-1 and fluorescence, demonstrating that DCLK-1 carrier peptide can bind with the extracellular DCLK-1 binding domain. Graphical analysis demonstrates two plateaus, corresponding to two binding sites due to the PEGA and DCLK-1 both binding to the target cells, providing increased selectivity of the drug to the breast cancer cells. The dissociation constant (Kd) values for the each of the plateaus are Kd 1 of 0.5x10-7 mM and Kd2 of 0.5x10-2 mM, and the small Kd values at each plateau indicating a high binding affinity of the DCLK-1 carrier peptide and PEGA carrier peptide directly to breast CSC. The antibody labeling of the MCF-7 breast cancer stem cells demonstrated bright green fluorescence on fluorescence microscopy, verifying the stemness of the MCF-7 stem cell culture. The fluorescence microscopy Results of the DCLK-1 homing peptide linked to TAMRA demonstrated bright red fluorescence, indicating the successful binding of DCLK-1 homing peptide to the extracellular DCLK-1 binding domain upon MCF-7 stem cells. The verified the binding ability of DCLK-1 homing peptide to MCF-7 stem cells.

Conclusion
In this study, we were able to demonstrate the binding capability and selectiveness of the DCLK-1 homing peptide to the DCLK-1 extracellular domain present on breast cancer tissue and breast (CSC). Through the binding assay, we were able to demonstrate the binding ability and the high affinity of DCLK-1 and PEGA carriers to directly target breast CSC. Through the indirect antibody labeling and fluorescence microscopy, we were able to isolate breast CSC and demonstrate the binding ability of the DCLK-1 homing peptide specifically to breast CSC, indicating that DCLK-1 offers the opportunity to target early progenitor tumor cells and allow direct targeting of therapeutics to the cells that pose the greatest risk for tumorigenesis. This study demonstrated a great potential for the therapeutic use of these carrier proteins for the administration of therapeutics to directly target malignant cells and increase treatment options for breast cancer patients.

Abstract Title: Socioeconomic Determinants between Preterm or Full Term Birth

Investigator: Simpson, Jarris
Mentor: Rula Atwani, MD
Department: Department of Obstetrics & Gynecology

Abstract

Introduction
Preterm gestation is characterized as the period of time between conception and <37 weeks until birth while full-term gestation is >37 weeks. This means patients who delivered a baby before 37 weeks are considered as preterm births while patients who delivered a baby after 37 weeks are considered full-term births. There are several factors that contribute to preterm birth such as genetics and socioeconomic status. For this study, 280 participants will participate in determining the correlation between socioeconomic status and preterm birth using five key neighborhood features: Area Deprivation Index (ADI) by neighborhood atlas, food access, The Accountable Health Communities Health-Related Social Needs (AHC HRSN) Screening tools, National Walkability Index, and maternal vulnerability index; Individuals who are Spanish speaking, delivered more than 1 baby and delivered a baby with known anomalies or genetic disorders are excluded from this study. These tools scale a pool of candidates and produce a questionnaire highlighting prominent socioeconomic aspects such as education, employment status, access to health care, transportation, and food access. The answers from the 26-question questionnaire can provide a criterion for the specific issues that impact preterm birth within Norfolk and Hampton Roads. Furthermore, this information can be used to aid gestational patients by reducing preterm birth and exposing them to resources, information, and health professionals that improve overall maternal health.

Methods
The following text describes the recruitment process for postpartum patients in this study. It begins with receiving information on patients screened via AHC HRSN tools from Atwani Rula, MD. Then proceed to the post-partum floor to engage with the list of screened individuals. Once I arrive, I introduce the names of patients to the nursing staff for permission to engage. When granted access, I enter the room to explain the study and consent form. If the patient wants to participate, they sign the consent form along with receiving a copy. Once the patient completes the questionnaire on the iPad, their answers are saved via REDCAP. In REDCAP, questionnaires are chronologically saved in the order that patients are approached; this number is recorded on top of each consent form. The patient's medical record number (MRN) is then inputted into REDCAP corresponding to their place in participation. If a patient is occupied or sleeping, they are not approached.

Results
This is an ongoing study still in the recruitment process to reach a total of 280 participants. There is currently no conclusive data nor data that can be accessed due to my limited clinical clearance.

Conclusion
The data is expected to provide investigators a range of socioeconomic factors that contribute to preterm birth. This data would be used to compare to full-term birth patients. This information focuses on the ability to influence the gestation process for many individuals of varying socioeconomic status.

Abstract Title: Targeting the virulence factor SdrE to moderate Staphylococcus aureus immune evasion

Investigator: Yermal, Amanda
Mentor: Julia Sharp, Ph.D.
Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1. Jeffrey L. Bose, Microbiology, Molecular Genetics & Immunology, University of Kansas Medical Center 2. Cristina M. Risi, Biomedical & Translational Sciences

Abstract

Introduction
Staphylococcus aureus (SA) is a major health threat due to its ability to cause disease, resist antibiotics and evade host immunity, thus highlighting the need for novel anti-staphylococcal therapies. SA virulence factors facilitate immune evasion, with many targeting the complement system, a component of innate immunity central to controlling bacterial infections. Virulence factors associated with the bacterial surface, due to their location, are ideal therapeutic targets. Previously, we demonstrated that the SA surface protein serine-aspartate repeat-protein E (SdrE) binds the complement regulator Factor H (FH) to subvert host immunity. Thus, the aim of the present study was to further explore the value of SdrE as a potential therapeutic target by creating a sdrE knockout model of S. aureus in a clinical isolate and designing a small peptide to compete with FH binding to SA SdrE.

Methods
A representative sdrE(+) community associated USA300 SA clinical isolate was selected for this study. Chromosomal deletion of sdrE (sdrE -/-) was performed using allelic exchange methodology. Briefly, an Escherichia coli-SA shuttle vector containing homologous regions to the select isolate sandwiched around a tetracycline resistance cassette (TetR) was generated via cloning Methods. Plasmid elements were confirmed via Sanger sequencing, analytical digests and PCR. The generated plasmid was transformed into restriction-deficient SA RN4220, followed by bacteriophage transduction of the clinical isolate. Homologous recombination was encouraged using environmental temperature shifts, assessed by patch plating, and allelic replacement was confirmed by whole-genome sequencing (WGS). For peptide studies, two peptides were designed in silico to disrupt/compete with SdrE:FH using published interaction-domain data, applying random and targeted mutagenesis (Peptide 1) or amino-acid probability (Peptide 2) methodologies. Peptides were biotinylated for visualization purposes. Peptide-binding assays were performed using the sdrE(+) and its isogenic sdrE knockout. To further explore binding, we tested two additional clinical isolates: one that carries bbp (bone sialoprotein-binding protein), an sdrE allelic variant, and one lacking sdrE and bbp. Briefly, bound peptide was extracted from SA using 2% SDS and heat, then examined for peptide presence via bio-dot/slot-blot, probing with streptavidin-IR680. Binding was calculated using Peptide standard curves, subtracting no-treatment control samples as background.

Results
The sdrE knock-out was successfully generated, with tetR in place of sdrE. Virulence-factor genes associated with the immune evasion cluster (IEC-1) were not displaced by the genetic manipulation, as determined by WGS. Surprisingly, all isolates bound both peptides, with a dose-response curve evident. Interestingly, Peptide2 revealed a higher affinity for isolates lacking sdrE compared to those carrying sdrE or bbp.

Conclusion
Overall, these data suggest that both peptides bind to SA targets in addition to SdrE, which may be due to homologous domains present in SA proteins of the same family. Future studies will examine the effect of peptide on SA FH recruitment and complement evasion. Examining the contribution of SdrE to S. aureus pathogenesis via creation of a sdrE -/- clinical isolate model and design of peptides to disrupt the immune-evasive SdrE:FH interaction supports the advancement of better targeted anti-staphylococcal approaches.

Abstract Title: Investigating molecular mechanisms of tumor eradication by targeting a major tumor vulnerability downstream of the EGFR/HER2/K-RAS signaling pathway: Seven in Absentia Homolog (SIAH)

Investigator: Baker, Jonathan
Mentor: Amy Tang, Ph.D.
Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1. Andrew P. Howell, M.S., Leroy T. Canoles Jr. Cancer Research Center, Biomedical & Translation Sciences 2. Ashleigh E. Hannah, M.S., Leroy T. Canoles Jr. Cancer Research Center, Biomedical & Translation Sciences 3. Daniel J. McWilliams, B.S., Leroy T. Canoles Jr. Cancer Research Center, Biomedical & Translation Sciences. 4. Julia D. Wulfkuhle, Ph.D., Center for Applied Proteomics & Molecular Medicine, School of Systems Biology, George Mason University 5. Rosa I. Gallagher, Ph.D., Center for Applied Proteomics & Molecular Medicine, School of Systems Biology, George Mason University. 6. Emanuel F. Petricoin, Ph.D., Center for Applied Proteomics & Molecular Medicine, School of Systems Biology, George Mason University

Abstract

Introduction
Hyperactivation of the EGFR/K-RAS pathway is a major driver of multidrug-resistance, tumor progression, and metastatic dissemination in human malignancy that leads to poor clinical outcome and reduced overall survival. Designing effective therapies to contravene the intertwined, compensatory downstream effector pathways of EGFR/K-RAS signaling to ultimately achieve curative antitumor efficacy has proven difficult. Seven in absentia homologues (SIAH1 and SIAH2) are RING-domain E3 ubiquitin ligases that function as the most downstream signaling gatekeeper of the EGFR/RAS pathway. Our prior studies demonstrated that SIAH inhibition led to a dramatic tumor eradication phenotype of multiple stage IV human cancers cell lines in mouse xenograft models. We propose that SIAH is a major tumor vulnerability and actionable drug target for inhibiting persistent EGFR/K-RAS pathway activation that's responsible for driving tumor malignancy and metastasis. 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
State-of-the-art reverse phase protein arrays (RPPAs) in conjunction with Principal Component Analysis (PCA) were used to quantify fold-changes of 15-45 signaling proteins/phospho-proteins that were significantly up- or down-regulated in response to SIAH inhibition ($p < 0.001$). Independent RPPA assays 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 without DOX (group A) and with DOX induction (group B); Tet-ON-SIAH2PD cancer cells without DOX, [no SIAH2PD inhibitor expression] (group C) and with DOX induction [SIAH2PD inhibitor expression] (group D). The ratios of D/C/B/A, D/C, D/B, C/A, and B/A were calculated in a pairwise comparison after normalization to GAPDH as an internal control. To validate putative targets of interest, immunoblotting and fluorescence-activated cell sorting (FACS) analyses of biological triplicate cell lysates for each respective cell line were performed for group C and D at 3-, 5-, and 7-days post DOX (+) induction; target proteins' expression normalized to β-actin, α-Tubulin, or GAPDH respectively, and the pathway alterations induced by SIAH2 inhibition were standardized, quantified, and validated in SIAH-mutant cancer cells. Statistical analyses were performed by paired and unpaired student t-tests using the Prism software.

Results
Following the RPPA analyses in the five human cancer cell lines, we focused on these 7 putative target proteins: cleaved PARP, cleaved Caspase-3, cleaved Caspase-7, NFκB, phospho-Cofilin, PD-L1, and Collagens. Their altered protein expression was differentially detected in SIAH-proficient and SIAH-deficient cancer cell lines in a pairwise comparison. Performed Western blot analyses and FACS assays confirmed that cleaved PARP, cleaved Caspase-3, and cleaved Caspase-7 are markedly upregulated in SIAH-deficient cancer cells, suggesting a role in cell death and DNA damage pathway activation induced by SIAHloss of function as a novel mechanism of tumor suppression in human cancer.

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 target therapies to control and eradicate undruggable and relapsed human cancers in the future.

Abstract Title: The Role of IgA in Atherosclerosis

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Abstract

Introduction
Atherosclerosis is a disease that is primarily characterized by the build-up of fatty lesions in large and medium-sized vessels, chronic inflammation, dyslipidemia, and obesity. It is the leading cause of death worldwide, contributing to 25% of deaths in the United States. Cells of both the innate and adaptive immune systems, especially B cell subsets, play a complex role in the development of plaque formation during atherosclerosis. Innate response activator (IRA) and follicular (FO) B cells are known to be pro-atherogenic via Type I T-helper cell (Th1) responses, inflammatory cytokine, and immunoglobulin production. On the other hand, B1, and marginal zone (MZ) cells show protective functions in atherosclerosis via T follicular helper cell (Tfh) suppression and IgM antibody (Ab) secretion. B1 cells produce immunoglobulin A (IgA) Abs that are crucial for mucosal immunity. Gut microbiota plays an important role in shaping the immune system during the early stages of life. IgA Abs are involved in maintaining intestinal homeostasis and have the ability to mediate protective immunity. Interestingly, studies have shown a close relation between altered gut microbiota and presence of bacterial populations within atherosclerotic plaques and atherogenesis. However, the role of IgA in atherogenesis development is still largely unknown. In this study, we investigate the role of IgA not only in the development of atherosclerosis but also in gut health and examine the extent to which IgA deficiency can alter the immune response in peripheral tissues and aorta.

Methods
IgA deficient low-density lipoprotein-deficient receptor (IgA-/-Ldlr-/-) and control Ldlr-/- mice were fed a high-fat diet (HFD) for ~14-18 weeks to induce hyperlipidemia and the development of atherosclerotic lesions. Additionally, we treated some of the mice with 4kDa fluorescein isothiocyanate (FITC)-dextran (FD4) via oral gavage, 45mins prior to tissue collection, for assessing intestinal permeability. We conducted subsequent cholesterol assays and measured lesion formation in the aorta (en face staining with Oil Red-O) and the brachiocephalic artery (BCA-branch between the aortic arch and the "fork" split of the carotid and the subclavian arteries). Blood, peritoneal lavage, spleen, omentum, mesenteric lymph nodes, Peyer's patches, aorta, and small intestines were collected and processed with a fluorescence spectrophotometer (FACS) to assess immune cell distribution and activation. Hearts and guts were collected for subsequent cryo-sectioning and staining to measure plaque development (histology).

Results
We observed statistically significant ($p<=0.05$) reduction in plaque development in IgA-/-Ldlr-/-mice compared to the control Ldlr-/- mice, post en face aorta analysis and BCA grading. These Results correlated with a significant reduction of total plasma cholesterol level in IgA-/-Ldlr-/- mice. Although cells counts from the spleen and peritoneal lavage had no significant difference, the omentum and carotids had significantly ($p<=0.05$) increased cell count within the IgA-/-Ldlr-/-mice compared to the Ldlr-/- control mice. Additionally, we observed sex-specific differences between the IgA-/-Ldlr-/- and Ldlr-/- mice. Further analysis of intestinal permeability test, flow cytometry and histology data are underway.

Conclusion
Our data so far suggest IgA acting in a site-specific manner and plays an unexpected inflammatory role during atherosclerosis, especially by altering the local immune composition. In vivo data from FD4 gavage would help us in uncovering the role of IgA in gut permeability. Future work would focus on identifying and analyzing the sites of IgA functionality and developing Methods to understand the mechanisms involved in lesion formation in the aortic valves and the aorta during atherogenesis.

Abstract Title: Aging Promotes Prostatic Lipid Accumulation and Urinary Dysfunction in Mice

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Abstract

Introduction
Benign prostatic hyperplasia (BPH) is the enlargement of epithelium and stroma in the transitional zone of the prostate gland. BPH is common in men over the age of 50, and prevalence increases to over 80% by age 70. Prostate enlargement can cause urethral obstruction and resistance and an increase in lower urinary tract symptoms (LUTS) which include urinary urgency, frequency, and incomplete emptying of the bladder. Our prior study showed a significant increase in lipids in human BPH specimens. We also showed upregulation of genes in the lipid synthesis pathway in a mouse model of BPH induced by steroid hormone imbalance. Lipid accumulation in other tissues, such as the liver and vascular connective tissue, triggers inflammation and fibrosis. Risk factors for BPH include diet and hormonal changes, with the most influential factor being age. Therefore, we hypothesize that aging is correlated to an increase in prostatic lipids, inflammation and urinary dysfunction.

Methods
Mice of varying ages (young, mature, aged) underwent a 6-hour uroflow study to measure the total number of voids, the average void mass, and the total void mass. Mice were then euthanized, and the four lobes of the prostate were collected to prepare frozen or formalin-fixed paraffin-embedded slides. Bladder dimensions were also measured. Oil Red O (ORO) staining was performed with the frozen tissue slides to detect lipids and immunohistochemistry was performed to analyze the expression of Fatty Acid Synthase (FASN) and immune cells via CD45 expression. Images were taken on a Mantra Quantitative Pathology Workstation and optical density, or the total number of CD45-positive cells, was quantified with Inform software. Differences between age groups was determined with Kruskal-Wallis and Dunn's multiple comparison test, with statistical significance defined as $p<0.05$. Results are reported as mean ± SEM.

Results
Via uroflow analysis, aged mice demonstrated a 3-fold increase in average void mass ($p=0.0050$) and a 2-fold increase in total void mass ($p=0.0099$) compared to young mice. Bladder volume did not show a significant difference between the different age groups. ORO yielded a 10-fold increase in the percent of lipids in the ventral prostate in the aged mice over the mature mice ($p=0.0068$). FASN expression was not significantly elevated in the ventral and anterior lobes.

Conclusion
Preliminary Results suggested an age-related increase in lipid accumulation in the prostate. Although no significant differences were observed in bladder volume, the increase in void mass suggested that differences in prostate histology might be the cause of the urinary dysfunction seen in our experiment. While lipid accumulation may contribute to these urinary changes, the initial FASN analysis has not demonstrated significant differences between our populations and therefore may not be as important for lipid synthesis in the aging prostate as originally hypothesized. Further investigation will focus on RNA-sequencing of the collected tissues to determine differentially expressed genes in the de novo lipid synthesis pathway in efforts to further understand the mechanism of lipid accumulation in the prostate during the progression of BPH.

Abstract Title: Differential Effects of Spaceflight Hazards On Neuroimmune Cell Morphology

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Abstract

Introduction
Space expeditions like the planned Mars missions will expose astronauts to hazards including space radiation (SR) and social isolation (SI). These hazards could impact stress management and the immune response with implications for astronaut health and performance. Astrocytes and microglia play important roles in the neuroimmune response and have high levels of interaction in the stress-regulatory neurocircuit which includes the hippocampus (HPC), basolateral amygdala (BLA) and medial prefrontal cortex (mPFC). We previously demonstrated that SR and SI impact the neuroimmune response including blood brain barrier permeability. However, the effects of spaceflight hazards on neuroimmune cell abundance and morphology in stress-regulatory brain regions is unclear. In this project, we utilized confocal microscopy to determine the effects of SR and SI on the abundance and morphology of astrocytes and microglia in the HPC, BLA, and mPFC.

Methods
Male, retired breeder outbred Wistar strain rats served as subjects. Animals were randomly placed into the following groups: SHAM (single-housed, control group), SI (single-housed with visual barriers between cages), and SR (single-housed and exposed to 15 cGy simulated Galactic Cosmic Radiation). Approximately 20 hours following completion of behavioral testing, rats were sacrificed and their brains extracted then divided longitudinally. Full left hemispheres were formalin fixed, paraffin embedded and sliced on a vibrating microtome (5µm). Slides containing visible sections of the HPC, BLA, or mPFC from each treatment group were stained for immune cell markers (GFAP for astrocytes, Iba1 for microglia) and imaged under a confocal microscope to assess immune cell abundance and morphology.

Results
Within each treatment group, there were observable differences in astrocyte abundance and morphology in the HPC, BLA, and mPFC. SHAM animals had protoplasmic astrocytes (long, branching projections) in the HPC and fibrous astrocytes (few projections) in the BLA. Very few astrocytes were observed in mPFC of SHAM . SI animals had protoplasmic astrocytes in the HPC and mPFC, but very few astrocytes in the BLA. The SR group only had fibrous astrocytes in BLA. All treatments contained microglia with few projections; however, microglia were more prominent in regions with a low number of astrocytes, and vice versa. Between treatment groups, SR animals had fewer microglia than SHAM and SI animals.

Conclusion
This study indicates that the abundance of astrocytes and microglia differ depending on brain region (HPC, BLA, mPFC) and treatment (SHAM, SI, SR). Interestingly, areas prevalent in astrocytes had fewer microglia, and areas prevalent with microglia had fewer astrocytes. This was seen in all treatment groups. Astrocyte morphology was also impacted by treatment (protoplasmic and fibrous in SHAM; mostly protoplasmic in SI, mostly fibrous in SR). This suggests that the abundance of neuroimmune cells vary between regions of the brain, and that immune cell abundance and morphology is differentially impacted by SR and SI.

Abstract Title: B cell subsets are differentially regulated by desmosterol in an atherosclerotic environment

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Abstract

Introduction
Atherosclerosis is an inflammatory disease of the large and medium size arteries that is characterized by deposition of oxidized lipids within the vessel. Inflammatory functions require proper metabolic reprograming to meet the increased energy demands of the cells. Cholesterol metabolism has recently been appreciated as a mechanism of regulation of such reprograming. Maintenance of cholesterol homeostasis is important in regulating potentially toxic levels of cholesterol accumulation. This process is likely dysregulated in a hyperlipidemic, atherosclerotic environment. Desmosterol, a precursor of cholesterol, serves as a negative regulator of macrophage functions. While it is known that different B cell subsets utilize divergent metabolic pathways, little is known about B cell subset specific cholesterol metabolism.

Methods
To understand the role of desmosterol in B cells, we generated a mouse model with overexpression of 24- dehydrocholesterol reductase (DHCR24), an enzyme that converts desmosterol into cholesterol (Dhcr24fl/fl mice were provided by Dr.Carlos Fernandez-Hernando), specifically in B cells using the cre/flox system crossed with an atherosclerotic mouse model (Dhcr24fl/flCd19cre/+Ldlr-/- mice). This overexpression of DHCR24 Results in reduction of desmosterol specifically in B cells. B cell subsets were isolated through magnetic isolation or sorted using FACs Aria and purity checked using flow cytometry. Intracellular calcium flux and phosphorylation of SYK and BTK were assessed by flow cytometry to determine activation of B cells. Dhcr24fl/flCd19cre/+Ldlr-/- and control Dhcr24+/+Cd19cre/+Ldlr-/- mice were fed high fat diet for 12-16 wks.

Results
Reduced desmosterol levels in B cells increases B cell activation in response to BCR induced activation with increased calcium flux. This is accompanied by an increase in phosphorylation of SYK and BTK. Additionally, desmosterol regulates B cell subset distribution at homeostatic and atherosclerotic environments, suggesting a specific implication of desmosterol in functions of innate B cells including B1 and Marginal Zone B cells. Importantly, reduced desmosterol levels in B cells accelerated atherosclerosis in Dhcr24fl/flCd19cre/+Ldlr-/- in comparison with age-, and sex-matched control Dhcr24+/+Cd19cre/+Ldlr-/- mice. Desmosterol depletion also promoted B cell receptor-induced B cell activation in a subset specific manner. Genes important in cholesterol efflux and biosynthesis are regulated by desmosterol in B cells.

Conclusion
Thus, our data uncover a potential role of cholesterol metabolism intermediates in the regulation of B cell subset functions in health and diseases. These findings also highlight the critical function of desmosterol in atherogenesis by reducing inflammation via integration of B cell metabolism in the modulation of the humoral immune response.

Abstract Title: Epithelium-Derived Factors Responsible for Luminal Translocation of Macrophages: The Role of CXCL17 in Benign Prostatic Hyperplasia

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Abstract

Introduction
Lower Urinary Tract Symptoms (LUTS) are a common collection of symptoms that affect the urinary system, often associated with Benign Prostatic Hyperplasia (BPH), which is non-malignant enlargement of the prostate gland. BPH primarily affects older men 50 or above and approximately 80% of all men in their 80s will acquire this disease leading to significant discomfort and disruption in daily life. The enlargement of the prostate compresses the urethra, causing difficulties in both storing and voiding urine, which manifests as LUTS. These symptoms can include frequent urination, urgency, weak urine flow, urinary tract infections as well as others. For those diagnosed, BPH and LUTS can significantly impact the quality of life, reduce the ability to perform daily activities as well as increase anxiety or stress about symptom management. Furthermore, the complex nature of BPH underscores the need for better disease characterization as well as advancements in understanding the pathophysiology of BPH. Investigation into this disease pathology, combined with morphological causation analysis could lead to more effective management of BPH, thus reducing the burden of the disease and enhancing the quality of life for those affected. Our team has demonstrated that inducing BPH in mice via a steroid hormone imbalance model increases prostatic macrophages and triggers their migration into the luminal space, where they differentiate into lipid-rich foam cells. Preliminary studies link these foam cells and epithelial lipid accumulation to LUTS/BPH, however, their impact on urinary function remains unclear. We identified the chemoattractant CXCL17 as a potential driver of macrophage migration. Additionally, foam cells express growth factors and chemokines that could promote fibrosis, proliferation, angiogenesis, and inflammation. We hypothesize that epithelial cytokines facilitate the translocation of macrophages into the lumen and the formation of foam cells, driving the development of BPH and LUTS, along with related urinary dysfunction. This hypothesis will be evaluated through identifying factors derived from epithelial cells in foam cell-rich regions in human prostates and characterizing the effect of Cxcl17 deficiency in mice.

Methods
Preliminary experiments performed single-cell RNA-sequencing (scRNA-seq) to identify epithelial chemokines and foam cell transcriptome in response to steroid hormone imbalance. We also assessed lipid accumulation using Oil Red O staining and in situ hybridization assessing Cxcl17 upregulation in T+E2 versus Sham controls. Currently, we are testing a Cxcl17-knockout (KO) mouse model (B6;129S5-Cxcl17tm1Lex/Mmucd) and wild-type (WT) littermates exposed to steroid hormone imbalance via subcutaneous implantation of testosterone and estradiol. Prostate tissues will be collected at two or twelve weeks for histological analysis. This includes immunohistochemistry to identify macrophages (CD68), neutrophils (Ly6G), B-cells (CD20), T-cells (CD3), and mast cells (toluidine blue), as well as collagen content using picrosirius red staining and cell proliferation via Ki-67. Urinary function will be evaluated using the Mouse Urovoid system and cystometry. In human BPH, chemokines driving foam cell migration will be identified using laser capture microdissection (LCM), RNA isolation, and NanoString "Chemokine Signaling" panel. Proteomic analysis with Liquid Chromatography-Electrospray Ionization-tandem Mass Spectrometry (LC/ESI-MS/MS) and Parallel Reaction Monitoring (PRM-MS) will validate chemokine profiles and elucidate molecular pathways involved in BPH.

Results
Our preliminary data utilizing the T+E2 model showed an early increase in macrophages and their translocation into the prostate lumen, where they differentiated into foam cells, followed by fibrosis at three months. These foam cells accumulated lipids and expressed high levels of the pro-inflammatory protein osteopontin. scRNA-seq revealed a foam cell cluster in T+E2 mice, resembling foamy macrophages in atherosclerotic plaques. We also identified upregulation of Cxcl17 in epithelial cells which was confirmed by in situ hybridization. Uroflow conducted on WT and Cxcl17-KO mice showed no difference in basal urinary function before pellet implantation and we are currently tracking the developing changes post-surgery.

Conclusion
In Conclusion, our preliminary data suggest that CXCL17 is the primary driver of macrophage luminal translocation in the prostate, a process necessary for foam cell formation, which likely contributes to the pathogenesis of BPH and associated urinary dysfunction. Successful completion of this study will confirm the CXCL17-dependence of this process, with potential alternative cytokines in human disease. The findings will identify molecular targets for potential therapeutic interventions, advancing our understanding of BPH pathophysiology as well as LUTS.

Abstract Title: Investigation of Cell Shape, Adhesion, and Cytoskeletal Changes induced by SIAH inhibition in Malignant Human Cancer Cell Lines

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Co-Investigators: Mr. Jonathan Baker

Abstract

Introduction
SIAH is an evolutionarily highly E3 ubiquitin ligase that plays an important signaling gatekeeper role downstream of the EGFR/HER2/RAS pathway. SIAH is found to be upregulated in a myriad of chemo-resistant and metastatic cancer subtypes; particularly pancreatic ductal adenocarcinoma (PDAC) and triple negative breast cancer (TNBC). Our lab has found that SIAH functions as a potent drug target, and it is a tumor-specific, therapy-responsive, and prognostic biomarker in human malignancy in vitro and in vivo. The major aim of this research is to characterize a novel molecular mechanism of how SIAH inhibition changes cell shape, alters mechano-sensing, reduces cell adhesion, and rearranges cytoskeleton organization in SIAH-deficient cancer cells. In particularly, we have focused on validating and quantifying molecular changes of phospho-YAP, phospho-cofilin, and collagen I proteins in MDA-MB-468, MDA-MB-231, and MiaPaCa (human TNBC/PDAC cancer cell lines). In this study, we aim to delineate the functional roles of these aforementioned protein phosphorylation in regulating mechano-sensing, cell adhesion, cell shape, and cytoskeletal re-organization in SIAH-proficient and SIAH-deficient cancer cell line models in a pairwise fashion.

Methods
The state-of-the-art reverse protein phase array (RPPA) technology in combination with immunofluorescence (IF), Flow, and western blots (WB) were used to document and quantify the molecular changes in phospho-YAP, phospho-cofilin, and collagen I proteins in several human cancer cell lines. The protein lysates were prepared by inducing the expression of our home-made SIAH inhibitor by doxycycline utilizing a Tet-ON/OFF system in human cancer cell lines for three days and seven days, and the control cell lysates were collected in parallel without doxycycline induction. The samples were run in triplicate. RPPA was utilized to quantify the altered expression of these phosphorylated proteins utilizing a nitrocellulose coated plate dotted with these corresponding pair-matched cell lysates. The RPPA assays were performed by our collaborators at GMU. We performed the additional Western blots/IF/FACS assays to verify and validate the molecular changes of these protein targets in these DOX (+/-)-treated cancer cell lines independently at ODU VHS. Their altered protein expression was then quantified and calculated by FACS and WB by Image J, and statistical analyses were performed by the paired and unpaired student t-tests using the Prism software.

Results
We found that phospho-cofilin was upregulated, and phospho-YAP were downregulated in a few selected SIAH-deficient cancer cell lines in response to DOX (+) induction as compared to the SIAH-proficient control cells (-DOX). These detected molecular changes were consistent with the altered cellular shape, increased cell detachment, and changed cell morphology observed in these SIAH-mutant cancer cells in response to DOX (+) induction. Further investigations will be conducted to identify synergistic changes in other key signaling molecules and regulatory proteins in the Hippo/Yap/Cofilin collagen type 1 signaling pathway in hopes of providing a molecular insight and signaling crosstalk of pathway interaction and feedback regulation of EGFR/HER2/RAS/SIAH with mechano-sensing, cell adhesion, and cytoskeletal signaling pathways in SIAH-proficient and SIAH-deficient cancer cells in response to DOX (-/+) induction in a comprehensive pairwise study

Conclusion
The Results indicate that expression of SIAH inhibitor changes the cell shape and cytoskeletal dynamics across multiple malignant cancer cell lines. Increased levels of phospho-cofilin suggest that SIAH inhibition may disrupt actin microfilament dynamics, alter cell shape, reduce cell motility and metastasis. Furthermore, changes in the Hippo/YAP pathway indicate that the mechano-sensing pathway may be altered in response to SIAHloss of function. Our preliminary Results showed decreased cell adhesion, increased cell detachment, and altered cell shape in respond to the blockade of the EGFR/RAS/SIAH pathway. These documented changes in the Hippo/YAP/Cofilin/Collagen Type 1 pathways may provide a novel mechanism to explain tumor suppression phenotype of SIAH-deficient human cancer cells in cancer.

Abstract Title: Neurotensin Drives Functional Changes in Theca Cells during Ovulation in Macaca fascicularis

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Abstract

Introduction
The luteinizing hormone (LH) surge is the kick start for ovulation. Theca cells are critical for ovarian steroidogenesis, both in the ovulatory follicle and the corpus luteum that forms after ovulation. Neurotensin (NTS), a tridecapeptide, is highly expressed in the ovarian follicle in response to the ovulatory LH surge. NTS has been shown to promote ovulation and luteinization in vivo. Receptors for NTS, including NTSR1 and SORT1, have also been identified in many ovarian cells including theca cells. This study tested the hypothesis that NTS initiates theca cell proliferation and migration into the ovarian follicle during ovulation.

Methods
To study the effects of NTS in vivo, vehicle or a NTS receptor antagonist was injected into preovulatory Macaca fascicularis follicles. Administration of human chronic gonadotropin (hCG) immediately followed, a substitute for the LH surge, and ovaries were removed 48 hours later, with ovulation anticipated at 40 hours. Additional ovaries were collected without the administration of hCG to serve as a pre-hCG control. All ovaries were then processed for histology and examined via immunofluorescent detection of the theca cell protein CYP17. Images of the ovulatory follicle were used to quantify CYP17 positive cells and assess migration of CYP17+ cells into the luteinizing follicle. Replicating populations of primary theca cells were isolated from M. fascicularis ovaries treated in vitro with NTS (0.05-50 μM) or NTS with the addition of a NTS receptor antagonist. Post exposure, theca cells were collected and processed for detection of NTS and NTS receptor RNA (by qPCR) and protein (by western blot and immunohistochemistry). Immunohistochemistry was also used to quantify proliferating cells via Ki67 immunodetection, and a transwell migration assay was used to quantify theca cell migration.

Results
In follicles of pre-hCG ovaries, CYP17+ theca cells were sparce and located in a punctuate pattern in the ovarian stroma surrounding the basement membrane, consistent with the expected appearance of a large, pre-ovulatory follicle. 48 hours after vehicle intrafollicular injection and systemic hCG administration, theca cells of the ovulated, luteinizing follicle were abundant and present both in the stroma and in the luteinized granulosa cell layer. Intrafollicular injection of a general NTS receptor antagonist, NTSR1 antagonist, or SORT1 antagonist reduced or eliminated the movement of theca cells past the basement membrane and into the granulosa cell layer. NTS receptor antagonist injection also reduced the number of theca cells when compared to the vehicle injected follicles. To determine if NTS acts directly at theca cells via the NTSR1 and SORT1 receptors to promote migration and proliferation; isolated theca cells were studied in vitro. Cultured theca cells expressed NTS, NTSR1, and SORT1 mRNA and protein. NTS treatment stimulated theca cell proliferation in vitro, and NTS-stimulated proliferation was reduced to basal levels by inclusion of NTS receptor antagonists. Theca cell migration also increased in response to NTS, and receptor antagonists reduced migration to basal levels. Since NTS receptor antagonists limited theca cell migration in vivo, we considered that components of the ovarian extracellular matrix may also influence theca cell migration. Collagen III and laminin each reduced theca migration in the presence of NTS, but NTS stimulated migration on fibronectin.

Conclusion
This study is the first to demonstrate that NTS acts directly at theca cells to promote changes associated with ovulation and luteinization. Theca cells of the M. fascicularis ovulatory follicle express NTS and the NTS receptors NTSR1 and SORT1. Our in vivo and in vitro findings suggest that NTS acts directly at theca cells to promote migration and proliferation via interactions with NTSR1 and SORT1 receptors. The lack of NTS-stimulated migration on collagen III and laminin matrixes in vitro suggests that NTS stimulates theca cell migration in a matrix dependent manner in vivo. Prior studies demonstrated that follicular NTS is required for follicle rupture and oocyte release. The current studies further elucidate the role of NTS in the ovary and expands our knowledge of theca cells and their potential roles during ovulation.

Abstract Title: A Lesson in Balance: The Duality Of STAT4 In Atherosclerosis And Survival

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Abstract

Introduction
Cardiovascular disease (CVD) is the leading cause of death worldwide. Atherosclerosis is a multifactorial disease of the large and medium sized arteries and is the major etiological process underlying the development of CVD. It is characterized by an accumulation of modified lipids, vascular dysfunction, and a dysregulated immune response. Sleep fragmentation (SF) is common in modern life effecting ~30% of the population. Recent studies have highlighted the importance of proper sleep by showing that decreased sleep duration and poor sleep quality are associated with high rates of cardiovascular disease (CVD), unstable plaque formation, and increased risk of all-cause mortality. Specifically, mechanistic studies have revealed disturbed sleep Results in unexpected premature death in some male mice through the accumulation of reactive oxygen species (ROS) in the small intestines and the hyperactivation of myeloid lineage immune cells, particularly neutrophils. Neutrophils are the most abundant immune cell in circulation and are vital for mounting a proper immune response against pathogens, but chronic neutrophil activation is detrimental and a main driver of chronic inflammatory disease progression. Signal transducer and activator of transcription 4 (STAT4) is a transcription factor known for its role in driving Th1 and Th17 differentiation. We have shown STAT4 is expressed in neutrophils and is a critical regulator of neutrophil activation and function in healthy and infectious conditions. Stat4 deficient neutrophils exhibit reduced ROS production, neutrophil extracellular trap (NET) formation, and migratory ability resulting in decreased survival of animals during bacterial challenge. Interestingly, when this model was used to evaluate atherosclerosis, the deletion of Stat4 in myeloid cells played a protective role in detrimental inflammation and reduced atherosclerosis and improved plaque stability in atherosclerotic Ldlr-/- mice. These studies highlighted the context-dependent role of Stat4 in neutrophils in various disease conditions. Studies in our lab have shown that SF accelerates atherosclerosis and destabilizes atherosclerotic plaques in a neutrophil dependent manner. Specifically, Sleep fragmentation induces hyper activation neutrophils reflected by enhanced ROS production, neutrophil extracellular trap (NET) formation and chemotaxis. We have also shown SF o Results in an accumulation of bacterial by-products in circulation with associated intestinal ROS accumulation and premature death of animals fed a high fat diet. Therefore, we hypothesized that Stat4 is involved in the neutrophil-dependent destabilization of plaques seen in sleep fragmented, atherosclerotic mice.

Methods
Eight-week-old, female Stat4ΔLysMLdlr-/- and control Stat4fl/fl Ldlr-/- mice were fed a high fat/cholesterol (DDC) diet and either sleep fragmented or allowed sufficient sleep for 16 weeks. Survival was tracked throughout the study via Kaplan-Meier analysis. After 16 weeks, body weight, and aortic atherosclerotic lesion formation were measured. Cholesterol (WAKO), LPS (ELISA), and cytokine (FACS) levels were measured in plasma. Immune populations in the blood, peritoneal cavity and small intestines were determined via vetscan and flow cytometry on Cytek Aurora. ROS production was measured in the small intestines using DHE and fluorescent microscopy.

Results
Survival studies revealed a increased susceptibility to SF-induced Premature death in 40% of atherosclerotic mice which lacked Stat4 in myeloid cells (Stat4ΔLysMLdlr-/-). Interestingly, while some Stat4ΔLysMLdlr-/- mice died, those which survived the study had improved atherosclerotic lesion formation following 16 weeks of DDC feeding and SF. No difference in BW or cholesterol was seen between genotypes or sleep conditions following 16 weeks of DDC-feeding. In line with previous data, female Stat4ΔLysMLdlr-/- mice had fewer circulating neutrophils compared to Stat4fl/flLdlr-/- controls, regardless of sleep condition. Importantly, 16 weeks of DDC-feeding increased ROS production in the small intestines of SF Stat4ΔLysMLdlr-/- mice vs SF Stat4fl/flLdlr-/- mice. There was also increased inflammation in the small intestines and the surrounding peritoneal cavity of SF Stat4ΔLysMLdlr-/- mice vs SF Stat4fl/flLdlr-/- mice

Conclusion
Myeloid specific Stat4 deletion reduced circulating neutrophil counts with improved atherosclerosis when compared to Stat4fl/flLdlr-/- mice. However, it appears that Stat4 may be important for the survival of mice when intestinal inflammation and barrier breakdown is present. These data suggest that Stat4 is involved in SF-induced myeloid activation and deleting Stat4 in myeloid cells reduces atherosclerosis but if makes the animal vulnerable to any additional immune challenges. Current studies are ongoing to reveal the specific mechanisms involved in the Stat4-dependent reduction of atherosclerosis in SF and to unveil the mechanism responsible for premature death observed.

Abstract Title: Neurotensin Stimulates Theca Androgen Production in the Monkey Ovarian Follicle

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Co-Investigators: 1. Thomas E. Curry, Jr., Ph.D., Department of Obstetrics & Gynecology, University of Kentucky

Abstract

Introduction
Neurotensin (NTS), a 13-amino acid peptide, is produced within the ovarian follicle and is essential for ovulation to occur. Granulosa cells produce NTS in response to the ovulatory surge of luteinizing hormone (LH). Theca cells of the ovarian follicles are responsible for producing androgens, which granulosa cells convert to estrogens. Both theca and granulosa cells express NTS receptors. Theca steroidogenesis-the production of steroid hormones such as progesterone (P4), androstenedione (A4), and testosterone (T)-is known to be stimulated by LH or human chorionic gonadotropin (hCG) via the LH/CG receptor (LHCGR). LHCGR activation impacts steroidogenesis by modulating cholesterol utilization and steroidogenic enzyme expression and activity. We hypothesize that NTS stimulates theca cell androgen production by altering cholesterol and/or steroidogenic enzyme expression.

Methods
Ovaries were removed from adult, female cynomolgus macaques (Macaca fascicularis) after a modified ovarian stimulation protocol, and the theca layers were isolated from antral (2-4 mm) follicles. Theca tissue was minced to uniform size and cultured in serum-free media with or without NTS or hCG. Media was collected after 24 or 48 hours and analyzed for A4, T, and P4 concentrations via ELISA. LDL uptake after 4 hours with or without NTS or hCG was determined via LDL ELISA of lipoproteins extracted from theca tissue homogenate. Total and esterified cholesterol after 24 or 48 hours treatment with or without NTS or hCG was determined via colorimetric detection of theca tissue homogenate in a modified cholesterol quantification assay using resorufin. Theca tissue RNA was isolated after 4 hours with or without NTS or hCG and analyzed for expression of steroidogenic protein mRNA after reverse transcription and qPCR, and mRNAs of interest were normalized to expression of GAPDH. For culture of proliferating theca cells, theca cells were enzymatically dispersed from surrounding matrix and enriched by culture under conditions ideal for theca cells. Lipid droplet contents of cultured theca cells were quantified and visualized after 24 hours with or without NTS or hCG using Oil Red O staining. For lipid quantification, Oil Red O stain was extracted from theca cells and relative stain intensity was quantified via absorbance at 492 nm. Theca lipid droplets were visualized via microscopy of theca cells stained with Oil Red O and counterstained with hematoxylin.

Results
NTS increased A4 and T concentrations in theca tissue media after 24 hours in a dose-dependent manner. However, NTS treatment did not significantly alter A4 or T after 48 hours compared to basal. In contrast, NTS did not alter P4 media accumulation after 24 or 48 hours compared to basal. As expected, hCG increased A4, T, and P4 media accumulation at both 24 and 48 hours compared to basal. Neither NTS nor hCG significantly altered theca tissue LDL uptake, total cholesterol content, or esterified cholesterol content compared to basal. The quantity and appearance of isolated theca cell lipid droplet contents were also unaffected by NTS or hCG compared to basal. Theca tissue expression of CYP17A1 and STAR mRNA were unaffected by NTS or hCG compared to basal.

Conclusion
These Results indicate that NTS stimulates production of androgens but not progesterone in theca cells. While LHCGR stimulation via hCG increased production of all theca steroids, neither NTS nor hCG were found to significantly affect LDL uptake, cholesterol, lipid droplets, or CYP17A1 or STAR mRNA at the selected time points. While cholesterol and steroidogenic protein mRNA are prominent areas of steroidogenic regulation, there are other processes where NTS and hCG could be acting to alter theca steroid production. LHCGR has also been found to regulate theca steroidogenesis by augmenting enzyme activity levels via protein kinase A (PKA). Accordingly, NTS and hCG may regulate enzyme activity without alteration in enzyme mRNA levels. In addition, neither NTS nor hCG appear to increase steroidogenesis primarily through regulation of cholesterol utilization/availability. Androgen production is a key function of theca cells that is necessary for ovulation and corpus luteum formation. These data implicate NTS as a novel regulator of theca androgen production, and the alignment of follicular NTS production with ovulation suggests a key role for this regulation in ovarian function. Future studies will explore possible regulation of other steroidogenic enzymes (e.g., CYP11A1, HSD3B, HSD17B) and investigate enzyme activity as a potential focal point of steroidogenic regulation.

Abstract Title: Identifying prognostic biomarkers and risk factors contributing to racial disparity and high mortality in pancreatic cancer at Sentara-EVMS-VOA

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Mentor: Amy Tang, Ph.D.
Department: Department of Biomedical & Translational Sciences

Abstract

Introduction
The incidence and numbers of the death due to pancreatic cancer have doubled from 1990-2017. Pancreatic ductal adenocarcinoma (PDAC) is the most aggressive and deadliest form of human cancer that lacks early detection tools and curative treatment regimens in the clinic. Oncogenic K-RAS mutation is universally activated in PDAC tumors, that drive tumor progression, invasion, early relapse, chemo-resistance, and dismal survival. In this study, we focus on the oncogenic K-RAS signaling pathway to examine whether SIAH, an evolutionarily conserved E3 ligase that is the most downstream signaling gatekeeper of the EGFR/K-RAS pathway, has prognostic value 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 are operable, and 802 patients are inoperable. 32.8% of the white/Caucasian patients and 27.4% of Black/AA patients received surgical resection. A comparison of the 5-year survival rate between the locally treated cohort and the national average from 2001 to 2016 shows underperforming local survival rates that start to approach national standards after 2010. Analysis of the SIAH expression in 34 NACT-treated residual tumors showed that low SIAH expression (< 5%) correlated with a longer survival than those with higher SIAH expression (>5%).

Conclusion
A 5.4% difference between the two-race groups in the operable cohort may indicate that Black patients are more likely to present with advanced, unresectable PDAC. The gap between local and national 5-year survival rates starts to narrow after 2010, which reflects a better understanding and timely implementation of more effective treatment modalities of PDAC, including the Whipple procedure, and NACT regimens for all the eligible operable PDAC patients at Sentara-VOA. We reported 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 that is prone to develop early relapse and poor survival.

Abstract Title: Adenotonsillectomy versus Bed Alarm for Children with Sleep Disordered Breathing and Nocturnal Enuresis

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Department: Department of Otolaryngology
Co-Investigators: Marysha Jones, B.A., Department of Otolaryngology

Abstract

Introduction
Adenotonsillar hypertrophy is the most common cause of sleep-disordered breathing (SDB) in children, treated primarily with adenotonsillectomy (T&A). Many children with SDB experience nocturnal enuresis (NE), thought to be due to increased release of atrial natriuretic peptide that occurs with disordered breathing. A bedwetting alarm is a standard treatment for children with NE. There is a lack of data comparing T&A to bedwetting alarms for the treatment of NE in children with SDB. Our objective is to compare the efficacy of T&A vs bedwetting alarm in NE outcomes in children with SDB.

Methods
Children aged 5-17 years presenting with SDB and NE >3 nights per week and deemed to be T&A candidates were considered for enrollment in the study. Patients with chronic constipation and daytime wetting were excluded. Eligible patients and their caregivers chose either the bedwetting alarm arm or the T&A arm following baseline assessment. After 4 months, patients could cross over to the alternate intervention. Primary outcomes were frequency of bedwetting (as assessed by a diary), and standardized quality of life assessments including the PinQ and OSA-18 questionnaires. Outcomes were recorded at baseline, 4-month, and 7-month follow-up.

Results
There are currently 56 participants enrolled with a mean age of 8 years. In total, 49.1% of patients were female. The mean baseline PinQ score was 48.01 with an SD of 15.37, while the mean baseline OSA-18 score was 57.86 with an SD of 16.71. Fifteen patients (10 alarm arm and 5 T&A arm) completed the 4-month follow-up assessment. Average PinQ scores for the alarm cohort decreased by 0.875 points from 44.5 at baseline to 43.63 at four months and average PinQ scores for the T&A cohort decreased by 1.67 points from 46.7 at baseline to 45 at four months. All alarm subjects reported continued bedwetting, though four noted decreased frequency. Two T&A subjects experienced resolution of their NE and three noted no changes in their bedwetting.

Conclusion
Data collection is ongoing in our prospective study assessing NE outcomes in children with SDB managed with bedwetting alarm vs T&A. At the Conclusion of our study, we aim to determine whether a bedwetting alarm or T&A is an optimal treatment option for children presenting with NE in the setting of SDB.

Abstract Title: Incidence and Outcomes of Pediatric Seymour Fractures in the Hampton Roads Area 2015-2023: A review

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Abstract

Introduction
Phalangeal fractures are common hand fractures in pediatric populations, but some fracture patterns are more uncommon than others. Seymour fractures, specifically, are very rare, and the official incidence has never been reported. Seymour fractures involve displacements of the distal phalanx with an associated nailbed injury. These fractures lack unique ICD or CPT codes and are often described elsewhere within a patient's chart. However, Seymour fractures are sometimes not explicitly mentioned when diagnosing finger fractures and may often be underdiagnosed. We are conducting a descriptive study to analyze the incidence of pediatric Seymour fractures, the treatment modalities, and the rates of complications associated with these injuries within the Hampton Roads area.

Methods
We will be conducting a retrospective chart review of all patients who were diagnosed with and treated for a finger fracture from 1/1/2015 to 12/12/2023. Due to the lack of specific ICD or CPT coding, we will review all imaging associated with finger fractures to determine the presence of a Seymour fracture. This approach will allow us to confirm Seymour fractures, maintain the validity of our data, and examine the rate at which Seymour fractures are present but not specifically diagnosed.

Results
At the time of abstract submission, we are in the early stages of data collection. Some key variables we plan to record include demographic information, treatment type, time to first antibiotic dose, time to presentation, follow-up treatments, length of follow up, operative reports, and duration of treatment. These variables will be analyzed for occurrence rates and possible predictors of complications arising from Seymour fractures, such as rate of infection, malunion post-fracture, physeal arrest, mallet finger deformity, nail deformity, acute and chronic osteomyelitis, mobility impairment, and extensive pain.

Conclusion
Our initial approach is a descriptive study. Depending on the quality and quantity of data collected, we plan to conduct appropriate statistical analyses. This single-center, retrospective chart review will help understand the incidence of Seymour fractures within our pediatric patient population, determine their characteristics, outcomes, and complication rates, and analyze treatment methodologies.

Abstract Title: Primary Cutaneous Mucinous Carcinoma Arising in an Endocrine Mucin-Producing Sweat Gland Carcinoma on the Lateral Zygomatic Arch of a 54-year-old Man

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Co-Investigators: 1. Jarett Casale, DO PGY-5 Mohs Fellow, Frontier Dermatology 2. Jesse Dewey, DO PGY-4 Dermatology Resident, Campbell University at Sampson Regional Medical Center 3. Melissa Muñoz-Bishop, MD, Dermatopathologist, Greensboro Pathology Associates, Aurora Diagnostics 4. Adam Ingraffea, MD, Dermatologist, Mohs Micrographic Surgeon, Cary Skin Center

Abstract

Introduction
Endocrine mucin-producing sweat gland carcinoma (EMPSGC) is a rare cutaneous adnexal carcinoma that predominantly affects the eyelids and periorbital area, particularly in elderly women. Clinically, it typically presents as a painless, slow-growing, skin-colored nodule with relatively non-specific features. Histologically, EMPSGC is analogous to solid papillary carcinoma of the breast. It has been proposed that EMPSGC may serve as an in-situ precursor to primary cutaneous mucinous carcinoma (PCMC), also referred to as mucinous sweat gland adenocarcinoma with neuroendocrine features. In this case, we report on a 54-year-old male who presented with a painful, bleeding nodule on the left lateral zygomatic arch, persisting for 12 months.

Case Information
A 54-year-old male presented for evaluation of a painful, bleeding nodule on the left lateral zygomatic arch of 12 months' duration. He reported no prior treatment for the lesion and had no significant medical history. A shave biopsy was performed, and initial dermatopathological evaluation suggested a diagnosis of endocrine mucin-producing sweat gland carcinoma. The patient was referred for full excision via Mohs micrographic surgery. During the procedure, a second tumor was identified upon inspection of Stage 1. Both tumors were fully excised with clear margins, and the Stage 1 slides were sent for dermatopathological consultation. The consultation confirmed that the additional tumor was a mucinous sweat gland adenocarcinoma with neuroendocrine features, also known as primary cutaneous mucinous carcinoma (PCMC), occurring in association with the initially diagnosed EMPSGC. The patient recovered from surgery without complications and will continue to undergo regular skin examinations.

Discussion/Clinical Findings
EMPSGC is a rare but histologically distinctive cutaneous tumor that is typically indolent and non-metastatic. However, recent reports have described cases of EMPSGC with metastases, including to the salivary glands and, in one case, to the lungs. Although EMPSGC remains a very rare diagnosis, it has been hypothesized to represent an in-situ precursor to PCMC. The precise nature of the connection between EMPSGC and PCMC and whether EMPSGC directly precedes PCMC remains an area of ongoing investigation, though the association is now generally accepted. The findings of this case further support the notion that EMPSGC may indeed be a precursor lesion to invasive PCMC, highlighting the need for additional studies to further understand the molecular mechanisms underlying this progression.

Conclusion
This case involved a patient who underwent Mohs micrographic surgery for a biopsy-proven endocrine mucin-producing sweat gland carcinoma on the left lateral zygomatic arch. Upon excision and examination via Mohs surgery, a concurrent diagnosis of primary cutaneous mucinous carcinoma was made. Both entities are extremely rare and presented in an unusual location in this case. Moreover, the occurrence of PCMC in association with EMPSGC as seen in this case gives further reinforces the concept, though still debated but increasingly accepted, that EMPSGC exists on a spectrum as a precursor to invasive PCMC, both of which may be less indolent than previously thought.

Abstract Title: When New Onset Psychosis Isn't - A Case Report of anti-NMDA Receptor Encephalitis in an Emergency Department Psychiatric Hold Patient

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Mentor: Kean Feyzeau, MD
Department: Department of Emergency Medicine
Co-Investigators: Michael Hudson, MD, Department of Emergency Medicine

Abstract

Introduction
NMDA receptors play pivotal roles in the central nervous system (CNS) with processes of learning and memory [1,3]. Anti-N-methyl-D-aspartate (NMDA) receptor encephalitis is an autoimmune and paraneoplastic process that presents with prominent neuropsychiatric symptoms. Literature on this form of encephalitis is lacking, however, prevalence seems to be increasing[9]. While published case reports have a wide demographic, most patients are females with median age of presentation in the early to mid 20s [1, 4]. Anti-NMDA receptor encephalitis has a close link with ovarian teratomas (as it was first described in 1997) [1,3,4], though the mechanism of that association remains unclear. Patient presentation often begins with viral-like prodrome, which then progresses to severe psychiatric manifestations [4]. Symptom onset to psychosis is about one week [4], and typically affects patients with no prior psychiatric history. Early recognition and diagnosis of NMDA receptor encephalitis is difficult, but is key in attaining positive outcomes for these patients. Diagnosis requires the presence of anti-NMDA receptor antibodies in serum and/or cerebrospinal fluid (CSF) [3,4]. Screening for ovarian teratoma in female patients is also recommended, as early surgical excision is associated with improved outcomes [1,3]. Brain imaging and electroencephalogram (EEG) are often utilized as adjunct studies, with EEG showing focal or diffuse abnormal activity [3]. In addition to removal of ovarian teratoma if present, first line treatment guidelines recommend corticosteroids, intravenous immunoglobulins, and plasmapheresis [1,3,4]. The majority of patients who present to the Emergency Department (ED) with NMDA receptor encephalitis are misdiagnosed on initial evaluation, with their symptoms being attributed to a psychiatric disorder or other etiology[1]. Here, we present the case of a previously healthy 21 y.o. female who presented to the ED accompanied by police with psychotic symptoms. She quickly progressed to catatonia, and then subsequent seizure activity.. Further workup revealed an ovarian mass on abdominal imaging along with positive serum and CSF anti-NMDA receptor antibodies.

Case Information
A 21-year-old woman with no past medical or psychiatric history presented to the ED early in the morning in police custody. She would not answer questions other than stating "let me go," and required frequent redirection to return to her seat. Police from the scene reported that there was concern for drug use, and that the patient was found on top of her grandmother in the midst of a physical attack. She was noted to be tachycardic with a heart rate in the 100-110s range. Other vital signs were within normal limits. On exam she was alert, handcuffed, and seated in a chair. She had no signs of trauma. Her initial evaluation included a complete blood count (CBC), basic metabolic panel (BMP), blood alcohol level, urine drug screen (UDS), and a computed tomography (CT) scan of her head. All studies were normal. She was referred for evaluation by our psychiatric social work service, and was awaiting inpatient psychiatric placement. By her third day in the ED the patient had stopped communicating, and was no longer eating or drinking. She showed no improvement in her presumed catatonia with benzodiazepines, and no change in psychotic symptoms with olanzapine. She began to show clinical signs of dehydration, including dry mucous membranes, as well as ketonuria and an elevated urine specific gravity. Given concern about her volume status and cessation of oral intake, and possible organic cause of her symptoms, she was admitted to the hospitalist service. That evening the patient had seizure activity. A lumbar puncture was performed and CSF studies were positive for NMDA-receptor antibodies. Further evaluation with pelvic ultrasound CT of the abdomen and pelvis demonstrated an ovarian mass. She was diagnosed with anti-NMDA Receptor encephalitis. Her course was protracted, requiring intubation, tracheostomy, and PEG tube. She underwent a laparoscopy by gynecology for removal of an ovarian teratoma. She slowly had recovery and improvement of her encephalopathy and was transitioned to an inpatient rehabilitation center.

Discussion/Clinical Findings
Anti-NMDA receptor encephalitis is a life threatening condition which was first discovered in 1997 [1] with an incidence of nearly 1.5 million people per year suffering from the disease [6]. The NMDA receptor is an ionotropic glutamate receptor which regulates excitatory synaptic transmission in the CNS. This receptor plays a critical role in the brain's neuronal development and function [3]. Patients who develop anti-NMDA receptor encephalitis often present with viral-like prodrome symptoms including but not limited to fever, vomiting, nausea, fatigue which later progresses to psychiatric manifestions of confusion, hallucinations, mood disturbances, homicidal or suicidal behaviours within a week[1]. Although the vast majority of cases have been associated with ovarian teratomas in female patients, a significant number of cases have been linked to infections including herpes simplex encephalitis and other CNS infections [7]. Due to the atypical presentation of anti-NMDA receptor encephalitis, the majority of patients who present are initially misdiagnosed, and their symptoms attributed to new onset psychiatric disorders [1]. These patients are often referred to psychiatric departments, or treated with antipsychotic drugs, without benefit hence delaying treatment. Delayed diagnosis and intervention is associated with complications including autonomic instability, hypoventilation requiring ventilatory support, intensive care unit (ICU) admission, and death[1,8]. When anti-NMDA receptor encephalitis is appropriately diagnosed, outcomes may be favorable.

Diagnosis involves identifying the presence of anti-NMDA receptor antibodies in the serum or CSF, EEG, and brain MRI [1,3,4]. MRI can be normal, but may show FLAIR signal hyperintensity in the brainstem, basal ganglia, hippocampus [9]. EEG may show focal or diffuse abnormalities in the setting of seizures [3]. Once anti-NMDA receptor encephalitis has been diagnosed, it is important to identify the underlying etiology such as a teratoma which can be further evaluated by pelvic ultrasound, CT or MRI [1]. Following the identification of a teratoma, early surgical excision will result in improved outcomes. First line immunosuppressive therapies include intravenous steroids, immunoglobulins and plasmapheresis, with rituximab and cyclophosphamide as second line therapy [1]. Although cases of Anti-NMDA receptor encephalitis have been reported in patients ranging from 8 months to 85 years old [1] , a review by Dalmau et al report the median age of presentation is 21 years old with a total of 74% of cases constituting of females and 26% males[9]. This female predominance was also demonstrated in a large study in India by Chowdhury et al [7]. Presentations in pediatric populations are similar to the adult populations, but with fewer MRI abnormalities compared to adult groups [7]. Our case of a 21-year-old woman who was initially misdiagnosed as having new onset psychosis, highlights the difficulty of diagnosis of anti-NMDA receptor encephalitis. Current data shows that about 75% of patients recover fully with appropriate treatment, while the remaining percentage die or are severely disabled [9]. Our patient had a protracted course, but ultimately made a full neuropsychiatric recovery after her teratoma resection, IV immunoglobulin, methylprednisolone, and plasma exchange.

Conclusion

Anti-NMDA receptor encephalitis remains a life threatening condition which is difficult to diagnose and treat due to its vague clinical presentation and the absence of clinical guidelines on the treatment and prevention of the disease. It is most prevalent in young females, and associated with ovarian teratomas [1]. Current data on the pathophysiology of anti-NMDA receptor encephalitis is limited and the disease is often misdiagnosed leading to fatal outcomes. Awareness, leading to early detection and intervention by healthcare providers is essential. Future research detailing prevalence, incidence, symptomatology, treatment practice patterns, and patient outcomes worldwide, would be a tremendous resource.

Abstract Title: Narrow interval dual time point 18F-FDG PET/CT: A practical approach for distinguishing radiation necrosis from tumor recurrence in brain metastasis

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Mentor: Atul Aggarwal, MD
Department: Radiology Associates of Richmond
Co-Investigators: 1. Ashwin K Aggarwal, Cornell University 2. Siddhant Prakash, Wake Forest University 3. Douglas J. Vile, Ph.D., Department of Gamma Knife & Neuroscience Center, Johnston Willis Hospital

Abstract

Introduction
Brain metastases are routinely treated by radiation therapy, surgery, or a combination of both. Patients with tumor recurrence (TR) or radiation necrosis (RN) can present similarly both clinically and on brain magnetic resonance imaging (MRI). In such patients, [18F]-fluorodeoxyglucose positron emission tomography/computed tomography (FDG-PET/CT) scans are often used to aid in the differentiation between these 2 diagnoses. Prior studies have demonstrated higher sensitivity and specificity of FDG-PET for tumor evaluation by using dual time point imaging, also known as dual phase imaging, in various organs. Our study demonstrates the efficacy of a narrow interval dual phase imaging with FDG-PET in distinguishing TR from RN by using the interval of 30 minutes for first scan and 90 minutes for second scan after tracer injection.

Methods
35 consecutive patients (22 female, 13 male) with various cancer subtypes, lesion size > 1.0 cm3, and suspected recurrence on brain magnetic resonance imaging (MRI) underwent narrow interval dual phase FDG-PET/CT (30 and 90 min after tracer injection). Clinical outcome was determined via sequential MRIs or pathology reports. Maximum standard uptake value (SUVmax) of lesion (L), gray matter (GM), and white matter (WM) was measured on early (1) and delayed (2) imaging. Analyzed variables include % change, late phase, and early phase for L uptake, L/GM uptake, and L/WM uptake. Statistical analysis ($P < .01$), receiver operator characteristic (ROC) curve and area under curve (AUC) cutoff values were obtained.

Results
Change in L/GM ratio of $> -2\%$ was 95% sensitive, 91% specific, and 93% accurate ($P < .001$, $AUC = 0.99$) in distinguishing TR from RN. Change in SUVmax of lesion alone was the second-best indicator ($P < .001$, $AUC = 0.94$) with an ROC cutoff > 30.5% yielding 86% sensitivity, 83% specificity, and 84% accuracy. Other variables (L alone or L/GM ratios in early or late phase, all L/WM ratios) were significantly less accurate.

Conclusion
Utilizing narrow interval dual phase FDG-PET/CT in patients with brain metastasis treated with radiation therapy provides a practical approach to distinguish TR from RN. Narrow time interval allows for better patient comfort, greater efficiency of PET/CT scanner, and lower disruption of workflow.

Abstract Title: Topical triamcinolone-induced Cushing's Syndrome: the utility of testing for urinary synthetic glucocorticoids in patients with unexplained Cushing's Syndrome

Investigator: Ahuja, Kripa
Mentor: Radwa Osman, MD
Department: Department of Medicine

Abstract

Introduction
Cushing's syndrome (CS) is caused by excess cortisol in the body. While there are many causes of Cushing's syndrome, some of the most common causes include exogenous steroid use and endogenous steroid production such as a pituitary adenoma, an adrenal adenoma, or ectopic ACTH secretion. Various testing modalities can be utilized to determine the etiology of Cushing's syndrome. Commonly used screening diagnostic tests include 24-hour urine cortisol, overnight low dose dexamethasone suppression test, and late-night salivary cortisol. After screening tests, confirmatory tests such as CRH stimulation test and high-dose dexamethasone syndrome can be used to help narrow the etiology. Typical lab assays for cortisol only detect prednisolone, methylprednisolone, or prednisone in terms of exogenous steroids.

Case Information
A synthetic urine glucocorticoid screen was ordered for a 60-year-old female patient presenting with clinical features consistent with Cushing's syndrome. The patient exhibited a constellation of hallmark symptoms, including central obesity with pronounced weight gain, particularly in the face and trunk, which contributed to the development of a characteristic "moon face." She also experienced significant facial redness (plethora), supraclavicular fat pads, and the formation of a dorsocervical fat pad, commonly referred to as a "buffalo hump." These physical changes were accompanied by progressive muscle weakness and proximal myopathy, leading to difficulty in activities such as rising from a seated position. Additionally, the patient complained of easy bruising, skin thinning, and delayed wound healing, particularly on her forearms. Her skin also exhibited purple striae over the abdomen, which is typical in cases of prolonged exposure to high glucocorticoid levels. The patient reported a history of exogenous steroid use, raising suspicion of this as the underlying cause of her Cushingoid appearance. However, despite her pronounced clinical signs, her biochemical workup revealed persistently low levels of urinary free cortisol and adrenocorticotropic hormone (ACTH), leading to a clinical conundrum. To clarify the source of her symptoms, a synthetic urine glucocorticoid screen was ordered to evaluate for the presence of exogenous glucocorticoids that might not be detected by standard assays.

Discussion/Clinical Findings
An elevated triamcinolone acetonide was detected on a synthetic urine glucocorticoid screen, providing a diagnostic explanation for this patient's Cushing's syndrome. The patient explained that she had been rubbing triamcinolone (a topical steroid) on her young daughter who has atopic dermatitis. The patient failed to rinse off her hands after application and instead rubbed the topical steroid into her hands.

Conclusion
A synthetic urine glucocorticoid is a valuable diagnostic test that should be considered in cases of unexplained Cushing's syndrome in the setting of exogenous steroid use with persistently low cortisol and ACTH. Though this laboratory test is a send out test, it can provide significantly helpful information where typical labs do not match clinical presentation.

Abstract Title: Breaking Barriers: Academic and Professional Profiles of Female Chiefs of Surgery

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Mentor: Yifan Guo, MD
Department: Department of Surgery, Division of Plastic & Reconstructive Surgery
Co-Investigators: 1. Mia Cranmer, EVMS MD Program MD2026 2. Sejal Sinha, EVMS MD Program MD2027 3. Victor Yu, EVMS MD Program MD2024

Abstract

Introduction
Although women have historically been excluded from surgical fields, the positive impact female surgeons have on their patients cannot be understated. A 2023 study showed female surgeons have improved postoperative outcomes than male counterparts. In recent years, there have been positive changes for women in medicine. In 2017 there were more female medical students than male. Yet, when looking at female leadership the tune changes drastically; of the 350 of surgical chiefs across the country, only 23 of those positions are held by women.

Methods
Female chairs of surgery were identified on the Association of Women Surgeons website. Background information was gathered from publicly available sources including institutional websites, LinkedIn, and Doximity. Educational background included degrees attained, medical school attended, residency completed, duration of residency, any fellowship training and subspecialty were queried. Professional and academic data included institutional title, years at current institution, distinguished professorships, senior faculty roles, national leadership positions, honors/awards, publications, citations, h-index, and i-10.

Results
Average time from residency graduation to chief of surgery role was 23.8 years. A majority (95.6%) of female chairs completed fellowship training. Surgical oncology was the most common fellowship completed (27.3%). Many (47%) had a secondary degree (MS, MBA, or MPH). On average, each surgeon spent 8.1 years at their institution prior to becoming a surgical chair. The mean number of publications and citations was 208 and 11,428, respectively. Average h-index and i-10 were 56.7 and 151.6, respectively.

Conclusion
Although gender equality in the surgical workplace continues to improve, there is still a large discrepancy in the surgical leadership roles held by women. We aim to provide a tangible pathway for female surgeons early in their careers so they can pursue higher leadership roles.

Abstract Title: The Association Between Tympanostomy Tubes and Speech Outcomes in Individuals with Cleft Palate

Investigator: Allison, Claire
Mentor: Yifan Guo, MD
Department: Department of Surgery, Division of Plastic & Reconstructive Surgery
Co-Investigators: 1. Gabriella Adams, EVMS MD Program 2027 2. Isabel Dashtizad, EVMS MD Program 2027 3. Naser Salem, EVMS MD Program 2027

Abstract

Introduction
Individuals with cleft palate frequently experience difficulties in speech and language development, often exacerbated by hearing loss. Hearing loss is a well-described complication of chronic otitis media (COM), an infection of the middle ear that occurs in 96%-100% of cleft palate patients. The standard treatment for COM is bilateral myringotomy with tympanostomy tube placement (BMTT). While BMTTs have been shown to significantly improve hearing and decrease COM recurrence, the relationship between BMTTs and speech outcomes in individuals with cleft palate is not well described. Additionally, most tympanostomy tubes will fall out spontaneously within 4-18 months, resulting in many individuals with cleft palate receiving multiple sets of tympanostomy tubes if COM or hearing issues persist. While the BMTT procedure is generally regarded as safe, complications such as persistent otorrhea, scarring and perforation of the eardrum, and tympanosclerosis may develop. Currently, there is little research comparing the speech outcomes of individuals with cleft palate who have undergone one BMTT to those who have undergone multiple BMTTs. This study aims to explore whether there is a strong association between BMTTs and speech outcomes in patients with cleft palate.

Methods
100 patient charts were reviewed from CHKD's Cleft and Craniofacial Center. Cleft palate severity was graded using the Veau Classification System: Class I (soft palate only), Class II (hard and soft palate, complete to left/right alveolus, incomplete to left/right alveolus), Class III (unilateral cleft lip/palate), and Class IV (bilateral cleft palate). Only patients with craniofacial anomalies that conformed to the Veau classification were included in the analysis. Speech assessment variables, including nasal air emission, facial grimace, nasality, resonance, and articulation, were evaluated and scored using the Pittsburgh Weighted Speech Score (PWSS), which quantifies velopharyngeal insufficiency (VPI) with a numerical score. A PWSS ≥ 7 indicates VPI. Additional variables considered in the analysis included patient gender, number of BMTT's, patient age at BMTT placement, cleft palate surgery history (date, repair method, age of patient at time of surgery), speech therapy compliance, and post-operative complications. To analyze whether there was a significant difference in speech outcomes between patients who receive one set of ear tubes when compared to those who received multiple sets, Chi-squared analyses were performed. To determine whether there was a proportional relationship between the number of ear tubes a patient receives and their speech score, linear regression was performed.

Results
65 patients could be classified using the Veau classification system (Class I: $n = 7$; Class II, $n = 10$; Class III, $n = 33$; Class IV, $n = 15$). 35 patients with craniofacial abnormalities that did not fit the Veau classification (craniosynostosis, cleft lip only, Pai syndrome) were excluded from analysis. For Veau Class I: 6 patients (85.7%) underwent BMTT placement, with a mean age at placement of 20.3 months and a median PWSS of 4 (range: 0-9). For Veau Class II: 9 patients (90%) underwent BMTT placement, with a mean age at placement of 9 months and a median PWSS of 6 (range: 0-13). For Veau Class III: 28 patients (84.8%) underwent BMTT placement, with a mean age at placement of 19.3 months and a median PWSS of 6 (range: 0-15). For Veau Class IV: 12 patients (80%) underwent BMTT placement, with a mean age at placement of 20.8 months and a median PWSS of 2 (range: 0-15). There was a significant difference in speech outcomes between patients who received one set of ear tubes when compared to those who received multiple sets for Veau Class III ($p = 0.0276$) and Veau Class IV ($p = 0.0488$); however, no significant difference was found for Veau Class I ($p = 0.2525$) and Veau Class II ($p = 0.1714$). Among Veau classifications, only Veau Class I showed a significant proportional relationship between the number of BMTTs and speech outcomes ($p = 0.0158$); no significant proportional relationships were observed for Veau Class II ($p = 0.7219$), Veau Class III ($p = 0.9955$), and Veau Class IV ($p = 0.2683$).

Conclusion
Our findings suggest that individuals with cleft palate who receive multiple sets of tympanostomy tubes are more likely to exhibit velopharyngeal insufficiency, as indicated by the PWSS, when compared to those who receive a single set of tubes. Additionally, the data indicate that the number of BMTTs does not have a significant proportional effect on speech outcomes for most Veau classifications.

Abstract Title: Prevalence of and Risk Factors for Diabetes in Western Tidewater: A Community-Based Screening Study

Investigator: Armstrong, Chase
Mentor: David Lieb, MD
Department: Department of Medicine
Co-Investigators: 1. Abigail McMillan, Department of Medicine 2. Carolina Casellini, Department of Medicine 3. Elias Siraj, Department of Medicine 4. Henri Parson, Department of Medicine 5. Marilyn, Bartholmae, RISE; Department of Psychiatry & Behavioral Sciences 6. Michelle Reed, Department of Medicine

Abstract

Introduction
Diabetes is a growing public health concern particularly in rural, lower income areas. A screening study was conducted in the Western Tidewater area of Virginia, a rural community, to assess the prevalence of diabetes, prediabetes, and their associated risk factors.

Methods
298 Western Tidewater residents were screened for diabetes between April 2022 and May 2024 using point-of-care hemoglobin A1c (HbA1c) and completed blood pressure testing along with surveys assessing demographics, medical history, and social determinants of health. The data were analyzed using generalized linear models, chi-square tests, and descriptive statistics.

Results
18.71% of those screened were found to have diabetes and 28.91% were found to have pre-diabetes compared to the national averages of 11.6% and 38% (National Health Interview Survey, 2022) and Virginia state averages of 9.6% and 33.3% (Dall et. al. 2020). Despite only 6.5% of individuals reporting not having a primary care provider (PCP), 31.05% were unaware if they were prediabetic or diabetic. Of those who did not know their diabetes status, 31.2% were diabetic or prediabetic. Most of the participants who were unaware of their diabetes status were from Suffolk and Franklin zip codes. The mean HbA1c was 5.6% and mean BMI was 32.67 kg/m2. There were significant associations found between diabetes and insurance status (p=.002), education (p=.003), household income (p=.020), poverty status (p=.029), and age (p=.048). Ability to pay utilities (p=.001), food insecurity (p=.001) and sex (p=.046) also significantly affected HbA1c levels according to the generalized linear model.

Conclusion
This study finds a high prevalence of diabetes and prediabetes in a screened population in Western Tidewater Virginia with significant associations with multiple social determinants of health including insurance status, education level, and food security. It also emphasizes the need for greater patient health status education even among those with PCPs. Furthermore, it shows the possible benefits of screening programs targeted towards lower-income, uninsured, undereducated, or food insecure individuals. Future research should investigate the best way to target these screenings toward those most likely to benefit.

Abstract Title: Challenges in Diabetes Management Among Western Tidewater Virginia Residents: A Qualitative Analysis

Investigator: Armstrong, Chase
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Abstract

Introduction
Diabetes is a significant public health issue, particularly in rural, low-income communities. A screening study was conducted in the Western Tidewater area of Virginia, a rural region, to not only assess the prevalence of diabetes and prediabetes and their associated risk factors but also to gather qualitative insights into participants' perceptions and experiences with diabetes management.

Methods
298 individuals living in the Western Tidewater region of Virginia participated in diabetes screening from April 2022 through May 2024. 18.71% of those screened were found to have diabetes and 28.91% were found to have pre-diabetes compared to the national averages of 11.6% and 38% (National Health Interview Survey, 2022) and Virginia averages of 9.6% and 33.3% (Dall et. al. 2020). Follow-up calls were conducted with those individuals that screened positive for prediabetes or diabetes, to better understand the barriers contributing to the higher rates of diabetes for those living in Western Tidewater.

Results
Twenty-six barriers to glucose management were reported and theme analysis was conducted. These barriers were organized into eight categories. From most to least reported they were Exercise, Financial, Diet, Medical, Psychological/Emotional, Access to Care, Perception, and Health Literacy. Black participants were almost three times more likely (2.9) to report having barriers to care than white participants. Of the participants that reported barriers, 42% reported an exercise barrier, 26% reported medical, financial, and diet barriers. 21% reported access to care and psychological/emotional barriers, and 10% reported health literacy and perception barriers. For example, participants discussed how their co-occurring medical issues such as asthma, chronic pain, atrial fibrillation, and shortness of breath prevented them from achieving their physical activity goals. Furthermore, multiple participants reported financial barriers including the high cost of medications for treating diabetes. Financial concerns were also reported to hinder participants' ability to buy healthy food. When it came to psychological/emotion barriers, general lack of motivation, family health problems, and high stress levels were common reasons inhibiting participants' ability to be consistent with diabetes management.

Conclusion
Beyond diving into the data, talking to those most affected and understanding their first-hand experiences is crucial to tackling the public health problem of diabetes. These follow-up discussions offer further clarity into the obstacles faced by diabetics in the Western Tidewater area and offer possible further avenues of exploration for solutions.

Abstract Title: Reducing Mental Health Disparities among Asian Americans though Culturally Competent Care: Insights from In-depth Interviews with Asian Community Stakeholders in Eastern Virginia

Investigator: Bahhouth, Andrew
Mentor: Hongyun Fu, Ph.D.
Department: Department of Pediatrics, Community Health & Research
Co-Investigators: 1. Aishwarya Rajendran, William Carey University College of Osteopathic Medicine, DO Program 2. Cynthia Romero, MD, Department of Family & Community Medicine

Abstract

Introduction
Although Asian Americans (AAs) have historically been stereotyped as a "model minority", recent studies highlight significant mental health challenges among AAs. In particular, AA youth (ages 15-24) and elderly individuals have higher suicide rates than their peers in other racial/ethnic groups. And AAs are 50% less likely than their counterparts to seek mental health services. However, limited qualitative research has systematically explored the underlying mechanisms of mental health disparities among AAs. To address this gap, we analyzed in-depth interview data collected from a diverse sample of Asian Americans as part of a mixed-method Community Health Resources and Needs Assessment (CHRNA) of Asian Americans to inform culturally competent health services and intervention strategies.

Methods
Key-informants (N=65, including 23 Chinese, 25 Filipino and 17 Asian Indians) were recruited between April 2023 and July 2024, using purposive sampling and referrals of Asian community gate-keepers in Hampton Roads of Eastern Virginia. Screening criteria included: 1) persons of Chinese, Filipino, and Asian Indian descent; 2) ages between 18-85 years; and 3) residents of project cities in Hampton Roads. Semi-structured interviews were conducted via Zoom (in English or Chinese), lasting approximately 30-45 minutes, by trained medical students. An Amazon e-gift card ($25) was provided to compensate participants for their time. Data analysis was guided by the Health Equity Framework and grounded theory.

Results
Mental health challenges among AAs were largely associated with the upheaval of uprooting, immigration, acculturation-related stress, and experiences of anti-Asian discrimination and racism. Access to healthcare was further compromised by language barriers, high healthcare costs, and lack of health insurance coverage. Additionally, cultural stigma around mental health contributed to underreporting of problems and reluctance to seek care, driven by a desire to maintain family reputation and harmony. Notably, significant disparities existed across subgroups, with unmet mental health needs being more pronounced among Asian Indians, older individuals, those with lower education levels, and those working in blue-collar professions.

Conclusion
Findings revealed significant mental health challenges and disparities in healthcare among AAs, highlighting the need for community-based efforts to increase awareness and education, as well as systemic interventions to improve cultural competency in healthcare.

Abstract Title: Complex Case of Aortic Stenosis with Self-Expanding TAVR Valve Infolding

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Department: Department of Medicine, Division of Cardiology
Co-Investigators: Jacob D. McAuliffe, MD, Department of Medicine

Abstract

Introduction
This case report focuses on the treatment of a patient with critical aortic stenosis via transcatheter aortic valve replacement (TAVR) which demonstrates the unusual complication of TAVR valve infolding. Risk factors for TAVR infolding include heavy calcification, which this patient exhibited. An Evolut valve was used for this procedure. We posit that careful attention to preimplant valve preparation reduces the likelihood of infolding, as demonstrated by this case in which two successive valves showed infolding ultimately relieved by aggressive valvuloplasty.
Case Information
The patient is a 69-year-old female with a history of five syncopal episodes over past two years. Physical exam was notable for stable vital signs with BMI 40, 3/6 systolic murmur with late peak, and 1+ edema. Transthoracic echocardiogram showed severe aortic stenosis. The patient's aortic stenosis was successfully treated with TAVR, with the final transaortic gradient by echocardiogram being 80 →11 mmHg in this highly stenosed bicuspid valve.
Discussion/Clinical Findings
This case focuses on the treatment of a patient with a bicuspid aortic valve with heavy calcification - TAVR was employed and valve infolding occurred twice before a valve was successfully put in place. An initial balloon valvuloplasty was performed. Subsequent implantation of a self-expanding supra-annular valve resulted in infolding. This was identified, and after a new valve was prepared and deployed, it again showed infolding. More aggressive balloon dilatation with full expansion at high pressure allowed the third and final prepared valve to be safely deployed without recurrent infolding. The first and second TAVRs were infolded due to heavy calcifications surrounding the patient's aortic valve. Thus, repeated balloon aortic valvuloplasty was performed with a high-pressure balloon, which allowed the third TAVR to be successfully inserted.

Conclusion
Overall, TAVR infolding occurred twice due to heavy calcifications around the patient's aortic valve. Following balloon aortic valvuloplasty, the calcifications were compressed, allowing the third TAVR to be successful.

Abstract Title: Prognostication of papillary thyroid microcarcinoma based on preoperative ultrasound

Investigator: Baroody, Michael
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Co-Investigators: 1. Samuel M. Cohen, MD, PhD, Department of Otolaryngology-Head & Neck Surgery, Stanford University School of Medicine 2. Lisa A. Orloff, MD, Department of Otolaryngology-Head & Neck Surgery, Stanford University School of Medicine

Abstract

Introduction
Diagnosis of papillary thyroid microcarcinoma, defined as papillary thyroid carcinoma measuring 1cm or less in greatest diameter, has increased with improvements in ultrasound technology and widespread familiarity and utilization. Given the indolent course of papillary thyroid carcinoma, active surveillance is considered an acceptable alternative to surgical resection for select patients. Candidacy for active surveillance is determined by a number of patient and tumor characteristics. Specifically, the location of the tumor within the thyroid gland plays one of the key roles in decision making. Here we evaluate characteristics of the primary tumor and distance to the thyroid capsule in association with locoregional metastases to help guide risk assessment.

Methods
Retrospective chart review of all thyroid surgeries performed by two surgeons at one medical center from 2014-2021 to evaluate characteristics of papillary thyroid microcarcinoma on preoperative ultrasound that are associated with locoregional metastatic disease.

Results
Our data show a sensitivity of 65% and specificity of 95% for identifying regional metastases in papillary thyroid microcarcinoma using preoperative ultrasound. We found no correlation between regional metastasis and size of tumor, distance to thyroid capsule or trachea, tumor contour, or presence of autoimmune thyroiditis. Nodules in the superior or midpole were associated with central or lateral neck metastases, whereas nodules in the isthmus or inferior pole were only associated with central neck metastases.

Conclusion
Active surveillance may be a reasonable option for even those papillary thyroid microcarcinomas adjacent to the thyroid capsule.

Abstract Title: Analysis of Evidence Based Care in Children and Adolescent Admissions for Primary Eating Disorders

Investigator: Berry, Carter
Mentor: Joanne Mendoza, MD
Department: Department of Pediatrics
Co-Investigators: 1. John Harrington, Department of Pediatrics, CHKD Quality & Patient Safety

Abstract

Introduction
Eating disorders in the pediatric population can require significant medical intervention for nutritional rehabilitation. Prior treatment at CHKD was gradual caloric increases beginning at 1440 kcal/day via nasogastric tube (NG). Recent literature suggests that a more rapid refeeding protocol with an average goal of 1800 kcal/day can facilitate quicker weight gain with no increased rates of refeeding syndrome or hypophosphatemia. Peebles et al. describe a protocol with excellent outcomes using primarily oral (PO) feeding and only utilizing NG tubes for food refusal or medically severe patients. We analyzed the current state of care for patients admitted for nutritional rehabilitation at CHKD and compare it to the emerging evidence to determine where we are succeeding and where there is room to improve.

Methods
Chart review of all patients admitted for nutritional rehabilitation from January 2018-March 2023, and those admitted for nutritional rehabilitation due to a primary eating disorder were included. Statistical process control charts were produced to analyze process, balancing, and outcome measures and identify special cause variation. Subgroup analysis was done evaluating the capture rate and documentation of individuals' reported sexual orientation and gender identity (SOGI) data as this population is at risk for health disparities and eating disorders.

Results
160 patients were identified from January 2018 through December 2023. 114 met inclusion criteria. Mean goal calories at admission was 1329 kCal/day. Mean duration of NG tube use was 4.4 days and mean time to medical stabilization was 8.4 days. 88 (77%) were given phosphorous supplementation with 15 (13%) having hypophosphatemia below 3.0 mg/dL. 18 individuals (16%) had any sexual orientation documented and 29 (25%) had any gender identity documented.

Conclusion
Goal calories at initiation are lower and NG tube use is higher at this facility than current evidence recommendations, reflecting an opportunity for improvement. SOGI data needs to be captured accurately before health disparities can be analyzed. These baseline data are being used to inform an implementation project with higher initial calorie goals and initiation with PO feeding. Implementation science methodology will be used to measure and compare patient outcomes resulting from evidence-based practice changes.

Abstract Title: Long-Term Outcomes of Autologous Free Flap Breast Reconstruction

Investigator: Bhadri, Tarun
Mentor: Lawrence Colen, MD
Department: Department of Surgery, Division of Plastic & Reconstructive Surgery
Co-Investigators: 1. Naser Salem, EVMS MD Program 2. Danxun Li, EVMS MD Program 3. Adam Evans, Plastic Surgery Resident PGY-3

Abstract

Introduction
Mastectomy and lumpectomy are common breast cancer treatments, but their impact on self-image can lead many women to opt for breast reconstruction. Breast reconstruction, using artificial implants or the patient's own tissue, aims to preserve breast shape and self-image. Alloplastic reconstruction uses implants, while autologous reconstruction uses the patient's tissue, requiring microvascular reattachment. Most studies on autologous breast reconstruction focus on short-term outcomes or less than 8 years of follow-up, missing much longer-term complications and satisfaction. This retrospective study examines patient satisfaction and outcomes 20-33 years post microvascular free flap breast reconstruction, providing valuable data for physicians and patients to guide their decision-making.

Methods
We reviewed the records of patients who received either unilateral or bilateral free-flap breast reconstruction between July 1990 and December 2003. This provided us with the patient charts and records from which contact info was utilized for requesting consent and completion of the BREAST-Q, a thorough patient-reported outcome measure to gather feedback from patients that is used for evaluating most types of breast surgery including free-flap breast reconstruction in women for determining long term outcomes. (ex: QOL, satisfaction, self-image, (confidence in) sexuality and identity, recurrent surgeries, clothing fit, pain, changes in nipple sensation.) Thus far, 17 patients have completed the BREAST-Q. Currently, chart review of patients to determine other outcomes (tissue necrosis, infection, hematoma, seroma, flap compromise, patient demographics, and abdominal donor site hernia formation) Patients who completed the BREAST-Q were offered a free visit for evaluation by Dr. Colen for further documentation.

Results

Type of reconstruction (scale is 0 to 1; 1 being best)	TRAM (n=14)	LTP (n=2)	LD+TRAM (n=1)
Satisfaction with recon breasts	0.94	0.92	0.88
Breast sensation	0.43	0.62	0.33
Psychosocial Well-being	0.92	0.70	0.56
Sexual Well-being	0.70	0.71	0.60
Overall Physical well-being	0.85	0.74	0.70
Physical Well-being Breast	0.93	0.84	0.82
Physical Well-being Abdomen	0.94	1	0.82
Physical Well-being shoulder/back	0.98	0.62	0.46
Satisfaction with healthcare team	0.94	0.8	0.98

Conclusion
Breast sensation is negatively affected by breast reconstruction, including free flap reconstruction, on average ranging from 33% to 55% satisfaction in breast sensation. Patients who received a free-flap breast reconstruction reported an average satisfaction of at least 88% across TRAM, LTP, and LD+TRAM flaps at 20 to 30 years post-surgery. Patients who received TRAM reported an average physical well-being of the abdomen 91%, suggesting TRAM flaps are a good option even when considering the loss of abdominis muscle. Further research is needed to a comparative analysis with long-term outcomes for implant-based reconstructions and a normalized BREAST-Q analysis to understand the impact of autologous and implant based reconstructive breast surgery compared to an appropriate control group.

Abstract Title: SIAH Prognosis in Patient Stratification, Cancer Racial Disparity, and Survival Prediction in High-Risk Triple-Negative Breast Cancer (TNBC) treated with Neoadjuvant Chemotherapy (NACT) in Hampton Roads Virginia

Investigator: Bouker, Zachary
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Department: Department of Biomedical & Translational Sciences
Co-Investigators: Claire Piatak, Taylor N. Drake, Caroline Dasom Lee, MD, Emily L. Breeding, MD, Janet S. Winston, MD, Billur Samli, MD, Rick J. Jansen, Ph.D., Michael Danso, MD, Richard A. Hoefer, DO FACS, & Amy H. Tang, Ph.D.

Abstract

Introduction
Triple-negative breast cancer (TNBC) is the most aggressive breast cancer subtype that disproportionately affects BRCA1 mutation carriers and young Black/white women. Supported by strong evidence in developmental, evolutionary, and cancer biology, we hypothesize that persistent EGFR/K-RAS/SIAH pathway activation is a major driving force of TNBC malignancy, racial disparity, early relapse, and high mortality.

Methods
Chart review was conducted using Sentara MD Office/EPIC and VOA iKnowMedicine portals to update tumor relapse, metastasis, and survival in 535 TNBC patients. In this study, we focused on 183 patients who received neoadjuvant chemotherapy (NACT). 5-year survival and pre- and post-NACT SIAH expression were analyzed to determine if survival is associated with SIAH expression, race, and/or other clinicopathological parameters.

Results
We found that a higher SIAH expression in residual tumors post-NACT was associated with lower 5-year survival rates. In a cohort of 48 incomplete responders (pIR) post-NACT, the 5-year survival rate was approximately 2.25-fold higher in patients whose residual tumors had a lower SIAH expression (< 50%) than those with a higher SIAH expression (> 50%) (61.5% vs 27.3%; p=0.02). Similarly, the 5-year survival rate was approximately 3-fold higher in 18 pIR patients with stage 2 residual tumors that had a lower SIAH expression (<50%) than those with a higher SIAH expression (> 50%) post-NACT (100% vs 37.5%, p=0.01). A significant racial disparity was also found for 5-year survival between stage 2 white and black NACT-TNBC patients (95 vs 74%; p=0.005).

Conclusion
A persistent high SIAH expression was associated with reduced survival in high-risk TNBC patients post-NACT. A striking racial disparity in 5-year survival was also detected in Stage 2 TNBC patients who were treated with neoadjuvant therapy. Encouraged by our preliminary data, we aim to develop a SIAH-centered biomarker panel, SIAHHigh (> 50%)/SIAHLow (<50%) by measuring the EGFR/K-RAS/SIAH pathway activation (ON)/inactivation (OFF) to risk stratify pIR patients, detect cancer racial disparities, forecast tumor relapse, and predict survival at 1st-line neoadjuvant settings. We also aim to delineate the molecular underpinning of the Black/white racial disparity in TNBC so that we can provide better, more equitable, high-quality, and precision care to our local community.

Abstract Title: Red cell exchange modulates neutrophil degranulation of myeloperoxidase in sickle cell disease

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Abstract

Introduction
In sickle cell disease (SCD), neutrophils are abnormally activated and contribute to vascular occlusion, leading to complications such as end-organ damage, acute chest syndrome, and stroke.1,2 Red cell exchange (RCE) is a therapy provided to SCD patients to remove sickled RBCs and replace them with healthy donor RBCs.3 Prior work from our lab has shown that RCE resulted in decreased plasma levels of matrix metallopeptidase 9 (MMP9), indicating a reduction in neutrophil tertiary granule release.4 Further investigation on the modulation of RCE on neutrophil primary and secondary granule release is necessary to fully understand the effects of RCE on neutrophil degranulation and hyperreactivity in SCD patients. We hypothesize that RCE will decrease the plasma levels of myeloperoxidase (MPO), which is representative of neutrophil primary granules.

Methods
We aim to establish the effects of RCE on neutrophil primary granule release, by comparing neutrophil degranulation responses and release of MPO in SCD patients before and after receiving RCE therapy. Whole blood samples from 22 SCD patients before and after receiving RCE therapy were collected in ethylenediaminetetraacetic acid (EDTA) collection tubes. Following published Methods , whole blood before (pre-RCE) and after RCE (post-RCE) were incubated with the following agonists at 37°C for 30 minutes: buffer, phorbol myristate acetate (PMA, 500 nM), N-Formyl-Met-Leu-Phe (fMLF, 1 mM), or lipopolysaccharide (LPS, 100 ng/ml). The buffer condition served to measure plasma levels of circulating MPO, and also represented spontaneous neutrophil degranulation. We assessed neutrophil degranulation responses by quantifying plasma levels of myeloperoxidase using commercially available enzyme-linked immunosorbent assay (ELISA) kits (R&D Systems, Minneapolis, MN).

Results
Our findings are obtained from the same study cohort as was included in our recent work.4 In total, 22 patients with sickle hemoglobin (HbSS) receiving steady-state RCE from an outpatient clinic were recruited (Table 1). 11 patients were male and 11 were female. The mean age was 35.4 years (range 20-60 years) and the median age was 33.5 years. From our study population, one patient received a transfusion > 15 months before the study and received a pre-operative RCE before undergoing surgery. Patients received RCE therapy for various indications. At the time of the study, the average number of RCE procedures each patient received was 66.6 ± 74.4, over an average duration of 7.2 ± 8.3 years. The mean HbS was 33 ± 14%, ranging from 15.9 to 64.6%.

Our findings demonstrate a significant decrease in the mean levels of released MPO among 22 patients with SCD following treatment with RCE (Figure 1). Neutrophils, when incubated with various agonists, showed the following trends in MPO release: incubation with buffer resulted in 1208.97 pg/mL before RCE and 677.2 pg/mL after RCE; incubation with PMA resulted in 3184.28 pg/mL before RCE and 1892.71 pg/mL after RCE; incubation with fMLF resulted in 4870.24 pg/mL before RCE and 2734.23 pg/mL after RCE; and incubation with LPS resulted in 3261.48 pg/mL before RCE and 1256.68 pg/mL after RCE. Overall, RCE reduced neutrophil degranulation of MPO by 44% in buffer incubation, 40.45% in PMA incubation, 43.86% in fMLF incubation, and 61.47% in LPS incubation.

Conclusion
Experimental Results support our hypothesis that RCE therapy not only decreases tertiary granule release but also inhibits neutrophil degranulation of primary granules. This is demonstrated by the overall decrease in plasma MPO in patients after receiving RCE, as compared to before receiving RCE. Building upon our previous research showing that RCE also reduces the release of MMP9 from tertiary granules, we uncover the role of RCE therapy in modulating neutrophil degranulation.4 In SCD, abnormally activated neutrophils exhibit enhanced adhesion to the endothelium, platelets, and RBCs, consequently leading to complications including end-organ damage, acute chest syndrome, and stroke.1,2 Our study underscores the role that RCE plays in modulating neutrophil hyperreactivity in SCD patients. Future studies will focus on analyzing neutrophil degranulation responses and the release of lactoferrin, which is representative of secondary granules.

Abstract Title: Novel Percutaneous Repair of Femoral Pseudoaneurysms using Perclose ProGlide: A Case Series

Investigator: Burnett, Emily
Mentor: Animesh Rathore, MD
Department: Department of Surgery, Division of Vascular Surgery
Co-Investigators: 1. Nicholas, Bandy, MD, Vascular Surgery Fellowship 2. Benjamin Samberg, B.S., EVMS MD Program 3. Thomas Cook, B.S., EVMS MD Program 4. Jacob Hoffman, B.A., EVMS MD Program 5. Sergio Sastriques, MD, Integrated Vascular Surgery Residency

Abstract

Introduction
This case series details the novel use of the Perclose ProGlide closure device to successfully repair three separate cases of iatrogenic femoral pseudoaneurysms (PSAs), one of the most common complications following femoral arterial access. Conventional treatment Methods of ultrasound-guided compression, duplex-directed thrombin injection (DDTI), or open surgical repair were contraindicated in these patients due to unique anatomy or advanced comorbidities.

Case Information
In the first case, a 73-year-old female had an access site PSA off the superficial femoral artery (SFA) with concomitant arteriovenous fistula (AVF) and advanced cardiac disease. The ProGlide device was deployed through the PSA neck with successful hemostasis. In the second case, a 78-year-old male had an asymptomatic access site PSA with a short and wide neck, as well as an endoleak following physician modified Thoracic Endovascular Aortic Repair (TEVAR). Access to repair the endoleak was obtained through the PSA neck. The ProGlide was successfully deployed following endoleak repair. In the third case, a 70-year-old female with chronic osteomyelitis of the left foot developed a left femoral PSA with a short and wide neck following bilateral lower extremity vascular interventions. The ProGlide was successfully deployed through the PSA neck, and the patient recovered well. All three patients maintained distal flow after ProGlide deployment.

Discussion/Clinical Findings
Conventional treatment Methods for PSAs include ultrasound-guided compression, DDTI, and open surgical repair; however, these treatments may be inappropriate for patients with underlying comorbidities or complex anatomy. Ultrasound-guided compression has the disadvantage of being uncomfortable with moderate primary success rates. DDTI is limited by PSAs with larger diameters and wide necks. Open surgical repair comes with the added risk of poor wound healing or the physiologic burden of general anesthesia in critically ill patients. For these reasons, we describe our experience successfully using the ProGlide device to repair femoral PSAs with several anatomic variations, including short neck, wide neck, and concurrent AV fistula.

Conclusion
Further evaluation of the efficacy of the ProGlide device as a treatment modality for PSAs is required. This case series provides preliminary evidence supporting its potential as a modality to address iatrogenic femoral pseudoaneurysms.

Abstract Title: Assessment of fetal liver volumes in patients with pregestational diabetes compared to controls

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Department: Department of Obstetrics & Gynecology
Co-Investigators: 1. Alfred Abuhamad, MD, Department of Obstetrics & Gynecology 2. Jerri Waller, MD, Department of Obstetrics & Gynecology

Abstract

Introduction
Inadequate glucose control during pregnancy, as seen in women with pregestational diabetes, leads to excess insulin production in the neonate, often resulting in detrimental neonatal outcomes and abnormalities. Ultrasound can be used to assess fetal growth abnormalities in individuals with diabetes, such as fetal liver volumes. The goal of our study was to determine if increased fetal liver volumes are observed in patients with diabetes compared to controls and to assess if increased liver volumes result in elevated transcutaneous bilirubin (TcB) levels in the newborn.

Methods
This was a single-center, prospective case-control study. Singleton pregnancies were consented for ultrasound (US) in the third trimester, between 30 and 34 weeks. Fetal biometry and three-dimensional (3D) fetal abdominal volumes were collected at each US visit. The fetal liver volume (FLV) was calculated from the 3D abdominal volumes using the standard VOCAL technique. Descriptive statistics were calculated for all study variables. The independent t-test and chi-square test for independence were performed where appropriate. All hypothesis testing was carried out at the 95% significance level, unless otherwise specified, with a P-value of <0.05 accepted as statistically significant.

Results
Of the 66 pregnancies enrolled in the study, 22 (33%) had pregestational diabetes, and 44 (66%) did not. Cases were more likely to have chronic hypertension (8/22 [38.1%] vs. 1/44 [2.3%], $P<0.001$) and a higher BMI (35 vs. 25, $P<0.001$). No other significant differences were noted between the groups. Fetal liver volumes were found to be larger on average in patients with diabetes compared to controls (115.88 cm3 vs. 114.29 cm3).

Conclusion
Pregnancies affected by pregestational diabetes are more likely to experience macrosomia, with fetal liver volume contributing significantly to the abdominal circumference. Our study showed that liver volumes in patients with diabetes, compared to controls, were on average larger. However, the study may be underpowered to detect a significant difference. Other components of the abdominal circumference, including abdominal fat mass, could contribute to macrosomia in pregnancies affected by diabetes. Further prospective studies are needed to assess the clinical significance of these findings in newborns.

Abstract Title: Stem Cell Targeted Therapy in Breast Cancer

Investigator: Chaw, Phyu
Mentor: Kan Wang, MD
Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1. Remy Lloyd, EVMS MD Program 2. Daiwik Munjwani, EVMS MD Program

Abstract

Introduction
Breast cancer is one of the most common forms of gene mutation related cancers in women (Van Pham, 2015). Current studies have established that BRCA1 strongly inhibits ER-a activity in breast cancer cells and blocks estrogen (ES) stimulated gene expression and cell proliferation. The BRCA1 repression of ER-a activity is due to a physical interaction between BRCA1 and ER-a protein, and this interaction acts as a breaking system for estrogen, driving breast cancer development. Treatment efficacy of breast cancer is often low while potential for remission of the tumor is high. As a result, new strides have been made in identifying potential treatment and therapy options following diagnosis. It is suggested that breast cancer, both hereditary and sporadic tumorigenesis, is caused by dysregulation in the cancer stem cell renewal and differentiation pathways (Zeng et al., 2021). Though the composition of breast cancer is primarily bulk-tumor cells, a subpopulation of breast cancer stem cells (BCSCs) has been suggested to contribute to the resistance of tumors to treatment options such as chemotherapy and surgical removal (Scioli et al., 2019). BCSCs possess stem cell features, namely self-renewal capacity, which allow for regeneration of both bulk-tumor cells and cancer stem cells. Recent improvements in breast cancer treatment and therapy have enhanced the potential of targeting BCSCs. Our project focuses on this possible targeted therapy. Our lab previously developed a homing peptide that is composed of two binding domains: a high-affinity estrogen receptor binding domain intended to target breast cancer cells, and a low affinity doublecortin-like kinase 1 (DCLK-1) binding domain which is a universally identified cancer stem cell marker. The compound would have the potential to mimic BRCA1 functionality to suppress breast cancer proliferation as it pertains to gene transcription. Following development of the structure of the homing peptide, we asked the following question: what is its binding affinity against BCSCs?

Methods
We began our investigation by culturing a BCSC line derived from an estrogen receptor positive, progesterone receptor positive, and HER2 negative breast cancer cell line, MCF7. Following development of the BCSC line, we tested the binding of the developed homing peptide. P100 plates were coated with a polylysine solution. Polylysine is a positively charged molecule which, when coated onto tissue-culture surfaces, promotes the attachment and growth of cells. After the MCF7-derived BCSCs were cultured on the polylysine-coated plates reached confluency, they were trypsinized and mechanically disassociated. Cell cultures were seeded onto new plates with a 0.1 μM concentration of the homing peptide and incubated for 1 hour. Following incubation, cells were washed with a phosphate-buffer solution three times, then stained with DAPI, a fluorescent stain that binds strongly to DNA sequences in cell nuclei, and a CD133 fluorescent-antibody marker, a common cell surface molecule in stem cells. The homing peptide itself contained rhodamine, an additional staining molecule. The stained cells were observed via fluorescence microscopy.

Results
Following this procedure, the homing peptide was observed to successfully bind to MCF7-derived BCSCs. The homing peptide had an affinity for the MCF7-derived BCSCs at homing peptide concentrations as low as 0.1 μM. Stem cell properties of the derived cell line were confirmed through CD133 fluorescent staining.

Conclusion
Our work demonstrates the efficacy of this homing peptide to guide the novel homing peptide to MCF7 BCSCs, providing proof of concept that this combination could stand as a potential candidate breast cancer therapy, perhaps for those cancers specifically relapsed after surgery or first-line chemotherapy as a result of BCSC proliferation. However, more work is needed to establish any inhibitory or toxigenic effect the homing peptide may have on this cell line. Further work should also investigate the use of this homing peptide on native rat or human BCSCs to determine its pharmacokinetics, affinity, toxicity, and anti-tumor effects.

Abstract Title: Investigating the potential contribution of TRIM72 to the mitigation of lung fibrosis by modulating ZEB1 signaling

Investigator: Choi, June
Mentor: Nagaraja Nagre, Ph.D.
Department: Department of Biomedical & Translational Sciences

Abstract

Introduction
Idiopathic pulmonary fibrosis (IPF) represents the predominant form of idiopathic interstitial pneumonia, characterized by progressive lung fibrosis. The pathogenesis of IPF involves repeated injury to alveolar epithelial cells (AECs), which accelerates epithelial cell loss and fibrosis. Our previous research has demonstrated that the Tripartite motif containing 72 (TRIM72) is expressed in AECs and plays a crucial role in repairing damaged membranes of AECs, thereby mitigating lung injury and facilitating AEC repair. Preliminary findings from our laboratory indicate an increased expression of Zinc-Finger E-Box Binding Homeobox 1 (ZEB1), a key regulator of epithelial-mesenchymal transition (EMT), in AECs from TRIM72 knockout mice compared to wild-type (WT) epithelial cells following fibrosis. This study aims to elucidate the regulatory role of TRIM72 in controlling ZEB1 expression within models of lung injury and fibrosis and to explore the consequences of TRIM72-mediated suppression of ZEB1.

Methods
Rat lung epithelial cells (RLE-6TN) with or without lentivirus-mediated TRIM72 overexpression were cultured and exposed to 25 mM bleomycin to induce injury and fibrosis. Western blotting was performed to examine ZEB1 and epithelial marker cadherin (E-cadherin) expression. Pulmonary fibrosis was induced by intratracheal administration of bleomycin (1.5 U/kg) in WT and AEC-specific TRIM72KO (SPC-TRIM72KO) mice. Immunostaining was used to analyze ZEB1 and mesenchymal marker a-smooth muscle actin (a-SMA) expression in lung tissue from WT Vs SPC-TRIM72KO mice post-fibrosis. Lung injury and fibrosis were evaluated by hematoxylin and eosin staining and Masson's trichrome staining respectively. ZEB1 and TRIM72 expression was further assessed in human lung tissues from normal and IPF lungs using immunostaining.

Results
ZEB1 expression was upregulated while E-cadherin expression was downregulated in RLE cells in response to bleomycin. However, TRIM72 overexpression reversed these changes. SPC-TRIM72KO mice had elevated expression of ZEB1 and a-SMA levels in the lung as compared to WT counterpart post-fibrosis. We did observe significantly higher lung injury and fibrosis in SPC-TRIM72KO mice as compared to WT mice as revealed by immunostaining. Immunostaining further confirmed that ZEB1 expression was elevated in human fibrotic lung tissue, as compared to normal lung.

Conclusion
Our findings indicate that TRIM72 mitigates epithelial-mesenchymal transition mediated by ZEB1, leading to a reduction in lung fibrosis. This underscores the potential of targeting alveolar epithelial cell membrane repair via TRIM72 as a promising approach for developing therapies against idiopathic pulmonary fibrosis (IPF).

Abstract Title: Common Imaging Findings in Volvulus of the Gastrointestinal Tract

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Mentor: Garrett Rucker, MD
Department: Department of Radiology
Co-Investigators: 1. Swachchhanda Songmen, Department of Radiology (Attending)

Abstract

Introduction
Volvulus of the gastrointestinal tract continues to pose a diagnostic challenge for many radiologists. The clinical symptoms associated with volvulus, such as pain, nausea, and vomiting, are nonspecific and can complicate the diagnosis. Imaging plays a crucial role in identifying volvulus, relying heavily on the radiologist's interpretation. Prompt diagnosis is essential to prevent severe complications, including bowel ischemia, infarction, and perforation. In this paper, we present four cases of patients with different types of volvulus to illustrate common imaging findings. These examples aim to assist radiologists in making timely and accurate diagnoses, ultimately improving patient care.

Case Information
Case #1: A 15-year-old female with no significant medical history presented with severe left upper abdominal pain, nausea, and vomiting. Her initial CT of the abdomen/pelvis showed a massively distended stomach with multiple radiodense foci, likely ingested content, and rotation along the short axis, with the antrum over the gastroesophageal junction, indicative of mesenteroaxial volvulus causing gastric outlet obstruction. She underwent urgent laparoscopic gastric detorsion and was discharged within two days post-surgery. No follow-up CT was performed after discharge. Case #2: A 92-year-old female with a history of peripheral artery disease, hypertension, chronic kidney disease stage 3, and diastolic heart failure presented with acute abdominal pain. Her CT of the abdomen/pelvis revealed a thickened antral wall of the stomach, a swirl sign compressing the venous system, and narrowing of the superior mesenteric artery. Additionally, multiple small bowel loops exhibited diffuse mesenteric edema. The findings suggested possible small bowel volvulus leading to superior mesenteric vein compression. She was managed conservatively and discussed for potential elective surgery in the future. Case #3: A 53-year-old female with no significant medical history presented with acute abdominal distension and pain. Initial lab tests showed no leukocytosis and a negative urinalysis. CT of the abdomen/pelvis revealed decompression of the distal rectum with no small bowel dilatation or thickening. However, the CT showed mesenteric twisting in the right lower quadrant consistent with cecal volvulus. The patient underwent urgent exploratory laparoscopy with right hemicolectomy and was successfully treated, being discharged after 6 days. Case #4: A 74-year-old female with a history of Parkinson's disease presented with increasing abdominal distension, pain, nausea, and vomiting. CT of the abdomen/pelvis revealed twisting of the vascular pedicle, a reversal of the sigmoid segment's position with a transition point in the left pelvis and dilated large bowel loops with fluid-filled areas. She was urgently treated with sigmoidoscopy for decompression and was discharged after 7 days.

Discussion/Clinical Findings
Volvulus of the gastrointestinal tract can present in multiple ways, including gastric, midgut, cecal, and sigmoid volvulus. Each of the presentation differs significantly in the CT of abdomen/pelvis. All of these conditions can lead to acute abdomen changes, such as bowel infarction, perforation, and even death if not treated on time. Most cases of volvulus cannot be diagnosed clinically since the symptoms are rather nonspecific. CT of abdomen/pelvis is commonly used to find the abnormalities of the gastrointestinal tract and the findings differ case by case depending on the type of volvulus. Gastric volvulus is rare, often presenting with epigastric pain, nausea, and vomiting. Diagnosis is aided by Borchardt's triad: sudden epigastric pain, intractable retching, and difficulty passing a nasogastric tube. The two main types are organoaxial volvulus, where the stomach rotates along the long axis, shifting the greater curvature above the lesser curvature, and mesenteroaxial volvulus, where rotation along the short axis displaces the antrum above the gastroesophageal junction. Radiographic findings may show herniation of a large portion of the stomach above the diaphragm, with an upper gastrointestinal series helping to determine the type of rotation. Midgut volvulus primarily affects infants, presenting with bilious vomiting and intermittent abdominal pain within the first month of life. However, due to the increased use of CT imaging, it is now also being identified more frequently in adults. Conventional radiography often yields nonspecific Results, so an upper gastrointestinal series with fluoroscopy is essential for diagnosis. On fluoroscopic imaging, the ligament of Treitz is abnormally positioned below and to the right of the left lumbar pedicle, and a twisted segment of the bowel may appear with a corkscrew-like appearance. CT imaging can reveal swirling of the vessels in the mesenteric root, which is indicative of volvulus. Cecal volvulus Results from abnormal fixation and motility of the right colon. Factors such as pregnancy or recent colonoscopy can trigger this condition. Unlike other types of volvulus, cecal volvulus is typically diagnosed with a CT scan of the abdomen/pelvis. The CT will reveal a dilated, gas-filled viscus located abnormally in the left upper quadrant and mid-abdomen. A whirl sign may be observed, indicating the presence of volvulus. A contrast enema can further assist in diagnosis by showing a decompressed distal colon and a beak-like tapering at the site of the volvulus. Sigmoid volvulus is the most common type of colonic volvulus, accounting for 60-75% of cases. It is often associated with chronic constipation and sigmoid colonic redundancy, which can result from a low-fiber diet, pregnancy, hospitalization, or Chagas disease. Patients typically present with nonspecific abdominal pain and signs of obstruction. CT imaging of the abdomen/pelvis usually reveals a large, air-filled bowel loop extending from the pelvis to the level of the transverse colon, a finding known as the "northern exposure sign." Additionally, the "coffee bean sign" may be observed, indicating a dilated sigmoid colon that resembles a coffee bean. A U-shaped closed-loop appearance of the colon can also be seen. If the diagnosis remains unclear, a water-soluble contrast enema can be used. This may reveal a beak-shaped narrowing at the distal aspect of the twisted sigmoid colon.

Conclusion
In patients with gastrointestinal volvulus, a CT scan of the abdomen and pelvis is crucial for accurate diagnosis. Clinicians often suspect other conditions before seeing the CT Results. Recognizing the imaging features of volvulus is essential to prevent serious complications such as bowel infarction, perforation, and ischemia.

Abstract Title: Innovation or Replication? Learning From the Prior Experiences of Trial Recruitment

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Co-Investigators: 1. Julie Sill, Ph.D., MDEHS, Department of Medicine. 2. Jordan Pettaway, M.S., Department of Medicine, Endocrine & Metabolic Disorders 3. Jankiben Patel, M.P.H., Department of Medicine, Endocrine & Metabolic Disorders 4. Henri Parson, Ph.D., Department of Medicine

Abstract

Introduction
Optimal clinical trial recruitment strategies are not completely known. Recruitment is difficult and costly and many trials fail to meet their recruitment goals despite multiple strategies.

Methods
A literature review helped determine prior barriers to trial recruitment and prior successful recruitment strategies. We analyzed retrospective data from our site's trial recruitment log for the GRAIL Pathfinder 2 trial (a nationwide, prospective and interventional multi-cancer detection trial). Our site's recruitment data was then classified as 1) replication of prior successful strategies (face-to-face office visit, presentations at community events, paper flyers with the study's information, and word of mouth), 2) replication of prior unsuccessful strategies (radio ad and study hotline) or 3) innovative method (prior study research participant). An interview was conducted with our institution's GRAIL study Research Associate to gain qualitative insight on the trial's recruitment processes. Descriptive statistics were utilized for the data extracted from the recruitment log. Qualitative coding was completed for an exploratory analysis using descriptive coding for the interview data.

Results
Our site recruited 47 patients between September 1st, 2023 and February 1st, 2024. The most successful recruitment strategy was face-to-face office visits (16 patients). Other successful strategies included a radio ad (8 patients) and paper flyers with the study's information (8 patients). Unsuccessful and less successful strategies included a Facebook post (0 patients) and a study hotline (1 patient). Replication of prior successful Methods resulted in 31 patients (66%) being recruited. Replication of prior unsuccessful Methods resulted in 9 patients (19%) being recruited. Finally, using innovation, we recruited 7 patients (15%) who had participated in previous study site trials. The qualitative interview with our Research Associate demonstrated that the greatest barrier to recruitment was the inability to enroll volunteers who are not registered through our medical group.

Conclusion
This study demonstrates that trial recruitment should focus on strategies that have been previously successful. An exciting new recruitment strategy which needs to be explored further is enrolling patients from previous trials. Our single site study is limited due to a small sample size from the first five months of recruitment.

Abstract Title: Displaced Aortic Endograft Rescued by Endoscopic Biopsy Forceps Pullback

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Abstract

Introduction
Treatment of abdominal aortic aneurysms (AAAs) is generally pursued via open, endovascular, or hybrid approaches depending on patient anatomy and comorbidities. Physician-modified endografts (PMEGs) are back table modified prior to deployment to exclude the aneurysm, maintaining flow to mesenteric and renal arteries in patients with inadequate seal zones. Displacement of the graft during deployment can lead to acute mesenteric or renal ischemia. Here, we present a case where a displaced and kinked PMEG was rescued using a novel pullback technique with endoscopic biopsy forceps.

Case Information
An 81-year-old male with prior endovascular aortic repair (EVAR) for AAA, thoracic endovascular aortic repair (TEVAR) for a penetrating atherosclerotic ulcer, and extensive cardiopulmonary and renal comorbidities presented with back pain, aneurysmal sac enlargement from 3 to 6.2 cm over three years, and periaortic stranding concerning for impending rupture. Computed tomography angiography (CTA) demonstrated a type Ia endoleak and occlusion of the right renal artery leading to kidney atrophy. He was a poor candidate for open repair. His solitary left kidney precluded off-the-shelf devices. Urgent endovascular repair was planned using a PMEG. Given the patient's urgent presentation, a PMEG solution was entertained and physician modification of the Zenith Alpha Thoracic Endovascular Graft (Cook Medical, Bloomington, IN) was performed adding fenestrations for the celiac, superior mesenteric, and left renal arteries. Bilateral common femoral arteries were accessed, and the PMEG was introduced and partially deployed at the infrarenal aorta. The pre-marked fenestrations were aligned anatomically with computed tomography (CT) fusion assistance. All fenestrations were cannulated. The PMEG was fully deployed prior to fenestration stenting. A partial kink in the distal landing zone within the old EVAR was noted with incomplete apposition of the PMEG and existing abdominal endograft. Balloon angioplasty was attempted without success. Endoscopic forceps were advanced using a 7 French (Fr) sheath from the right common femoral artery, and downward traction was applied to the left lateral aspect of the PMEG. The kink resolved after the graft was carefully pulled down and all fenestrations were noted to be in proper alignment. Target vessel stents were deployed and angiography confirmed patency of all stents with successful aneurysm exclusion. The patient tolerated the procedure well. During recovery he developed pneumonia before being discharged on postoperative day (POD) 16 to a skilled nursing facility. He had multiple admissions in the following months with cardiopulmonary issues unrelated to aneurysmal complications. Ultimately he transitioned to comfort measures, expiring on POD 65.

Discussion/Clinical Findings
Multiple techniques have been described for the repair of type Ia endoleaks after EVAR including open surgical repair, endoanchors, extension of the initial repair with additional stents and or grafts, and fenestrated endograft implantation. A 2021 study by Doumenc et al suggested that fenestrated EVAR (FEVAR) had decreased early morbidity compared to open surgical repair. O'Donnell et al found that open repair is associated with better long term survival, while endovascular repair displayed better Results in patients with advanced age or comorbidities. Given this patient's extensive comorbidities, his operative risks were prohibitive for open repair, prompting endovascular repair with a fenestrated PMEG. PMEG use is not currently FDA-approved, but given this patient's complicated anatomy, it was deemed the best option available. The instructions for use of the Zenith Alpha Thoracic Endovascular Graft (Cook Medical) chosen for the procedure state that the diameter of the distal and proximal aneurysmal neck must be between 20-42 mm. The choice of the 32 mm graft allowed for adequate seal in the previous endograft which was measured to be 23 mm. An alternative option would be coverage of the left renal artery rather than fenestration, but this would have mandated permanent dialysis as the patient only had one functioning kidney due to an occluded right renal artery. During PMEG deployment, the resulting kink was possibly due to the re-sheathing process, however an endograft kink can occur for a variety of reasons when overlapping two endografts, with sizing, deployment, and placement issues being common causes (e.g. tilt and angulation). After an unsuccessful attempt at balloon angioplasty to resolve the kink, there were no well-established techniques available to address the issue endoscopically, usually necessitating a transition to open repair. The patient's comorbidities offered a grim prognosis for open repair, so an alternative approach was taken using endoscopic forceps as described above.

Conclusion
We detail the use of a PMEG to manage a patient with juxtarenal graft endoleak from previous EVAR. During PMEG deployment, a kink in the distal landing zone prevented an adequate seal and did not resolve with balloon angioplasty. PMEG pullback with endoscopic biopsy forceps resolved this kink and ensured proper graft alignment. This technique successfully created optimal overlap between the two endografts and prevented open conversion.

Abstract Title: The Relationship Between Adhesive Capsulitis and Metabolic Disorders

Investigator: Cornelius, Julia
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Department: Department of Surgery, Jordan-Young Institute for Orthopedic Surgery & Sports Medicine
Co-Investigators: 1. Justin W. Griffin, MD, Jordan-Young Institute for Orthopedic Surgery & Sports Medicine 2. Eric C. Hayes, B.S., MD Student 3. Katherine S. Worcester, M.S., Jordan-Young Institute for Orthopedic Surgery & Sports Medicine 4. Jillian L. Meyers, M.S., Jordan-Young Institute for Orthopedic Surgery & Sports Medicine

Abstract

Introduction
Adhesive capsulitis (AC) of the shoulder, often termed "frozen shoulder," is a common clinical condition characterized by restricted active and passive range of motion at the shoulder joint, frequently associated with pain. AC affects 3-5% of the general population and up to 20% of those diagnosed with diabetes mellitus (DM). There is also evidence of association between AC and hyperlipidemia (HLD), specifically low-density lipoprotein (LDL). While many studies have shown a strong relationship between the prevalence of AC and DM, the use of AC diagnosis as an indication for metabolic disorder testing has been poorly studied. One prior study did find a 38.6% prevalence of DM in patients with AC, and 32.95% prevalence of pre-diabetes in patients with AC, however this study utilized a relatively small sample size and did not test for other metabolic disorders such as HLD. We hypothesized that a large portion of patients with newly diagnosed AC have an undiagnosed metabolic disorder such as diabetes or hyperlipidemia.

Methods
Patients of two orthopedic surgeons at a private practice were identified from clinic schedules between 2022 and 2023 and screened for study eligibility. Patients were included if they were at least 18 years old and had a new clinical diagnosis of AC. Patients were excluded if they had any prior diagnoses of AC, DM or HLD, prior shoulder surgery, chronic pain disorders, or lab work performed within the past 6 months. Following informed consent, participants obtained fasting blood glucose (FBG), HbA1C, and lipid panel lab work. Participant demographics, AC characteristics, and labs were then collected via chart review for analysis. Enrolled patients were informed of their lab Results by a research team member and recommended follow-up with their primary care physician in cases of elevated values. All values were graded based on CDC guidelines. Descriptive statistics were performed on patient demographics and lab Results using Microsoft Excel.

Results
Of 20 patients who signed informed consent, a subsequent 15 eligible patients obtained labs. Patient ages ranged from 38 to 71 years old, with a mean of 57. There were 12 females (80%) and 3 males (20%). By BMI, 6 (40%) participants classified as overweight and 3 (20%) classified as obese. AC presented equally in each shoulder (7 right, 8 left). By HbA1C, 11 (73%) were normal, 3 (20%) had pre-DM, 1 (7%) had DM. By FBG, 4 (27%) had pre-DM and 1 (7%) had DM. Nine (60%) had elevated cholesterol, 10 (67%) had elevated LDL, 2 (13%) had elevated triglycerides, and all had a high-density lipoprotein (HDL) value greater than 40.

Conclusion
This study found that the majority of participants are not diabetic or pre-diabetic but do have elevated cholesterol (>200 mg/dL) and LDL (>100 mg/dL), which is consistent with prior studies on AC and HLD. The 60% prevalence of elevated cholesterol in this study is much greater than CDC population data, which reports a prevalence of 15.1% in those aged 40-59. As participants did not have any previously diagnosed metabolic disorders, the Results of this study suggest that a new diagnosis of AC may indicate underlying HLD. However, our data is limited by small sample size, which may reflect the relative participant burden of fasting, traveling to a lab site, undergoing needle for phlebotomy, and having blood drawn. Future research can further define the strength of the relationship between AC and HLD, as well as consider whether a new diagnosis of AC warrants routine testing for metabolic disorders in all patients.

Abstract Title: Itemizing Patient Safety Events in a New Children's Mental Health Hospital

Investigator: Cottle, Hayden
Mentor: John Harrington, MD
Department: Department of Pediatrics, CHKD Quality & Patient Safety
Co-Investigators: 1. Maya Rao, EVMS MD Program Student 2. Yvette Conyers R.N., M.S.N., CHKD Quality & Patient Safety 3. Turaj Vazifedan, D.H.Sc., CHKD Department of Pediatrics

Abstract

Introduction
Patient safety is one of the most important aspects of care management in healthcare. While substantial efforts have been made to improve patient safety in most facilities, in-patient pediatric mental health represents an area with unique challenges that require consideration. In October 2022, the Children's Hospital of The King's Daughters (CHKD) opened an in-patient pediatric mental health facility known as the Children's Pavilion (CP). The aim of this study was to gain a clearer understanding of the types of safety events that occurred within the first 17 months of operation at the CP.

Methods
All safety events for the CHKD event reporter (VERGE) were tabulated with duplicate and non-patient events subtracted. Events were then divided into three broad categories: behavioral, care management, and patient protection. These categories were further divided into more specific subcategories such as assault, medical events, and facilities issues. Data on the use of restraint and patient demographics (race, ethnicity, age, and biological sex) were also collected. Descriptive statistics were performed to summarize the distribution of events.

Results
959 safety events were obtained from the CHKD event reporter (VERGE) and filtered to exclude duplicate events and those unrelated to patient safety. The remaining 772 events were then categorized into three broad groups, based on their respective descriptions: behavioral (BE), care management (CM), and patient protection (PP). Preliminary Results show that BE were most common at 58% of all events, while CM and PP comprised 20% and 22%, respectively. Among BE, assaults on staff were most common (70%), followed by assaults on other patients (16%). For CM, medication events were most frequent (36%), followed by staff communication issues and patient relations (both 19%). In PP, contraband events were most common (34%), followed by facilities issues (25%), and self-harm (11%). 209 events involved the use of some form of restraint.

Conclusion
Preliminary findings suggest that behavioral events are the most common safety events at the CP. These Results underscore the urgent need for safety measures to protect both staff and patients from violence. Future research should focus on identifying effective strategies to reduce behavioral events in these settings.

Abstract Title: Management of Vestibular Schwannomas in Pregnancy: A Mini-Case Series

Investigator: Cranmer, Mia
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Department: Department of Surgery, Sentara Neurosurgery Specialists
Co-Investigators: 1. Hayden Cottle, EVMS MD Program 2027 2. Karma, Barot, EVMS MD Program 2025

Abstract

Introduction
Vestibular schwannomas (VS) are Schwann cell-derived lesions that originate from the vestibular segment of the eighth cranial nerve at the cerebellopontine angle (CPA). Roughly 40 cases of VS diagnosed or causing symptoms during pregnancy have been globally documented in the literature. Corresponding to this paucity is the lack of in-depth discussion on the experience of managing these tumors, which can culminate in devastating consequences for both the mother and fetus (e.g. increased intracranial pressure (ICP), hydrocephalus, gestational hypertension, and premature delivery), we present two cases of VS during pregnancy. Here we present two cases of VS during pregnancy to emphasize the importance of a coordinated, multi-disciplinary approach involving neurosurgery, obstetrics, and anesthesia.

Case Information
Patient 1 is a 27-year-old G2P1 female with noncontributory history who presented with nausea, vomiting, headache, gait disturbances, lower extremity weakness, facial droop, and visual changes at 31 weeks gestation. Symptoms had been persistent and worsening since 11 weeks. MRI demonstrated a 4.5 x 3.7 x 3.6 cm, extra-axial, left posterior fossa mass with extensive mass effect on adjacent structures including the brainstem, left middle cerebellar peduncle, fourth ventricle, and left cerebellum. An EVD was placed, and the patient was scheduled for c-section. She underwent emergency c-section at 33 weeks due to spontaneous rupture of membranes. Left retrosigmoid craniotomy was then performed for tumor resection. Pathology confirmed VS. Post-operatively, the patient experiences 7th nerve palsy, headaches, and depression which have all shown gradual improvement. At 1-year follow-up, MRI demonstrated stable residual enhancement that continues to be monitored. Patient 2 is a 28-year-old G1P0 female with noncontributory history who presented with intermittent headaches, tinnitus, and blurred vision at 19 weeks. MRI showed a 4.5 cm right CPA mass with local mass effect and hydrocephalus. She was followed outpatient with a plan to delay surgery until after delivery but admitted 1 month later with rapidly progressing hearing and vision loss. An EVD was placed, and bilateral optic nerve fenestration was performed. C-section was performed at 34 weeks without complication. Two-stage tumor resection was performed by retrosigmoid craniectomy and a translabyrinthe approach. The patient's vision improved post-op but she continues to experience 6th nerve palsy with diplopia. At 10-month follow-up, MRI demonstrated stable residual tumor with evidence of psuedomeningocele. Overall, the patient and her child are doing well, and she will continue to be monitored annually.

Discussion/Clinical Findings
In both of our cases, EVD alleviated neurological symptoms, and a cesarean section was planned for 34 weeks. Cesarean section (CS) is the recommended mode of delivery for patients with VS, as vaginal delivery is associated with increased intracranial pressure and associated neurological deficit. Patient 2 had a successful CS, as planned, at 34 weeks, while Patient 1 experienced spontaneous rupture of membranes at 33 weeks and had to have an emergent CS. Both deliveries were uncomplicated and the fetuses were transferred to NICU, and surgical resection of the tumors were planned 1-2 weeks postpartum. The delay in resection is recommended to allow time for maternal hemodynamics to stabilize. Patient 1 had their tumor resected successfully 1-week post-delivery, while Patient 2 had a two-stage resection at 2 and 4 weeks postpartum.

Conclusion
In this mini-case series, we presented two cases that underscore the diagnostic and therapeutic challenges surrounding vestibular schwannoma in pregnancy. Multiple specialties were involved in care, including neurosurgery, obstetrics, anesthesia, ophthalmology, and ENT. We emphasize the need for a multidisciplinary approach that prioritizes both maternal and fetal well-being. Our successful outcomes reflect the critical role of timely interventions, such as intracranial pressure management, in preventing irreversible neurological damage. While guidelines recommend conservative management until full-term, these cases reveal that earlier intervention may be vital for preserving maternal health. Serial surveillance and patient-centered care in the postpartum period are crucial to address any residual disease and optimize outcomes for the mother. These cases contribute valuable insights to a limited body of literature on this complex clinical scenario, offering more data for future management strategies in similar cases.

Abstract Title: CD40L Expression Increases in Epilepsy

Investigator: Cranmer, Mia
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Department: Department of Biomedical & Translational Sciences
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Abstract

Introduction
Neuroinflammation is increasingly recognized as a pivotal factor in the development and progression of epilepsy, a chronic neurological disorder characterized by recurrent, spontaneous seizures. Inflammatory processes within the brain can contribute to the onset and exacerbation of epileptic activity by altering neuronal excitability and network stability. CD40, a transmembrane protein of the TNF receptor superfamily, has been implicated in several inflammatory diseases, including epilepsy. CD40 is expressed on the surface of various cell types within the central nervous system (CNS), such as microglia, astrocytes, and neurons. Activation of CD40 by its ligand, CD40L (CD154), leads to the production of pro-inflammatory cytokines like IL-1β, TNF-α, and IL-6, which are known to exacerbate neuroinflammation and potentially contribute to the pathogenesis of epilepsy. Studies have demonstrated that the downregulation of CD40 can attenuate seizure susceptibility, highlighting its potential role in epileptogenesis. Given the critical role of CD40 in neuroinflammation, investigating the expression and function of its ligand, CD40L, in epilepsy is of great interest. This study aimed to explore the expression levels of CD40L in both experimental and clinical models of epilepsy and to assess its potential role in promoting neuroinflammation and epileptogenesis.

Methods
A pilocarpine model of epilepsy was induced in adult male mice to simulate the chronic stages of the disorder. Seizure activity was assessed both clinically, using Racine's score, and electrically, through local field potential recordings obtained from a silicon probe implanted in the brain. Following seizure induction, the mice were euthanized, and brain tissues were collected for further analysis. CD40L expression was examined using immunohistochemistry and biochemical assays. The levels of secretory CD40L (sCD40L) and various cytokines and chemokines were measured using ELISA and the Meso-Scale Discovery platform. In parallel, CD40L expression was also analyzed in human brain samples obtained from epileptic patients through immunohistological techniques. Statistical analyses were performed using ANOVA, Student's t-test, and Z-scores to evaluate the significance of the findings.

Results
Our preliminary data indicate a significant increase in CD40L and sCD40L levels following seizures in both experimental and clinical settings. Immunohistochemical analysis revealed that CD40L is upregulated in neural tissues, particularly within microglia and neurons, in both experimental and human epileptic brain samples. This upregulation was notably higher in areas exhibiting chronic epileptic activity. Furthermore, the increased expression of CD40L in chronic experimental epilepsy correlated positively with elevated levels of IL-1β, a potent pro-inflammatory cytokine known to contribute to the inflammatory response in epilepsy.

Conclusion
These findings suggest that CD40L plays a critical role in the inflammatory processes associated with epilepsy, likely by activating the CD40 pathway and promoting the production of pro-inflammatory molecules. The upregulation of CD40L in microglia and neurons indicates its involvement in the neuroinflammatory cascade that contributes to epileptogenesis. The CD40L-CD40 signaling system appears to be a key component of a broader network of inflammatory mediators that collectively drive the development and progression of epilepsy. Targeting this pathway could offer new therapeutic strategies for controlling neuroinflammation and reducing seizure susceptibility in epileptic patients.

Abstract Title: Brown-Séquard syndrome secondary to spinal cord stimulator lead migration

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Abstract

Introduction
Spinal cord stimulation (SCS) is a neuromodulation technique widely used to treat various types of chronic pain, including failed back surgery syndrome (FBSS) and complex regional pain syndrome (CRPS). SCS involves placing electrical leads into the epidural space, with both percutaneous and open implantation techniques available. Despite its benefits, SCS carries a significant risk of complications, with lead migration being one of the most common. This case report discusses a rare complication of SCS-lead migration resulting in spinal cord hemisection and Brown-Séquard syndrome in a 57-year-old male patient.

Case Information
57-year-old male with a history of chronic pain, SCS replacement two months earlier, and elevated PSA s/p MRI one month earlier presented to the ED with thoracic and abdominal pain and LLE weakness. Patient noted he initially felt "funny" after his MRI but ignored the feeling. Strength to the LLE was 0/5. CT imaging revealed displacement of the SCS leads. During surgery, an abscess was found and drained, and the SCS was removed. The patient was treated with intravenous vancomycin for MRSA and discharged to a skilled nursing facility with no improvement in the left leg and new sensory deficits in the right leg. Follow-up imaging showed spinal cord damage at T8-T9, consistent with Brown-Séquard syndrome. The patient was referred to PM&R for worsening spasticity and is now undergoing pain management with an intrathecal pain pump.

Discussion/Clinical Findings
Neurological injury from Spinal Cord Stimulation (SCS) is a rare but severe complication, potentially leading to paralysis and other deficits. Causes include direct trauma during lead placement, hematomas, abscesses, or lead migration. MRI safety is critical, as interactions with the static, RF, and pulsed gradient fields can induce lead migration, heating, or nerve stimulation. We initially had thought that the leads migrated secondary to static magnetic field of the patient's MRI, but the IPG and leads were found to be conditional to the MRI parameters. The more likely cause of the migration was from mechanical force from a deep abscess found posterior to the leads, that resulted in hemisection of the spinal cord and Brown-Sequard Syndrome, supported by the timeframe between the MRI and symptoms. The case underscores the importance of careful patient selection, meticulous surgical technique, and prompt recognition and management of complications.

Conclusion
This case highlights the potential severity of SCS complications, particularly lead migration leading to spinal cord injury. Clinicians should be vigilant in monitoring patients post-implantation, especially those with risk factors for lead migration, and consider early intervention to prevent serious outcomes.

Abstract Title: Do we need to use mesh for hernia repair in massive weight loss patients?

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Abstract

Introduction
Ventral hernias are abdominal wall defects often acquired secondary to incision, chronic abdominal stress, or trauma. Abdominal wall hernia repairs are among the most common procedures performed in the United States, with half a million conducted annually. Of those, 350,000 are ventral hernia repairs (VHR). There are many ways in which VHR can be undertaken, with a series of decisions that the surgeon must make including open vs laparoscopic repair, mesh vs suture repair, and other variations in technique. VHR should be tension-free, maintain dynamism and anisotropy, and protect the viscera. The literature supports utilizing prosthetic or biologic mesh to support the hernia repair as this approach decreases recurrence rates. Surgical complications are associated with mesh utilization, hence, if there is a subgroup of patients who may not require mesh, it would be advantageous to identify such.

Methods
This study is a retrospective, case-control study of 32 bariatric patients who underwent a VHR without use of surgical mesh greater than 18 months following massive weight loss surgery. These individuals will be contacted via phone for the opportunity to complete the Abdominal hernia-Q survey which assesses outcomes for those that underwent a VHR.

Results
Out of the 32 patients identified for this study, 10 patients responded, one of which did not wish to participate. Among the 9 participants, the mean number of lifetime operations of any kind was 8.6. 33.3% (n=3) of the participants had a hernia recurrence since the initial operation with Dr. Colen, and 11.1% (n=1) underwent a second hernia repair surgery. One patient noted persistent numbness in the surgical site; no other health issues were reported.

Conclusion
Additional patient participation is being requested as, with the current response rate, meaningful Conclusions cannot be reached. Further investigation with larger sample sizes is needed to assess long-term outcomes in the massive weight loss population undergoing VHR without use of surgical mesh.

Abstract Title: Visual and Intraocular Pressure Outcomes with Advanced Technology Intraocular Lens Implants

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Co-Investigators: 1. Trenton R. Wetsel, B.S., Department of Ophthalmology 2. Angela Goyal, M.S., Department of Ophthalmology 3. Setta R. Brown, M.S., Department of Ophthalmology 4. Siddharth Bhargava, MD, Department of Ophthalmology

Abstract

Introduction
Intraocular lens (IOL) technology has substantially evolved in recent years. However, as technology advances, so do patients' visual demands and expectations; accordingly, cataract surgery has progressed into refractive surgery rather than merely visual restoration. With the expansion of Internet and smartphone usage among older adults, there is an increasing desire for functional vision and spectacle independence at near, intermediate, and distance following cataract surgery. Monofocal IOLs are the simplest in structure and thus the most frequently used form of IOL, but they only provide visual correction at a single distance. Multifocal IOLs have been developed to restore vision at multiple distances. However, due to their optical design, these IOLs are associated with more frequent dysphotopsias (unwanted visual phenomena) and worse contrast sensitivity, especially in dim lighting or glare conditions, than in monofocal IOLs. The recent development of extended depth of focus (EDOF) IOLs reduces these dysphotopsias normally associated with multifocal IOLs while maintaining quality of vision and increasing functional range of vision without correction. In guiding patients with a glaucoma diagnosis who are considering cataract surgery with an advanced technology intraocular lens (ATIOL), it is important for surgeons to understand not only the objective visual outcomes but consider patients' subjective experiences. The aim of the study was to evaluate the visual and intraocular pressure (IOP) outcomes of patients undergoing cataract surgery with an ATIOL implant alone or in combination with minimally invasive glaucoma surgery (MIGS).

Methods
We performed a single-center, retrospective study of patients who underwent either stand-alone cataract surgery with ATIOL implantation or in combination with MIGS. All surgeries were performed by a single experienced glaucoma specialist and cataract surgeon. Patients with a diagnosis of ocular hypertension, anatomical narrow angle, and mild-moderate primary or secondary glaucoma who underwent cataract surgery between 2016 and 2023 with an ATIOL were included in the study. Patients with less than 3 months of clinic visits and those under the age of 18 years were excluded. The decision to perform cataract and concurrent glaucoma surgeries and the selection of IOL and MIGS procedure was a shared decision between the patient and the surgeon, based on the clinical indications. Data was collated from pre-operative assessment (Pre-Op), post-operative day 1 (POD1), post-operative week 1 (POW1), post-operative month 1 (POM1), postoperative months 3-6 (POM3-6), and postoperative months 9-12 (POM9-12). A questionnaire was used to qualitatively assess patient perspectives based on satisfaction with visual capabilities.

Results
A total of 158 eyes were included. The average age was 69 years. 57% (n=90) were female and 43% (n=68) were male. 98 (62.0%) eyes had mild glaucoma, 26 (16.5%) moderate glaucoma, and 34 (21.5%) ocular hypertension or anatomical narrow angle. 104 (65.8%) and 54 (34.2%) eyes underwent cataract surgery with an EDOF and multifocal IOL, respectively. 125 (79.1%) of eyes underwent concurrent MIGS. Average baseline IOP was 16.74+/-4.46 mmHg while on an average of 1.54+/-1.22 IOP-lowering medications. Marked improvements in postoperative uncorrected distance (UDVA) and near (UNVA) visual acuity were noted at POM9-12 in both IOL groups. 58.3% of patients with EDOF IOL exhibited UDVA of 20/20 or 20/25 compared to 67.7% with multifocal IOL. 78.6% of patients with EDOF IOL demonstrated UNVA of 20/40 or better compared to 71.4% with multifocal IOL. 78 patients (49 with EDOF IOL, 29 with multifocal IOL) completed the satisfaction questionnaire. When evaluating satisfaction with their ability to read with uncorrected near vision, 67% of patients with EDOF IOL compared to 52% with multifocal IOL expressed satisfaction, aligning with the comparison observed in quantitative analysis. Among those with concurrent MIGS, there was both a significantly reduced IOP ($p<0.0001$) and reliance on IOP-lowering medications ($p<0.0001$) at POM1, POM3-6, and POM9-12.

Conclusion
Our study demonstrates significant improvement in visual and IOP outcomes of patients with a glaucoma diagnosis with an ATIOL, especially EDOF IOLs, which were designed with less risks associated with dysphotopsic phenomena and reduced visual quality in low-contrast settings. Only patients who underwent cataract surgery between 2016 and 2022 with an ATIOL were considered in this preliminary analysis. Further data assessment with IRB extension will expand to include those who underwent ATIOL implantation between 2022 and 2023. In addition, patient satisfaction questionnaire Results will be further investigated and correlated to ATIOL type and glaucoma stage. This review is part of a larger ongoing project under the Advocates for Glaucoma Education (AGE) Initiative evaluating the long-term outcomes of cataract surgery in glaucoma patients with and without concurrent minimally invasive glaucoma surgery in IOP reduction and decreasing the risk of progressive glaucomatous damage, with further data expected as more patients reach the 1-year post-operative milestone.

Abstract Title: Non-Contact Quantitative Corneal Esthesiometry: More Than Meets the Eye

Investigator: Drake , Taylor (Nikki)
Mentor: John Sheppard, MD
Department: Department of Ophthalmology
Co-Investigators: 1. Katherine J. Becker, MD, Department of Ophthalmology

Abstract

Introduction
Ocular surface discomfort, a common chief complaint among patient visits to eye care practitioners, has substantial impact on quality of life and healthcare costs. Pain may manifest directly as a result of tissue damage at the ocular surface (nociceptive pain) or may develop due to changes to the peripheral or central nerves in the sensory pathway (neuropathic pain). The peripheral afferent nerves are preferentially sensitive nociceptors arising from the densely innervated cornea and ocular surface. Hence, free nerve endings play an important role in detecting environmental stimuli but are susceptible to damage. Despite the high prevalence of ocular surface pain as well as neurotrophic keratopathy, a thorough understanding of its causative factors and tools for appropriate diagnostic evaluation remain notably absent in many eye clinics. We performed a cross-sectional observational study to compare corneal sensitivity measurements using a novel non-contact, instrument-mounted esthesiometer in a group of patients with a variety of ocular surface conditions.

Methods
In this cross-sectional study, corneal sensitivity was measured with a non-contact, non-invasive device delivering reproducible, constant-pressure air pulses at gradually increasing levels of intensity. To measure corneal sensitivity, participants were instructed to sit and direct their gaze straight ahead. The corneal esthesiometer was mounted to the slit lamp and measurements were performed according to the manufacturer instructions using the built-in LED positioning system. Measurements on eyes with ocular surface conditions were recorded in mbar units: mildly sensitive (2-3), normal (3-5), mildly insensitive (5-7), moderately insensitive (7-9), severely insensitive (9-10), and no sensation (>10). During cross-sectional chart review, parameters assessed included patient age, sex, ocular diagnosis, prior ocular surgeries, and data from corneal esthesiometry. Secondary outcomes included surveys regarding ocular symptoms. The Standardized Patient Evaluation of Eye Dryness (SPEED) questionnaire was utilized to assess the severity and frequency of ocular surface symptoms and scored as follows: mild (0-5), moderate (6-14), severe (15-40).

Results
A total of 206 patients (407 eyes) were included. The average age was 61 years. 60.7% (n=125) were female and 39.3% (n=81) were male. A significantly pronounced decrease in corneal sensation can be observed in subjects over the age of 50. The mean corneal sensitivity of subjects greater than 50 years of age (n=154) measured 4.30 mbar compared to that of subjects less than 50 years of age (n=52), which was 3.41 mbar (p=0.0002). Corneal esthesiometry measurements at the various intensity levels were as follows: mildly sensitive (n=181), normal (n=151), mildly insensitive (n=33), moderately insensitive (n=17), severely insensitive (n=12), and no sensation (n=13). Mean (M) esthesiometry measurements trended upward with increasing depth of corneal incisions in the ocular procedures performed: photorefractive keratectomy (M=3.82), partial-thickness corneal transplant (M=4.08), laser in-situ keratomileusis (M=4.54), cataract extraction with posterior chamber intraocular lens implantation (M=4.56), and full-thickness corneal transplant (M=4.93). When comparing subjects with symmetrical corneal esthesiometry measurements (n=138) to those possessing asymmetry differing by at least one intensity level (n=62) between their eyes, mean measurements were 3.70 mbar and 4.78 mbar, respectively (p<0.0001). SPEED questionnaire Results showed 42% (n=87) mild, 34% (n=69) moderate, and 24% (n=50) severe with mean esthesiometry measurements of 3.81 mbar, 4.12 mbar, and 4.46 mbar, respectively, based on patients' subjective evaluations of their ocular surface symptoms (p=0.049).

Conclusion
The non-contact quantitative corneal esthesiometer is a non-invasive, diagnostic tool for detecting subclinical corneal dysesthesia and related pathologies. By using this device, ophthalmologists and optometrists are better able to prescribe specific treatment for early-stage neurotrophic disease and evaluate the effectiveness of each intervention. Early diagnosis and effective therapeutic implementation can avoid permanent damage of corneal nerves and prevent patients from facing irreparable vision loss.

Abstract Title: Galactic Cosmic Radiation Negatively Affects Rat Ovarian Follicles

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Co-Investigators: 1. James Vettichira, EVMS MD Program Class of 2027 2. Richard A. Britten, Ph.D., Department of Radiation Oncology & Biophysics

Abstract

Introduction
Galactic cosmic radiation (GCR), the radiation found in space, is between 3-100 times more potent than X-rays and poses a significant risk to astronauts. NASA will be sending female astronauts on the Mars missions, but currently there is little information on the short-term and long-term effects that space radiation may have on female reproductive health. By assessing each of the four stages of follicular growth in the ovary, we can attempt to identify which stages are most vulnerable to radiation exposure, which will highlight the specific risks involved. Decreased follicle numbers could lead to short-term fertility issues or even cause premature ovarian failure which may send the females into early menopause, leading to potential operational consequences. 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
As part of ongoing studies, female Wistar rats (7-months old) were exposed to space radiation (SR) at Brookhaven National Laboratory. After completion of cognitive testing (~ 4 months post exposure), the rats were euthanized and their ovaries recovered and fixed in 10% formalin. For the present study, ovaries from sham (n=3) and rats exposed to three types of SR exposure (10 cGY of GCR/GCR (n=2), 10 cGY of GCR/He (n=3), 10 cGY of Fe10 (n=2)), were embedded in paraffin wax and sectioned at 5 µm. Every fifth slide was stained with hematoxylin and eosin, and the primordial, primary, and secondary follicles with a visible oocyte nucleus were counted. Follicle counts were multiplied by five to account for assessing every fifth section. Antral follicles are larger than the other follicles and could be directly counted without adjustment. To calculate ovarian volume, an ellipsoid volume formula was used: $V = 4/3*\pi*rh*rl*rw$. Radii included the longest and widest sections of each ovary, while the height was determined by counting the number of sections containing ovarian tissue and multiplying by 5 µm.

Results
Ovaries from sham irradiated 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 irradiated animals, irradiated animal ovaries contained similar numbers of primordial, primary, and antral follicles. Our preliminary data suggests that SR exposure reduces (by approximately two-fold) the abundance of secondary follicles compared to that observed in sham rats. There was an average count of 100 secondary follicles in the sham group, whereas GCR/GCR had 48, GCR/He had 53, and Fe10 had 38. There was also an apparent decrease in ovarian volume with radiation treatment, with the sham average volume measuring 15.54 µL, and the GCR/GCR, GCR/He, and Fe10 measuring 11.97 µL, 13.18 µL, and 8.57 µL respectively.

Conclusion
These data, while preliminary, support our hypothesis that space radiation negatively affects the ovary. Our findings show secondary follicle numbers were decreased by all types of radiation. Further investigation is needed to determine why these follicles specifically were affected and what implication that may have on female reproductive health. Irradiated ovaries were also smaller than the sham ovaries. Typically, a larger ovary is thought to be more active because the antral follicles make up the most volume in the ovary. If an ovary is healthy and active, it will therefore contain more antral follicles and the overall volume will be larger. The diminished secondary follicle counts could also potentially explain the difference in size between radiation and sham groups. 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 the negative health consequences of follicular loss.

Abstract Title: Migratory Synovial Chondromatosis Following Knee Incision and Drainage

Investigator: Eckstrom, Alexander
Mentor: Dina Elgohary, MD
Department: Department of Radiology
Co-Investigators: Kevin Nguyen, MD, Department of Radiology

Abstract

Introduction
Synovial chondromatosis (SC), also known as synovial osteochondromatosis or Reichel syndrome, is characterized by the presence of loose cartilaginous bodies within the joint capsule or surrounding tissue. Patients typically endorse monoarticular pain, swelling, and decreased range of motion that may lead to significant disability or physical limitation. Diagnosis relies heavily on radiological evaluation demonstrating loose bodies within the affected joint, bursae, or rarely, the periarticular tendons. In this report, we present a case of intra-articular SC with migration to the quadriceps tendon following repeated episodes of septic arthritis.

Case Information
The patient is a 44 year old male presenting with severe right knee pain, swelling, erythema, and warmth following a minor trauma. Past medical history was notable for SC of the right knee diagnosed approximately twenty years prior following a traumatic fall from a ladder. Plainfilm evaluation of the right knee demonstrated degenerative joint changes with large suprapatellar joint effusion and similar SC compared to previous studies. He was diagnosed with septic arthritis and received antibiotics followed by parapatellar arthrotomy with drainage, extensive synovectomy, and loose body removal as well as subsequent incision and drainage with lavage. He was discharged with a regimen of antibiotics but returned two days later with similar right knee pain, swelling, warmth, erythema, and serosanguinous drainage at the arthrotomy incision site. Magnetic Resonance Imaging (MRI) of the knee demonstrated diffuse high-grade chondral loss, large joint effusion with enhancing thickening, and several intra-articular calcified bodies. An area of capsular dehiscence was present at the previous incision site superior and medial to the patella with a communicating fluid collection present. The patient received three additional arthrotomies of the knee during this admission with copious purulent fluid removed. He was discharged with antibiotics and recommendations for follow-up. Two weeks after discharge, the patient was evaluated in an outside clinic. He continued to report pain and swelling of the right knee. Radiographs of the knee were obtained and again demonstrated extensive degenerative changes, though now with decreased burden of chondromatosis and small calcific foci within the distal quadriceps tendon. Three months later, the patient presented again with severe right knee pain. Knee radiographs demonstrated interval increase in calcifications along the quadriceps mechanism, as well as similar, but less dense loose bodies compared to prior study. Arthrocentesis was performed under fluoroscopy with approximately 5 cc of unremarkable, non-purulent synovial fluid evacuated. Fluid cultures were negative for infectious organisms. The patient was discharged with recommendations for outpatient follow-up with orthopedics.

Discussion/Clinical Findings
SC affects men approximately four times as often as women and has a predilection for large joints such as the knee and hip. While generally considered benign, rare malignant transformation to chondrosarcoma is possible. Primary forms of SC resulting from synovial hyperplasia have been identified, however the majority of cases are secondary to traumatic or degenerative joint changes. Loose fragments of bone and/or cartilage may implant within the synovium, where they may persist or even grow. These loose bodies show greater variation in size compared to the primary form and have a greater tendency to ossify. Considering our patient's history of trauma, the secondary form of SC is likely. Previous radiographic evaluation of the patient's knee demonstrated multiple loose bodies within the joint. Involvement of the quadriceps tendon was not identified until after the patient's repeated episodes of septic arthritis. Current understanding of the pathophysiology of SC suggests that loose bodies may implant within articular or periarticular tissue. Following implantation, these loose bodies may grow due to nourishment from synovial fluid and local vasculature. Due to this patient's repeated episodes of septic arthritis, he received multiple surgeries of the knee with removal of multiple loose bodies. It is possible that during one of these procedures, small fragments broke off from within the joint capsule and deposited within the quadriceps tendon. It is also possible that loose bodies within the knee migrated to the quadriceps tendon via the area of dehiscence identified on MRI. On the patient's most recent admission, knee radiographs demonstrated increased calcification within the quadriceps tendon, suggesting implantation and growth of these loose bodies. While septic arthritis may necessitate surgical washout, surgeons should be aware that such procedures may lead to extra-articular manifestations of SC in patients with previously identified intra-articular loose bodies.

Conclusion
SC is characterized by the presence of loose cartilaginous bodies within or around the joint space. Secondary chondromatosis is due to traumatic or degenerative changes within a joint, leading to free-floating loose bodies that may implant and grow. Patients with SC may be at risk of extra-articular loose body migration following surgical manipulation of the joint. Such patients should receive post-operative radiological evaluation to assess for loose body migration and subsequent growth of implanted bodies. Surgeons should be aware of this potential outcome and should assess for functional complications at subsequent postoperative visits.

Abstract Title: Starry Sky Liver in the Setting of Early Ketosis

Investigator: Eckstrom, Alexander
Mentor: Scott Rader, MD
Department: Department of Radiology
Co-Investigators: Kevin Nguyen, MD, Department of Radiology

Abstract

Introduction
"Starry Sky" appearance of the liver is a sonographic sign characterized by diffuse hypoechogenicity of the liver parenchyma with relative hyperechogenicity of the portal venule walls. Edematous changes of parenchymal hepatocytes creates a background of hypoechoic "night sky", while relative hyperechogenicity of the portal venules create diffuse "stars". This finding, classically described in the setting of acute hepatitis, has relatively low sensitivity and specificity and may appear in a variety of settings including toxic shock syndrome, lymphoma, pre-eclampsia, or diabetic ketoacidosis. This finding has also been described in the setting of a fasting liver, when glycogen store depletion causes decreased echogenicity of the liver parenchyma. In this case report, we describe an 18 year old female with starry sky liver appearance in the setting of starvation ketosis secondary to poor PO intake and severely low BMI.

Case Information
The patient is an 18 year old female with unremarkable medical history presenting to the emergency department with complaints of abdominal pain, nausea, and vomiting of 2 days' duration. Symptoms began after eating, with pain described as crampy, dull, and localized to the mid-abdomen without radiation. The patient reported that these symptoms had been recurrent for the past two years and previously resolved without treatment. On exam, vitals were unremarkable and physical exam was notable only for mild dehydration. BMI was noted to be 15.3, considered severely underweight. Laboratory studies showed leukocytosis, elevated anion gap with normal bicarbonate, and mild elevation of liver enzymes. Urinalysis showed moderate ketonuria. Noncontrast CT of the abdomen and pelvis demonstrated mild nonspecific ground-glass opacities at the bilateral lungs bases but otherwise was unremarkable. Liver, gallbladder, and bile ducts appeared normal with no acute process identified. Due to concerns for cholecystitis, ultrasound of the right upper quadrant was obtained. Gallbladder and bile duct evaluation was unremarkable, but diffuse "starry sky" appearance of the liver was noted. The patient reported improvement in her symptoms following a dose of ondansetron and declined further workup. She was discharged with recommendations for follow-up.

Discussion/Clinical Findings
Historically, the starry sky liver sign has been associated most strongly with acute hepatitis. While hepatitis workup was not obtained on our patient, a greater elevation of the liver enzymes would be expected. In the setting of postprandial abdominal pain, severely low BMI, elevated anion gap, ketonuria, and a mild elevation in liver enzymes, a feeding or eating disorder such as anorexia nervosa should be considered. While we cannot definitively exclude acute hepatitis, the patient's history and mild elevation in liver enzymes suggest another underlying process. We suggest that the starry sky liver appearance may be the result of increased hepatic metabolic demand in the setting of severely low BMI complicated by poor PO intake in the setting of acute gastrointestinal illness. The starry sky sign, while nonspecific, may still offer clinical relevance as an indicator for acute liver injury. Such acute injury may occur in the setting of increased demand of hepatic metabolism, as occurs in the setting of early starvation. As glycogen stores are depleted and ketogenesis begins, hepatocytes may swell and show decreased sonographic echogenicity. As a result, the starry sky sign may be an indicator of early starvation ketosis and insufficient glycogen storage. Patients with severely low BMI may demonstrate decreased glycogen stores at baseline. These patients may be at greater risk of developing acute liver injury and resulting starry sky sign in the setting of decreased PO intake leading to early ketosis.

Conclusion
Traditionally, the starry sky sign has been associated with acute hepatitis. However, the sign is largely nonspecific and may be present in other pathologies associated with increased hepatic demand, such as the early stages of starvation ketosis. Clinicians and radiologists must be aware of the pathophysiology underlying the starry sky appearance and tailor workup and management appropriately.

Abstract Title: Seasonal Blood Pressure Variation in Relation to Outdoor Temperature Change in People Experiencing Homelessness in Norfolk, VA

Investigator: Ekdahl, Luke
Mentor: Katherine Schaffer, MD
Department: Department of Emergency Medicine
Co-Investigators: 1. Kean Feyzeau, MD, Emergency Medicine 2. Joshua Edwards, M.P.H., Medical Student Research

Abstract

Introduction
Seasonal variation in blood pressure (BP) has been widely observed in a multitude of populations with implications for hypertension management and diagnostic sensitivity in both research and clinical practice. Globally, it has been shown that individuals who are of a lower socioeconomic status or lack access to consistent protection from cold temperatures may be subject to an amplified seasonal BP change. Currently, the American homeless population has been observed to have worse hypertension control and hold a greater risk for developing cardiovascular disease than the general population. Characterizing seasonal BP variation in this vulnerable group may further inform the context by which effective hypertension diagnosis and management occur. This study aims to identify associations between blood pressure and the daily average temperature as affected by season in individuals presenting to the Eastern Virginia Medical School (EVMS) Street Health clinics, in Norfolk, VA.

Methods
Medical record extraction from two EVMS Street Health clinics located in Norfolk, VA held between September 28, 2019 and December 15, 2023 yielded 606 patients, of which 301 patients met inclusion criteria. Systolic blood pressure (SBP), diastolic blood pressure (DBP), date, sex, and age were data points necessary for a visit to be included in the analysis. Mean daily temperature was sourced from data publicly available through the National Oceanic and Atmospheric Administration. American Heart Association criteria for hypertension was used (value of 130/80mmHg or greater). Interquartile range (IQR) method for outlier detection limited the visit per patient to six BP readings. Significance testing was preformed using a Spearman's Rank Correlation test.

Results
Among the 690 visits to the EVMS Street Health clinics (mean age: 53.1 years; 74% male), 523 (75.8%) met criteria for hypertension. Decreased mean daily temperature was found to be associated with both increased SBP ($p=0.006$) and DBP ($p=0.037$).

Conclusion
Patients reporting to EVMS Street Health clinics were found to be hypertensive at a greater rate than the estimated national average of 46.7% (NHANES 2017-2018). Likewise, a statistically significant association was found between decreased mean daily temperature and increased SBP and DBP. Many individuals who report to EVMS Street Health clinics are of a lower socioeconomic status and are housing insecure. As a result, these patients often spend extended periods of time outdoors. These data suggest providers should consider the relationship between seasonal context and the time at which hypertension is diagnosed and managed in this vulnerable cohort.

Abstract Title: Band Heterotopia: Clinical Presentation and MRI Findings in a 37-Year-Old Male

Investigator: Eldosougi, Randa
Mentor: John Campbell, MD
Department: Department of Radiology
Co-Investigators: Kevin Nguyen, MD, Department of Radiology

Abstract

Introduction
Band heterotopia, also known as double cortex syndrome, is a type of malformation of cortical development in which neuronal migration is disrupted, leading to a band of gray matter situated between the ventricular and cortical surfaces of the brain. This band of gray matter disrupts normal brain architecture and leads to seizures, developmental delays, and in rare cases, hypotonia, and other neurologic deficits. The severity of symptoms is associated with the thickness of the gray matter band. Patients can present in early childhood or remain asymptomatic into their adolescent years. Magnetic resonance imaging (MRI) shows bilateral, symmetric band of gray matter within the cortical white matter pathognomonic for band heterotopia, making it the gold standard method of diagnosis for this condition. It is important to determine the need for MRI screening in patients with new onset recurrent seizures to evaluate for disruptions of cortical development, including band heterotopia, to accelerate proper care. Here we present the case of band heterotopia in a 37-year-old male.

Case Information
Clinical History: A 37-year-old male with a history of intractable epilepsy presented for evaluation. The patient's family history was non-contributory, and there was no history of perinatal complications. Imaging Findings: 1. Subcortical band heterotopia involving the bilateral frontal and parietal lobes. The overlying cortex appears normally formed, no pachygyria. 2. No other seizure focus identified. The hippocampi have a symmetric appearance, no mesial temporal lobe sclerosis or mass. 3. Small right mastoid effusion, nonspecific. These imaging findings are consistent with band heterotopia (double cortex syndrome), a form of lissencephaly spectrum disorder. The typical bilateral and symmetric bands of gray matter located in the subcortical white matter confirmed the diagnosis.

Discussion/Clinical Findings
Normal cortical development involves the migration of neurons from the ventricular zone to the cortical plate. The Doublecortin (DCX) protein is theorized to direct this neuronal migration, and mutations in the DCX gene cause some neurons to fail to reach the cortex. The neurons are arrested in the white matter rather than migrating to the cortical plate, resulting in the characteristic subcortical band of gray matter seen in MRI. Males with DCX mutations typically develop lissencephaly, while females often present with band heterotopia due to the X-linked inheritance pattern. Patients with band heterotopia typically present with seizures, ranging from mild to severe, and varying degrees of cognitive impairment. The severity of neurological symptoms often correlates with the thickness of the heterotopic band. In rare cases, symptoms may include hypotonia, developmental delays, and other neurologic deficits. The disorder can present as either a thin or thick band and may appear in a nodular or diffuse form. MRI is the diagnostic modality of choice, as it delineates the heterotopic gray matter from the surrounding white matter and cortical structures. The early diagnosis of band heterotopia through imaging is crucial for the effective management of seizures and for providing genetic counseling to affected families. Band heterotopia is frequently associated with other conditions within the lissencephaly spectrum. Management of patients includes regular MRI monitoring, neurologic evaluation, appropriate seizure medications, and referral for genetic counseling. Early intervention is essential for optimizing outcomes in patients with this disorder.

Conclusion
Band heterotopia is a rare neuronal migration disorder characterized by the presence of heterotopic gray matter in the subcortical white matter. This case highlights the importance of recognizing the characteristic MRI findings associated with band heterotopia, particularly in patients presenting with epilepsy. MRI is essential for confirming the diagnosis and differentiating band heterotopia from other cortical malformations. Early and accurate diagnosis via MRI allows for timely intervention, which is critical in managing seizures and associated symptoms. Effective management typically involves a multidisciplinary approach, including the integration of radiology for accurate diagnosis, neurology for seizure management, and genetic counseling for family planning. This comprehensive approach enhances patient care and optimizes long-term management and quality of life for individuals affected by this condition.

Abstract Title: Interventional Radiology Novel Techniques for Knee Pain: A Review of Genicular Artery Embolization and Genicular Nerve Ablation

Investigator: Eldosougi, Randa
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Department: Department of Radiology
Co-Investigators: Kyle Bonner, MD, Department of Radiology

Abstract

Introduction
Chronic knee pain is a widespread and debilitating condition that affects millions of individuals, severely impacting their ability to perform daily activities, such as walking and exercising. Beyond the physical discomfort, chronic knee pain can lead to reduced mobility, an increased risk of comorbidities, and mental health challenges, including depression and anxiety due to the diminished quality of life. Osteoarthritis is the most common cause of chronic knee pain, affecting approximately 14 million people in the United States. Traditionally, treatment has focused on nonsteroidal anti-inflammatory drugs (NSAIDs), intra-articular injections, and surgical interventions like knee arthroplasty. However, the high prevalence of chronic knee pain among older adults presents unique challenges, as many patients require less invasive options to manage their symptoms effectively. Contraindications to invasive surgical procedures, such as comorbid conditions (e.g., cardiovascular disease, diabetes), poor overall health, and the increased risk of complications from anesthesia, further necessitate the exploration of less invasive alternatives. Interventional radiology has emerged as a promising field, offering two minimally invasive techniques-Genicular Artery Embolization (GAE) and Genicular Nerve Ablation (GNA)-to alleviate chronic knee pain. These innovative approaches minimize the risks associated with traditional surgery while providing effective pain relief. GAE and GNA can serve as alternatives or adjuncts to conventional treatments, offering new hope for patients seeking to manage their pain with minimal disruption to their daily lives while avoiding potential complications.

Genicular Artery Embolization (GAE) GAE involves the targeted embolization of the genicular arteries, which are small vessels that supply blood to the knee joint. Increased blood flow through these arteries is theorized to exacerbate pain by promoting inflammation in the affected joint and increasing migration of inflammatory cells. By embolizing, or blocking, these arteries, blood flow to the joint is reduced, leading to decreased inflammation and pain relief. The procedure is performed under fluoroscopic or CT guidance, with a catheter inserted into the femoral artery and advanced to the genicular arteries, where embolic agents are injected to selectively block blood flow. GAE provides significant and long-lasting pain relief, particularly in patients with osteoarthritis who have not responded to NSAIDs, physical therapy, or intra-articular injections. Pain relief is reported up to 24 months after the procedure, however, patients with severe osteoarthritis report the return of pain 6 months post-procedure. The efficacy of GAE has shown promise in several prospective randomized control trials. Patients were followed at intervals ranging from 3 months to 3 years post procedure. There was a statistically significant response to treatment, as measured through quality-of-life scores, physical activity tests and MRI analysis of synovial inflammation. Complications including hematomas, cutaneous ischemia, infection, and inadvertent embolization of non-target arteries are rare and mitigated by sterile techniques and precise imaging guidance. The procedure typically lasts around 60 to 90 minutes, and patients usually experience rapid recovery with minimal downtime. Genicular Nerve Ablation (GNA) GNA involves denaturing of the genicular nerves, which are sensory nerves that transmit pain signals from the knee joint to the brain. By denaturing these nerves, the transmission of pain signals is interrupted, reducing the sensation of pain in the knee. This can be achieved through various techniques, most commonly radiofrequency ablation or cryoablation. Under fluoroscopic or ultrasound guidance, a radiologist advances an electrode to the target area and delivers heat or cold to ablate the nerve, effectively cutting off its ability to transmit pain signals. GNA is commonly indicated for patients with chronic knee pain, particularly due to osteoarthritis, who have not responded adequately to conservative treatments, or who continue to experience pain after knee arthroplasty. If a nerve block successfully alleviates the patient's pain, it suggests they are a good candidate for GNA. GNA provides significant and sustained pain relief, improving both quality of life and functional ability for up to 24 months. Pain may return in time due to potential regrowth or regeneration of the geniculate nerves. GNA has been efficacious in comparison to the current standard of care, intra-articular corticosteroid injections. A multi-center randomized control trial found a statistically significant difference post treatment pain scoring, with 74% of GNA patients and 16% of corticosteroid injection patients reporting >50% reduction in pain at 6-month post-treatment. GNA is typically well tolerated, potential complications are minimal and may include temporary soreness at the treatment site, numbness or swelling in the treated area, hemarthrosis, or subcutaneous bleeding. Vascular complications are rare but possible. GNA is an outpatient procedure, allowing patients to return home the same day and typically resume normal activities shortly after.

Conclusion
Genicular Artery Embolization (GAE) and Genicular Nerve Ablation (GNA) are exciting developments in the treatment of osteoarthritis. Initial studies into the efficacy of these treatments show promise. However, there is benefit in conducting larger scale studies on their efficacy, especially in comparison to the current standards of care. There are numerous opportunities for advancements in research, technology, and clinical practice. As these techniques continue to evolve and integrate into the standard of care, there is the potential to offer more effective, personalized, and accessible treatment options for patients suffering from chronic knee pain. Through ongoing innovation and integration into multidisciplinary care models, GAE and GNA may become cornerstone treatments in the management of knee pain in the coming years.

Abstract Title: Classics in Abdominal Radiology: Jumping Deer Sign

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Department: Department of Radiology
Co-Investigators: Trent Taros, MD, Department of Radiology

Abstract

Introduction
The "jumping deer sign" is a finding on liver ultrasonography representing normal anatomic relationships of often confusing tubular structures within the liver parenchyma. The structures that make up and are identified as parts of the jumping deer sign include the portal vein and its primary branches, the gallbladder, and the IVC. Signs and other memory or pattern recognition heuristics are essential to identifying and characterizing pathology. Just as important, but much rarer, are those reassuring signs, whose presence is reassuring rather than frightening. The "jumping deer sign" is one such sign when evaluating for liver conditions that may distort adjacent structures.

The portal vein and its primary branches comprise the head and body of the jumping deer. The anatomy of the portal venous system can vary widely, which often leads to misinterpretation and being erroneous mistake with intrahepatic ducts or systemic veins and vice versa. Accurately distinguishing portal veins from bile ducts is crucial for evaluating conditions such as portal hypertension, primary biliary cholangitis, and primary sclerosing cholangitis. Portal hypertension can be detected intrahepatically on ultrasound by identifying a dilated portal vein or hepatofungal (reversed) blood flow in the portal vein. Conversely, liver pathologies involving the intrahepatic biliary ducts may present with distinct sonographic features, including intrahepatic ductal dilatation and thickened ductal walls. Identifying these pathologies requires thorough understanding of and ability to identify normal anatomy. Finding the jumping deer sign on ultrasound can help confirm the veracity of presumed anatomical structures and reduce the risk of confusing portal veins with dilated ducts. As the "deer" leaps forward over the "log", it is trailed by its bushy, somewhat bulbous tail, a structure that is in reality the gallbladder. Ultrasound is a highly effective imaging modality for detecting gallbladder pathologies. It is often the first choice due to its accessibility, non-invasiveness, and ability to provide detailed images of the gallbladder and surrounding structures. Emphysematous cholecystitis is an often life-threatening condition, with a mortality rate of up to 25%, caused by gas-forming bacteria infecting the gallbladder wall. This condition may present as echogenic foci with posterior dirty shadowing or reverberation artifacts within the gallbladder wall. Unfortunately, this is very similar in appearance to bowel gas, with posterior shadowing obscuring detail behind said gas and potentially leading to confusing one for the other. Identifying the normal anatomy, made easier by seeing the jumping deer's tail, may help differentiate emphysematous cholecystitis from bowel gas. Furthermore, a "clipped tail" in the ultrasound image may suggest a cholecystectomy, particularly if surgical clips are visible in the area where the tail would normally be. Finally, the obstacle over which the "deer" can be seen jumping over is, in reality, the inferior vena cava (IVC). Measurement of the IVC using ultrasound is a valuable tool for assessing hydration status, especially in critically ill patients. The size and collapsibility of the IVC can provide insights into intravascular volume and right atrial pressure. A distended, non-collapsible IVC may indicate fluid overload or elevated central venous pressure (CVP), which is often seen in conditions such as heart failure. Conversely, a small, collapsible IVC usually suggests low intravascular volume and hypovolemia. Therefore, assessing IVC collapsibility is crucial for management decisions. A recent study found that sonographic IVC diameter measurements are accurate and correlate well with direct CVP measurements made by catheterization, which had previously been the gold standard. These Results suggest that sonographic IVC measurement could potentially replace more invasive techniques. Easy and rapid identification of the IVC in a window not obscured by bowel gas, such as that offered intrahepatically via the jumping deer sign is therefore very advantageous in the management of acutely ill patients.

Conclusion
In Conclusion, the "jumping deer sign" offers a unique and valuable framework for interpreting liver ultrasonography, enhancing diagnostic accuracy and reducing potential misinterpretations of liver anatomy. By recognizing the portal vein, gallbladder, and inferior vena cava, clinicians can better distinguish between normal anatomical variations and pathologic conditions. Overall, the "jumping deer sign" demonstrates the utility of pattern recognition in ultrasound, offering both clarity and reassurance in the complex field of liver imaging.

Abstract Title: Eagle Syndrome: An Uncommon Etiology of Persistent Neck Pain

Investigator: Elliott, Samantha
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Department: Department of Radiology
Co-Investigators: Kevin Nguyen, MD, Department of Radiology

Abstract

Introduction
Eagle syndrome is a rare condition caused by the elongation or calcification of the styloid process or stylohyoid ligament. The styloid process is a slender, pointed bone extending from the base of the skull near the temporal bone, while the stylohyoid ligament connects the styloid process to the hyoid bone. Elongation or calcification of these structures can put pressure on adjacent tissues and nerves, leading to a range of clinical symptoms.

Case Information
A 53-year-old female, who had undergone a total thyroidectomy approximately 10 years ago for unknown etiology, presented to the Ear Nose and Throat (ENT) clinic with worsening left-sided neck pain and a sensation of fullness over the past 6 months. Her medical history includes hypertension, obesity, hypothyroidism, asthma, fibromyalgia, and tobacco use. Given her history of long-term tobacco use, there was concern for possible carcinoma. However, she reported no constitutional symptoms such as weight loss, fatigue, or fever. On examination, tenderness was noted along level 2 of the left neck, but no masses or other abnormalities were appreciated. A CT scan of the neck with contrast was ordered to further investigate the cause of her neck pain. The imaging revealed an enlarged left styloid process and an ossified, thickened left stylohyoid ligament, suggestive of Eagle Syndrome. No masses were observed on the CT scan. Unfortunately, due to missing documentation, follow up and treatment details could not be determined for this case report

Discussion/Clinical Findings
Eagle syndrome is an acquired condition of unknown cause, characterized by the elongation of the styloid process or calcification of the stylohyoid ligament. Due to its rare prevalence-affecting approximately 4% of the population, with only 0.16% showing symptoms-it is often overlooked in differential diagnoses. The subtlety of its symptoms, which can resemble those of cervical arthritis, head and neck masses, and facial neuralgias, contributes to the challenge of accurate diagnosis. Recognizing Eagle syndrome is crucial because its management differs significantly from other similar conditions. The utility of CT in diagnosing Eagle syndrome is paramount, as it provides clear imaging of the styloid process and surrounding structures. An elongated styloid process can compress several structures, including cranial nerves (primarily the glossopharyngeal nerve), the external carotid artery, the internal jugular vein, and the pharynx. Additionally, the stylopharyngeus muscle and the muscles of mastication may be indirectly affected by the compression of nearby nerves. CT scans can reveal elongation of the styloid process or calcified ligaments with high specificity, facilitating accurate diagnosis and distinguishing Eagle syndrome. Early and accurate identification through CT imaging enables appropriate treatment interventions, which may include conservative management, corticosteroid injections, or surgical intervention, thus improving patient outcomes and preventing unnecessary, potentially invasive procedures that may arise from misdiagnosis.

Conclusion
In Conclusion, this case highlights the importance of considering Eagle Syndrome in patients with unexplained neck pain and a sensation of fullness, especially those with a history of tobacco use and chronic pain syndromes, as seen in this patient. The CT imaging revealed an enlarged left styloid process and an ossified stylohyoid ligament, supporting the diagnosis of Eagle Syndrome. This case emphasizes the need for thorough evaluation of such symptoms to ensure accurate diagnosis and appropriate management.

Abstract Title: Ultrasound Indicated Cerclage in Women with Previous Late Preterm Birth

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Abstract

Introduction
Preterm birth, delivery before 37 weeks, is a leading cause of neonatal morbidity and mortality. The objective of this study is to explore the effectiveness of ultrasound cervical length screening in reducing preterm births in individuals with varying preterm birth histories (<34 weeks vs. 34-36 weeks) to optimize prevention strategies.

Methods
Study Design: A retrospective cohort study Setting: Single academic institution Population: Pregnant individuals with singleton pregnancies and a history of preterm birth from January 2014 to December 2020 who underwent transvaginal ultrasound cervical length screening. Primary Outcome: The primary outcome measure was the detection of a short cervix (≤25 mm) by transvaginal ultrasound. Methods: Serial cervical length screenings were performed biweekly from 16 to 24 weeks' gestation, and cerclage was recommended for cervical lengths ≤25 mm. Relative risks (RR) with 95% confidence intervals (95%CI) were calculated using modified Poisson regression with robust variance, controlling for confounders. Further, Kaplan Meier Survival Curves were plotted, and curves were compared using log-rank test.

Results
Of 576 individuals, 437 (75.9%) had a previous GA <34 weeks and 139 (24.1%) has a previous GA 34-36 weeks. Compared to individuals with a previous GA<34 weeks preterm births, those with a previous 34-36 weeks preterm births were less likely to have short cervix (41.9% vs. 21.6%; RR 0.52; 95%CI 0.37-0.73), ultrasound-indicated cerclage (21.1% vs. 6.5%; RR 0.34; 95%CI 0.18-0.67), and preterm delivery <34 weeks (20.8% vs. 6.5%; RR 0.32; 95%CI 0.17-0.64). However, based on our analysis of the Kaplan Meier Survival Curves, there was no significant difference in gestational age at delivery between groups (log-rank $p = 0.75$).

Conclusion
Individuals with a previous 34-36 weeks preterm births compared to those with a previous GA<34 weeks preterm births were less likely to have preterm birth related complications. Those with a previous 34-36 weeks preterm births may need less frequent cervical length screening.

Abstract Title: The use of artificial intelligence for mental health care and behavior prediction in correctional settings: a scoping review

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Co-Investigators: 1. Juan Ferrando 2. Gautam Ramanathan 3. Alex Liu 4. Kallen Hager

Abstract

Introduction
Within the context of correctional facilities, the need for comprehensive mental health services has reached unprecedented levels. To our knowledge no other reviews have explored how artificial intelligence (AI) can be used to potentially improve mental health outcomes for those involved in the criminal justice system.

Objective
This scoping review aims to map the utilization of AI for monitoring or predicting mental health status, mental health episodes, misconduct, and other behaviors among individuals in correctional facilities. Methods: Our protocol was drafted using the PRISMA Extension for Scoping Reviews (PRISMA-ScR) checklist. This review was pre-registered with the Open Science Framework (OSF) on January 16, 2024. Peer-reviewed articles published between 2017 and 2023 were included. Searches were conducted in PubMed, Web of Science, and Academic Search Complete via EBSCO. The search was drafted to find references that mentioned three criteria: the use of artificial intelligence, mental-health/misconduct/behavior prediction, and a correctional population/setting. The search Results were exported into DistillerSR for deduplication and screening by four reviewers. Results: A total of 3683 articles were screened at the title level. 450 articles were screened at the abstract level, of which 142 were selected to also be assessed at the full-text level for eligibility. This resulted in 21 articles that fit the inclusion criteria. Studies originated from 9 different countries, with the most prevalent being Switzerland (47.6 [10/21]) and The United States (14.2% [3/21]). Studies included various facility types including correctional facilities (33.3% [7/21]), psychiatric inpatient (61.9% [13/21]), and Other (4.7% [1/21]). The articles were categorized as following: recidivism (23.8% [5/21]), self-harm/suicide (19% [4/21]), schizophrenia and violence (14.2% [3/21]), schizophrenia treatment (9.5% [2/21]), crime prevention (9.5% [2/21]) and other (14.2% [3/21].

Conclusion
As the amount of studies utilizing AI increases, more research needs to be conducted to find additional use cases. The majority of the studies included in our review were related to schizophrenia and were conducted in a psychiatric inpatient facility outside of the United States. The majority of the studies were also conducted on populations that were composed primarily of males. Future studies should explore a wider range of psychiatric conditions and distinguish between different demographic groups. Additionally, a wider range of facility type should be considered when creating newer AI models.

Abstract Title: Mpox, a truly multisystem disease

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Mentor: Sami Tahhan, MD
Department: Department of Medicine

Abstract

Introduction
Mpox (previously referred to as monkeypox) is a viral zoonotic infection that is caused by monkeypox virus and Results in a rash similar to that of smallpox. Monkypox was renamed to follow current best practices of not naming diseases after animals or geographic locations to reduce any stigma that could be associated with the original name. Mpox virus is an orthopoxvirus that is in the same genus as variola (the causative agent of smallpox) and vaccinia viruses (the virus used in the smallpox vaccine) Recently a global health emergency was declared with outbreaks amongst men who have sex with men. As of January 2023, over 84,000 cases have been identified. Mpox can be transmitted through fomites, respiratory secretions and direct contact. It can present with lymphadenopathy, fever, myalgias and headaches with 96% of patients presenting with a diffuse rash. We present a case of Mpox with an unusual and interesting course.

Case Information
A 40-year-old male with HIV not on antiretroviral therapy and secondary syphilis 2 years prior with self-reported treatment presented with diaphoresis, malaise, abdominal and rectal pain for one week. He acknowledged participating in anal-receptive sex. Physical exam revealed non-purulent, non-bleeding rectal warts. His CD4 count was 347 cells/microL and his RPR was reactive with titers of 1:4 which previously were 1:64. Transaminase were elevated with ALT of 295 U/L, AST of 199 U/L and Alkaline Phosphatase of 463 U/L Acute viral hepatitis panel was negative. CT scan reveals findings consistent with proctitis, cystitis and splenomegaly. The patient declined gonococcal swab and was treated empirically with ceftriaxone and doxycycline but rectal pain and diaphoresis persisted. Approximately 4 days after admission, the patient developed discrete, tender pustules on the hands and lower extremities. Dermatology was consulted and PCR from a skin lesion tested positive for Mpox. The patient was appropriately isolated and received supportive treatment. Anti-viral administration was considered but not given as the patient was feeling better. The patient continued to clinically improve with resolution of diaphoresis, abdominal and rectal pain. His LFTs drastically improved and his skin lesions resolved. He was ultimately diagnosed with Mpox induced hepatitis, proctitis and skin lesions.

Discussion/Clinical Findings
Outbreak regions have reported approximately 2% of those with PCR positive Mpox presented with complications of proctitis with 40% of those being people living with HIV. Those who participated in anal-receptive sex practices were found to present more often with proctitis and systemic symptoms before rash, as our patient did. In addition, patients with Mpox can present with hepatitis with ALT and AST elevation which can be used as a poor prognostic indicator. For persons with HIV who have Mpox, anti-monkeypox virus therapy should be considered for those who are immunocompromised and at risk for severe disease (CD4 count <350 cells/microL) For those taking antiretroviral therapy (ART), ART should be continued. For persons with newly diagnosed HIV and those who are not taking ART, ART should be started/restarted as soon as possible. Mpox is a multisystem disorder which can be very tricky to diagnose.

Conclusion
Mpox is a multisystem disorder which can be very tricky to diagnose. It can present with lymphadenopathy, fevers, myalgias. Mpox can present both with and without rash with prodromal phase and clinicians must have high index of suspicion. With the new outbreak of Mpox, it carries a higher mortality rate with infection. Patients with severe disease can be treated with antivirals such as tecovirimat and those at higher risk can benefit from vaccination.

Abstract Title: Are you sure this is not MS? Atypical manifestation of aseptic meningitis presenting as bilateral internuclear ophthalmoplegia.

Investigator: Figgs, Taylor
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Department: Department of Medicine
Co-Investigators: 1. Muhammad Usman Javed, PGY-3 Department of Medicine 2. Hira Sarfraz, PGY-3 Department of Medicine

Abstract

Introduction
Internuclear Ophthalmoplegia (INO) is an ocular movement disorder characterized by impaired conjugate lateral gaze. While unilateral INO can result from various conditions such as demyelinating diseases or infections, bilateral INO is pathognomonic for multiple sclerosis. In this abstract, we present an atypical case of bilateral INO caused by aseptic meningitis.

Case Information
The patient, a 29-year-old G1P1 female, presented to the emergency department with a 3-day history of double vision, frontal headache, and gait instability. Eye examination was significant for asymmetric bilateral internuclear ophthalmoplegia. Admission labs demonstrated mild leukocytosis without left shift and elevated inflammatory markers including complement levels and IL-6. An MRI of the spine and head revealed no evidence of demyelinating illness. Upon further review of the history, it was noted that the patient had an upper respiratory illness 3-weeks ago, followed by neck stiffness and cold sores which resolved spontaneously without treatment. A lumbar puncture was ordered; however, the patient was empirically given Acyclovir before it could be obtained and her symptoms improved significantly. Later, CSF studies showed lymphocytic pleocytosis with normal protein levels suggesting aseptic meningitis, however, CSF and serum PCR were negative for common viral pathogens including HSV and VZV. Multiple sclerosis workup came back negative, and she was discharged on oral valacyclovir 1g TID for two weeks.

Discussion/Clinical Findings
Internuclear Ophthalmoplegia (INO) is caused by damage to a heavily myelinated bundle of neurons called Medial Longitudinal Fasciculus, which connects the nucleus of ipsilateral cranial nerve III with the nucleus of contralateral cranial nerve VI. It is characterized by the inability to adduct the eye on the affected side, coupled with impaired abduction of the contralateral eye. The typical presentation includes nystagmus, horizontal diplopia, dizziness, gait instability, and headaches. Although imaging including, MRI and proton density imaging can help visualize lesions, INO is a clinical diagnosis. INO is primarily diagnosed clinically. CSF analysis is reserved for cases where infection or Multiple Sclerosis is strongly suspected. Treatment involves the management of the underlying cause. Demyelinating disorders, particularly Multiple Sclerosis, are the most common cause of INO. Less frequent causes include brainstem infarctions, hemorrhage, trauma, vasculitis, and bacterial, or viral infections. Bilateral INO is particularly significant as it is strongly suggestive of Multiple Sclerosis and warrants complete workup for Multiple Sclerosis.

Conclusion
Here we present a case of bilateral INO caused by aseptic meningitis with a negative workup for multiple sclerosis. Although less prevalent than other causes, aseptic meningitis should be in the differential as preceding infections can be very subtle. In these instances, diagnosis is made with the help of CSF analysis, cultures, and PCR. However, it is important to remember that CSF is sterile in the majority of cases, especially if patients have already received antimicrobials.

Abstract Title: An Atypical Presentation of Drug Induced Thrombocytopenia

Investigator: Figgs, Taylor
Mentor: Lisa Madren, MD
Department: Department of Medicine
Co-Investigators: Sam Stein, MD, PGY-3 Department of Medicine

Abstract

Introduction
Immune Thrombocytopenia (ITP) is a disorder in which the formation of antiplatelet antibodies leads to platelet destruction. It can be idiopathic or be caused by infections, autoimmune diseases, and medications. We present a case of an individual developing severe thrombocytopenia within days of receiving various antibiotics.

Case Information
A 78-year-old male with past medical history of type 2 diabetes, hypertension, and ESRD on hemodialysis was admitted for colitis and treated with IV vancomycin and aztreonam in the setting of a known penicillin allergy. He was transitioned from vancomycin to oral metronidazole on day 4 and discharged on that medication to complete his course. Three days after discharge, he returned to the ED for lethargy and was found to have a platelet count of 15,000. His labs were notable for baseline chronic anemia without leukocytosis/leukopenia. Imaging showed chronic splenomegaly but was otherwise normal and he did not have any overt signs of bleeding. His platelet count was 175,000 on initial admission, 125,000 on day 3, and 99,000 on discharge. Hemolytic and infectious workups were negative and peripheral smear didn't show any platelet abnormalities. The HIT panel was weakly positive with a HIT score <5%. He was admitted given concern for ITP and received two days of IVIg, four days of dexamethasone and five units of platelets with gradual improvement.

Discussion/Clinical Findings
Drug induced immune thrombocytopenia (DITP) occurs due to formation of IgG autoantibodies against platelet membrane proteins after exposure to an inciting agent, which include hundreds of medications including many antibiotics. These antibody-platelet complexes are sequestered in the spleen and liver causing platelet consumption. DITP tends to cause platelet counts less than 20,000 whereas Heparin induced thrombocytopenia (HIT) rarely does so. Onset also tends to be rapid especially in the setting of prior exposures to inciting medications, which our patient did not have. The HIT panel was weakly positive but the HIT score was very low. Our patient received 3 days of vancomycin, 7 days of aztreonam, and 8 days of metronidazole. This patient's cause of DITP is difficult to elucidate, given that both vancomycin and aztreonam are associated with DITP, as well as metronidazole in very rare cases. His platelets started declining on the second day of vancomycin and aztreonam and decline persisted despite cessation of both drugs, not reaching nadir until cessation of metronidazole. DITP typically resolves a few days after cessation of offending medication, and while aztreonam induced thrombocytopenia is far less rare than metronidazole, it is likely that both antibiotics played a role in development of thrombocytopenia. Vancomycin is less likely given his very short course relative to his course of aztreonam and metronidazole. Treatment of DITP includes discontinuation of the offending agent as well as IVIg and steroids.

Conclusion
This case report highlights an interesting patient who was treated with multiple antibiotics for colitis and later developed drug induced ITP. Of the antibiotics received, it is likely that both aztreonam and metronidazole were implicated in the cause of DITP.

Abstract Title: Variable UTI Rate in Isolated Hydronephrosis: Implications for Prophylactic Antibiotic Use

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Abstract

Introduction
Hydronephrosis is the abnormal dilation of the renal pelvis and calyces. Urinary tract infections (UTI) are the most common complication of hydronephrosis, resulting from urine stasis and collection allowing for bacterial growth. Continuous antibiotic prophylaxis (CAP) can be recommended for children with hydronephrosis, although there is limited data to support this intervention.

Methods
Patients with prenatal hydronephrosis confirmed via postnatal ultrasound with a documented Society of Fetal Urology (SFU) grade ≥ 1 who were enrolled in the multi-institutional Society for Pediatric Urology Prenatal Hydronephrosis Database were included for analysis. Exclusion criteria were confirmed vesicoureteral reflux, megaureter, duplicated collecting systems, solitary kidney, ureterocele, multicystic dysplastic kidney, neurogenic bladder, and other kidney and ureteral anomalies. Male patients with missing circumcision status were also removed from the analysis.

Results
There were 1672 patients who met the inclusion criteria for analysis. The overall UTI rate was 5.2% (87/1672). Most patients had a single UTI during the study period (n=73). UTI frequency was 8.8% (34/386) in females compared to 4.1% (53/1286) in males. Among males, UTI was more common in uncircumcised patients, occurring in 6.4% (39/611) compared to 2.1% of circumcised males (14/675). UTI occurred in 8.6% (56/651) of patients with high grade hydronephrosis (defined as SFU grades 3 or 4), compared to 3.0% (31/1021) in low grade hydronephrosis (SFU grades 1 or 2). Females with high grade hydronephrosis had the highest rates of UTI at 15% (24/157).

Conclusion
The UTI rates in patients with hydronephrosis correlate with sex, circumcision status in males, and the severity of hydronephrosis. While the overall UTI rate in isolated hydronephrosis is only 5.2%, patients with one or more risk factors can have a much higher UTI rate. CAP use is an important consideration for clinical management in high-risk groups, such as females with grades 3 and 4 hydronephrosis.

Abstract Title: Burnout Interventions for Medical Residents: A Systematic Review of Quality and Efficacy

Investigator: Ghiorzi, Julianne
Mentor: Rehan Qayyum, MD
Department: Department of Medicine
Co-Investigators: 1. Vibhav, Badrish, EVMS MD Program 2. Rajita Kanapareddy, EVMS MD Program 3. Kelly Thomson, MD, Department of Medicine 4. Julie Sill, Ph.D., Department of Medicine

Abstract

Introduction
Physician burnout is a phenomenon that has been highly documented in the medical literature over the past fifteen years with increasing numbers. While the findings indicate that physicians at all levels in their careers are affected, resident physicians are uniquely prone due to a variety of factors, such as transition from academic context to career experience, an increase in patient responsibility, and other work-related stresses. This systematic review adds to the findings of a previously published systematic review on the topic and documents the most recent findings from a 7-year period July 2016-July 31, 2023.

A team of six investigators completed a systematic review on the topic using the updated PRISMA guidelines. An experienced investigator searched three databases (e.g., Embase, PubMed, Web of Science) using the following search terms, 1) Resident OR Residency Intern and 2) Burnout which resulted in a total of 12,550 peer-reviewed articles. Articles from the search were added to the Covidence program and duplicates were automatically removed. Inclusionary criteria were, 1) articles must be published in English, 2) the investigation was original research and not an abstract or review, 3) the study included an intervention, and 4) burnout outcomes. Two reviewers completed each step of the process (e.g., title/abstract screening, full-text review, data extraction, bias assessment) and a third reviewer solved any conflicts at each step in the process. Risk of bias was calculated according to the Cochrane ROB 2 tool or the ROBBINS-I tool, as appropriate. A total of 8958 peer-reviewed titles and abstracts were screened after the removal of duplicates over a two-month period and 347 full-text reviews were subsequently completed by the team, resulting in the inclusion of 95 articles for data extraction and final analysis. Burnout interventions of 7 types were highlighted across all investigations utilizing 7 burnout instruments. A total of 22 RCTs and 73 observational, pre-post designed trials were noted. In all, 6437 resident physician subjects were included in 95 investigations.

Conclusion
Although 8958 peer-reviewed articles have been published on the topic of physician burnout, only 95 of these studies included an intervention to look at this problem in a systematic manner. More prospective studies are warranted to investigate more intricate solutions to this widely documented phenomenon. Otherwise, the problem will continue to be documented without any real solutions.

Abstract Title: Uncovering Gaps in Prenatal Care: A Survey-Based Study of Resource Awareness and Access in the Greater Hampton Roads Area

Investigator: Ghiorzi, Julianne
Mentor: Emily Terifay, M.L.I.S.
Department: Community Engaged Learning
Co-Investigators: 1. Lia Dopp, EVMS MD Program 2. Katie McLaughlin, EVMS MD Program

Abstract

Introduction
Quality prenatal care has been shown to have a positive impact on both the mother and child. Mothers who receive consistent prenatal care are less likely to die due to pregnancy-related complications and their children are less likely to experience adverse health outcomes and death. Many factors can impede access to prenatal care. These factors include insurance status, distrust of medical providers, racism, socioeconomic status, availability of prenatal appointments, social support, transportation, and mental health status. The United States has an infant mortality rate of 5.4:1000, yet Norfolk City has an infant mortality rate 9.6:1000. When broken down by race, Black individuals in Norfolk have an infant mortality rate of 15.7:1000. Norfolk City is also above the national average for both low birthweight and very low birthweight newborns. These statistics indicate a need for increased access to prenatal care within the Norfolk/Hampton Roads area. The Mother and Baby Mermaids (MBM) CEL at EVMS created a survey to access public knowledge of prenatal care resources. The goal of the quality improvement study was to find gaps in access to care and quality of prenatal/postpartum care among low-income women in Hampton Roads.

Methods
Inclusion criteria were respondents 1) 18 years old or older and 2) interested in prenatal care. The 28-question survey included questions on demographics, pregnancy status, concerns during current/previous/future pregnancies, and awareness of currently available resources in Hampton Roads. Some questions also provided a "write-in" option that allowed us to analyze qualitative data in addition to our quantitative data. Survey data collection occurred primarily at EVMS OB/GYN Clinic at Hofheimer Hall. Patients were asked as they entered the waiting room if they would be willing to fill out the survey, which was available in both English and Spanish, via a QR code linked to Redcap. The data was analyzed using Excel to elucidate demographic data and trends in responses.

Results
Out of 100 respondents, 71 were currently pregnant, 25 had specific concerns about breastfeeding, 5 had concerns about postpartum birth control, and 14 had nutrition concerns. Data analysis revealed first-time pregnant people were less likely to have heard of or used at least one local prenatal/pregnancy resource than women with 1+ children (56% vs 72%). Additionally, individuals with Medicaid/Medicare were more likely to have heard of or used at least one resource than those with other insurance (81% vs 53%). 30 people were interested in educational sessions about pregnancy-related topics, 85 responded their questions were fully answered by their healthcare providers, and 86 respondents plan on regularly seeing a provider for prenatal visits.

Conclusion
Analysis of our data shows that first-time pregnant individuals as well as pregnant individuals without Medicaid/Medicare are less likely to be aware of local prenatal/pregnancy resources. Additionally, Concerns about breastfeeding, prenatal nutrition, and post-partum birth control are still present in this community. Our next steps include developing community education classes focusing on breastfeeding and nutrition as well as identifying ways to educate first-time pregnant individuals about community resources.

Abstract Title: Turbinate Reduction Outcomes in Children with Sleep Disordered Breathing Undergoing Adenotonsillectomy

Investigator: Godambe, Maya
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Department: Department of Otolaryngology
Co-Investigators: Suhas Bharadwaj, Department of Otolaryngology Residency PGY4

Abstract

Introduction
Inferior Turbinate Hypertrophy is linked to chronic nasal congestion and is associated with sleep-disordered breathing (SDB) in pediatric patients. While adenotonsillectomy is the standard surgical intervention for children, rates of persistent obstruction are high. Currently, there is insufficient data to determine whether turbinate surgery performed at the time of adenotonsillectomy improves pediatric Obstructive Sleep Apnea (OSA) outcomes.

Methods
A prospective randomized clinical trial was designed to assess children ages 3-12 years (n = 86) with turbinate hypertrophy and at least 3 months of chronic nasal congestion with or without mouth breathing who were undergoing adenotonsillectomy for the treatment of SDB. Participants were randomized to adenotonsillectomy alone or adenotonsillectomy plus turbinate reduction and outfracturing. Standardized, validated questionnaires, including the OSA-18, Nasal obstruction symptom evaluation (NOSE), and the Sleep Related Breathing Disorder (SRBD) section of the Pediatric Sleep Questionnaire (PSQ), were assessed at baseline and 3-month follow-up. Physiological measurements of nasal obstruction were done using acoustic rhinometry and rhinomanometry at baseline and 3-month follow-up.

Results
The recruitment of children is ongoing. Preliminary data is being managed in REDcap, and protocols for the standardized performance of both acoustic rhinometry and rhinomanometry have been developed.

Conclusion
Turbinate reduction is a rapidly evolving surgical method for managing chronic nasal obstruction in pediatrics. Further research using randomized control trials in pediatric patients with enlarged turbinates is needed to fully evaluate the effects of turbinate reduction on symptom burden and QOL in children presenting with chronic nasal obstruction in SDB.

Abstract Title: Examining the Prevalence of Visually-Significant Cystoid Macular Edema in Patients Treated with Dextenza® Following Cataract Surgery

Investigator: Goodrich, Zachary
Mentor: Jennifer Schneider, MD
Department: Private Practice
Co-Investigators: 1. Zachary Goodrich, EVMS MD Program Class of 2027 2. Matthew Jackson, EVMS MD Program Class of 2027

Abstract

Introduction
Cataract surgery is one of the most common surgical procedures in the United States. Although outcomes are typically positive, there are several well described complications that may arise following surgery. Cystoid macular edema (CME) is one of the most common causes of poor visual outcome following cataract surgery. To ward against this, prophylactic treatment with anti-inflammatory ophthalmic medications such as nonsteroidal anti-inflammatory drugs (NSAIDs) and/or corticosteroids is administered in postoperative cataract patients. This standard drop therapy can last up to six weeks and requires a diligent daily schedule to stay on top of medication intervals. While this has been the standard for years, many patients struggle to instill eye drops for one reason or another. Because of this burden, new "drop-less" regimes have offered alternatives to surgeons and their patients. One dropless option, Dextenza®, releases dexamethasone after the insert is placed in the intracanalicular space of the patient at the time of cataract surgery. This alternative can at least eliminate one of the more burdensome ophthalmic drops patients typically have to use. Dextenza® stays active over the course of 30 days following surgery and then dissolves without requiring further intervention. The purpose of this report is to examine the rates of cystoid macular edema in patients treated with Dextenza® over the calendar year of 2023.

Methods
We performed a nonrandomized, nonblinded retrospective chart review of patients with visually significant cystoid macular edema from January 1, 2023 to December 31, 2023. All surgeries were performed by the same surgeon with standard technique. Data included patients between the ages of 18 and 89 years old who underwent phacoemulsification and posterior chamber intraocular lens placement and were subsequently treated with Dextenza®. All patients under the age of 18 and over the age of 89 as well as anyone who received corticosteroid or NSAID ophthalmic eye drops in place of or in conjunction with Dextenza® treatment were excluded. Patients who received their postoperative care at any other facility or those with incomplete documentation due to reasons such as non-adherence of at least one month of follow-up appointments were also excluded. The diagnosis of cystoid macular edema was made by one of six providers including ophthalmologists and optometrists. A positive diagnosis was suspected based on poor visual acuity in relation to the expected outcome. CME was then confirmed via fundoscopic exam and/or macular optical coherence tomography between the 2-8-week postoperative interval following cataract surgery of the affected eye.

Results
After screening for eligibility as stated, a total of 151 individuals and 245 eyes were included in our study and analyzed. 14 eyes (5.7%) from 10 different patients were diagnosed with cystoid macular edema during the postoperative interval. 11.2% of males in the study developed CME while only 2.8% of females did. The majority of eyes included in this study were of White patients, while Black and Hispanic patients were represented at lower rates. Of these patients, CME was diagnosed in 6.6% of eyes in White patients and 4.4% of eyes of Black patients. No Hispanic patients developed CME. In addition, eyes of previously diagnosed diabetic patients with no history of diabetic retinopathy developed CME at a rate of 4.5%. In eyes with a past history of diabetic retinopathy, 12.5% were diagnosed with CME. Non-diabetic patients' eyes had a rate of 6.1%. The mean intraocular pressure was 16.0 mm Hg for individuals with CME and 14.9 mm Hg for those who were not diagnosed. Of the eyes diagnosed with CME, the average visual acuity change between expected outcome and actual outcome was 0.2 using the LogMAR scale. This correlates to a change in two lines of letters on the Snellen chart.

Conclusion
This is a multi-part project reviewing patients from a single institution who underwent cataract surgery. Future projects will look to examine CME rates in patient populations treated with standard drop therapy and/or a combination of therapies. With the examination of other therapies, we will be able to more effectively conclude whether or not Dextenza® is on par with standard treatment options. Results to date demonstrate that Dextenza® is an effective treatment option that provides prophylactic treatment in addition to decreasing the burden of instilling eye drops.

Abstract Title: Testing novel histological markers for fibrosis in Benign Prostatic Hyperplasia (BPH)

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Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1. Dita Julianingsih, Department of Biomedical & Translational Sciences, Division of Tumor Biology 2. Mariah Jensen-Wachspress, Department of Biomedical & Translational Sciences, Division of Tumor Biology 3. Ilya Sobol, MD, Department of Urology, Urology of Virginia

Abstract

Introduction
BPH often presents with prostatic fibrosis, which is the formation of fibrous tissue within the prostate due to aging or inflammation. Staining for fibrosis using a COL1A1 antibody is common; however, the baseline level of Collagen-I is high in the prostate, making it difficult to establish fibrotic grades. The aim of this study is to identify a more quantitative marker for visualizing prostatic fibrosis via immunohistochemistry (IHC), and uncover any correlations between optical density and patient data.

Methods
BPH patients were consented at Urology of Virginia and received Holmium Laser Enucleation of the Prostate (HoLEP) surgery at Sentara Norfolk General. Tissues from 10 patients were selected for IHC. Antibodies for three markers of fibrosis: COL1A1, Lumican, and Decorin, were optimized and then applied. The average staining intensity for each antibody was calculated using InForm Software (Akoya). Additional patient data regarding age, race, BPH medication, smoking status, prostate specific antigen (PSA) levels, and prostate size were accessed via Epic Hyperspace and organized in RedCap. Prism software was used to correlate patient data with staining intensity.

Results
Variability in optical density is associated with a better indication for the use as a biomarker in our experiments. Interestingly, COL1A1 showed the highest variability, followed by decorin and lumican. Although no statistically significant correlations were found in regards to prostate size, COL1A1 displayed the lowest P value of 0.1210, and the highest R2 value with 0.3079. Mann-Whitney test showed no statistically significant difference in COL1A1 intensity between Caucasian and African-American patients. BPH treatment and smoking status was also not associated with staining intensity of the antibodies tested.

Conclusion
Our studies indicate that COL1A1 performs best to indicate the degree of prostatic fibrosis. We found a trend for inverse correlation between prostate volume and COL1A1 density, which corroborates earlier suggestions about the relationship between prostate size and fibrosis. Our future experiments will focus on increasing the sample size of tissues assessed to provide statistically significant proof of this correlation.

Abstract Title: Terson Syndrome: Case Report & Literature Review

Investigator: Gupta, Neha
Mentor: Scott Rader, DO
Department: Department of Radiology
Co-Investigators: Kevin Nguyen, MD, Department of Radiology

Abstract

Introduction
Terson Syndrome (TS) is described as the presence of any intraocular hemorrhage in patients with intracranial hemorrhage or traumatic brain injury.

Case Information
We report on a 66-year-old female who presented to the ED with altered sensorium, nausea, vomiting, and headache. Initial CT head demonstrated presence of subarachnoid hemorrhage (SAH). Three days later, repeat CT head showed hyperdensity in the bilateral posterior globes suggestive of TS.

Discussion/Clinical Findings
In cases where TS is a concomitant process with subarachnoid hemorrhage (SAH), studies have shown an association with worse neurological outcomes and increased mortality. Therefore, presence of intraocular hemorrhage should be carefully examined for on imaging as it is an important prognostic factor. Unfortunately, given the acuity of patient conditions in these situations and often inability to communicate visual symptoms, ocular exams are frequently deferred5. Screening through ultrasound or head CT then becomes increasingly important. If left untreated, complications of TS include retinal damage and potentially irreversible vision loss.

Conclusion
Despite the relatively high incidence of TS in patients with SAH, it is likely an overall underdiagnosed condition. Awareness in radiologists to carefully examine the orbits and in medical professionals to obtain imaging or fundoscopic exams in the setting of head trauma or SAH should be increased to minimize diagnosis delay and chance of irreversible vision loss.

Abstract Title: Typical and Atypical Presentations of Chondrocalcinosis: An Educational Exhibit

Investigator: Gupta, Neha
Mentor: Dina Elgohary, MD
Department: Department of Radiology
Co-Investigators: Kevin Nguyen, MD, Department of Radiology

Abstract

Introduction
LEARNING OBJECTIVES: (1) To review the imaging findings of chondrocalcinosis (CC) on radiographs. (2) Explore the spectrum of diseases associated with chondrocalcinosis.

Case Information
BACKGROUND: Chondrocalcinosis (CC) is a term used to describe visualization of gross calcium deposition in hyaline and fibrocartilage. CC is commonly and mistakenly used interchangeably with calcium pyrophosphate deposition (CPPD), however, these two are not synonymous. For some familial CC cases, mutations have been identified in the ANKH gene affecting pyrophosphate metabolism; however, the exact underlying pathogenic mechanism of calcium deposition in cartilage remains not entirely understood6. CC is often seen with advanced osteoarthritis but is also associated with a wide variety of diseases. While most commonly associated with CPPD, CC is also associated with Addison's disease, Wilson's disease, alkaptonuria (ochronosis), hypothyroidism, hyperparathyroidism, hypomagnesemia, and hereditary hemochromatosis (HH) largely due to abnormal calcium/pyrophosphate metabolism. Management of CC generally involves anti-inflammatory medications and control of the underlying etiology.

Discussion/Clinical Findings
IMAGING FINDINGS: Often demonstrated on radiographs, CC appears as hazy punctate and linear densities in hyaline and fibrocartilage. These findings remain similar despite differences in the underlying cause of the CC. Typical locations involve the knee, wrist, hip, and symphysis pubis, areas often affected by degenerative changes4. CC in the knees tend to affect the menisci more commonly than the articular cartilage. In the wrist, the most common site of calcification is the triangular fibrocartilage complex. While unusual, it is possible to also see CC in areas such as the acromioclavicular joints, external ear, and ankle cartilage as well.

Conclusion
Conclusion AND/OR TEACHING POINTS: 1. CC is associated with a wide variety of disease processes. 2. CC is more commonly found in elderly patients with advanced osteoarthritis. 3. One must consider an underlying metabolic process for patients under 60 years old presenting with CC on radiographs. 4. Associated diseases include CPPD, Addison's disease, Wilson's disease, alkaptonuria (ochronosis), hypothyroidism, hyperparathyroidism, hypomagnesemia, and hereditary hemochromatosis (HH).

Abstract Title: Adherence to Evidence-Based Approaches to Early Childhood Mental Health

Investigator: Hale, Valicia
Mentor: Mary Margaret Gleason, MD
Department: Department of Pediatrics
Co-Investigators: Bhavana Madhu

Abstract

Introduction
Established treatment algorithms for very young children recommend psychotherapy as the first-line treatment for most clinical conditions (Gleason et al., 2007), with medication acting as a supplemental treatment if psychotherapy alone is insufficient. However, past research shows that many young children receive treatment plans that do not align with established guidelines, suggesting that there are factors affecting clinical decisions. Therefore, this project aimed to examine the treatment plans recommended to young patients at CHKD and their adherence to published treatment guidelines based on diagnosis and level of impairment. Also of interest was if any moderators appeared to influence adherence based on demographic or clinical factors.

Methods
Retrospective chart reviews were conducted of 233 patients under the age of 6 who were seen for a Brief Clinical Needs Assessment (BCNA; their initial triage appointment) between July 2023 and June 2024. Data extracted included demographic information (sex, race, primary language, insurance status), diagnosis/symptom category, past history of treatment, current medications, impairment level, and treatment recommendations. These treatment plans were then compared to published guidelines to assess for adherence.

Results
Recommended treatment plans aligned with established treatment guidelines in 67.0% (n=155) of cases. However, there is room for improvement: 27.5% (n=64) of plans only partially aligned and 5.6% (n=13) of plans did not align at all. Of the 64 plans that only partially aligned, most included a psychiatry referral being indicated but not done (55%; n=35) or inappropriate psychological testing (60%; n=38). Patient age, race, sex, and insurance status did not appear to influence adherence. However, clinicians still in training were less likely to recommend treatment plans that were fully adherent (56.8%; n=63) compared to their licensed supervisors (85.6; n=30%).

Conclusion
Overall, most plans of care aligned with published recommendations. Importantly, adherence to guidelines was not associated with demographic factors usually associated with disparities. Additionally, even with real time supervision, unlicensed assessors had lower rates of adherence than independently practicing licensed clinicians. Attention to training and the supervision process will promote adherence to published guidelines and ensure that services are being referred to appropriately.

Abstract Title: Assessing the Efficiency of GPT-4 in Simplifying and Summarizing Radiology Reports: A Quantitative and Qualitative Analysis

Investigator: Hasani, Amir
Mentor: Ashkan Malayeri, MD
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Co-Investigators: Mahshid Golagha - Radiology Department, Clinical Center, National Institute of Health Kush Attal - National Medical Library, National Institute of Health Mahshid Goljamali - School of Pharmacy, Virgnia Commonwealth University Brian Ondov - National Medical Library, National Institute of Health Aryan Zahergivar - Radiology Department, Clinical Center, National Institute of Health Mark, B.A.ll - Urology Department, Clinical Center, National Institute of Health

Abstract

Introduction
The integration of AI and large language models (LLMs) like GPT-4 in medicine aims to simplify complex medical information, making it more accessible for patients and healthcare providers. This study evaluates GPT-4's ability to summarize and simplify radiology reports, focusing on the quality, readability, and clinical usefulness of AI-generated reports compared to those produced by radiologists.

Methods
A total of 150 anonymized abdominal radiology reports were processed through GPT-4 to generate two types of outputs: summarized versions and simplified versions. The original reports served as controls. Evaluations were conducted by six urology fellows and six radiology post-doc fellows, all blinded to the study's objectives. Metrics such as Flesch-Kincaid Grade Level, Gunning Fog Index, BLEU, and ROUGE scores were used alongside human assessments focusing on clarity, language, and usefulness.

Results
The original reports averaged 120.98 words and 576.4 characters, while GPT-4 summarized reports had 24.77 words and 128.75 characters, and simplified reports had 22.12 words and 94.14 characters. Readability scores for GPT-4 outputs were significantly better, with Flesch-Kincaid scores of 0.95 (summarized) and 1.00 (simplified) versus 3.54 for the original reports. BLEU and ROUGE metrics indicated lower text overlap between AI-generated and original reports. Human evaluators rated the summarized reports higher in clarity (3.98 vs. 3.62) and overall preference (3.92 vs. 3.80) compared to simplified versions.

Conclusion
GPT-4 effectively simplifies and summarizes radiology reports, improving readability and clarity, which may enhance patient understanding. However, further refinement is necessary to ensure that these AI-generated reports maintain the accuracy and completeness required for clinical use.

Abstract Title: Evaluating Automated Hand Tracking Hygiene Technologies in an Inpatient Pediatric Care Setting

Investigator: Hayes, Eric
Mentor: John Harrington, MD
Department: Department of Pediatrics, CHKD Quality & Patient Safety
Co-Investigators: Rebecca N. Lee

Abstract

Introduction
Children's Hospital of The King's Daughter's (CHKD) contracted a vendor in June 2023 to install a Bluetooth-enabled system of sensors throughout the hospital to monitor hand hygiene (HH) compliance in an effort to reduce health care associated infections (HAI). The system is locally branded "Wonder Washers". Wonder Washers functions on an individual wearing a SmartBadge on their upper torso that communicates with location sensors, sensors in automated hand sanitizer and soap dispensers, and "gateways" that off-load HH data to the vendor's database for display. In this study, automated HH data from pediatric residents was analyzed from July 2023-July 2024. Additionally, HH data from medical students on clinical rotations was analyzed each week during June-July 2024.

Methods
Pediatric residents and medical students were selected as populations of the study due to their widespread areas of activity and comparison subgroups (i.e. resident year groups, medical student cohorts). This allowed analysis of discrepancies between individuals, resident classes, and inpatient units not entirely attributable to personal HH practices. User data was obtained from the vendor's online dashboard and compiled into respective subpopulations. The user data was then reconciled against observer verified HH opportunities and compliance on rounds to generate an "opportunity error rate" and "compliance error rate" for the system.

Results
The most impactful factors for the system's efficacy were simply badge wearing and proper badge placement. 63% of residents recorded a badging event in July 2023, however that figure had decreased to 28% by June 2024. During July 2024, the opportunity error and compliance error rates were found to be 31.9% and 53.6%, respectively.

Conclusion
Badge wearing compliance presented the single largest limitation in determining the efficacy of the automated HH tracking system. Large error rates fed pessimism on the system's utility, which fed lower badge wearing compliance rates, which lowered data collection, which further distorted the system's error rates. While automated HH tracking system theoretically gave users the power of information about their own HH practices, additional improvements in system efficacy are necessary to promote buy-in to the system.

Abstract Title: Healing Hearts & Health with Caring Connections: Perceptions of Provider Compassion

Investigator: Hernandez, Alexis
Mentor: Alvin Maliakal, MD
Department: Department of Medicine
Co-Investigators: 1. Rebecca Fetter, EVMS MD Program 2. William Crafton, EVMS MD Program 3. Ayaan Khan, Undergraduate student

Abstract

Introduction
The compassion of healthcare providers has become increasingly recognized in the scientific literature as providing measurable benefits to patients, healthcare systems, and the providers themselves. Studies show that patients treated compassionately experience enhanced trust in their provider and in the patient-provider relationship. Increased trust is believed to contribute significantly to improved patient satisfaction and improved health outcomes. Efforts have been made to understand the factors that contribute to the delivery of compassionate healthcare by providers. However, there remains a gap in our understanding of the patient-centered factors that influence the perception of compassion from the patient's point of view, including the role of social determinants of health (SDoH - e.g., type of insurances, socioeconomic status, gender, age, education level). We hypothesize that SDoH directly contributes to patient satisfaction of healthcare services at the clinics investigated regardless of patient perception of provider compassion. The aim of this study is to better understand the role of physician compassion from a patient-centered lens and to identify how SDoH may impact patient perceptions of this factor, especially for historically marginalized individuals who may have experienced chronic disparities in healthcare delivery or outcomes over time. To identify other factors that may add to a patient's perception of clinic efficiency, patient satisfaction, or provider compassion.

Methods
This prospective, observational study, utilized a 36-item questionnaire to examine patient perceptions of compassion, as impacted by SDoH and patient satisfaction with their overall healthcare visit in an outpatient clinic setting. Inclusion criteria; adult patients (ages 18-89) were recruited via convenience sampling from three internal medicine clinics at Eastern Virginia Medical School (EVMS). Patients were asked to fill out the questionnaire at the end of their medical appointment via research team members. Patients were given the choice to complete the questionnaire on a paper form or by scanning a QR code to complete the questionnaire electronically. The questionnaire contained validated items from the following, 1) Outpatient 5-Item Compassion Instrument, 2) the Visit-Specific Instrument (VSQ-9), and 3) the Centers for Medicare & Medicaid Services (CMS) - The Accountable Health Communities Health-Related Social Needs Screening Tool, in addition to other general demographic data. Power analysis showed that statistical significance wou This prospective, observational study, utilized a 36-item questionnaire to examine patient perceptions of compassion, as impacted by SDoH and patient satisfaction with their overall healthcare visit in an outpatient clinic setting. Inclusion criteria; adult patients (ages 18-89) were recruited via convenience sampling from three internal medicine clinics at Eastern Virginia Medical School (EVMS). Patients were asked to fill out the questionnaire at the end of their medical appointment via research team members. Patients were given the choice to complete the questionnaire on a paper form or by scanning a QR code to complete the questionnaire electronically. The questionnaire contained validated items from the following, 1) Outpatient 5-Item Compassion Instrument, 2) the Visit-Specific Instrument (VSQ-9), and 3) the Centers for Medicare & Medicaid Services (CMS) - The Accountable Health Communities Health-Related Social Needs Screening Tool, in addition to other general demographic data. Power analysis showed that statistical significance would be obtained from 800 patients. Data analysis will encompass both descriptive statistics & also linear or multivariate regression, as appropriate to identify potential associations between variables. ld be obtained from 800 patients. Data analysis will encompass both descriptive statistics & also linear or multivariate regression, as appropriate to identify potential associations between variables.

Results
Preliminary Results of the 5-month data collection period highlight the perceptions of N=346 patients.

Conclusion
Dissemination of the information from this study's findings will add to the generalizable knowledge on the topic of physician compassion and will build upon prior studies that have reported smaller numbers of patients from outpatient medicine clinic settings. Robust Results will impact outpatient practices across the nation by highlighting the patient perceptions of physician compassion for today's internal medicine patients, as impacted by SDoH.

Abstract Title: A Review on Distraction Osteogenesis using Magnetic Lengthening Nails: A Quality Improvement Project

Investigator: Herron, Simone
Mentor: Toni McLaurin, MD
Department: Department of Surgery, Orthopedics

Abstract

Introduction
Distraction osteogenesis is a technique that can be used for limb lengthening or managing segmental bone defects in individuals with deformities and/or limb length discrepancies following traumatic musculoskeletal injuries to induce new bone formation by means of bone lengthening and/or bone transport. It is achieved through the stimulation of tissue growth by applying slow, progressive traction at an osteotomy site. In the past, distraction osteogenesis has commonly been accomplished using external fixators, frames that have rods and nuts that can be manually adjusted to achieve distraction. The frame is attached with tensioned wires and pins to the patient's bones. Later, the 'lengthening over-nail' approach was introduced where an intramedullary nail and external fixators were used in conjunction. This method allows for better alignment of the bone throughout the lengthening/healing process and shortens the overall time in the frame. However, the use of an external fixator is not well tolerated by many patients due to the external hardware and is frequently associated with pin site infections. A magnetic lengthening nail (e.g. Precice nail) is a newer technology that has been developed to achieve distraction osteogenesis and is composed of a magnet, motor, and extendible rod. The nail system is activated via an external device that allows a patient to gradually achieve a lengthening goal with consistent use.

Methods
This quality improvement project evaluated patient outcomes following Precice nail procedures. A retrospective chart review was conducted to identify Bellevue Hospital patients that had lower extremity procedures involving Precice nails between 2022-2024. All patients who had an exchange nail procedure or nail removal were analyzed as this indicated completion of lengthening/bone transport with the magnetic nail.

Results
Following chart review, 7 patients were identified as having prior lower extremity surgeries utilizing the Precice nail. Six of the seven patients underwent exchange nailing to a weightbearing trauma nail and one only underwent nail removal. On average, Precice nail patients had 3 surgeries related to the Precice nail including insertion, revision, and removal/exchange procedures. The average length of the patients' nonweightbearing period following initial Precice nail insertion was 4 months. The average time to completion of the bone lengthening/bone transport process was 5 months. When the patient's bone lengthening/bone transport was complete, the Precice nail was exchanged for an intramedullary trauma nail. For 2 of the patients the exchange nail was their final surgery related to the Precice nail. However, 4 patients had complications that required additional unplanned surgeries. These complications included delayed bone healing requiring bone grafting, surgical site infection requiring irrigation and debridement, as well as knee stiffness and equinus contracture requiring soft tissue releases.

Conclusion
Given the recent adoption of Precice nail procedures evaluated in this project, a longer follow-up period is needed before further Conclusions can be made and patient outcomes following Precice nailing can be evaluated. For next steps, the authors plan to compare the preliminary Precice nail patient results to those of previous patients treated with external fixators. The authors will compare factors such as average number of surgeries, time to completion of lengthening/bone transport, length of nonweightbearing period, number of unplanned secondary procedures, time to bony union, and complications.

Abstract Title: Femoral Endarterectomy Rescue After Partial Extraluminal Stent Deployment in TAVR-related Arterial Dissection

Investigator: Hoffman, Jacob
Mentor: Hosam El Sayed, MD
Department: Department of Surgery, Division of Vascular Surgery
Co-Investigators: 1. Benjamin Samberg, EVMS MD Program, 2. Emily Burnett, EVMS MD Program, 3. Thomas Cook, EVMS MD Program

Abstract

Introduction
The use of Transcatheter Aortic Valve Replacement (TAVR) has emerged as the new standard of care in elderly patients with severe aortic valve stenosis. One of the major concerns with TAVR is vascular complications secondary to large bore sheath placement1 and vascular closure devices. This report presents a TAVR case which led to an arterial access site dissection and occlusion. Attempted endovascular management was unsuccessful and led to additional complications for the patient and ultimately required open repair.

Case Information
An 80-year-old female who had prohibitively high surgical risk was scheduled for TAVR procedure. A 23 mm Edwards SAMPIEN 3 valve was successfully deployed through right common femoral arterial access through a 14 Fr sheath. MANTA closure device was deployed to close the right CFA. Completion angiogram via left CFA access revealed a discrete dissection flap in the right external iliac artery with minimal distal perfusion. Multiple prolonged attempts to cross the dissection with a wire and catheter technique were performed with apparent success. Balloon angioplasty revealed no improvement in distal flow but persistence of the dissection flap, prompting placement of an uncovered stent. Completion angiogram showed complete arterial occlusion with no flow through the stent. Vascular surgery was consulted and initiated a right groin exploration procedure.

Discussion/Clinical Findings
On exposure of the right common femoral artery, the stent was visualized traversing the common femoral artery wall into an extraluminal hematoma. Arteriotomy was performed in the right common femoral artery extending to the superficial femoral artery. The stent and MANTA closure device were both removed. Endarterectomy and bovine patch angioplasty were performed. Flow was restored to the RLE with confirmation by angiogram and the patient was discharged POD 3.

Conclusion
External iliac dissection due to large devices in small and/or diseased iliac arteries is a common occurrence. In this case, attempted percutaneous management created a false passage transmurally into the intermuscular space. Angioplasty was followed by transmural stent deployment resulting in hematoma and acute limb ischemia. Femoral endarterectomy and patch angioplasty after removal of the transmural stent led to a positive patient outcome. It can be seen that multiple, prolonged attempts to avoid open repair for this patient ultimately led to additional procedural time and adverse events. Despite the patient's high operative risks, she did well with a local incision and direct repair. Vascular complications during TAVR procedure are not uncommon. This case highlights the benefit from multidisciplinary teams assisting when complications arise in these medically complex patients and early vascular surgical consultation is imperative for positive patient outcome.

Abstract Title: The Effect of Hypernatremia on 30-Day All-Cause Mortality from a Real-World Retrospective Cohort Review

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Abstract

Introduction
Hypernatremia is a poorly understood clinical condition recognized in hospitalized patients. The largest observational retrospective cohort study observed that 6% of patients developed hypernatremia and they were 14 times more likely to die in the hospital. Unfortunately, this study included patients in whom the development of hypernatremia could be therapeutic or in patients that may have been administered hypertonic saline. A retrospective review of a large electronic health record database can be undertaken to evaluate an association of mortality in patients admitted to the hospital with an observed hypernatremia (serum sodium (SNa) above 145 mmol/L) during the first 14 day of admission. Patients in whom hypernatremia could be a therapeutic goal and those who received hypertonic saline (3% saline or higher) should be excluded from evaluation.

Methods
For this retrospective cohort study deidentified electronic health record information from approximately 115 million individuals in 85 healthcare organizations of the TriNetX Research Network was accessed on 27 June 2024. To assess mortality, patient records for this study were linked to the United States Social Security Death Index. Patients 18 years and older who had an inpatient encounter with two serum sodium assays 24 hours apart during the first 14 days of hospitalization were included. Patients with an ICD-10 diagnosis related to traumatic brain injury; ischemic and hemorrhagic cerebral infarcts; and renal failure were excluded from the review. Patients with SNa below 135 mmol/L at admission or within the first 14 days of hospitalization were excluded. Patients were divided into two groups for comparison. Patients with SNa above 145 at admission or with in the first 14 days of hospitalization were considered the hypernatremia groups. Patients that maintained SNa between 135 and 145 at admission and the subsequent 14 days were the comparison group. Propensity score match was applied considering age and sex, with a 1:1 ratio within the TriNetX platform. The primary end point for the study was all cause 30-day mortality. All analyses were completed within TriNetX Advanced Analytics using the Compare Outcomes functionality. Univariate time-to-event analysis using the Kaplan-Meier analysis option was implemented for each outcome. Hazard ratios (HR) and associated 95% confidence intervals were estimated using the Cox proportional hazards model.

Results
714,407 patients were identified; 42,717 had SNa above 145 mmol/L. The hypernatremia group were 9.0 years older ($p=0.01$) and had 5.2 % more males ($p<0.01$). After 1:1 PSM. 41,580 patients were in the hypernatremia group and 41,958 were in the comparator. All-cause mortality at 30 days was observed in 12.2% of patients in the hypernatremia group but only 1.3% of the comparison group. The largest group was the SNa 146-150 mmol/L patients accounting for 74.1% of the entire population. The risk of death at 30-days increased as the sodium level increased but due to the shrinking population in each group the 95% confidence interval widened. The Kaplan-Meier survival curve suggests that the risk of death in the entire hypernatremia cohort continues to increase throughout the 30-day observation period. The hypernatremia group was divided into 5 quartiles of 5 mmol SNa. The risk of death increased as the SNa increased with HR 9.755 (95% CI 8.934, 10.652) for the entire group.

Conclusion
This is the first retrospective database review of hypernatremia that excluded patients in whom hypernatremia may have been a therapeutic goal or occurred after hypertonic saline injection. Hypernatremia in inpatients significantly increased the risk of death at 30-days. There is no level of hypernatremia that does not increase the risk of death. The risk of death increases as the SNa increases. In summary, hypernatremia should be avoided. Inpatients with hypernatremia should be recognized and judiciously treated to avoid additional increases in SNa. This study is not without limitations. The use of the TriNetX database provided a large patient population for this study; however, the database has profound limitations that limited the analysis of the Results. First, the database only allowed for propensity score matching on three variables, therefore age and sex were the only two selected. Race was not used in propensity scoring matching because the authors did not feel that it was a reliable variable. Additionally, the database only allowed for a 1:1 propensity score matching between the two groups although the comparison group was large enough to have had a 1:2 or 1:3 propensity score comparison. Finally, all analysis in this study were univariate, as the database did not allow for multivariant analysis which limited the precision of the analysis.

Abstract Title: Developing a Longitudinal Advocacy Curriculum for a Pediatrics Residency Program

Investigator: Hooberman-Pineiro, Andrea
Mentor: Andria Tatem, MD, M.Ed.
Department: Department of Pediatrics

Abstract

Introduction
Advocacy is a crucial aspect of pediatric medicine, and children depend on adults to represent their needs. Pediatricians play a vital role in advocating for their young patients, making the development of advocacy skills essential during their training. In addition, the ACGME (Accreditation Council for Graduate Medical Education) has developed new requirements for advocacy in pediatric training. This study aims to review current approaches to advocacy training in pediatric residency programs and identify gaps to help inform the creation of a comprehensive longitudinal advocacy curriculum at Eastern Virginia Medical School.

Methods
A literature review was conducted using AAMC's MedEdPortal and Google Scholar to identify existing advocacy curricula in pediatric residency programs. The review focused on curriculum formats, content topics, educational strategies, and Methods of curriculum evaluation. Kern's 6 steps of curriculum development were used as a framework to help guide the review.

Results
Eleven advocacy curricula of varying durations were identified: 5 were month-long, 2 ranged from 8 to 9 months, 1 was of unspecified length, and 2 were longitudinal. The longitudinal programs were described, however detailed curriculum materials were not published. Didactics and workshops were the most common components (9 out of 11), while 5 curricula included independent advocacy projects. Legislative experiences were also included in 5 curricula. Frequent topics mentioned included knowledge of current issues in healthcare, knowledge of the legislation process, and identification of community resources. Residents frequently cited time constraints as a significant challenge. The most common method of curriculum evaluation consisted of pre- and post- curriculum surveys.

Conclusion
Although several advocacy curricula exist, there continues to be a lack of a standardized longitudinal curriculum spanning all years of residency. Using insights from existing models and employing Kern's 6 steps of curriculum development, an advocacy curriculum is being developed and implemented at EVMS. It will include workshops and independent advocacy projects with community partners. It will focus on bedside, community, state, and federal advocacy efforts. This curriculum will help residents gain skills to become successful physician advocates and enhance preparedness for addressing systemic healthcare challenges.

Abstract Title: CD40 Influences HFO Rate by Sensitizing NMDA Receptor Activity

Investigator: Hubbard, Gregory
Mentor: Alberto Musto, MD, Ph.D.
Department: Department of Biomedical & Translational Sciences

Abstract

Introduction
Pathological High Frequency Oscillations (pHFO, >180 Hz) are a marker of neuronal disarray. Recent studies have associated pHFO with the development of epilepsy and the progression towards overt seizures. pHFOs are a specific manifestation of neuronal hyperexcitability and neuroinflammation. The upregulation of CD40-CD40L, a potent inflammatory system, mediates seizure susceptibility through unknown molecular mechanisms. This research aims to investigate the potential biological mechanism underlying CD40 neuronal excitability.

Methods
Pentylenetetrazole (PTZ) or pilocarpine -induced status epilepticus (SE) was performed in adult male mice deficient in CD40 (CD40KO) genetic matched controls (WT). A subgroup of mice was selected to receive siRNACD40 or shRNA (control) injection before PTZ. After PTZ or SE, seizures were analyzed clinically using Racine's score and electronically using multielectrodes assembled in a silicon probe across the cortex-hippocampal axis. Spontaneous local field potentials (LFPs), a representation of summed synaptic activity, were recorded in freely moving mice. Signal morphology and frequency analysis was conducted using signal analysis software to identify HFO. After euthanasia, neural tissue was histologically processed to evaluate CD40 expression. sCD40L (as a marker activation of CD40-CD40L), NR2B (NMDA sub-unit as component of excitability) and Integrin (as a marker of synaptic plasticity) was measured using ELISA.

Results
Preliminary data indicates that CD40 deficiency alters neural network functionally and morphologically. Neural oscillations of CD40KO demonstrate lower pHFOs rate with decreased baseline gamma/theta (functional activity) compared to controls. CD40KO reduces status epilepticus. After the administration of PTZ, CD40KO downregulates the expression of NR2B - limiting seizure susceptibility in concordance with decrease of pHFO rate.

Conclusion
This preliminary data suggests that activation of the pro-inflammatory CD40 cascade promotes seizure susceptibility through the upregulation of excitatory NMDA receptors. This mechanism could participate in epileptogenesis by promoting the formation of an epileptogenic network through the expression of pHFO.

Abstract Title: Exploring Neighborhood Level Socioeconomic Status and Volumetric MRI Results in Patients with Memory Impairment

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Department: Department of Medicine
Co-Investigators: 1. Hannah M Stamos, EVMS MD Program MD2025 2. Mia Achitoov, EVMS MD Program MD2026 3. Nadia Zia, EVMS MD Program MD2026 4. Andrus Jackson, EVMS MD Program MD2027 5. Bahar Niknejad, MD, Department of Medicine

Abstract

Introduction
This study addresses the impact of neighborhood-level socioeconomic disadvantage, as measured by the Area Deprivation Index (ADI), on individuals with mild cognitive impairment and dementia. Our primary outcome aimed to explore associations between ADI and hippocampal volume in cognitively impaired individuals from a comprehensive memory center.

Methods
We conducted a retrospective, cross-sectional analysis of patients over 50 from Virginia and North Carolina, with visits between January 1st, 2014, and July 1st, 2022. Normative percentile of hippocampal volume, total hippocampal occupancy scores (HOC), superior lateral ventricular volume, and inferior lateral ventricular volume of patients living in census block groups at the top and bottom 20th ADI percentiles were compared. We fitted a linear regression model on propensity-matched data in the two ADI groups, with multiple covariates. We performed g-computation in the matched sample and included the interaction of ADI category with covariates and the matching weights in the estimation.

Results
A total of 310 patients were included in the analysis, with 8% of the subjects in the high-ADI category. The actual sample size slightly varied for each outcome after excluding missing records, thus full matching was utilized. The estimated average treatment effect for high versus low ADI groups only reached statistical significance for hippocampal volume with the difference of 13.9% (SE = 5.83, $p = 0.01$). The difference of 0.7% (SE = 2.11, $p = 0.75$) for HOC, 0.5% (SE =4.13, $p = 0.90$) for superior lateral ventricular volume, and -0.2% (SE =7.18, $p = 0.90$) for inferior lateral ventricular volume were not statistically significant.

Conclusion
Contrary to expectations, high versus low ADI groups only showed a difference in hippocampal volume, but in the reverse direction. This finding may suggest global effects of the ADI on the brain health, rather than focal effects on hippocampus. Due to the limited size of our sample in the top 20th percentile, further validation of this discovery is necessary through studies employing larger sample sizes.

Abstract Title: Aberrant glycosylation and viral attachment enhance influenza A virus pathogenesis and induce systemic cytokine storm in a mouse model of Leigh syndrome

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Abstract

Introduction
High risk populations, such as children with mitochondrial diseases (MtD), are prone to develop severe morbidity and mortality from viral infections. Children with Leigh syndrome (LS), a severe MtD phenotype, represent a particularly medically vulnerable group. Respiratory infections like influenza A virus (IAV) can trigger life-threatening neurodegenerative events in LS, necessitating investigation into host-viral pathogen interactions in this disorder. At the cellular level, cells affected by LS adopt Warburg metabolism, which is marked by increased glycolysis, pentose phosphate pathway flux, and fatty acid synthesis. These metabolic characteristics are similar to metabolic reprogramming induced during IAV infection. We hypothesized that respiratory epithelial cells affected by LS would facilitate viral pathogenesis due to their baseline metabolism mirroring the alterations induced in IAV-infected cells.

Methods
To elucidate the mechanisms of augmented IAV pathogenesis in LS, we began by examining CRISPR-edited Ndufs4 knock out (KO) murine lung epithelial type I (LET1) cells, a model of LS due to complex I deficiency. Wild type (WT) and Ndufs4 KO cells were infected with a mouse adapted H3N2 subtype of human IAV, which causes mild illness in mice. Host glycosylation patterns are known to be a crucial determinant factor for viral attachment; therefore, we examined surface glycans in Ndufs4 KO cells using fluorescently tagged lectins. To better understand this enhanced viral pathogenesis in vivo, we infected Ndufs4 KO mice with nebulized IAV to induce viral pneumonia.

Results
At 24 hours post-infection, Ndufs4 KO cells displayed markedly increased viral load by RT-PCR for several IAV gene segments, including NS1, NP, PB2, M1, M2, and PA. In addition, at 10 and 20 minutes post-infection, viral attachment was significantly increased in Ndufs4 KO cells relative to WT. Ndufs4 KO cells also exhibited elevated glycoprotein/glycolipid sialylation, the primary receptors for IAV. Following infection, Ndufs4 KO mice demonstrated elevated sialic acid in the lungs by fluorescence microscopy for lectin binding. Lung viral load was also increased, and the mice displayed worse clinical severity scores and amplified weight loss relative to WT. Moreover, we observed systemic cytokine storm in IAV-infected Ndufs4 KO mice, with elevated levels of inflammatory cytokines, including IFN-γ, IP-10, IL-6, and TNF-α.

Conclusion
Increased sialylation may be attributed to metabolic reprogramming in LS cells marked by increased utilization of the hexosamine and sialic acid biosynthetic pathways. Altogether, our Results suggest that aberrant glycosylation leads to increased IAV attachment, producing higher viral loads, which provokes host cytokine storm and heightened illness in LS.

Abstract Title: Social Vulnerability Associated with Comorbidities and Health Habits for Men with Prostate Cancer

Investigator: Jhandi, Angad
Mentor: Samuel Washington, III, MD, M.A.S.
Department: Department of Urology, UCSF

Abstract

Introduction
Social Vulnerability (SV) encompasses several factors used to identify communities at greater disadvantage, and that may experience a greater burden of comorbidities and detrimental health-related behaviors. In men with Prostate Cancer (PCa), little is known of the prevalence of community SV and its relationship with patients' comorbidity burden and health habits such as smoking and alcohol use. We aim to examine whether community social vulnerability is associated with greater burdens of comorbidities and detrimental health habits in men receiving PCa treatment in community urology settings.

Methods
Data for participants in the CaPSURE registry were geocoded, deidentified, and combined with publicly available Social Vulnerability Index (SVI) data. Patients were deemed 'high' SVI if their community was ranked ≥90th percentile nationally for overall SVI rankings and the four SVI domains: socioeconomic status (SES), racial and ethnic minority status (REMS), housing type and transportation (HTT), and household characteristics (HC). Descriptive statistics examined relationships between patient SVI and BMI at diagnosis, number of comorbidities, job type, job status at study enrollment, site of diagnosis, current smoking status, and alcohol consumption.

Results
The cohort included 9,027 individuals (86.3% non-Hispanic White, 10% non-Hispanic Black, and 3.7% Asian/Latino/Other). Mean age at PCa diagnosis was 65.3 years (SD 8.8). 47.6% lived in high SVI neighborhoods; of which 683 (15.9%) were non-Hispanic Black, 3,412 (79.5%) non-Hispanic White, and 198 (4.6%) Asian/Latino/Other. By SVI domain, 15.9% had high community SVI by SES; 5.8% by REMS; 23.2% by HTT; and 30.8% by HC. Significantly more patients from high SVI communities reported an unpaid job compared to those from low SVI communities (70.1% vs 63%, $p<0.001$). Patients from high SVI communities more commonly smoke (7.1% vs 6.1%, $p<0.001$) and are less overweight (33.4% vs 36.8%, $p<0.001$). Higher weekly alcohol consumption was more common in low SV patients (7+, 15.06% vs 13.8%, $p<0.001$) while high SV patients had greater comorbidity burden (>5 comorbidities, 4.5% vs 3.4%, $p<0.001$).

Conclusion
Our study found that 47% of men with PCa lived in areas of high SV, with HTT (23%) and HC (31%) being the most common drivers of vulnerability. Greater comorbidity burden, joblessness, current smoking, and lower alcohol use were more common within areas of high SV. These findings highlight the significant interactions between SVI, health related behaviors, and comorbidities for PCa patients within community urology settings. This relationship elucidates a confounding relationship between comorbidities, health habits, and SV independent of access to urologic care. This geocoded SVI data allows for identification of and tailored interventions for neighborhoods with greater social vulnerability, and in turn men with PCa at potentially greater risk of worse outcomes.

Abstract Title: Social Vulnerability Influences Baseline Health Related Quality of Life for Men with Prostate Cancer

Investigator: Jhandi, Angad
Mentor: Samuel Washington, III, MD, M.A.S.
Department: Department of Urology, UCSF

Abstract

Introduction
Health Related Quality of Life (HRQOL) affects prostate cancer care and survivorship. Prior work has shown that patients with greater social needs experience worse QoL throughout the cancer continuum. This study seeks to examine whether community level vulnerability is associated with lower baseline HRQOL in patients with prostate cancer (PCa).

Methods
Deidentified data for participants in the CaPSURE registry were geocoded and combined with publicly available Social Vulnerability Index (SVI) data. Patients were deemed 'high' SVI if their community was ≥90thpercentile nationally for overall SVI rankings and the four SVI domains: socioeconomic status (SES), racial and ethnic minority status (REMS), housing type and transportation (HTT), and household characteristics (HC). Patients reported HRQOL (0-100 (best) scores) prior to PCa treatment using SF-36 general health (GH), physical function (PF) and mental health (MH) scales and the UCLA Prostate Cancer Index urinary function and bother (UF, UB), sexual function and bother (SF, SB), and bowel function and bother (BF, BB). Mean HRQOL scores were compared by SVI group with t-test.

Results
The cohort included 9,027 individuals (10% non-Hispanic Black, 86.3% non-Hispanic White, 3.7% Asian/Latino/Other) with mean age of PCa diagnosis being 65.3 (SD 8.8). Nearly half of the cohort (47.5%) resided in communities with high SVI. By SVI domain, 15.9% had high community SVI by SES; 5.8% had high community SVI by REMS; 23.2% high community SVI by HTT; and 30.8% high community SVI by HC. We found that patients from high SVI communities reported worse baseline scores for GH (73.3 vs 71.2, $p<0.001$), PF (87.4 vs 83.5, $p<0.001$), UB (86.3 vs 84.3, $p<0.005$), SF (55.4 vs 51.1, $p<0.001$), and SB (63.9 vs 60.0, $p<0.001$). MH, UF, BF, and BB did not differ significantly for patients with high community SVI vs those with low community SVI.

Conclusion
Our study found that at baseline HRQoL scores differ significantly by the extent of community vulnerability for men with PCa. Men living in areas of high community vulnerability experienced worse GH, PF, UB, SF, and SB compared to those in areas of low vulnerability. These findings point to a greater baseline health burden for patients living in vulnerable communities, which may be further exacerbated by the potential morbidity of PCa treatment. This study illustrates significant relationships between SVI and baseline HRQOL for men with PCa undergoing treatment in community urology settings, with implications for post-treatment QoL outcomes. When caring for PCa patients, especially those residing in vulnerable areas, HRQoL factors must be considered throughout their treatment course. Further assessment of long-term QoL changes over time after treatment, in the context of vulnerability, will identify those at greater risk and provide actionable targets for intervention.

Abstract Title: Streptoccocal Toxic Shock Syndrome

Investigator: Jin, Paul
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Department: Department of Surgery, Division of Plastic & Reconstructive Surgery
Co-Investigators: 1. Paul Jin, EVMS MD Program MD2025 2. Alexandra Van Horn, PGY-4 Surgery Residency

Abstract

Introduction
Streptococcal toxic shock syndrome (STSS) is a severe, exotoxin-mediated complication of invasive Group A Streptococcus (GAS) infections, such as necrotizing fasciitis and bacteremia. While GAS commonly causes noninvasive infections such as pharyngitis and non-necrotizing skin and soft tissue infections, the incidence of invasive GAS cases has notably risen in recent years, from 3.8 per 100,000 persons annually (2005-2012) to 8.2 per 100,000 in 2022., Up to 30% of patients with invasive GAS infections develop STSS, with rates climbing to 50% among those with necrotizing fasciitis. Recent US data reports 556 cases of STSS in 2023 and 333 in 2022. Clinical manifestations of STSS commonly include renal failure, acute respiratory distress syndrome (ARDS), hepatic failure, and heart failure, with mortality rates estimated around 30%. The pathogenesis of STSS involves the release of superantigenic toxins that trigger a cytokine storm. Treatment typically includes intravenous immunoglobulin (IVIG) to neutralize toxins, along with bactericidal antibiotics (penicillin) and protein synthesis-inhibiting antibiotics (clindamycin, linezolid).,

Case Information
Our patient is a forty-five year male with past medical history of hypertension who presented following brushfire who was found to have deep partial thickness to full thickness burns to the left lower extremity, left upper extremity, and left axilla with TBSA ~ 9%. He underwent burn excision 7 days after the incident and was discharged home the next day. He went for graft check with autograft about a week later and was again discharged home post op day (POD) 1. Patient represented POD3 from the second operation to an outside hospital with one-day history of shortness of breath and persistent fevers. His initial workup revealed leukocytosis (20,000), elevated lactic acid (10 mmol/L), creatinine (5 mg/dL), BNP (7,800 pg/mL), and troponin (55 ng/mL), concerning for septic shock and prompting transfer to our hospital. Further evaluation revealed multiorgan involvement including biventricular heart failure with an ejection fraction (EF) of 27% and concern for pulmonary embolism in setting of tachycardia with a new oxygen requirement of high flow nasal cannula. Broad spectrum antibiotics (vancomycin and zosyn) were continued and a heparin drip was started empirically. Due to concern for acalculous cholecystitis in setting of elevated LFTs with unknown source of sepsis, the patient underwent percutaneous cholecystostomy tube placement. He was unable to have CTA done in setting of AKI, so we proceeded with a VQ scan to further assess for PE. This demonstrated low probability of PE and heparin drip was discontinued. Patient was placed on CRRT in setting of AKI with volume overload and lactic acidosis. He developed ARDS and was intubated within 48 hours of admission with transfer to the cardiac ICU for possible ECMO. Blood cultures resulted around this time and ID was consulted now with known strep pyogenes toxic shock syndrome. Speciation confirmed invasive GAS infection likely secondary to skin grafting, despite no overt signs of infection at the graft sites. The patient was started on a 21-day course of penicillin G and a 3-day course of linezolid and IVIG. He improved significantly with decreasing leukocytosis and pressor requirements, and was extubated 4 days later. He developed a pruritic maculopapular rash on his trunk on day 10 of penicillin therapy and was switched to cefazolin for the remainder of his antibiotic course. His recovery was prolonged by heart failure necessitating guideline-directed medical therapy (GDMT) and kidney failure requiring dialysis three times a week. Due to his renal dysfunction, his GDMT was limited. Despite not receiving full GDMT, his EF improved from 27% to 55% prior to discharge. He was discharged on hospital day 18 with a temporary dialysis catheter, which was removed 10 days later as dialysis was no longer needed.

Discussion/Clinical Findings
This case illustrates the rapid onset of STSS with multisystem organ failure and the critical importance of early identification and treatment. As the incidence of invasive GAS infections and STSS continues to rise, maintaining a high index of suspicion is crucial, even in the absence of overt signs of infection. In fact, up to 45% of invasive GAS infections lack a clear portal of entry as the anti-phagocytic M protein enables the bacteria to evade the host immune system during transient bacteremia. In our case, the patient's recent debridement and grafting procedures likely led to GAS bacteremia, precipitating STSS without evidence of skin and soft tissue infection. Renal impairment is a classic and early manifestation of STSS, occurring in over 50% of patients. Renal impairment often precedes hypotension; in fact, a a clinical picture of sepsis with or without cutaneous or soft tissue lesions with elevated creatinine at time of admission is highly suggestive of STSS.6 In our case, the patient's sepsis and elevated creatinine in the context of recent skin debridement and grafting should have raised suspicion for STSS. While initial broad-spectrum antibiotic coverage with vancomycin and Zosyn covered GAS, the lack of antitoxin therapy with linezolid or clindamycin and IVIG delayed optimal treatment. The patient's rapid recovery following the initiation of IVIG and linezolid suggests that earlier suspicion and intervention may have reduced morbidity. Reversible heart failure due to septic cardiomyopathy is a recognized complication of STSS. Although the exact mechanism is unknown, it is established that pore-forming toxin, Streptolysin O (SLO), and subsequent calcium influx mediates cardiotoxicity. As the infection progresses, superantigen mediated cytokine storm further diminishes cardiomyocyte contractility. Importantly, this septic cardiomyopathy is reversible, as SLO-mediated pores can be repaired via calcium and ATP-dependent endocytosis. Our patient initially presented with an EF of 27%, which markedly improved to 55% following resolution of STSS. This recovery corroborates the reversibility of STSS-induced heart failure. In all, this case upholds our current understanding of STSS of early renal impairment, reversible cardiomyopathy, and most importantly, the importance of early identification and treatment.

Conclusion
Although rare, STSS is a life-threatening condition with significant morbidity and mortality. Given the doubling incidence of invasive GAS infections in the US in recent years, clinicians must maintain a high level of suspicion for STSS in patients presenting with sepsis and acute kidney injury. Early treatment with penicillin, IVIG, and linezolid or clindamycin is essential for improving outcomes in STSS.

Abstract Title: Commonly Seen Implantable OB/GYN Devices on Imaging

Investigator: Johnson, Katherine
Mentor: Sarah Shaves, MD
Department: Department of Radiology
Co-Investigators: 1. Shripadh Chitta, MD, Department of Radiology 2. Swachchhanda Songmen, MD, Department of Radiology

Abstract

Introduction
Devices implanted by OB/GYN colleagues are commonly seen on imaging and include those for contraception, incontinence, prolapse, and cervical incompetence. Radiologic imaging may be ordered to confirm the presence or position of implanted devices, or these devices may be seen incidentally.

Examples of implanted devices can be seen on various imaging modalities, whether the study was ordered for their evaluation or seen incidentally. Implanted contraceptive devices include hormonal and barrier types. Alternatives to surgical interventions for incontinence include devices for neuromodulation and transurethral injections. Vaginal pessaries or surgically placed pelvic mesh are used for uterine prolapse. Lastly, cervical cerclage stitches are placed for patients at risk of cervical incompetence during pregnancy. Radiologists need to be familiar with devices implanted by OB/GYN clinicians so that they can confirm the presence, appropriate positioning, and any unexpected findings.

Conclusion
There are a variety of devices implanted by OB/GYN colleagues for different clinical indications. It is important for radiologists to understand the purpose and expected appearance of such devices to confirm the adequacy of treatment or alert clinicians if an issue is seen.

Abstract Title: Blood Culture Utilization: How Many Follow-Up Cultures Are Needed?

Investigator: Jones, IV, George
Mentor: Jennifer Hanrahan, DO
Department: Department of Medicine

Abstract

Introduction
Blood cultures (BCx) are a frequently ordered laboratory test to evaluate for bacteremia. After an initial positive BCx, follow-up cultures are often ordered to assess for clearance of infection. While indications for follow-up cultures, timing of follow-up culture collection, predictors of follow-up culture positivity, and the association between obtaining a follow-up culture and mortality have been described, the appropriate number of follow-up cultures to collect is unknown. Given the recent national shortage of BCx bottles, it is important to determine optimal use of this resource for patient care. There is a recommendation to obtain two rather than one culture when BCx are drawn to optimize identification of possible pathogens. However, when follow-up cultures are ordered, it is unclear whether multiple are always necessary. Collecting excess cultures has disadvantages. Each BCx set consists of an aerobic and anaerobic bottle, each requiring 10-15 mL of blood; thus, two sets would require removing up to 60 mL of blood from the patient. Obtaining BCx is also painful for the patient, requires time for specimen procurement, and consumes laboratory resources. While ordering only a single follow-up set could reduce clinical waste, the risk of failing to detect ongoing bacteremia is unclear. The balance between practicing diagnostic stewardship and maximizing patient safety by reliably identifying continuing bacteremia warrants investigation. We sought to assess the frequency at which the second follow-up set is positive after the first follow-up set is negative to determine how many follow-up sets are needed after an initial positive BCx.

Methods
We conducted a retrospective descriptive study of all BCx submitted to Sentara Health microbiology laboratory from 1/1/18-11/1/23. The study included all patients ≥18 years old within the Sentara Health system who had at least two follow-up BCx drawn 24-72 hours after an initial positive culture. Cultures obtained within two hours of each other were counted as one set. Data collected from the electronic medical record system (Epic) included patient demographics, length of stay, source of infection, BCx dates/times and Results, relevant workup performed, and relevant antibiotics received. Patients were divided into four groups based on BCx positivity, with a focus on the cohort with an initial positive culture, a negative follow-up set, and then a positive follow-up set (PNP group). Different strains of an organism were considered to be different organisms.

Results
There were 28,875 patients with an initial positive BCx, and of these, 2,636 had at least two follow-up cultures drawn in the selected timeframe. Within this group, 585 (22.2%) had two positive follow-up sets, 1500 (56.9%) had two negative, 431 (16.4%) had a positive followed by a negative, and 120 (4.6%) had a negative followed by a positive (PNP). Of the PNP cohort, 71 (2.7%) grew the same organism in the initial and second follow-up cultures, while 49 (1.9%) did not. In the same-organism subset, the most commonly identified classes of organisms were coagulase-negative staphylococci (n=21; 0.8%), gram-negative bacteria (n=17; 0.6%), methicillin-sensitive Staphylococcus aureus (n=13; 0.5%), and methicillin-resistant S. aureus (n=7; 0.3%). The most frequently isolated organisms in this subset were SA (n=20, 0.8%), Staphylococcus epidermidis (n=16, 0.6%), and Escherichia coli (n=11, 0.4%). In the different-organism subgroup, 35 (1.3%) of the second follow-up sets had suspected contamination, though true bacteremia from skin/soft tissue (n=4; 0.2%), central line (n=4; 0.2%), unknown (n=3; 0.1%), and other sources was also observed, often due to S. aureus (n=4; 0.2%), E. coli (n=2; 0.1%), and Candida (n=2; 0.1%).

Conclusion
The number of patients who had ongoing bacteremia that would have been missed with one follow-up BCx was small. Having a positive initial BCx followed by a negative follow-up set and then a positive set growing the same organism has been described for S. aureus, but we found this "skip phenomenon" occurred with gram-negative organisms as well. There were also second follow-up BCx that were positive for a new organism, usually a contaminant. Further data are needed to determine when two follow-up sets should be obtained and when a single one may be sufficient.

Abstract Title: Interesting Case of Ruptured Dermoid Cyst

Investigator: Jordan, Timeri
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Department: Department of Radiology
Co-Investigators: Dylan Steffey, MD, Department of Radiology, Residency Program

Abstract

Introduction
Intracranial dermoid cyst refers to a typically benign mass which range from epidermoid cysts (made up of only desquamated squamous epithelium) to teratoma (made up essentially of any kind of tissue from all three embryonic tissue layers). Dermoid cysts account for approximately 0.5% of all primary intracranial tumors, typically present within the first three decades of life and are slightly more common in females. While often "benign" and discovered incidentally, these masses are not without symptoms or consequence. A long history of vague symptoms, with headache being the predominant feature commonly described. However, if large enough, complications from adjacent mass effect and seizures have been reported. Malignant transformation into squamous cell carcinoma, while extremely rare, has also been reported. Cyst rupture is another potential complication where fat like droplets can be seen layering along the cortical sulci, subarachnoid cisterns, and ventricles. Rupture may lead to chemical/aseptic meningitis and often present/responsible in symptomatic patients. Dermoid cysts have a characteristic appearance of a well-defined, low attenuating, lobulated mass on computed tomography (CT). Peripheral calcification may be seen within the walls. On magnetic resonance imaging (MRI), an intracranial dermoid will often show more variable signal characteristics being hyperintense on T1 sequences due to cholesterol/proteinaceous components as opposed while variable hypointense to hyperintense appearance on T2 sequences. Generally, these masses do not enhance on post contrast imaging, however in the setting of rupture, extensive pial enhancement may be present suggesting chemical meningitis.

Case Information
Patient presented to the emergency department as a trauma alert after motor vehicle accident (MVA). Patient reportedly had a seizure leading up to the accident, where patient subsequently crashed into a light pole at an estimated 35 miles per hour. Patient had altered mentation following the incident and was unable to provide information regarding their identity at initial presentation. Thus, patient was registered in the emergency department under an assigned pseudonym. Standard trauma protocol was followed, and patient underwent CT of the Head, Cervical spine, and Chest, Abdomen, and Pelvis. No traumatic sequela or abnormal findings were identified in the cervical spine, chest, abdomen, or pelvis. On the CT head, there was low attenuating substance seen throughout the subarachnoid space including along the cerebral sulci, subarachnoid cisterns and intraventricularly. Evidence of prior left temporoparietal craniotomy were identified. Additionally, there were more circumscribed and defined low attenuating collections were noted adjacent to the left temporal lobe, and along the high left frontoparietal cortex with peripheral calcification were noted. As the patient presented under an assigned pseudonym, access to prior imaging was initially unavailable. Clear evidence of traumatic sequela such intracranial hemorrhage or calvaria fracture were not identified. Patient was determined to be clinically stable and was subsequently discharged without further imaging or intervention.

Discussion/Clinical Findings
On initial assessment of a post-trauma CT head, evaluation for acute intracranial hemorrhage is paramount. Acute hemorrhage is classically hyper-attenuating in character. From initial "eyeball" test, intracranial low attenuation in the post traumatic setting may raise concern for pneumocephalus which can be seen following acute skull fracture. Fortunately, this can be confidently ruled out by utilizing the "region of interest" (ROI) tool which will report the average Hounsfield units (HU) of the region of interest. Hounsfield unit system is dimensionless and universally used in CT which provide a standardized numerical representation of attenuation. Gas will range in attenuation between from -500 to -1000 HU while fat/sebum ranges from -50 to -150 HU. Thus, with this distinction made and the lack of other identifiable post-traumatic sequela, ruptured dermoid with possible residual/recurrent dermoid was the leading diagnosis. None the less, the possibility of acute rupture and the possible complications such as chemical/aseptic meningitis being the etiology for patient's seizures must be considered. At the time of initial dictation, patient had recovered from their presumed post-ictal state and were able to provide information regarding their true identity. Thus, comparison to prior imaging could be performed. No-acute intracranial abnormalities were confirmed. Overall, there was a similar finding compatible with dermoid rupture and possible recurrent/residual dermoids.

Conclusion
Intracranial dermoid is a relatively uncommon intracranial mass which can be fairly confidently diagnosed given their characteristic appearance on CT and MRI. Despite their benignity, complications related to size and/or rupture ranges from headaches and seizure to vasospasm and even death. In Conclusion, this case of ruptured dermoid is particularly intriguing given its relatively uncommon/rare nature, as well as its striking appearance on imaging and the potential diagnostic challenges this case may pose when evaluated as an unknown.

Abstract Title: Post-COVID-19 Self- Reported Patient Satisfaction Outcomes from an Outpatient Primary Care Clinic

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Co-Investigators: 1. Harsh Amin, B.S., EVMS MD Program 2. Janani Anbazhagan, B.S., EVMS MD Program 3. Zooha Altaf, MD, Department of Medicine, Residency Program 4. Cynthia J Avila, M.B.S,. Department of Medicine 5. Rehan Qayyum, MD, MHS, SFHM, FAHA, Department of Medicine

Abstract

Introduction
Patient satisfaction is the crux of high quality patient care, and a vital measure of healthcare quality. The COVID-19 pandemic changed the landscape of healthcare, introducing increased application of telehealth, and few investigations have been done since to see the ways in which these changes have affected overall patient satisfaction. The aim of this study was to find the impact of perceived time spent with providers and actual time spent with providers during primary care visits on overall patient satisfaction, following the era of the COVID-19 pandemic.

Methods
Patients interested in study participation were given a one-page (double-sided) questionnaire. The patients' visit and check out times were tracked; they were then instructed to fill out the questionnaire consisting of demographic and clinical questions, followed by inquiries regarding patient satisfaction and perception of physician compassion. No patient identifiers were collected in the questionnaire. Hard copies of the questionnaire were distributed to subjects by IRB-approved research team personnel.

Results
Of the 607 patients who consented, in response to "How long have you been going to this provider?", 277 (45.6%) selected " >=5 years," 129 (21.3%) selected "1 to 5 years," 47 (7.7%) selected "6 months to 1 year," and 90 (14.8%) selected "<6 months." In response to "How much time did your provider spend with you today?," 20 (3.3%) selected "<5 minutes," 33 (5.4%) selected "6-10 minutes," 161 (26.5%) selected "10-15 minutes," and 331 (54.5%) selected ">15 minutes." In response to "Was this time sufficient," 26 (4.3%) selected "no" and 520 (85.7%) selected "yes."

Conclusion
These Results are part of a larger patient-satisfaction and compassion survey study on clinic staffing models post COVID-19. Most providers spent more than 15 minutes with their patients, and this was seen as a sufficient amount of time for the vast majority. Primary care patients were studied to develop an outcome that qualitatively measured patient care. They both show similar outcomes in both populations, and the majority of patients in both groups were found to show that time spent with their provider was sufficient. Further analysis of this data will look into specific waiting times and how that affects patient satisfaction and how that affects patient perceptions of physician compassion.

Abstract Title: Are you ready for it? A call for a second victim phenomenon training

Investigator: Kauffman, Lily
Mentor: Alberto Musto, MD, Ph.D.
Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1. Emily Sheetz, EVMS MD Program

Abstract

Introduction
The 'second victim phenomenon' refers to feelings of guilt or failure following an unanticipated outcome or error. This phenomenon is extremely prevalent in the medical field. Over 50% of healthcare professionals experience a second victim phenomenon at least once in their career. Despite the extensive coverage of organ systems and diseases, there remains a significant gap in preparing medical students for the inevitable trauma they will face as physicians. Traumatic events can include life-altering accidents, difficult conversations during end-of-life care, and instances of abuse. Our study aims to elucidate the need for a program that teaches medical students healthy coping mechanisms.

Methods
A secure, anonymous survey was created using REDCap to be sent to medical students of all four years at Eastern Virginia Medical School (EVMS). This IRB-approved survey included basic descriptor questions and also asked students how prepared they felt to cope with traumatic events, whether their school currently has a curriculum in place to teach them healthy coping mechanisms, and whether they believe a formal curriculum should be implemented. This survey was open to students between July 12th-July 26th of 2024, and it could only be answered by a student once. Our survey received 68 responses (11.3% response rate).

Results
Most of the students who answered this survey were in their 1st year (39.7%) and third year (42.6%) during the 2023-2024 academic year. 32.4% of these students took one gap year before attending medical school, and 27.9% took over three gap years. 66.2% of students reported that their institution did not adequately prepare them for traumatic events. 95.6% of students said that they would be open to their medical school providing educational resources for healthy coping mechanisms, and 58.8% believe this should be a required program within the curriculum. 51.5% of students believe this course should be held during the pre-clerkship phase. Medical students in their third and fourth years, specifically, were asked to disclose if they experienced a traumatic event during their clinical rotations. 73.7% reported that they have, and only 60.7% of students felt prepared for it. In addition, peer debriefing sessions, incorporation into clinical skills workshops, resiliency training, end-of-life care training, discussions on what to say during difficult conversations, sessions with trained psychologists, and reminders of available resources during rotations were included in the survey's additional comments section.

Conclusion
This study brings awareness to the mental health challenges associated with a career in medicine. Coping mechanisms for traumatic incidents should be part of the formal instruction to promote the well-being of physicians. Thus, we are working with experts in the fields of education and mental health to design and implement a program within medical school curricula that will provide students with mental health resources.

Abstract Title: Relationship between genetic generalized epilepsy and SUDEP

Investigator: Kauffman, Lily
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Department: Department of Biomedical & Translational Sciences

Abstract

Introduction
Sudden Unexpected Death in Epilepsy (SUDEP) is a complication of epilepsy where otherwise healthy patients die suddenly, most often at night while the patient sleeps. Previous studies have found that 1/1000 patients with epilepsy die from SUDEP every year. Multiple tonic-clonic seizures are one of the main risk factors for SUDEP. Although the mechanism behind SUDEP is not yet fully understood, there are many hypothesized mechanisms of SUDEP. Some of the most promising include the idea that respiratory distress, cardiac failure, or tonic-clonic seizures during sleep lead to SUDEP in patients. Thus, this review aims to establish a genetic link between generalized seizures and SUDEP.

This review obtained data from several articles and a database. Published in 2023, a genome-wide association study (GWAS) was conducted to analyze 29,944 patients with epilepsy. This study found that 29 genes are associated with epilepsy and other complications, 23 of which are associated with genetic generalized epilepsy (GGE). This review identifies the relationship between mutations in these 23 genes and SUDEP. In a 2016 study, mutations in the DEPDC5, SCN2A, SCN1A, GAGRB3, SCN1B, KCNQ2, or PAFAH1B1 genes were found in 25% of SUDEP patients analyzed, and 15% had mutations in the KCNH2, RYR2, SCN5A, AKAP9, HCN4, or TRPM4 genes. Both SCN1A and RYR2 were categorized into the 'GGE' phenotype in the previously mentioned 2023 GWAS. Additionally, a study published in 2022 states that mutations in SCN1A are found in 80% of patients with Dravet Syndrome, for which there is a markedly increased risk of SUDEP. Another gene found to be associated with SUDEP is SCN8A, as mentioned in a different study published in 2023. Like the aforementioned 2016 study, this 2023 study also found that patients who suffered from SUDEP had mutations in SCN2A or SCN1A, along with STXBP1. Another of the 23 genes from the GWAS study that was found to be associated with SUDEP is GRIK1. This was discovered by a research team analyzing data from 8 SUDEP patients. This study was published in 2018. Thus, this review found that 4/23 (17%) of the genes found by the GWAS to be associated with GGE are also related to SUDEP, including mutations in RYR2, SCN1A, SCN8A, and GRIK1. This also means that 19/23 (83%) of the genes found to be associated with GGE are not related to SUDEP. These genes are CHRM3, BCL11A, POU3F3, GLS, STAC, CACNA2D2, PCDH7, KCNN2, SPOCK1, PTPRK, SUGCT, RMI1, KCNIP2, RBFOX1, ARHGEF15, CDK5RAP3, AP3D1, TMPRSS15, and FAM19A5. In addition, the previously mentioned study published in 2016 discovered a possible relationship between mutations in genes associated with cardiac arrhythmias and patients who suffered from SUDEP. This study performed exome sequencing and analysis on 61 SUDEP patients. These researchers looked for specific gene mutations that are already known to be associated with Long QT Syndrome (LQTS), catecholaminergic polymorphic ventricular tachycardia (CPVT), and other cardiac arrhythmias. 7% of SUDEP patients analyzed in this study were found to have a mutation in either the KCNH2, KCNQ1, or SCN5A genes, all of which are highly associated with LQTS (70% of instances). 15% of SUDEP patients were found to have mutations in the KCNH2, RYR2, SCN5A, AKAP9, HCN4, or TRPM4 genes, all of which are associated with cardiac arrhythmias. RYR2 is also associated with CPVT. In addition, the researchers also analyzed genes that are already known to be associated with epilepsy for both new and previously discovered mutations. 25% of SUDEP patients had mutations in the DEPDC5, SCN2A, SCN1A, GAGRB3, SCN1B, KCNQ2, or PAFAH1B1 genes. Finally, 10% of SUDEP patients had mutations in DEPDC5, the most prevalent out of all the genes.

Conclusion
Despite its fatality and prevalence within the population of epilepsy patients, SUDEP remains understudied. Though there are several theories postulated surrounding its mechanism, there is little case-based data supporting many of these theories. This review suggests that there may be a genetic component that places patients with epilepsy at risk. Mutations in 4 genes, RYR2, SCN1A, SCN8A, and GRIK1, are associated with both genetic generalized epilepsy and SUDEP. Additionally, several genes known to be associated with malignant cardiac arrhythmias were found in patients who suffered from SUDEP. Thus, additional research needs to be done to investigate these relationships and determine if there may be a genetic mechanism behind SUDEP. Identifying the mechanism behind SUDEP will bring us one step closer to developing a preventative measure for this seemingly silent complication of epilepsy.

Abstract Title: Healthcare Provider Perspectives of COVID-19's Impact on Adolescent Sexual and Reproductive Health Services: A Qualitative Study

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Abstract

Introduction
Despite evidence from literature demonstrating COVID-19's multifaceted health impacts, few studies examine its effect on adolescent sexual and reproductive health (SRH). This study investigates COVID-19's impact on adolescent SRH services through in-depth interviews (IDIs) with healthcare providers in a Virginia children's healthcare system.

Methods
We employed a purposive sampling method to recruit key informants for IDIs using three sampling criteria: 1) aged 18 years old and above; 2) employed at the children's healthcare system and holding a M.D., D.O., P.A., or N.P. degree, and 3) provided an informed consent. As of May 2024, semi-structured IDIs have been conducted with 10 key-informants via Zoom by trained medical students. Thematic analysis was performed using an inductive coding process. Recruitment continues through the summer of 2024 with an anticipated sample size of 25 key informants.

Results
Pediatric healthcare providers (N=10) universally observed a decline in adolescent SRH services amid the COVID-19 pandemic. Most commonly, providers cited telehealth constraints impeding the ability to conduct thorough physical examinations (N=6) as a major barrier. Postponement of gynecological care (N=4), interruptions in STD testing (N=3), delays in vaccine administration (N=3), and missed opportunities for reproductive health counseling (N=2) were additional barriers identified in adolescent SRH provision. Concerns persist about long-term impacts on adolescent SRH, with providers anticipating ongoing challenges post-pandemic.

Conclusion
Our study found unanimous reports from pediatric providers of decreased adolescent SRH services during COVID-19. Interruptions in STD testing, delayed vaccines, and missed counseling underscore the need for targeted interventions to mitigate long-term effects.

Abstract Title: Stewards of Anatomy

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Co-Investigators: 1. Gabriella Adams, EVMS MD Program Class of 2027 2. Devan Heinrichs, University of Iowa, MD Class of 2025

Abstract

Introduction
Anatomy stewardship plays a crucial role in preserving and managing anatomical resources, ensuring their ethical and educational utilization within academic and research settings. By definition, a discipline's steward is entrusted with its care by peers for the benefit of the field and the wider community. The current scope of stewardship in medicine, however, remains limited. With its proven benefits, there is a need for broader implementation of stewardship practices across various disciplines. This study aims to capture the perspectives of various anatomy stewards at multiple institutions in Virginia, USA. The following research question guided the study: How do anatomy stewards describe roles, responsibilities, and functions of anatomy stewardship?

Methods
This study employed stewardship as a conceptual framework, using a combined phenomenological and grounded research design to explore the experiences of diverse stewards of human anatomy. Four anatomy professionals agreed to participate in 30-45 minute interviews conducted online over Zoom. The eight constructs of stewardship were used to generate interview questions with the goal of framing and exploring several key stewardship concepts. Interviews were transcribed verbatim and an iterative coding procedure using inductive descriptive coding and collaborative processes were used to develop themes.

Results
The following three themes were identified across all four interviewees: Education, Professional Excellence, and Community. Education is highlighted by the stewards' ability to teach and innovate in any circumstance. Professional Excellence is described as the stewards' respective responsibilities and how they face challenges in their role. Lastly, community is how stewards collaborate with those both inside and outside their field to help improve the discipline.

Conclusion
Understanding the roles of a discipline steward is essential for the progress and sustainability of any field, as they are seen as instrumental in promoting best practices, ethical behavior, and ongoing improvement within their area of expertise. The themes of this study support the stewardship framework and inform medical educators and employers on how to best support and nurture the identity of stewards in medicine. This work contributes to a broader understanding of stewardship practices and offers valuable perspectives for enhancing education and resource management.

Abstract Title: Modeling of Heterocycles in Tubulin: Towards Anticancer Drug Development

Investigator: Laryea, Reuben
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Abstract

Introduction
Tubulin is a protein complex that makes up microtubules, which are essential for critical cellular functions, including mitosis, cell signaling, intracellular trafficking, and angiogenesis. When cancerous cells form, they undergo rapid cell division in which microtubules play an essential role by aiding mitosis and cell signaling. Inserting an inhibitor into a specific tubulin binding site can prevent microtubule polymerization. If the rate of monomer formation can be altered, this could be an effective strategy for anti-cancer research. There are multiple known binding sites for the tubulin protein complex, including the taxane binding site, the vinca binding site and the colchicine binding site. This research focuses specifically on the colchicine binding site. The colchicine binding site is found at the junction between the alpha and beta tubulin subunits, specifically within the beta subunit of tubulin. The colchicine binding site has a distinct advantage over other tubulin binding sites in that it is less susceptible to multidrug resistance. Finding new binding agents is essential to anticancer research as it gives scientists critical information on protein-ligand interactions and the resulting protein-ligand complex's effect on cancer cells.

Methods
The X-ray crystal structure of tubulin complexed with colchicine (PDB 4O2B) (Prota ref I emailed to Erin) was used in molecular modeling studies. Briefly, chain B of the tubulin-colchicine complex (less the solvent and the inhibitor) was used as the receptor model in docking studies. The inhibitors were energy-minimized using the MM2 module, and subsequently converted to .pdb files, using Chem3D Pro 14.0 (CambridgeSoft). Docking studies were performed using AutoDock Vina (Trott, O., Olson, A.J. (2010) AutoDock Vina: Improving the Speed and Accuracy of Docking with a New Scoring Function, Efficient Optimization and Multithreading. J. Comput. Chem. 31, 455-461.) and analyzed in the PyMOL Molecular Graphics System, Version 2.5.0 (Schrödinger, LLC). As a control, colchicine was also modeled and compared to the known crystal structure.

Results
PY-407-C was chosen for modeling given its demonstrated anti-tubulin activity.4 The most favorable predicted binding of PY-407-C is shown in Figure 2. Like colchicine (Figure 3), PY-407-C binds into the pocket of the beta subunit. Determination of specific binding interactions is still in progress, but previous studies indicated that PY-407-C made many of the same interactions as colchicine. The predicted free energy of binding of PY-407-C is lower than that of the colchicine control, suggesting that it is a more potent inhibitor

Conclusion
Modeling of ligand PY-407-C showed that models 1 and 2 had the lowest predicted free energies of binding. Models 1 and 2 were bound directly in the pocket. The low energy implies that there is a higher chance of the ligand binding to the colchicine site. These Results will help to inform the in silico design and subsequent synthesis of more potent analogues. Finding new binding agents is essential to anticancer research because it gives scientists more information on protein ligand interactions. Each ligand and each binding site has unique benefits and risks so by learning as much as possible about these benefits and risks, scientists can evaluate which ligand is safest and most effective. Additionally, the information discovered can be used to influence future research by proving promising theoretical ligand structure.

Abstract Title: Do we need to use mesh for hernia repair in massive weight loss patients?

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Co-Investigators: 1. Isabel Dashtizad, EVMS MD Program, MD 2027 2. Aref Rastegar, EVMS MD Program 2026 3. Brendan Podszus, EVMS MD Program 2025 4. Riccardo De Cataldo, MD, MUSC Department of Medicine 5. Jamie Parkerson, MD, Icahn School of Medicine at Mount Sinai Department of Psychiatry 6. Jennifer Smith, MD, Loma Linda University Health Department of Plastic Surgery

Abstract

Introduction
Ventral Hernias are abdominal wall defects that often occur secondary to surgical incisions, chronic abdominal stress, or other trauma. With obesity, there is increased abdominal stress, so this can increase the risk for developing hernias. To assist in their weight loss, patients may elect to undergo bariatric surgery. Through this procedure, the rate of hernia recurrence following repair also decreases. The standard of care states that repairs using prosthetic mesh for reinforcement are superior to those that do not. However, this can have drawbacks as there are unique complications. Individuals that have lost significant weight following bariatric surgery often have a large amount of excess skin and other soft tissues. This could have a role in hernia repair as an autologous scaffold, challenging the current mesh-based approach.

Methods
To begin, the team obtained a list of patients who underwent ventral hernia repair at least 18 months following bariatric surgery and a >100 pound weight loss. Following that, a chart review was done to learn more about each subject, including their medical history, the closure technique used, number of drains, and any postoperative complications that might have occurred. When this was complete, the patients were contacted by both phone and email to complete the Abdominal Hernia questionnaire, which would be used to assess the long-term outcomes. Specifically, we are interested in the incidence of hernia recurrence.

Results
Of the 32 subjects that met our inclusion criteria, nine chose to participate in the study. Three mentioned that they had a recurrence of a hernia, one of who noted that they had numbness of the abdominal wall following our surgery. Only one of the three chose to have another repair.

Conclusion
The data collected shows that using abdominal fascia is a plausible method for hernia repair, however 30% of the responses indicated a recurrence. So far, the response rate for our survey is poor and it is difficult to draw any meaningful Conclusions. We hope to increase the number of participants in order to better assess the need for prosthetic reinforcement when hernia repair is required in the massive weight loss patient.

Abstract Title: Characterization of Patients Requiring Multiple Doses of Epinephrine

Investigator: Lawrence, Zachary
Mentor: Lindsey Moore, DO
Department: Department of Pediatrics, CHKD Pediatric Allergy & Immunology
Co-Investigators: 1. Zachary Lawrence 2. William Tredwell 3. Ashlee Law 4. Alex Liu 5. Lindsey Moore

Abstract

Introduction
The current standard of care for patients experiencing anaphylaxis is an intramuscular injection of epinephrine, with rapid administration being associated with decreased reports of hospitalization and death. One of the feared consequences of anaphylaxis is the progression toward a more severe state, with one of the most cited risk factors for severe anaphylaxis being a delayed administration of epinephrine. However, recent studies looking at the pharmacokinetics of epinephrine show that serum concentrations can vary based on the mode of epinephrine delivery: auto-injectors and manual intramuscular injection. The CHKD Allergy Clinic currently administers epinephrine through both modalities. This data prompted our research project to assess whether there is an impact of utilizing the manual syringe compared to auto-injector on clinical outcomes.

Methods
Retrospective chart review using electronic medical records between 1/1/18 - 12/31/23 with ICD10 code of 96076 (oral food challenge) from the CHKD Allergy & Asthma Clinic. Patients 0 to 65 years old who experienced an episode of anaphylaxis during an oral food challenge and required at least one dose of epinephrine were included. Data was collected on the following: demographics, relevant serum specific IgE levels and skin tests to relevant allergen(s), grade of anaphylaxis according to the Anaphylaxis Grading System, other atopic comorbidities, modality and dose of epinephrine, and additional medications used to treat anaphylaxis.

Results
Out of the 151 administrations of epinephrine given, 29 (19%) received more than 1 dose of epinephrine. Out of the 103 manual administrations of epinephrine given, 18 (17.65%, p=0.06) received more than 1 dose of epinephrine. Out of the 20 auto-injector administrations of epinephrine given, 1 (5.0%, p=0.06) received more than 1 dose of epinephrine.

Conclusion
The rate of receiving more than 1 dose of epinephrine for food-induced reactions (19%) is higher than the national average of 11.1%. Manual administration of epinephrine (17.65%, p=0.06) correlated more with needing a second dose of epinephrine than auto-injector administration (5.0%, p=0.06). This data suggests that auto-injector administration of epinephrine may be preferred for intramuscular injections of epinephrine indicated for anaphylactic reactions to food challenges.

Abstract Title: Targeted Interventions for Hand Hygiene Improvement in an Inpatient Pediatric Care Setting

Investigator: Lee, Rebecca
Mentor: John Harrington, MD
Department: Department of Pediatrics, CHKD Quality & Patient Safety
Co-Investigators: 1. Eric Hayes, B.S., EVMS MD Program 2027

Abstract

Introduction
In an effort to reduce healthcare associated infections (HAI), Children's Hospital of The King's Daughter's (CHKD) contracted a vendor in June 2023 to install a Bluetooth-enabled system of sensors throughout the hospital to monitor hand hygiene (HH) compliance. HH data from CHKD pediatric resident physicians and medical students from Eastern Virginia Medical School (EVMS) on clinical rotations were collected and analyzed weekly during June-July 2024, after which interventions to improve HH compliance rates were designed and implemented.

Methods
Pediatric residents and medical students on inpatient rotations were selected as subpopulations of the study due to their more widespread movement throughout the units and central workspace where interventions could be posted. Only data from CHKD inpatient wards were analyzed, as the HH tracking system is not installed in outpatient locations. Specific interventions included: weekly public posting of (1) individual user HH compliance data, (2) previous HAI data, (3) badge-wearing compliance differentiated into resident year groups and medical students, and (4) the reissue of new badges during the week of July 8th, 2024.

Results
Overall, each resident class and medical student body displayed fluctuations in hand hygiene compliance throughout the weeks. The average baseline compliance was 53% for the residents and 45% for the medical students. Maximum compliance was approximately 59% for the residents and 51% for the medical students. In terms of the global aim, HAI incidence reduced 25% in June 2024 as compared to May 2024 and changed 0% when compared to June 2023.

Conclusion
The data suggests none of the attempted interventions to date has had any lasting impact on compliance. Although HAI cases did decrease during the weeks of interventions, the lack of statistical significance makes it impossible to attribute a causal relationship between the two. One major limitation to the study is badge usage, particularly among the resident physicians. Usage steadily decreased over time to rates as low as <25%. Of note, the usage data for the medical students stayed high throughout the duration of the project and ranged from 73-100%. Further areas of study include interventions to improve badge usage.

Abstract Title: Systematic Review of Augmented Reality in Plastic Surgery

Investigator: Lee, William
Mentor: Richard Tyrell, MD
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Co-Investigators: 1. William Makana Lee, EVMS MD Program 2. Naser Salem EVMS MD Program 3. Jhobani Torres-Gomez, EVMS MD Program 4. Ramzy Ahmed, EVMS MD Program 5. Tarun Bhadri, EVMS MD Program 6. Jessica Bigner, MD, Department of Surgery, Division of Plastic & Reconstructive Surgery 7. Richard Tyrell, MD, Department of Surgery, Division of Plastic & Reconstructive Surgery

Abstract

Introduction
Augmented reality (AR) overlays digital elements onto the real world, enhancing surgical procedures across many specialties. This review examines AR implementations in plastic and reconstructive surgery.
Google Scholar, PubMed, and Cochrane Library were searched with keywords "Augmented Reality" and "Plastic Surgery." Studies were included if they reported using AR in plastic surgery cases and excluded if they lacked AR usage, patient cases, or were systematic reviews. Studies yielded from the literature search were screened using Covidence, with four reviewers analyzing measures, outcomes, procedures, body regions, complication rates, AR platforms/software, and changes in costs and operation duration. Descriptive statistics were performed using Jamovi. Thirty-nine articles with remarkable clinical heterogeneity were reviewed, totaling fifteen unique AR devices and 478 cases primarily in the craniomaxillofacial region. Head-mounted devices were studied most, but Smartphones were implemented in more patient cases. Positive outcomes were generally reported, except in the breast region, and measured by a wide variety of qualitative or quantitative measures, rarely were both used simultaneously. Only seven studies reported an 8.76% complication rate among 137 patients. Thirteen and fifteen studies briefly discussed cost and operation duration changes, respectively.

Conclusion
The included studies demonstrate diverse approaches and measures of success, highlighting AR's versatility but complicating analysis of efficacy. Cost and availability of AR devices appear to influence device selection as Smartphones were used in the greatest number of cases, but Head-mounted devices were the most investigated across studies. Although no studies reported major outcomes opposing AR usage in plastic surgery, the vast majority of studies did not consistently report complications which may explain the low complication rate. More research is needed on AR's effectiveness in operative duration and cost implications, non-craniomaxillofacial regions like the breast, and implementing standardized reporting measures.

Abstract Title: Fox Insight: Most bothersome symptoms in early-stage Parkinson's disease

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Co-Investigators: 1. Aaron Lerner, Macon & Joan Brock Virginia Health Sciences at Old Dominion University 2. Jennifer R. Mammen, Ph.D., University of Massachusetts Dartmouth, College of Nursing & Health Sciences 3. Mirinda Tyo, Ph.D., University of Massachusetts Dartmouth, College of Nursing & Health Sciences 4. Peggy Auinger, University of Rochester Medical Center, Department of Neurology 5. Raunak Al-Rubayie, University of Rochester Medical Center, Center for Health & Technology (CHeT) 6. Yuge Xiao, The Michael J Fox Foundation for Parkinson's Research 7. Connie Marras, MD, Ph.D., The Edmond J Safra Program in Parkinson's Disease & Morton & Gloria Shulman Movement Disorders Clinic 8. Jamie L. Adams, MD, University of Rochester Medical Center, Department of Neurology

Abstract

Introduction
This study aimed to identify the most bothersome symptoms experienced by people with early Parkinson's disease (PD), leveraging data from the Parkinson's Disease Patient Report of Problems (PD-PROP) questionnaire within the Fox Insight Study.

Methods
Individuals aged >18 years, with and without a self-reported diagnosis of PD were enrolled via the Fox Insight platform and completed an open-ended online survey (PD-PROP), which asks participants to report up to five most bothersome symptoms/impacts of PD. Machine curation, integrating human expertise with advanced natural language processing and machine learning techniques, was used to analyze responses and derive symptom types and frequencies. Only individuals with PD duration less than 2 years were included in the present analysis.

Results
Participants (N=8,536) were 0.9 years since diagnosis, predominantly white (96%), male (53.3%), and with an average age of 64.6 years. Top most bothersome motor symptoms were tremor (55.9%), followed gait issues (36.7%), impaired dexterity (33.3%), balance problems (27.1%), slowness (23.4%), and stiffness (20.0%). Among non-motor symptoms, pain/discomfort (33.1%), physical fatigue (27.5%), anxiety/worry (22.8%), and negative emotions or cognition (22.4%) were most often cited.

Conclusion
This study underscores the complexity of PD and the diverse symptomatology affecting patients early in the disease course. Future consideration of diverse patient experiences in early PD is needed to improve therapeutic and outcome measurement strategies.

Abstract Title: C3aR1 as a mediator of Insulin secretion, downstream of Adipsin activity

Investigator: Li, Ang
Mentor: James Lo, MD, Ph.D.
Department: Department of Medicine
Co-Investigators: 1. Renan Lima, Ph.D., Department of Medicine 2. Moritz Reiterer, Ph.D., Department of Medicine 3. Eric Cortada Almar, Ph.D., Department of Medicine 4. Lunkun Ma, Ph.D., Department of Medicine 5. Edwin Homan, MD., Ph.D., Department of Medicine

Abstract

Introduction
Hallmarks of type 2 Diabetes (T2D) include insulin resistance, progressive pancreatic β cell failure and subsequent decline in insulin secretion. Adipsin is an adipocyte-derived protease that catalyze the formation of C3 convertase, acting upstream in the alternative complement pathway, producing complement component C3a and C3b. Lo et al. 2014 has shown that adipsin plays a role in the secretion of insulin, in which adipsin-knockout mouse lines exhibited reduced glucose tolerance, insulin secretion, and pancreatic β cell size. C3a binds to C3aR1, a G-coupled protein receptor, expressed in many tissues. We are interested in uncovering the impact of C3aR1 receptor on pancreatic β cell secretion of insulin, under the scope of understanding pathophysiology of type 2 diabetes.

Methods
I bred mice colonies with whole body C3aR1 KO, C3aR1-Ins1Cre genotype, as well as colonies of Ins1-Cre genotype only, as a control population. Injecting 2.5g/kg of glucose, I measured each population's glucose tolerance over 180min, collected plasma at 0, 5, 20min for insulin Elisa to measure insulin secretion at each time point. Then, harvested pancreatic islets for ex vivo glucose stimulated insulin secretion, and qPCR on whole islets to measure intracellular gene expression genes associated to insulin production and secretion. Glucose tolerance test with a larger sample size, harvest pancreatic β cell mass measurements as well as expression levels of apoptosis and dedifferentiation markers are currently pending.

Results
At 15 weeks on chow (regular diet), both female and male cohorts exhibited no difference in glucose tolerance and insulin secretion between Ins1-cre control genotype and KO genotypes. Regular diet females exhibited no difference between fasting glucose and weight levels prior to glucose challenge and exhibited no differences in glucose tolerance and insulin secretion throughout the glucose challenge. In vitro glucose stimulated insulin secretion study on harvest whole islets had similar Results between control and KO genotypes. These findings were replicated in the male cohorts. In male cohorts after 22 weeks on a high caloric diet, harvested islets from the KO cohort showed a significant decrease in C3aR1 expression, but a significant increase in gcg expression. The KO genotype also showed a trend toward reduced expression of Dusp26 and Aldh1a3. Other markers, Mafa, Nkx6.1, Emr1 had no significant differences between genotypes. Further glucose tolerance tests, insulin ELISA, apoptosis and dedifferentiation expression, and β cell mass studies with larger sample sizes are currently under progress.

Conclusion
Without a metabolic challenge of a high caloric diet, C3aR1 KO may not incur a significant influence on insulin secretion. Furthermore, increases in apoptosis markers can indicate a decrease in β cell composition within pancreatic islets of C3aR1 KO mice populations. Although statistically insignificant, the trend toward reduced expression of tumor suppressors Dusp26, and Aldh1a3 may be a sign of dedifferentiation or degradation of function of β cells. Experiments to validate our findings with a larger sample size, as well as β cell mass measurements, and qPCRs to measure gene expression markers within whole islets are currently underway. I believe they will provide a deeper insight on our findings and contribute to our understanding of the behaviors of pancreatic β cells throughout consistent intake of high fat foods.

Abstract Title: Medical Students' Attitudes and Motivations Toward Research

Investigator: Li, Nina
Mentor: Uzoma Ikonne, Ph.D.
Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1. Danxun Li, MD 2026 2. Curt, Bay, ATSU Department of Interdisciplinary Health Sciences

Abstract

Introduction
The recent pass/fail scoring change for the USMLE Step 1 exam has significant implications for residency applicants. It is anticipated that research productivity will gain greater importance in the evaluation process. The NRMP provides quantitative data on residency applicants' publications. However, there is a scarcity of studies focusing on their research experience. To support medical students, we aim to understand their attitudes, motivations, and experiences in conducting research.

Methods
This is a cross-sectional study among second-year medical students at Eastern Virginia Medical School between October and November 2023. A questionnaire was used to assess students' motivations and perceived barriers towards research in medical school. Students' experiences were assessed on a Likert scale. A Mann-Whitney U test analyzed differences in attitudes and Pearson correlations quantified the relationship between perceived specialty competitiveness and research activity.

Results
Results reveal that out of 68 respondents, 57% reported that the USMLE STEP-1 transition to pass/fail influenced their attitudes about research in medical school. The top motivating factors for conducting research were to be competitive for residency and to differentiate oneself from other medical students. The top barriers were lack of time, mentorship, and opportunities. Perceived specialty competitiveness is correlated with research participation but not with research publication output. There were significant differences in research output by students who indicated interest in internal medicine, general surgery, and otolaryngology. There is no statistically significant difference between genders in motivations and barriers to research, publications, or competitiveness of interested specialties.

Conclusion
The shift to pass/fail scoring in the USMLE STEP-1 exam has impacted MD medical students' attitudes on research, with many considering research output a significant differentiating factor in residency candidacy. The difference in perceived competitiveness is reflected in students' research participation. Findings from this study may inform institutions as they aim to optimize students' research.

Abstract Title: Adaptive Problem Solving in Female Rats Exposed to Space Radiation

Investigator: Li, Nina
Mentor: Richard Britten, Ph.D.
Department: Department of Radiation Oncology

Abstract

Introduction
The upcoming long-duration missions to the Moon and Mars will pose significant challenges to the physical and mental health of astronauts compared to the ISS missions. Astronauts will be exposed to spaceflight stressors, including space radiation (SR), which have been demonstrated to impact CNS functionality. A growing body of evidence from ground-based rodent studies, including the Associative Recognition Memory and Interference Touchscreen (ARMIT) test, indicates that even low doses of SR can impair various cognitive functions. The ARMIT was designed to determine if adaptive problem solving are affected by changing associative cues presented over multiple learning sessions under time constraints to obtain a reward. However, astronauts travelling to deep space will be exposed to double the radiation during their journey to and from their destination. This study aims to replicate the ARMIT in rats subjected to doubled doses of GCRSim irradiation to assess whether an additional dose of radiation impacts on executive function, working memory, and long-term memory.

Methods
The doubly irradiated rats were part of a subset previously exposed to a low dose (10 cGy) cocktail of 6 ions simulating the galactic cosmic ray spectrum (GCRSim). These rats were initially screened on an attentional set shifting (ATSET) task to provide a measure of executive function and had participated in a separate study on risk taking propensity (RTP). After their second irradiation, the rats underwent gradual training for the ARMIT task. They were first familiarized with the C1.1 configuration for seven consecutive days, to ensure that the rats have a strong memory of the location of these holes. Thereafter the rats are then presented sequentially with the C.1.1; followed by C.1.2; then C.1.3. If a rat fails to correctly chose the rewarded hole in C.1.1 or C.1.2, the chamber light is switched on (aversive stimuli) during a 20 s time-out period, the chamber light is then switched off and the sequence restarts at the C.1.1 stage. The rats are presented with the C.1.1 to C.1.3 transition task for three consecutive days.

Results
This study determined that GCRSim exposed rats tend to pick the incorrect choice more often when transitioned to the C1.2 format than the sham rats. There was no statistical difference in C1.3 tasks. However, this may be due to the low number of successfully completed C1.2 trials. Additionally, an analysis of the response time revealed that the doubly irradiated rats took significantly longer to make a selection than did the shams, suggesting a SR-induced loss of processing speed.

Conclusion
This study provides preliminary data that doubly irradiated GCRSim rats show a trend in performance decrements in the complex ARMIT task as compared to the sham rats. These irradiated rats exhibit a decline in processing speed, similar to what was observed in the RTP test, which may contribute to their diminished ability to adapt to new formats of the ARMIT.

Abstract Title: Effect of B-Cell Receptor Recognition on Atherosclerosis in Transgenic Mice

Investigator: Lillard, Jonee
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Co-Investigators: 1. Shelby Ma, Department of Biomedical & Translational Sciences 2. Alina Moriarty, Department of Biomedical & Translational Sciences 3. Tayab Waseem, Department of Biomedical & Translational Sciences 4. Marion Mussbacher, University of Ganz, Austria

Abstract

Introduction
Atherosclerosis is an inflammatory disease of the large and medium arteries characterized by accumulation of oxidized low-density lipoproteins (oxLDL) within the aorta. Antibodies against oxLDL show that B cell response is involved in atherogenesis; however, B cell receptor (BCR) recognition of oxLDL has not been directly demonstrated, and specific self-antigens are not well characterized. B cell anergy is a state of B cell unresponsiveness caused by weak recognition of self-antigens. While anergy break is critical in autoimmune diseases, evidence suggests that anergic autoreactive B-cells may support chronic inflammation by mechanisms outside classical autoimmunity. While no oxLDL-specific BCR-restricted mouse model yet exists, models of increased anergy (the ARS/A1 mouse model, with weakly self-reactive BCR and therefore high anergic populations) and BCR restriction (the MD4 mouse model, with BCR sensitive only to hen-egg lysozyme) can be used to explore the effect of B cell anergy and BCR restriction on atherosclerosis.

Methods
Male MD4, ARS/A1, and C57BL/6 WT mice were treated with an adenovirus vector containing PCSK9 to induce hyperlipidemia and fed a high-fat diet (HFD) for 15-28 weeks before sacrifice. Genotyping was performed via flow cytometry. Plasma cholesterol was determined via colorimetric assay. Aortas were removed and stained with Oil Red O en face, and plaque formation was quantified through color analysis in ImageJ. Hearts were fixed, and sections at the aortic sinus were stained with Movat pentachrome stain. Total lesion, fibrous cap, and necrotic core areas were assessed and analyzed using ImageJ.

Results
No significant differences were found in aortic atherosclerosis lesions (n=4-12) or aortic sinus fibrous cap or necrotic core between ARS, MD4 and WT mice (n=4-9/group).

Conclusion
Our preliminary data suggest that altering BCR recognition by all B cells does not significantly affect the degree and phenotype of plaque burden. Further experiments focused on BCR recognition in specific B cells subsets might elucidate role of BCR in atherogenesis.

Abstract Title: Influence of Body Mass Index on Epinephrine in Anaphylaxis Management

Investigator: Liu, Alex
Mentor: Lindsey Moore, DO
Department: Department of Pediatrics
Co-Investigators: 1. William Tredwell, MD, Department of Pediatrics, 2. Zachary Lawrence, EVMS MD Program, 3. Ashlee Law, Department of Pediatrics, 4. Lindsey Moore, DO, Department of Pediatrics,

Abstract

Introduction
The gold-standard for anaphylaxis treatment is epinephrine administered intramuscularly, with most cases resolving promptly to a single dose. However, it is estimated that about 7.7% of anaphylaxis cases require multiple doses of epinephrine. A higher BMI and consequently a higher skin-to-muscle distance (STMD) may hinder the systemic delivery of epinephrine, causing patients to require additional doses. Conversely, there is limited and conflicting data regarding this topic. Duvauchelle et al. and Worm et al. both demonstrated adequate systemic delivery of epinephrine among patients with a higher STMD. Whereas Bernstein et al. found an inverse relationship between peak concentration of epinephrine and BMI. This study aims to clarify the impact of BMI on the efficacy of epinephrine in resolving anaphylaxis.

Methods
A retrospective chart review was conducted at CHKD Allergy & Asthma clinic using electronic medical records of patients who had received at least 1 dose of epinephrine during a physician supervised oral food challenge between January 1st, 2018, to December 31st, 2023. A total of 151 subjects met inclusion criteria; however, 52 subjects were excluded from the analysis due to missing BMI.

Results
In the final analysis of 99 subjects, the number of individuals receiving more than one dose of epinephrine varied across different BMI categories. Specifically, 2 underweight subjects (28.57%), 14 normal weight subjects (20%), 2 overweight subjects (20%), and 2 obese subjects (16.67%) required multiple doses.

Conclusion
These Results revealed no significant association between BMI and the administration of multiple epinephrine doses ($p<0.94$).

Abstract Title: Impact of Pre-Conditioning Clofarabine on Engraftment and Cell Recovery in Allogeneic Transplantation Using Post-Transplant Cyclophosphamide

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Abstract

Introduction
For relapsed or refractory AML (r/r AML), an allogeneic hematopoietic stem cell transplant (allo-HCT) is a potentially curative treatment. Yet, relapse rates are high, and non-relapse mortality is concerning due to the incidence of infectious complications and graft-versus-host-disease (GVHD). Clofarabine, a purine nucleoside antimetabolite, is a safe and effective conditioning agent that can be used for high-risk leukemia. We demonstrated Clofarabine/busulfan conditioning is an effective regimen for r/r AML. More recently, we reported its efficacy using Clofarabine as a pre-conditioning (pre-Clo) before allo-HCT for non-remission hematological malignancies, which suggests this strategy can be expanded for the application to high-risk AML such as TP53 biallelic mutated MDS/AML. Despite the intensity of this regimen, the engraftment of patients with pre-Clo was comparable to others, including lymphocyte recovery. We hypothesized that pre-Clo may give additional immunosuppression, which may benefit high-risk hematological malignancies by facilitating donor T-cell chimerism.

Methods
In this retrospective study at our institution, we included 175 peripheral blood allo-HCT patients who received PTCy as GVHD prophylaxis from April 2017 to March 2024. Using the propensity-score matching, we analyzed the effect of pre-Clo (N=19) on neutrophil/platelet/lymphocyte engraftment and donor cell chimerism achievement compared to a cohort without pre-Clo (control; N=19). Propensity matching factors included age, patient sex, disease (AML, ALL, CML/MDS), HCT Comorbidity Index, Karnofsky Performance Status, number of prior HCT, donor type, and conditioning intensity. Because pre-conditioning is intentionally reserved for those with active disease, disease status, and bone marrow blast percentage before transplant were not matched. Engraftment was defined as the first day achieving >20,000/μL platelets, >200/μL lymphocyte counts, and the first of three consecutive days achieving >500/μL neutrophils, respectively.

Results
Median age was 49 and 57 for pre-Clo and the control cohort, respectively, and AML patients comprised 63.2% of each group (pre-Clo: 15.8% ALL, 21.1% CML/MDS; control: 21.1% ALL, 15.8% CML/MDS). Overall survival at 1-year post-transplant was encouraging at 42% for pre-Clo (58% for the control cohort). Of note, these two groups vary regarding disease activity, given that most pre-Clo cases were non-CR (89.5% in pre-Clo, compared to 10.5% in the control group). As expected, there was no difference between both groups found in neutrophil (p=0.785) or lymphocyte (p=0.299) engraftment. Pre-Clo may be associated with delayed platelet engraftment (p=0.141). There were no differences in donor total or T-cell chimerism at 30, 60, or 90 days after allo-HCT. Still, when stratified with those who received HLA-matched donors (47.4% of each cohort), the pre-Clo group showed increased donor total and T-cell chimerism at day 60 after allo-HCT (total cell p=0.026; T-cell p=0.029). This effect continued to day 90 only for T-cell chimerism (total cell p=0.768; T-cell p=0.029), and may suggest enhanced immunosuppressive activity of pre-Clo, and anticipated enhanced graft-versus-leukemia effect, specifically in the context of an HLA-matched donor. These trends were not observed in patients receiving HLA-mismatched transplants because HLA-mismatched, including haploidentical donors, facilitate full donor T-cell chimerism by themselves, masking any influence pre-Clo might have. Further, post-transplant CD4+ counts appeared to trend lower in the pre-Clo group, continuing to around 6 months (limited patient data available; pre-Clo N=6 and control N=7, p=0.073), which could be concerning for a higher incidence of infectious complications in the pre-Clo group.

Conclusion
Considering these trends and the similar lymphocyte recovery in both groups, more precise analysis of lymphocyte fractions after pre-Clo should be undertaken. Additional investigation is warranted to validate the efficacy of pre-Clo followed by allo-HCT for r/r AML and other hematological malignancies by understanding how this may affect GVHD and graft-versus-leukemia on top of the anti-tumor effect of Clofarabine by itself.

Abstract Title: Brief Clinical Needs Assessment Quality Check for EBP Adherence in pediatric primary care

Investigator: Madhu, Bhavana
Mentor: Mary Margaret Gleason, MD
Department: Department of Pediatrics, CHKD Psychiatry & Psychology
Co-Investigators: Vera Hale, MD

Abstract

Introduction
Children's mental health is in crisis, with long waitlists and high rates of untreated mental health problems. It is critical that children receive care based on the highest quality research. Most mental professionals have limited training in the care of children under 6, increasing the importance of assessing their care. Practice guidelines published by pediatricians and child psychiatrists define best practices for young children under 6. The CHKD Mental Health Program has developed briefer guidelines organized by age, diagnosis, and impairment. This project examines the adherence to treatment guidelines for children under 6 at CHKD in the initial triage appointment. A secondary objective is to identify any differences in adherence by patient or clinician factors.

Methods
This study utilized a retrospective chart review of charts of children seen for an initial triage appointment between June 2023 to July 2024. The primary outcome was adherence to guidelines, assessed by linking documented diagnosis, level of impairment, and treatment plan, categorized as fully adherent, partially adherent, non-adherent. Weekly reliability discussions addressed specific charts and a second rater rated 85% for reliability. Moderator variables included age, race, language, diagnosis, insurance, and evidence of impairment across multiple domains.

Results
Overall, 67% (n=156) of the care plans fully adhered to published treatment guidelines An additional 27.5% (n=64) were partially adherent. Only 5.6% (n=13) of plans of care were not adherent.

Conclusion
First, most children seen for care receive treatment recommendations adherent to published guidelines There was no evidence of systemic disparities in care plans by age, race, gender, and insurance This project found evidence of possible judicious use of limited resources. Importantly, there was a high number of patients displaying symptoms of ADHD who did not receive a diagnosis and were referred to testing. This causes delays in care, as testing involves copious resources and time of mental health professionals This can result in longer wait time to receive therapy as well as to access psychiatrists for medication Quality improvement strategies may support patient outcomes and improve adherence to standard guidelines for treatment of patients under six Assessing professionals for levels of understanding of CHKD protocol guidelines for children under six Education via trainings and workshops to refresh knowledge of standard guidelines and clarify guidelines Integrating AI into Electronic Medical Records to streamline care management by automating treatment plan suggestions in line with protocol, further allowing practitioners to adhere to standard care plans Repeat trainings periodically and continually re-assess adherence to guidelines.

Abstract Title: Attitudes and Beliefs Regarding Use of Artificial Intelligence/Machine Learning Information in the Clinical Setting

Investigator: Mancoll, Ryan
Mentor: Eric Werner, MD, M.M.M
Department: Department of Pediatrics, Children's Specialty Group
Co-Investigators: 1. Ryan Mancoll, B.S, EVMS MD Program, M1 2. Rebecca Horgan, MD, Department of Obstetrics & Gynecology, 3. Jerri Waller, MD, Department of Obstetrics & Gynecology, 4. Eric Werner, MD, Department of Pediatrics, Children's Specialty Group

Abstract

Introduction
Despite the many studies deriving, validating, and/or testing artificial intelligence/machine learning (AI/ML) models in healthcare (HC), understanding how the emergence of AI/ML in medicine is being interpreted by clinicians and developers is integral to its proper stewardship and safe implementation.

Methods
A mixed method, convergent parallel design implementing both a survey and semi-structured interview was used to understand the attitudes and beliefs of obstetric and pediatric providers (HCP) regarding the use of ML/AI in HC and compare them with those of data scientists (DS) and clinical informaticists (CI).

Results
In the inferential analysis due to the small sample size of DS (N =5) and CI (N =3) groups in contrast to HCP (N= 24) statical significances could not be accurately assessed. However, descriptive survey analysis found that less HCP reported having a clear understanding or general familiarity with AI/ML in contrast to DS/CI (46% vs. 100%). HCP were less aware of using AI daily professionally than DS (52% vs. 100%). HCP also perceived AI/ML to be less professionally useful than DS (61% vs 100%). However, all groups reported that data source representation and size were important factors in trusting AI, which was reflected in the themes. HCP and DS had similar ideas about validation, but HCPs deemed professional society endorsement less important and requirement by regulatory agency more important than DS. Thematic analysis of interviews N = 17 highlighted many themes that went into multiple areas but included hopes that AI could alleviate provider task load, offer improvements in direct and indirect patient care activities, and aid in quality improvement/public health efforts. On the other hand, common concerns were societal obstacles, data/AI model validity, improper use, and the potential to undermine provider-patient relationships or humanity in medicine

Conclusion
With some notable differences between them, both clinical providers and data scientists report a positive outlook for improving patient care, efficiency of practice and education amongst other uses while also reporting concerns regarding accuracy/validity, proper usage, and societal obstacles. These findings should be incorporated into the design, implementation, and dissemination of ML/AI in health care.

Abstract Title: Presentation as a Tool to Raise Awareness of Bias and to Increase Confidence When Discussing Weight Loss Amongst Third-Year Medical Students

Investigator: Manga, Stephen
Mentor: Bruce Britton, MD
Department: Department of Family & Community Medicine
Co-Investigators: 1 Janvi Agrawal, EVMS MD Program Class of 2026 2. Agnes Kwak, EVMS MD Program Class of 2026

Abstract

Introduction
Excess weight is a well-documented risk factor for developing many chronic conditions, including coronary heart disease, hypertension, type 2 diabetes, gallbladder disease, osteoarthritis, cataracts, certain types of cancers, asthma and obstructive sleep apnea, and even cognitive decline such as in Alzheimer's disease. Although weight loss in at-risk obese populations is associated with improvements in cardiometabolic health, it is usually followed by progressive regain and weight cycling, which has also been associated with an increased risk of cardiovascular events. Further nuance has been introduced by recent studies that emphasize substantial heterogeneity in metabolic health amongst moderately obese individuals, proposing that some individuals with obesity do not exhibit metabolic disorders traditionally associated with excess weight, such as insulin resistance, hypertension, and dyslipidemia. Because of the intricate ways that genetics, lifestyle, and environment affect body weight and the development of health outcomes, some propose that weight management intervention strategies should be tailored to individuals' metabolic profiles rather than a blanket approach for all overweight or obese people. Thus, physicians' comfort level in discussing issues of body weight and weight loss in an appropriately sensitive manner is paramount to improving patient health outcomes and strengthening patient-physician relationships. Unfortunately, historical studies have shown that healthcare providers and medical students display implicit bias against obese patients and are reluctant to devote time to discussing weight management strategies; recent studies have shown providers have a fear of offending patients and feel they have been insufficiently trained to discuss weight with patients comfortably. Training directed at developing knowledge, acknowledging and eliminating implicit biases, and improving communication skills, such as judging patient readiness and approaching sensitive topics, could bolster providers' confidence in initiating patient-centered conversations about body weight and weight loss in the clinical setting.

Methods
Participants: Participants will consist of current third-year medical students from Eastern Virginia Medical School (EVMS) who are completing their family medicine (FM) clerkship during the 2024-2025 academic year. The FM clerkship is six weeks long. Alteration to current curriculum: Students will have a lecture delivered on the first day of their second week within their FM clerkship that discusses the data on implicit bias among medical students, bias' relationship to discussions about weight loss, ways to recognize bias, what to do about bias, and a template for discussing weight loss. Data collection: During the lecture, the students will be asked a Likert-style question about their comfort when discussing weight loss. Answers will be recorded with no identifiers. During the sixth and last week of the clerkship, students will complete a survey with the same question about their level of comfort and additional questions to determine which aspects (if any) of the presentation students found useful. Students will not be asked to add any identifiers during the second survey. Data Analyses: Data will be analyzed using descriptive statistics and chi-square tests on Microsoft Excel, which will compare student comfort levels across the Likert scale before and after the implementation of the lecture. Statistical significance will be defined as $p<0.05$. Statistically significant differences in the frequency of students that answer "Somewhat comfortable" or "Very comfortable" will confirm the presentation had a positive effect. We will also record additional feedback we receive in the post-intervention survey. Data Safety: Only the investigators will have access to the deidentified RedCap data, which will be deleted after the study is completed. Data Collection Tools: • Pre-intervention question • Post-intervention survey

Results
Study is currently ongoing. Results will be available later this academic year.

Conclusion
Study is currently ongoing. Results will be available later this academic year.

Abstract Title: Contrast-induced bronchospasm in a patient with bronchopleural-esophageal fistula

Investigator: Markert, Olivia
Mentor: Xian Qiao, MD
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Co-Investigators: 1. Gorjeite Sweidan, B.S., EVMS MD Program 2026 2. Alynna Knaub, DO, Department of Medicine, Residency Program PGY-3

Abstract

Introduction
Contrast-induced bronchospasm can be a rare and severe reaction to iodinated contrast media, comprising only 0.2% of total contrast related reactions. This outcome is most commonly associated with intravascular administration. We present a patient with a rare case secondary to orally administered contrast in a patient with bronchopleural-esophageal fistula (BEF) and chronic obstructive pulmonary disease (COPD) who underwent enteric contrast administration during esophagogastroduodenoscopy (EGD) with esophageal stent placement, leading to severe bronchospasm and failed extubation.

Case Information
A 66-year-old male with a history of esophageal squamous cell carcinoma (SCC), COPD, and chronic hypoxic respiratory failure presented to the hospital with a chief complaint of shortness of breath and significant respiratory secretions. Notably, the patient underwent an esophageal stent placement a month prior to the current admission for esophageal stenosis and had no documented history of allergy to iodinated contrast media. A CTA chest upon admission showed a BEF and a thick-walled collection containing gas along the adjacent right mediastinal pleura, concerning for a leak. The patient underwent stent replacement and EGD. Fluoroscopy with iodinated-contrast media was used to locate the fistula in the middle third of the esophagus. A covered stent was placed under fluoroscopic guidance. Upon initial extubation following stent placement and administration of contrast, the patient complained of dyspnea and chest tightness. His vitals were significant for hypotension, tachycardia, and tachypnea. Two doses of phenylephrine 100 mcg were administered. He was re-intubated due to worsening respiratory status and transferred to the intensive care unit. Review of procedural images, contrast was noted to have entered the main bronchi and extended into the subsegments bilaterally. The patient was started on methylprednisolone 40 mg IV, ipratropium-albuterol 3 mL and broad-spectrum antibiotics, resulting in clinical improvement and extubation the following day. Imaging (CT chest with IV contrast) three days later showed larger posterior basilar left lower lobe consolidation consistent with aspiration pneumonia. The patient expired later in hospitalization secondary to an aspiration event.

Discussion/Clinical Findings
This case presents an interesting etiology of contrast-induced bronchospasm. Anaphylactoid reactions, including bronchospasm, to enteric administration of contrast media as seen in this patient are rare in comparison to intravascular or direct injection. This patient underwent fluoroscopy accompanied by enteric contrast media which is useful for direct visualization of various pathologies of the gastrointestinal tract. Specifically, in our patient with a BEF, enteric contrast was utilized to guide esophageal stent placement to the area of contrast extravasation. Despite aiding in stent placement, the extravasation of the contrast into the airway via the fistula contributed to the development of adverse symptoms. This is likely not a true contrast related allergic reaction and more likely due to direct irritation of the airway tissue by the contrast. Additionally, the patient's history of COPD is independently associated with bronchospasm. When coupled with his BEF, the enteric contrast administration caused direct airway insult and bronchospasm that led to extubation failure and aspiration pneumonia.

Conclusion
Although fluoroscopy accompanied by enteric contrast media is highly useful for direct visualization of pathology in the GI tract, in patients with BEF, it may be important to consider potential preventative treatments, such as steroids and additional nebulizer treatments for possible respiratory complications in patients with COPD or asthma.

Abstract Title: Outcomes of a Hospital Discharge Clinic for Patients Without Insurance

Investigator: Meester, Noah
Mentor: Brooke Hooper, MD
Department: Department of Medicine
Co-Investigators: 1. Reem Sharaf-Alddin, Ph.D., Department of Obstetrics & Gynecology, CONRAD 2. Brynn Sheehan, Ph.D., Department of Psychiatry & Behavioral Sciences

Abstract

Introduction
Following hospitalization, patients without insurance carry an increased risk of adverse health outcomes. Social determinants of health and health-systems issues are contributing factors, and hospital readmissions are a reliable indicator of poor health outcomes following hospitalization. Government programs, such as the Medicare Hospital Readmission Reduction Program, have incentivized the development of programs that prevent hospital readmissions. There are many different interventions that healthcare delivery systems have implemented to mitigate hospital readmissions, and previous studies have shown inverse relationships between early outpatient follow-up visits and readmissions. The aim of this study was to explore the benefit of an intervention incentive for patients who lack insurance, to reduce hospital readmissions and emergency department visits, and to identify factors that affect attendance at a hospital discharge clinic follow-up appointment for this vulnerable patient population.

Methods
This was a cross sectional study that utilized deidentified data of adult patients hospitalized at a 525-bed tertiary care teaching hospital in Norfolk, Virginia between January 2016 and June 2018. These patients were scheduled for a hospital discharge appointment with an ambulatory care clinic (ACC) restricted primarily to patients without insurance within 90 days of a hospitalization. Data was extracted from the electronic medical record (EMR) system of Sentara Healthcare. The initial data set included 3149 observations, with each observation representing a patient hospital discharge clinic visit at the ACC. The final number of participants included in analysis was 1741. The primary outcome evaluated was attendance at initial hospital discharge outpatient visit, while the secondary outcomes were readmission and emergency department visit(s) within 90 days of discharge. The data set included the following covariates: age, race, ethnicity, length of hospital admission, cost of hospitalization, discharge to follow-up time interval, month in which the follow-up visit was scheduled, and the hospital encounter information for 90 days after discharge (visit to ED, frequency of ED visits, rehospitalization, frequency of rehospitalizations). To assess for associations between attendance at first follow-up visit and each categorical variable, chi-square tests were used. Mann Whitney U tests were conducted to assess associations between each continuous variable and attendance at first follow-up visit.

Results
Variables that were significantly associated with attendance at the first follow-up visit were age, race, length of hospital stay, and discharge to appointment date time interval. Age was positively associated with attending the first hospital discharge clinic visit (OR: 1.009; CI [1.002 - 1.017]; p=0.012]). The odds of attending the first follow up visit was about 30% less among patients reported in the EMR as White compared with patients reported in the EMR as Black (OR: 0.68; CI [0.55 - 0.85], p=0.001). Length of hospital stay demonstrated a positive correlation with the likelihood of attendance at the first hospital discharge clinic visit (χ^2(df) = [insert chi-sq value], p=0.036). Finally, the discharge to follow-up time interval was associated with attending the first hospital discharge clinic visit (OR: 0.981; CI [0.974 - 0.987]; p <0.001). Those who attended their scheduled outpatient follow-up visit had lower odds of being re-hospitalized in 90 days after discharge compared to those who did not attend their hospital discharge clinic visit (OR: 0.76; CI [0.59 - 0.96]; p =0.022).

Conclusion
These Results suggest that patients who lack insurance who have a prompt follow-up appointment scheduled after hospital discharge are more likely to attend their appointment. Importantly, Results also suggest that patients without insurance who attend the initial follow up visit after hospitalization are less likely to be readmitted to the hospital within 90 days of discharge. Hospital systems that design clear short-interval follow-up plans for their patients without insurance after discharge from the hospital can reduce barriers to care and help patients access appropriate follow-up, leading to decreased hospital admissions, more efficient resource utilization, and ultimately better patient outcomes. To accomplish short-interval follow-up, hospital systems and their community counterparts should ensure that there is adequate appointment availability, something that requires effective staffing, scheduling technology, and patient education at discharge. Further research is needed to identify factors that impact attendance at hospital follow-up appointments.

Abstract Title: A crescent setting down on the kidneys: A Case of RPCG in the setting of IgA Nephropathy

Investigator: Minson, Nealy
Mentor: Sami Tahhan, MD
Department: Department of Medicine
Co-Investigators: Taylor Figgs, EVMS MD Program

Abstract

Introduction
According to the National Kidney Foundation, there are an estimated 60,000 Americans living with IgA nephropathy. Since its discover by Dr. Jean Berger, we have continued to learn more about the pathophysiology, the progression of disease, and treatments; yet, there are still no FDA approved treatments. there is still controversy among the literature about treatment strategy and specific risk factors for the development of end stage renal disease (ESRD) in patients with IgA nephropathy with crescents. Patients with crescentic IgA nephropathy have variable presentations which brings challenges to diagnosing and treating this population. Presenting symptoms for crescentic IgA nephropathy range from mild proteinuria and hematuria to gross hematuria, hypertension, and acute kidney injury, though crescents are more likely to be found on biopsy in patients who present with AKI and gross hematuria. Delay in diagnosis may lead to significantly more morbidity and mortality as the degree of crescents correlates with progression to ESRD and reduced life expectancy. It is crucial to continue to learn about this disease including the way it clinically presents, progression of disease, and effective treatments. It

Case Information
A 30-year-old female presented to the emergency department with worsening nausea, fatigue, left flank pain, and hematuria. She was noted to have a creatinine of 2.3 with urine that was positive for leukocytes, moderate amount of blood and RBCs with hyaline casts. The patient developed significant edema, creatinine continued to increase, and she developed new onset worsening proteinuria greater than 1 gram per day.

Discussion/Clinical Findings
Renal biopsy showed mesangial immunoreactivity for IgA and C3 deposition with 36% crescentic glomeruli on microscopy. Findings were consistent with IgA nephropathy with crescent glomerulonephritis, Oxford IgA classification score of M1 E1 S0 T0 C2. Nephrology was consulted and started the patient on 3 days of pulse IV solumedrol 250mg and oral mycophenolate for immunosuppression. After pulse steroid course was completed, creatinine slowly decreased, and her condition improved. She was discharged on oral prednisone 60mg for 6 months, oral mycophenolate 1000 mg BID, and losartan 25mg QD. IgA Nephropathy is an autoimmune condition that is a common cause of glomerulonephritis. While it can be idiopathic, it is often triggered by mucosal infections of the upper respiratory or gastrointestinal systems. Based on histological findings on kidney biopsy, patients are classified into five categories including mesangial hypercellularity (M), endocapillary hypercellularity (E), segmental glomerulosclerosis (S), tubular atrophy/ interstitial fibrosis (T), and the presence of crescents (C). The presence of crescents as a predictor of disease progression has recently been added to the Oxford Classification system in 2017 as it has been found to be associated with accelerated rate of renal decline to end stage renal disease when not promptly and appropriately treated with immunosuppressive therapy and strict blood pressure control. Crescents on glomerular biopsy are only present in approximately 20-30% of patients with IgA nephropathy and only approximately 3% of biopsy may meet the criteria for C2 IgA nephropathy.

Conclusion
Unfortunately, appropriate treatment of rapidly progressive glomerulonephritis (RPGN) in IgA Nephropathy has yet to be clearly identified, as it has previously been excluded in many studies due to the rapid rate of decline and severity of disease in most patients. Previous research has focused on the use of immunosuppressive therapies as the mainstay in treatment including various corticosteroids, cyclophosphamide, calcineurin inhibitors, mycophenolate, and azathioprine. Proposed metrics to predict disease progression include the degree of daily proteinuria (> 1g/day), hypertension, and Oxford Classification. More research is needed in order to ascertain ideal management for patients who present with severe disease.

Abstract Title: 5-Hydroxymethyl-2-furfural (HMF): A Suspected Diabetogen?

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Abstract

Introduction
During thermal food processing, as when sugars such as glucose and fructose are heat processed, furan compounds which include HMF are formed. This can be noted in a number of cooking processes: the manufacture of high-fructose corn syrup (HFCS), cooking of fruit sugars as in jams and marmalades, caramelization of sugars, roasting of coffee, and pasteurization and sterilization of milk products. Along with this, HMF is present in foods that have undergone the Maillard reaction which is the browning reaction in baking, frying, and the searing of proteins. As a result of this prominence during heat processing, HMF has been used as a quality indicator in the food industry, signifying overheating or inadequate storage conditions (Lee et al., 2019). For example, HMF content in honey increases with greater storage and heating times, indicating a less fresh product. Moreover, studies reveal several potential effects of HMF, such as an irritant to the eyes, upper respiratory tract, and skin. HMF is a suspected carcinogen, mutagen, diabetogen, hepatotoxin, and nephrotoxin. When comparing soluble protein content in the lenses of cataracts patients, there was a 52% increase in HMF in those lenses derived from diabetic patients versus non-diabetic patients (Rao & Cotlier, 1986). Moreover, in honeybees, varying HMF dosages have shown to lower future brood size and be lethal (Shapla et al., 2018). In a previous experiment in the 832/13 β-cell line, when cultures were shifted from low- (2.5 mM) to high-glucose media (12 mM), we were surprised to see a large increase in intracellular 5-hydroxymethyl-2-furoic acid (Sumiki's acid), a cellular oxidation product of HMF. This caused us to ask the following question: do beta cells exposed to HMF generate Sumiki's Acid, and is this glucose dependent?

Methods
We began our investigation by challenging the rat β-cell line, βG 49/206, with a pulse high-glucose solution spiked with HMF, and assaying HMF and Sumiki's acid at two time points using mass spectrometry. The βG 49/206 cell line shares a close common ancestor with the cells used previously. Trypsinized confluent cultures were seeded onto fresh plates. After adherence, P100 plates were rinsed with phosphate-buffered saline, and then cultured under 10 mL of a low-glucose secretion buffer (2.5 mM) for 60 minutes. Following this, cells were subjected to one of three conditions: 10 mL of low-glucose buffer, 10 mL of high-glucose buffer (12 mM), or 10 mL of high-glucose buffer spiked with HMF (1 mM). Conditioned media and cell lysates were captured at 100 minutes (high-glucose spiked with HMF) and 270 minutes (low-glucose, high-glucose, and high-glucose spiked with HMF). Relative amounts of metabolites were measured by ultrahigh-pressure liquid chromatography / quadrupole, time-of-flight mass spectrometry (UHPLC / QToF MS) on an Agilent 1290 / 6546 system. and by gas chromatography (GC) / MS on an Agilent 8890 / 5977B system. Glucose concentrations were measured on a Beckman UniCel DxC 600 Synchron instrument.

Results
As in our earlier work in the 832/13 insulinoma cell line, the 49/206 β-cell line was able to take up HMF and oxidize it to Sumiki's acid. In cell lysates in the present study, HMF and Sumiki's acid were only observed in plates dosed with HMF. HMF concentrations rose between 100 and 270 minutes, while levels of Sumiki's acid were relatively stable. Compared to high-glucose cultures that received no HMF, at 270 minutes, HMF-treated cells showed a marked increase in adenine (purine), 6-methyluracil (pyrimidine), spermidine (polyamine), components of fetal bovine serum (urea, norepinephrine), taurine, and several amino acids, including lysine, phenylalanine, and tyrosine, perhaps reflecting an acute proteolytic response to the HMF dose. Lactate was increased, and a number of Krebs-cycle intermediates (succinate, fumarate, and malate) were decreased in HMF-dosed cells, suggesting a shift of central fuel metabolism toward glycolysis-but the effect size there was modest.

Conclusion
By deliberately spiking a glucose-secretion buffer with HMF, we confirmed our earlier observation that transgenic rat β-cell lines can absorb HMF and oxidize it to Sumiki's acid. Further work is needed: • Can native rat and human β cells concentrate HMF and oxidize it to Sumiki's acid? If so, what are the pharmacokinetics? If so, is HMF toxic to β cells at physiologically meaningful doses, or does it form adducts with their proteins or DNA? • Is HMF being concentrated in β cells via such transporters as GLUT1 and GLUT2? • If dietary HMF levels in highly processed foods, such as HFCS, are shown to be diabetogenic, could they be reduced by process controls in the food industry?

Abstract Title: Association of Hospital Readmission Rates with Social Determinants of Health Among Cancer Patients in Level 1 Trauma Centers

Investigator: Naranjo, Gerryl
Mentor: Prachi Chavan, MD, Ph.D.
Department: Public Health Program

Abstract

Introduction
Cancer patients have higher rates of hospitalization and unplanned readmissions compared to the general population. Social determinants of health (SDOH) such as socioeconomic status, education, and social support play a significant role in hospital readmission rates and overall health; yet, SDOHs are rarely studied when examining hospital readmission rates. We hypothesize that SDOH can be a useful tool in determining hospital readmission rates among patients with cancer.

Methods
This is a cross-sectional study of 3,237 adult patients (ages > 18 years) who were hospitalized at Sentara Norfolk General Hospital between February 2022 to November 2022. Patient demographics and hospitalizations were manually collected from the EPIC EMR. Descriptive statistics were used for demographic variables. We calculated N (%) for categorical variables and mean with standard deviation for categorical variables. The total sample size of our study is 340 patients with cancer. Multivariable logistic regressions were performed to assess associations between dependent and independent variables.

Results
Of the total 340 patients, there were more females compared to males (n=179, 52% vs. n=161, 47%), and more White patients (n=134, 39%) compared to Black patients (n=116, 34%) and Other racial groups (n=90, 26%). We will be calculating 90-day readmissions and 180-day readmissions in addition to 30-day readmissions, and anticipate that the readmission rates for 30 days will be higher for patients with cancer. The regional estimates for 90-day and 180-day readmissions are unknown. We anticipate a higher rate of unplanned readmissions among cancer patients compared with other patients.

Conclusion
Addressing social determinants through targeted interventions such as increasing access to outpatient care and providing referrals to community-based resources to socioeconomically vulnerable patients can potentially reduce readmission rates and improve overall patient outcomes.

Abstract Title: Dupilumab-Induced Palmoplantar Psoriasiform Dermatitis in a Patient with Prurigo Nodularis: A Case Report

Investigator: Nelson, Houston
Mentor: Patrick Carrington, MD
Department: Department of Dermatology
Co-Investigators: 1. Houston Nelson, B.S., EVMS MD Program 2. Yanci A. Algarin, B.S., EVMS MD Program 3. Landon Hope, MD, MBA, Dermatology, University of Arkansas for Medical Sciences

Abstract

Introduction
Dupilumab, a monoclonal antibody targeting the interleukin (IL)-4 and (IL)-13 receptor subunit α, developed as an opportune therapeutic modality for moderate to severe atopic dermatitis (AD) is also approved by the Food and Drug Administration (FDA) for treatment of prurigo nodularis (PN), severe bronchial asthma, and chronic rhinosinusitis with nasal polyps. Reports have surfaced of papulosquamous psoriasiform skin changes developing in patients treated with dupilumab, including dupilumab induced cases of psoriasis, psoriasiform eruptions, and psoriasiform dermatitis. This report highlights a comparable phenomenon in a 57-year old female revealing itself after one year of treatment with dupilumab PN.

Case Information
We present the case of a 57-year-old female diagnosed with prurigo nodularis (PN) two and a half years prior, who developed erythematous, scaly, well-demarcated patches on her palms and soles after one year of successful dupilumab therapy. Despite previous treatments with clobetasol, UVA1 phototherapy, and methotrexate, among others, the patient showed marked hyperkeratosis with patchy parakeratosis and hypergranulosis consistent with psoriasiform chronic spongiotic dermatitis upon biopsy. This case highlights a dupilumab-induced palmoplantar psoriasiform dermatitis that emerged during therapy.

Discussion/Clinical Findings
Palmoplantar psoriasis (PP) is a distinct subtype of psoriasis affecting the palms and soles, often misdiagnosed due to its clinical overlap with chronic eczema and other dermatoses. Dupilumab, a monoclonal antibody targeting IL-4 and IL-13, has been associated with psoriasis, psoriasiform eruptions, and psoriasiform dermatitis as a side effect, possibly due to a shift in the immune response from a Th2 to a Th1/Th17 phenotype. The complexity of diagnosing and managing PP underscores the importance of a thorough clinical and histopathological evaluation to differentiate it from similar conditions. The balance between Th1 and Th2 pathways is crucial in the pathogenesis of both PN and psoriasis, with dupilumab potentially disrupting this balance, leading to psoriatic manifestations.

Conclusion
This case underscores the potential for dupilumab to induce psoriasiform dermatitis, highlighting the importance of comprehensive diagnostic approaches and careful management of dupilumab therapy. While dupilumab provided significant relief from PN symptoms, the emergence of psoriasiform dermatitis necessitates a balanced consideration of treatment benefits and risks. Ongoing monitoring and personalized treatment adjustments are essential to optimize patient outcomes, and further research is needed to better understand the mechanisms driving dupilumab-induced psoriatic conditions.

Abstract Title: Ischemic Infarction After Intracerebral Hemorrhage in Elderly Caucasian Female with Atrial Fibrillation

Investigator: Newton, Savannah
Mentor: Taylor Attar, DO
Department: Department of Medicine

Abstract

Introduction
The management of hemorrhagic stroke in elderly patients with atrial fibrillation (AF) on anticoagulation presents significant challenges, particularly when balancing the risks of anticoagulation with the potential for recurrent ischemic events. This case report examines the clinical course of an 87-year-old woman with persistent AF who suffered a hemorrhagic stroke, highlighting the complexities of decision-making in the resumption of anticoagulation, the role of standardized care protocols, and the importance of clear communication in managing patient and family expectations.

Case Information
We present the case of an 87-year-old female with persistent atrial fibrillation (AF) on warfarin, who suffered a hemorrhagic stroke following administration of dextromethorphan. The patient, with a complex medical history including hypertension, diastolic heart failure, and chronic kidney disease, experienced acute left-sided weakness. Initial evaluation at a community hospital confirmed an intracranial hemorrhage (ICH) with midline shift. Warfarin was reversed using prothrombin complex concentrate and vitamin K, and the patient was transferred to a Neurologic Intensive Care Unit (Neuro ICU). Upon admission, the patient's Glasgow Coma Score (GCS) was 14, and she required nasogastric tube (NGT) placement due to dysphagia. Despite initial stabilization and a transfer to a step-down unit, the patient's GCS declined to 9 by Day 12, with persistent encephalopathy attributed to the global effects of ICH and other chronic conditions. Neurology predicted permanent left-sided motor deficits but expected meaningful recovery in language and cognition. On Day 19, a decline in the patient's condition raised concerns for a new ischemic stroke. Repeat imaging revealed a large middle cerebral artery occlusion with resolving ICH, likely due to cardioembolic stroke from AF off anticoagulation. Re-admission to the Neuro ICU followed, and shared decision-making led to the initiation of Comfort Care. The patient was transferred to inpatient hospice and passed away on Day 23.

Discussion/Clinical Findings
This case underscores the challenges in managing elderly patients with AF who experience ICH, particularly in decisions regarding anticoagulation resumption. The patient's outcome, despite an initially optimistic prognosis, suggests the need for standardized care protocols for ICH management in AF patients, consistent neurologic assessments outside of the Neuro ICU, and the integration of objective scoring systems like the PLAN Score for better prognostication and expectation management.

Conclusion
Proactive, compassionate care and continuous education are vital in improving outcomes for similar patients.

Abstract Title: Using Machine Learning Algorithms to detect Carpal Tunnel Syndrome on Ultrasound images

Investigator: Park, David
Mentor: Richard Tyrell, MD
Department: Department of Surgery, Division of Vascular Surgery

Abstract

Introduction
Depending on the severity, site, or cause of peripheral nerve injuries, inaccurate or late detection of the injured nerve poses a challenge for patient prognosis and the ability to offer surgical intervention. Peripheral nerve injuries are diagnosed by initial cross-sectional imaging i.e. CT, MRI, or US, followed by physical exam maneuvers and EMG testing. Inaccurate radiological detection during the initial visit can lead to patients having permanent disability and lower quality of life. Modern advances in artificial intelligence and machine learning algorithms have enabled automated localization and segmentation of peripheral nerves. By using cross-sectional imaging that is already obtained during initial patient encounters, applying machine learning models can assist clinicians in early detection of peripheral nerve injuries. This review investigates the use of machine learning algorithms to detect Carpal Tunnel Syndrome on ultrasound images. Carpal Tunnel Syndrome is caused by compression of the median nerve which can be difficult to visualize on ultrasound images due to operator dependence and morphological variations.

Methods
Independent reviewers conducted a literature search using PubMed, Web of Science, and MEDLINE (through July 1, 2024) to identify studies using machine learning algorithms for detecting carpal tunnel syndrome on ultrasound images. The database searches used were ("median nerve" OR "carpal tunnel syndrome") AND ("ultrasonography" OR "ultrasound" OR "sonography") AND ("artificial intelligence" OR "deep learning" OR "machine learning" OR "convolutional neural network"). Articles were screened for sonographic detection of the median nerve using machine learning algorithms by either localization, segmentation, or both.

Results
Eleven articles were used after screening 74 articles, comprising 593 participants. The machine learning algorithms used include U-Net, SegNet, MATLAB, Mask R-CNN, Resnet, MNT-DeepSL, DeepLabV3+, and FPN. Machine learning algorithm performance metrics obtained include precision, accuracy, recall, F-score, IoU, and dice coefficient.

Conclusion
Machine learning algorithms show capability for automating localization and segmentation of the median nerve on ultrasound images by statistically significant measures. Carpal tunnel syndrome can be difficult to visualize by ultrasound due to operator dependence and morphological variations of the median nerve. Further research should involve more participants varying in age, sex, and comorbidities to account for morphological variations of the median nerve in order for machine learning algorithms to be a reliable tool for sonographers in clinical practice.

Abstract Title: Terrible Triglycerides: A Fatal Side Effect

Investigator: Park, Ryan
Mentor: Naveen Voore, MD
Department: Department of Medicine
Co-Investigators: 1. Ryan Park, EVMS MD Program MS4 2. Lily Nguyen, MD, Department of Medicine Residency Program 3. Sam Stein, MD, Department of Medicine Residency Program 4. Ogochukwu Ilobi, MD, Department of Medicine Residency Program 5. Naveen Voore, MD, Department of Medicine

Abstract

Introduction
Acute pancreatitis is an inflammatory disorder of the pancreas characterized by elevated pancreatic enzymes, abdominal pain and correlating imaging findings. Severe cases can lead to necrosis of the pancreas with eventual development of shock and organ failure. While gallstones and alcohol are the most common causes of acute pancreatitis, hypertriglyceridemia is another notable cause.

Case Information
A 37-year-old male with past medical history of PTSD, bipolar disorder (on valproic acid), HIV (on dolutegravir-rilpivirine), and polysubstance abuse presented to the emergency department with a 1-day history of severe abdominal pain, nausea, vomiting, fever and chills. Initial labs were most notable for a cholesterol of 434, lactic acid of 6.9, glucose of 398, and an anion gap metabolic acidosis. His blood was described as lipemic by the laboratory thus an initial lipase level could not be read. An abdominal CT scan revealed interstitial pancreatitis. He was admitted and initiated on IV fluids and analgesic medications. A lipid panel revealed a triglyceride level of >4000 and he was subsequently started on an insulin drip. A few hours after admission, he developed progressive lethargy with marked hypotension warranting central line placement for pressor support with norepinephrine, vasopressin, phenylephrine as well as broad spectrum antibiotics. He was transferred to a nearby hospital for emergent plasmapheresis. Upon arrival, he was intubated for respiratory acidosis and his repeat triglyceride level was 8,029. Other notable labs were a valproic acid level of 9.4 and lipase of 4,006. He received plasma exchange with continued pressor support and IV steroids were initiated. Renal replacement therapy was also initiated for shock-induced renal failure. Despite these measures, he continued to decompensate, developing profound transaminitis secondary to shock liver. Additionally, he developed abdominal compartment syndrome for which he was to undergo a decompressive laparotomy. However, on preparation for the procedure, he went into cardiac arrest with eventual ROSC. Given his continued clinical decline, his family decided to transition to comfort care, and the patient passed away.

Discussion/Clinical Findings
This patient notably had a benign triglyceride level of 120 two months prior to the described hospitalization; the profound increase is a unique aspect of this case. Triglycerides can be elevated from several causes, including HIV, hypertension, sedentary lifestyles, liver disease, and medications. On review of the patient's medications which included dolutegravir-rilpivirine and valproic acid, it was concluded that valproic acid was the most likely cause of the abrupt triglyceride elevation and development of acute pancreatitis. Valproic acid has a dose- independent relationship with pancreatitis. The association between metabolic derangements (such as increased weight and triglycerides) and valproic acid use has been well established in prior literature. Valproic acid-induced pancreatitis was first reported in 1979 and over 120 cases have been reported since. The mechanism behind valproic acid's effect on lipid profiles is multifactorial, including an increase in both insulin resistance and fatty acid oxidation.

Conclusion
We present this case to highlight a severe adverse effect of a commonly used medication and its potentially fatal consequences.

Abstract Title: Active or Resolved COVID Infection and Risk of Postoperative Complication in Cleft Palate Repair

Investigator: Park, Sarah
Mentor: Yifan Guo, MD
Department: Department of Surgery, Pediatric Plastic & Oral Maxillofacial Surgery
Co-Investigators: 1. Sarah Park, M2 2. Parker Adams, M2 3. Claire Allison, M2

Abstract

Introduction
Cleft palate is a congenital condition that can lead to various respiratory complications due to the abnormal communication between the oral and nasal cavities which can pose significant respiratory challenges, including an increased risk of upper respiratory infections, otitis media with effusion, and obstructive sleep apnea. These complications are particularly concerning during surgical interventions like palatoplasty. The COVID-19 pandemic introduced new complexities in managing surgical cases, such as delay to procedure as well as difficulties in managing post-surgical care given pandemic protocols. However, there is limited research on how a past or perioperative COVID-19 infection affects the outcomes of cleft palate repair. To address this gap, we utilized the TriNetX database, which aggregates data from 127 national and international healthcare organizations, providing a large and diverse sample size necessary to study this issue in the pediatric population, where COVID-19 incidence is lower. This study primarily aims to determine whether a history of COVID-19 infection increases the risk of postoperative respiratory complications in cleft palate repair. The primary objective is to isolate COVID-19 as a risk factor, while the exploratory analysis considers the impact of pre-existing respiratory conditions, offering a comprehensive view of the factors that may contribute to postoperative complications.

Methods
Data were sourced from the TriNetX Global Collaborative Network, involving 127 healthcare organizations. The study included two cohorts: Cohort 1 (3,148 patients in the primary analysis and 3,117 patients in the exploratory analysis) with a history of COVID-19 infection undergoing palatoplasty, and Cohort 2 (15,348 patients in the primary analysis and 14,048 patients in the exploratory analysis) undergoing palatoplasty without prior COVID-19 infection. The primary analysis excluded outcomes prior to the index event to specifically assess the impact of COVID-19. An exploratory analysis was also conducted, including prior outcomes to examine the potential influence of pre-existing respiratory conditions.

Results
In the primary analysis excluding prior outcomes, respiratory complications occurred in 0.8% of patients in Cohort 1 and 0.5% in Cohort 2, with no statistically significant difference between the cohorts (Risk Ratio: 1.458, p=0.127). In the exploratory analysis, which included prior outcomes, the complication rate increased to 2.4% in Cohort 1 and 1.6% in Cohort 2, indicating a significant risk increase in the COVID-19 cohort (Risk Ratio: 1.489, p=0.002). Kaplan-Meier survival analysis revealed no significant difference in survival probability in the primary analysis (Log-Rank Test: p=0.133), while the exploratory analysis showed a significant difference (Log-Rank Test: p=0.003).

Conclusion
Excluding prior outcomes helps isolate the impact of COVID-19, suggesting no significant increase in postoperative respiratory complications directly attributable to COVID-19 alone. In contrast, including prior outcomes indicates a higher overall risk, potentially linked to pre-existing respiratory conditions. This finding underscores the importance of further analyses focusing on specific syndromic and respiratory diagnoses, as these may reveal additional factors contributing to postoperative complications beyond COVID-19.

Abstract Title: Evaluating Online Educational Resources for Osteogenesis Imperfecta: Insights from Google, Bing, and ChatGPT3.5

Investigator: Partin, Victoria
Mentor: April Pace, D.H.Sc., M.L.S.
Department: School of Health Professions
Co-Investigators: Andrea Hooberman-Pineiro, EVMS MD Program

Abstract

Introduction
Osteogenesis Imperfecta (OI) is a rare connective tissue disorder resulting in a diverse range of musculoskeletal deformities. Patient education is an important aspect of medical care, and the internet is a popular place in which patients seek information about their medical conditions. This is a cross-sectional study aimed to evaluate the quality of online patient educational resources about OI.

Methods
The authors searched for patient education websites using Google and Bing. Twenty patient education websites about OI were collected from each. Websites meeting inclusion criteria were evaluated using the DISCERN tool, JAMA Benchmark Criteria evaluation, and a Flesch-Kincaid Readability test. T-tests were used to compare search engine Results. Websites were also collected from ChatGPT3.5, however, due to hallucinations and exclusion criteria, the sample size was too small to compare to the search engines.

Results
No significant differences were found between search engines, and the quality of the websites was not high. Average overall ratings for DISCERN were mediocre, and for the JAMA criteria they were low. The average readability scores required 8-9 grade level reading comprehension, although there was variability within each search engine.

Conclusion
Neither search engine provided significantly better sources than the other, the overall quality of the websites was not high, and the low readability scores could make these difficult for patients with lower health literacy to understand.

Abstract Title: Don't Assume From the Problem List: Unmasking a Hidden Diagnosis

Investigator: Patel, Dhruvi
Mentor: Lisa Madren, MD
Department: Department of Medicine, Hampton VA Medical Center
Co-Investigators: 1. Isabelle Brown, MD, PGY-1, Department of Medicine 2. Lily Nguyen, MD, PGY-3, Department of Medicine

Abstract

Introduction
Anti-synthetase syndrome is a rare idiopathic inflammatory myopathy (IIM) that is characterized by antibodies directed against aminoacyl-transfer RNA (tRNA) synthetases. Currently, there are 10 known such antibodies, with the anti-isoleucyl tRNA synthetase (anti-OJ) antibody having a prevalence of 2-5%. We describe a unique patient presentation who was found to have anti-OJ positive anti-synthetase syndrome after hospitalization for suspected cellulitis.

Case Information
A 38 year-old male with a medical problem list of COPD, asthma, Crohn's disease, rheumatoid arthritis, and ankylosing spondylitis was admitted for abrupt sharp pain in left groin, knee, and ankle. Upon arrival, he was diaphoretic, febrile at 104.5°F, tachypneic, and tachycardic. He endorsed mild dyspnea with chills, diffuse joint pain, and difficulty with moving hands due to pain. Physical exam revealed facial erythema, bilaterally swollen fingers, mild lower extremity edema, erythema on left ankle, and tenderness to palpation of left inguinal fold, left knee, and left lateral ankle. He also had non-blanching petechial rashes on both shins, which the patient stated had been present for years.

Discussion/Clinical Findings
His initial laboratory Results were significant for WBC 13,000, PLT 254,000, CPK 546, ESR 28, LDH 245, and mild transaminitis. The initial concern was for sepsis, although procalcitonin and lactate were within normal limits. The source was attributed to cellulitis of his left leg due to mild swelling, increased erythema, and pain, and CT was significant for mild fat stranding of the left thigh with mild lymphadenopathy. Bilateral lower extremity PVLs were negative for DVT. Dermatology and infectious disease were consulted and the petechial rash was attributed to leukocytoclastic vasculitis secondary to infection. Patient was empirically treated with ceftaroline and doxycycline, but he continued to experience recurrent fever to 101°F so he was switched to linezolid due to concern for Group A Strep. Blood cultures were persistently negative, however. Additional investigation revealed that he had no history of smoking, bringing the diagnosis of COPD into question. Pulmonary function tests from the previous year were found to be within normal limits, including before and after bronchodilator administration. The patient also clarified he did not have rheumatoid arthritis and tested negative for rheumatoid factor and anti-CCP antibodies. Furthermore, despite the diagnosis of ankylosing spondylitis, his treatment was only limited to spine injections and he was negative for HLA-B27, with no evidence of sacroiliitis. The patient also shared that he had Raynaud's phenomenon. The workup was expanded to cover a broad differential for polyarthralgia; a myositis panel was obtained given his elevated CPK, and Dnase B antibody was ordered to rule out Group A Strep. The patient's symptoms improved and he was discharged home on oral ciprofloxacin. Dnase B antibody was negative but the myositis panel was positive for anti-OJ antibody. The positive antibody and history of Raynaud's met criteria for anti-synthetase syndrome. The patient and his primary care provider were notified of the result, as well as recommended rheumatologic follow-up.

Conclusion
The symptoms of anti-synthetase syndrome can manifest in presentations similar to other conditions. There are two major classification criteria proposed for the diagnosis, Connor's and Solomon's criteria, both of which require a positive aminoacyl-transfer RNA (tRNA) synthetase antibody. Criteria can then be fulfilled by at least one of the following: fever unexplained by other causes, interstitial lung disease, "mechanic's hands", arthritis, Raynaud's phenomenon, and inflammatory myopathy by Bohan and Peter criteria. This case intends to raise awareness about the possibility of an inflammatory myopathy or autoimmune etiology in patients with negative infectious cultures, yet have symptoms of polyarthralgia, rash, and shortness of breath. It also emphasizes the importance of finding supporting clinical evidence for a listed medical diagnosis.

Abstract Title: Diagnosis of Exclusion: A Case of Rare Demyelinating Disorder

Investigator: Patel, Dhruvi
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Co-Investigators: 1. Rajita Kanapareddy, B.S., EVMS MD Program MS4 2. Dmitry Bondarenko, MD, Department of Medicine, Infectious Disease Fellow

Abstract

Introduction
Acute disseminated encephalomyelitis (ADEM) is a rare acute, rapidly progressive, immune-mediated demyelinating disorder of the central nervous system requiring early hospitalization. The disease is characterized by diffuse neurological symptoms such as encephalopathy unexplained by fever, extrapyramidal signs, ataxia, aphasia, nystagmus, seizures, intracranial pressure, optic neuritis, urinary retention, dysarthria, and oculomotor dysfunction. It is often monophasic and self-limiting with clinical remission as early as 4 weeks. Signs of peripheral involvement including weakness of limbs and muscle atrophy, which are considered to have worse prognosis, might be seen in some adult patients. Evidence of multifocal demyelination in the brain, spinal cord, and optic nerve is visible on neuroimaging. The clinical manifestations are often similar to multiple sclerosis or solitary lesions. More common in children, preceding infection or immunization has been reported in 50-85% of ADEM cases. Infectious etiology include cytomegalovirus, herpes simplex virus, human herpes-virus-6, Epstein-Barr virus, influenza virus, mumps, rubella, coxsackie, hepatitis A, HIV, mycoplasma pneumonia, Leptospira, beta-hemolytic streptococci, and Borrelia burgdorferi.

Case Information
A 56-year-old female with medical history of HIV on tenofovir/ emtricitabine/ cobicistat/ elvitegravir with last CD4 930 and undetectable viral load was admitted for generalized malaise, non-bloody emesis, and painful rash on right neck. On arrival, she was febrile at 101.3F, tachycardic, tachypneic, and hypertensive. CBC was unremarkable. Initial concern was for sepsis, but blood cultures were negative. Physical exam revealed right-prominent lower extremity weakness with numbness and lesions in C4-C5 dermatome distribution consistent with herpes zoster. MR lumbar spine was notable for degenerative changes. Patient was initiated on a 7-day course of acyclovir. On Day 7 of admission, she began developing right-prominent upper extremity weakness. After neurology consult, a non-contrast brain MRI was done, which initially raised concern for multifocal stroke given subacute infarcts in brainstem and left cerebrum. Subsequent contrast-enhanced brain MRI revealed increased T2 FLAIR hyperintensity with bilateral periventricular and adjacent white matter enhancements. Cervical and thoracic MRIs were significant for longitudinally extensive abnormal cord signals with associated enhancements. BioFire Respiratory panel was negative. Meningitis/Encephalitis panel including serology tests for cytomegalovirus, Epstein-Barr virus, JC virus, HTLV antibodies, varicella zoster virus, and herpes simplex virus were unremarkable. Acute myelitis, extensive ADEM, and granulomatous process were included in our differential. With high suspicion for ADEM, the patient was initiated on IV solumedrol with a 5-day course, but she experienced minimal improvement in extremity weakness with continuous fluctuation of mentation. Subsequent lumbar puncture showed open pressure of 12 mmHg, pleocytosis, and mildly elevated protein and glucose supporting the diagnosis of ADEM along with imaging studies. After the course of glucocorticoid, a 5-day regimen of intravenous immune globulin was also initiated. At discharge, the patient was afebrile, alert, and oriented, but continued to experience right upper extremity weakness with poor lower extremity strength. She was instructed to follow up with a multiple sclerosis specialist outpatient.

Discussion/Clinical Findings
ADEM is typically seen in children following an illness. Subtle MRI changes include hyperintense lesions, often with indistinct margins compared to clear-cut margins seen in multiple sclerosis. There are no specific biomarkers or confirmatory diagnostic tests for ADEM. It is a diagnosis of exclusion with supportive features of one or more supratentorial or infratentorial demyelinating lesions on brain MRI, signs of neurologic dysfunction, preceding infection, and abnormal CSF with mild lymphocytic pleocytosis and elevated protein. First-line treatment is a 5-day course of high dose methylprednisolone. Empiric treatment with acyclovir and antibiotics can be provided before infectious etiology is ruled out. If no symptomatic improvement is seen, intravenous immune globulin or plasma exchange is required.

Conclusion
This case describes a rare finding of acute monophasic ADEM likely secondary to varicella zoster virus infection in a HIV-positive, 56-year-old female with preserved immune status. Our clinical suspicion for varicella zoster-induced ADEM compared to HIV etiology was supported by symptomatic manifestation following recent herpes zoster infection. Nevertheless, more extensive research is warranted to better understand the pathophysiology and complications associated with ADEM in adult patients, especially those with HIV who have a diverse clinical spectrum. In addition, despite being a rare diagnosis in adults, ADEM should be a part of the broader differential diagnosis as it can often be misdiagnosed as multiple sclerosis or primary neurological infection.

Abstract Title: Baseline characteristics of patients with psychiatric complaints presenting to a pediatric ED

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Mentor: John Fanton, MD
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Co-Investigators: 1. Margaret Lubas, Ph.D., LCSW, CHKD Mental Health Academic Research Center 2. Laura Lang, M.P.H., Chesapeake Mental Health Department 3. Paul C. Mullan, MD, M.P.H., CHKD Emergency Medicine

Abstract

Introduction
The American Academy of Pediatrics (AAP) Pediatric Acute & Critical Care (PACC) Quality Network, is implementing, with over 80 Children's Hospitals participating, interventions to improve the care of patients presenting to emergency care with acute mental health complaints including but not limited to: reduction in physical restraint usage, reduction in the use of routine labs for medical clearance/stabilization, increase in lethal means restriction counseling, and increase in daily suicide risk re-assessment in patients awaiting transfer to inpatient psychiatric treatment facilities. CHKD is actively enrolled in this 18 month project beginning Winter '24 to conclude in Summer '25. The scope of this poster is to establish baseline characteristics of children receiving universal suicidal screening who present to the ED with primary psychiatric complaints, within the broader parameters of this PACC coordinated project.

Methods
A retrospective chart review of pediatric CHKD ED patients, aged 12 to 18 years, with a primary psychiatric complaint from 4/1/2023 to 3/31/2024 Were eligible for inclusion; random number generation was used to select twelve per month for Inclusion and analysis. Analysis included ED length of stay (LOS), disposition, Suicide Screening Questionnaire (SSQ) completion, SSQ Results, physical restraint rates, and rate of intramuscular medications for agitation (IMA).

Results
Of the 144 patients, the ED LOS was 13.5 hours (SD 19.7). Dispositions included a 46.5% discharge rate, 53.5% admission rate (34%CHKD and 19.5% to other inpatient facilities). Of the 142 (98.6%) patients with an SSQ completed, the average score was a 4 (SD 3.2). Two (1.3%) of these SSQ-screened patients had a repeat SSQ completed prior to discharge. Three (2.1%) were physically restrained and nine (6.3%) had IMA administered.

Conclusion
In this sample of adolescent ED patients, almost all were screened for suicidality and the majority of patients were admitted to an inpatient service. Physical restraint and IMA rates were comparable to similarly published reports. Future interventions are in process to improve care for this vulnerable clinical population.

Abstract Title: Trends of Social Media Plastic Surgery Influencers

Investigator: Patel, Himali
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Department: Department of Surgery, Pediatric Plastic & Oral Maxillofacial Surgery
Co-Investigators: 1. William M. Lee 2. Meghana Devi Sunkara, MS 3. Jashana Walia, MS 4. Phavon Sage

Abstract

Introduction
Countless physicians have shifted to social media platforms like TikTok to showcase their work through engaging content.1 This study contrasts plastic surgeons popular on TikTok (Influencers, over 99,999 followers) and plastic surgeons who use TikTok without a large following (Casuals, 10,000 to 99,999 followers) based on the videos they choose to highlight for their audiences.

Methods
Potential accounts were identified with search terms like "plastic surgeons of TikTok", applying exclusion criteria: residency programs, organizations, unrelated specialties, practicing outside of the U.S., and less than 10,000 followers. Highlight playlists were recorded from a holistic review of included accounts, separating them into eight categories. Statistical analyses were performed using Jamovi software.

Results
Fifty-eight Casuals and forty-four Influencers were included, totaling 298 highlight playlists. Thirty five Influencers and nineteen Casuals had no highlights at all. Influencers and Casuals had an average number of highlights of 3.27 and 2.67 (Mann-Whitney U $p < 0.095$) respectively. Only Entertainment and Before & After highlights are significantly associated with Influencer status. No categories are significantly associated with Casual status.

Conclusion
The lack of statistical significance between Influencers and Casuals suggests they are similar in how many highlights they produce. However, some highlight video categories are associated with Influencer status, insinuating the quantity of highlights does not outweigh the importance of the content that is being highlighted. This is supported by the increased number of Influencers without highlights at all compared to Casuals.

Abstract Title: Testing a novel acidic-sensing pHLIP delivery reagent for oncomiR knockdown in prostate cancer cells.

Investigator: Patel , Urvi
Mentor: Aurora Kerscher, Ph.D.
Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1. Katherine Routon, Biomedical & Translational Sciences 2. Raman, Bahal, MD, Pharmacy at University of Connecticut

Abstract

Introduction
Prostate cancer (PCa) is the most prevalent male-related cancer and the second leading cause of male cancer-related deaths in the United States. Approximately 20% of men diagnosed with PCa progress to metastatic disease, of which the 5-year survival rate is only 30%, indicating a need for better therapeutic options to increase patient survivorship. MiRNAs are small noncoding RNAs (~22-24 nucleotides) that have emerged as important tumor suppressors and pro-oncogenic factors of PCa and metastasis. MiRNAs negatively regulate gene expression by binding to their messenger RNA targets in a sequence-specific manner and recruiting the RNA-induced silencing complex (RISC) to the site, resulting in mRNA degradation and/or blocking protein translation. The Kerscher lab identified the miR-888 cluster of seven miRNA genes (including miR-888 and miR-891a) as increased in human metastatic PCa cells and prostatic fluids from high-grade PCa patients. We tested if miR-888 and miR-891a played functional roles as pro-oncogenic factors in the prostate. Indeed, treatment of non-aggressive human PCa cell lines with miRNA mimics to overexpress miR-888 or miR-891a resulted in increased cell proliferation and invasion. Conversely, prostate cells treated with antisense miRNA oligonucleotides (antimirs) to block miR-888 or miR-891a activity showed slowed growth and invasion. This indicated the clinical potential of antimiR drugs for advanced PCa. We aim to test a novel acidic-sensing tumor delivery reagent called pH Low Insertion Peptide (pHLIP), a 36 amino acid peptide that adopts an α-helical conformation at low pH (< pH 6.5) facilitating the insertion of its C-terminus across the cell membrane. Systemic administration of pHLIP specifically targets tumors (possessing acidic microenvironments due to high glycolytic rates) and has entered clinical trials as a breast tumor imaging biomarker. AntimiR delivery reagents synthesized by the Bahal lab for this study are composed of pHLIP conjugated to Peptide Nucleic Acid (PNA) antimir-888 or antimiR-891a. We sought to determine if pHLIP-PNA-antimiR delivery to human PCa cells in a simulated acidic tumor environment blocked cell growth and invasion. We predicted that co-treatment of antimir-888 and antimir-891a reagents would have additive or synergistic effects in vitro.

Methods
2X105 PC3-ML (metastatic, castration-resistant) or LNCaP (low malignancy, hormone-sensitive) cells were plated per well of a 6-well plate. The next day, cells were treated with 4 uM pHLIP-PNA antimir-888, antimir-891a, or in combination in pH 6.0 serum-free DMEM media for 3 hours. As a negative control, cells were also treated with 4 uM pHLIP-PNA antimir-67 (NC67), which targets C. elegans miR-67 that shares no homology in humans. Cells were washed in PBS and recovered for 24 hours in pH 7.4 serum-free DMEM media. For Proliferation Assays; 3000 PC3-ML and LNCaP cells were plated per well of a 96-well plate. Four hours prior to the 24-, 48-, 72-, and 96-hour time points, the WST-1 reagent (Roche) was added to the cells. Cleavage of colorless tetrazolium salt WST-1 to purple formazan by cellular enzymes is proportional to the number of viable cells in the well. Absorbance was measured with a BioTek Synergy HT plate reader (450 nm, 620 nm). Results were quantified in triplicate. For Invasion Assays, 3X105 PC3-ML cells in 500 µL of media with 0.5% FBS media were added to the upper portion of a Boyden Matrigel chamber and traversed across Matrigel and an 0.8 mm polycarbonate insert towards the chemoattractant (15% FBS) for 48 hrs. Cells that traversed the insert were fixed in 4% paraformaldehyde, permeabilized in methanol, stained with 1% crystal violet, and photographed. Wells were destined with 10% acetic acid, 30% methanol. Results were quantified in triplicate (BioTek, 595 nm).

Results
Individual treatment of antimiR-888 and anti-miR-891a to PC3-ML cells showed significantly decreased proliferation and invasion compared to controls. Drug treatment of LNCaP cells showed similar inhibitory growth effects implying that these reagents are effective on hormone-sensitive and castration-resistant PCa cells. Cotreatment of 4 uM antimiR-888 and 4 uM antimiR-891a reagents did not show additive or synergistic effects.

Conclusion
Our Results indicated that these novel acidic-sensing pHLIP reagents to inactivate miR-888 and miR-891a show clinical promise in reducing tumor load and metastasis. More work needs to be done to verify the efficacy of combination treatment, and we will test if reducing treatment concentrations to 2 uM antimiR-888 and 2 uM antimiR-891a Results in better anti-proliferative effects. This work will lead to new strategies to improve PCa patient survival.

Abstract Title: Maternal Outcomes of Peripartum Meningioma Diagnosis: A Systematic Review

Investigator: Peterson, Madeleine
Mentor: Marika Toscano, MD
Department: Maternal Fetal Medicine, Johns Hopkins University
Co-Investigators: 1. Madeleine Peterson, EVMS MD Program 2027 2. Dr. Lauren Meiss, Johns Hopkins University School of Medicine, Maternal-Fetal Medicine Fellow 3. Emily Joseph, Johns Hopkins University Welch Medical Library

Abstract

Introduction
Meningioma in pregnancy is a rare diagnosis, and there is no level I or II evidence to guide clinical management or assist in patient counseling. This review's objective is to summarize the available evidence describing maternal outcomes associated with newly diagnosed meningioma in the peripartum period.
A systematic review of 5 databases was performed 7/2024 for any study type published from the year 2000 onward and reporting on pregnant or postpartum (within 1 year) human subjects diagnosed with any meningioma type. Non-English language, commentaries/editorials, letters/responses, video abstracts, and other reviews were excluded. Analysis was performed using Covidence Systematic Review Software. After de-duplication, two authors independently screened abstracts for eligibility and reviewed potentially eligible full-text articles for inclusion, with disagreements resolved by a third author. The risk of bias was also independently assessed by two authors. The primary outcomes were quantitatively synthesized descriptive analyses of pregnancy management and patient outcomes. The initial search yielded 4853 publications (2232 Embase, 1564 PubMed, 870 Web of Science, 102 ClinicalTrials.gov, 85 CENTRAL). After de-duplication, 3647 were title/abstract screened, 210 were full text screened, and 111 were included (Fig. 1). Greater than one in four cases presented prenatally, at a mean gestational age of 27 (±7) weeks, and diagnosis was most often made by Magnetic Resonance Imaging without contrast. Just over half of cases were delivered at full term, the majority by Cesarean section. Most reported cases were treated with craniotomy during pregnancy or immediately postpartum. There were 5 maternal deaths due to neurologic deterioration. No neonatal deaths were reported.

Conclusion
This review highlights the sparse clinical data available to guide clinical management and adequate patient counseling in cases of meningioma diagnosed in the peripartum period, and demonstrates the need for a national registry for meningioma in pregnancy.

Abstract Title: The Effects of Space Radiation Exposure on Risk Behavior in Rats

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Co-Investigators: 1. Nina Li, EVMS MD Program MD2026 2. Elliott Smits, EVMS MD Program MD2025 3. Faith Reid, EVMS MD Program MD2025 4. Ella N Tamgue, Radiation Oncology 4. Paola Alvarado Arriaga, Radiation Oncology

Abstract

Introduction
Astronauts on the proposed deep space missions to Mars will be exposed to an estimated ~30 cGy of galactic cosmic radiation (GCR). There are numerous studies that indicate space radiation (SR) impairs cognitive processes, including executive function. However, executive function also regulates inhibition, impulse control, processing and regulating affect, motivation, and arousal. Astronauts on board a mission are routinely assessed using the Balloon Analogue Risk Task (BART), a validated assessment of risk-taking behavior that has demonstrated correlation with baseline risk propensities in humans. While ground-based rodent studies have demonstrated that SR significantly impairs executive function, there is limited research on how SR will impact risk decision making. We hypothesized that SR exposure will impact risk decision making in rodents in addition to the already anticipated psychological stress.

Methods
Female rats previously exposed to a low dose (10 cGy) of either 4He ions or a cocktail of 6 ions that simulates the galactic cosmic ray spectrum (GCRSim) were screened initially on an attentional set shifting (ATSET) task to provide a measure of executive function. In this study, female rats previously screened for ATSET performance were put on a restricted diet and were trained in the Rodent Gambling Task (RGT). The rats underwent a gradual training process, progressing through five training stages (H1-H5), that collectively constitute a Stimulus Response (STR) training procedure. During the STR procedure, rats progressively learn that a food reward is only obtained if they press an illuminated response light within 10 seconds. The rats that met the criteria in the STR training were subsequently put through RGT. This touchscreen-based task is designed to replicate the impulsivity and risk decision making aspect of BART, consisting of four response lights with cues defining a win/loss probability, reward size and loss penalty. Rats were screened for RGT performance by investigators with no knowledge of the rats' ATSET performance status.

Results
The majority of SR-exposed rats screened for GCT performance to date were rats that had maintained high ATSET performers. Not surprisingly, those rats did not exhibit diminished impulsivity in the gambling task. Female rats exposed to a low dose (10 cGy) of 250 MeV/n He particles were observed to have a greater RTP than their sham counterparts. Increased RTP was found to be significantly associated with increased reaction time during the trials.

Conclusion
SR exposure-induced loss of executive function impacts both cognitive flexibility performance (ATSET) and impulsivity and risk taking propensity (RTP) in female rats. Further studies will determine whether male rats are affected in the same manner. These findings suggest that astronauts into deep space missions with similar exposures to SR may be more likely to make risky decisions.

Abstract Title: Baseline Comparison of Nasal Nitric Oxide Levels and Nasal Patency in Chronic Rhinosinusitis Patients and Healthy Controls

Investigator: Pierpoint, Gregory
Mentor: Kent Lam, MD
Department: Department of Otolaryngology
Co-Investigators: 1. Joseph Han, MD, Ear, Nose & Throat Surgeons

Abstract

Introduction
Chronic rhinosinusitis (CRS) affects approximately 11% of the adult population in the United States. Current diagnostic methods often involve invasive procedures or imaging. Nasal nitric oxide (nNO), crucial for local defense mechanisms and ciliary motility, shows promise as a non-invasive biomarker for sinonasal diseases. Previous studies suggest altered nNO levels in CRS patients, but Results have been inconsistent. This study, part of a larger longitudinal investigation, compares baseline nNO levels and nasal patency between CRS patients and healthy controls.

Methods
This cross-sectional, case-control study enrolled 11 CRS patients and 8 healthy controls in the EVMS ENT Clinic. During a single visit, fractional exhaled nitric oxide (FeNO) and nNO were measured using the NIOX VERO system. Nasal patency was assessed via acoustic rhinometry at 0cm, 2cm, 4cm, and 6cm depths bilaterally using the A1 Clinical Research Acoustic Rhinometer. Data analysis included calculation of means, standard deviations, and unpaired t-tests for between-group comparisons. While the small sample size limits the ability to confirm normality, t-tests were used for consistency with the planned larger longitudinal study (n150).

Results
Mean nNO levels were lower in the CRS group (270 ± 260 ppb) compared to the healthy group (641 ± 458 ppb), with a trend toward significance ($p = 0.044$). Mean FeNO levels were higher in the CRS group (37.7 ± 17.7 ppb) compared to the healthy group (28.4 ± 23.1 ppb), though not statistically significant ($p = 0.33$). Acoustic rhinometry revealed no statistically significant differences in nasal patency between groups at any measured depth.

Conclusion
This study reveals significantly lower nNO levels in CRS patients compared to healthy controls, supporting its potential as a non-invasive biomarker for CRS. Although no statistically significant differences were observed in nasal patency or FeNO levels between groups, the limited sample size warrants cautious interpretation of these Results. As part of our larger longitudinal investigation, future assessments at 6 and 12 weeks post-intervention will help elucidate the relationship between osteomeatal complex patency, nNO levels, and CRS disease activity.

Abstract Title: Computational Modeling of Dendritic Spine Morphology Effects on Synaptic Signal Propagation in 2D Neuronal Networks

Investigator: Pierpoint, Gregory
Mentor: Alberto Musto, MD, Ph.D.
Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1. Abheek Ritvik, Department of Biomedical & Translational Sciences 2. Samantha Smith, EVMS MD Program M1 Student

Abstract

Introduction
Neural inflammation promotes a reactive remodeling in dendritic spine expression. Cumulative alterations in the functional neural network are thought to be mirrored by morphologic change. In Vivo models of TLE demonstrate aberrant post-synaptic change.

Methods
This study presents a MATLAB-based 2D neuronal model for investigating the impact of dendritic spine morphology on synaptic signal propagation. The framework comprises four key components: a dendrite generation function utilizing probabilistic branching and angular distributions, a compartmental modeling system that discretizes dendritic segments and spines into electrical units with unique resistance and capacitance properties, a spine distribution function based on predefined densities and morphological types, and a visualization module. Electrical properties are computed using series and parallel resistance calculations for dendrites and spines. While the current model focuses on steady-state analysis, it is designed to accommodate future integration of dynamic signal propagation models.

Results
This computational approach enables systematic exploration of how spine morphology variations, characterized by head diameter, neck diameter, and length, affect neuronal signal processing. The model provides a foundation for investigating structural-functional relationships in neurons, with potential applications in understanding both normal brain function and pathological conditions such as epilepsy.

Conclusion
By offering a quantitative framework for analyzing the interplay between dendritic spine geometry and signal transmission, this work contributes to the broader understanding of neuronal information processing and network dynamics.

Abstract Title: Scoping Literature Review on the Mathematical and Computation Models Currently Available to Predict Causes of Abnormal Uterine Bleeding

Investigator: Quan, Linh
Mentor: Andrew Moore, MD
Department: Department of Obstetrics & Gynecology

Abstract

Introduction
Abnormal uterine bleeding (AUB) affects 3-30% of women of reproductive age. Per the International Federation of Gynecology and Obstetrics system, etiologies of AUB can be classified as structural (PALM - polyp, adenomyosis, leiomyoma, and malignancy/hyperplasia) or non-structural (COEIN - coagulopathy, ovulatory dysfunction, endometrial, iatrogenic, and not yet classified). The diagnostic process frequently involves numerous office visits and invasive imaging and procedures such as transvaginal ultrasounds and endometrial biopsies to rule out various etiologies in a stepwise fashion. The purpose of this review was to determine which mathematical and computational models were currently available to diagnose abnormal uterine bleeding and guide initial treatment. Research articles from five databases were screened based on inclusion criteria of "abnormal uterine bleeding" and "model" and exclusion criteria of "postpartum hemorrhage" and "pregnancy." Then articles were further screened based on whether or not they generated a predictive model for AUB. The full text of these articles was retrieved and evaluated for inclusion in the review. Pertinent information was charted using Excel. The full text of nineteen articles were reviewed. None of them evaluated for all possible causes of AUB at the same time. Two studies have developed diagnostic models that distinguish between endometrial polyps, endometrial myoma, endometrial hyperplasia without atypia, and endometrial carcinoma. Seventeen articles generated predictive models for AUB due to endometrial malignancy/hyperplasia (AUB-M). The remaining two articles focused on AUB-O and AUB-L.

Conclusion
While there are currently no comprehensive diagnostic models for AUB, the work done by Wynants et al and Shang et al were the first models to be able to differentiate between multiple etiologies of AUB. Their Methods provide a strong foundation for future studies to build upon and expand the diagnostic scope of predictive models. Based on the articles in this review, next steps have been suggested to create a more comprehensive predictive model.

Abstract Title: Defining the Population of a Pediatric Acute Inpatient Psychiatric Unit: Medical Comorbidities and SDOH

Investigator: Ram, Kailash
Mentor: Andria Tatem, MD, M.Ed.
Department: Department of Pediatrics
Co-Investigators: Irene Park, EVMS MD Program MD2027

Abstract

Introduction
The COVID-19 pandemic has highlighted the need for increased hospitalizations for patients with mental health diagnoses among adolescents. There is a large unmet need for acute psychiatric stabilization of children and adolescents nationwide. Although there has been an increase in the prevalence of depression in adolescents in recent years, to date, there have been no studies describing patients' demographics in a pediatric acute inpatient psychiatric facility. Our study aims to look at the demographics and social determinants of health (SDOH) that could affect children and adolescents' admission rates and quality of care across the country. We will ultimately determine if the CHKD Children's Pavilion fills the gap in our community's pediatric psychiatric needs.
A literature review was conducted using Google Scholar and PubMed to search for the demographics of pediatric patients admitted to psychiatric hospitals and programs. Searches looked for demographics including race, ethnicity, socioeconomic status, and most common medical diagnoses seen at the facility. Google was used to search for programs offering "acute child psychiatric services". 50 pediatric psychiatric facilities were reviewed across 21 states. Patient demographics were reviewed within 1 year of CHKD Children's Pavilion being opened to examine the demographics of pediatric patients taken care of in this time frame. Our literature review showed that minimal information was known about the existing pediatric psychiatric facilities. Websites revealed ages, and the most common psychiatric diagnoses treated in their facilities. Very few programs discussed medical comorbidities that were cared for. Of the few that did, seizures, insulin-dependent diabetes mellitus, and sleep disorders requiring CPAP were listed.

Conclusion
There is a great need for a description of the demographics and medical comorbidities of patients hospitalized in an acute pediatric inpatient psychiatric program. This project will show the data from one pediatric hospital and lead to future studies in pediatric mental health.

Abstract Title: Addressing Food Insecurity as Part of Routine Clinic Operations at a Student-Run Free Clinic in Norfolk, VA

Investigator: Ramanathan, Gautam
Mentor: Ellen Pudney, Ph.D.
Department: Department of Pediatrics
Co-Investigators: Mackenzie Kathleen Kelley, EVMS MD Program, Medical Year 3

Abstract

Introduction
Food Insecurity (FI) is associated with an array of adverse health outcomes in adults and children. In a prior project, we measured FI among 139 patients at our student-run free clinic (SRFC) in Norfolk, VA, and found 76% to have food insecurity. Despite high rates of FI, less than half of patients reported using any kind of food assistance resource, such as food pantries, soup kitchens, or federal aid. Our prior work aimed to provide resource booklets to patients while they waited for their appointments, but this process was not integrated into routine clinic operations and initial feedback indicated that the handouts alone did not provide patients with the support they needed. Given that FI is an important social determinant of health and a prevalent issue among our patient population, our current project aimed to implement a modified strategy that integrates documenting FI in patients' electronic medical records (EMR) and includes patient counseling.

Methods
First, we developed a new volunteer position at the clinic to serve as FI coordinator. The role of the FI coordinator was to facilitate routine measurement of FI and support clinicians in counseling patients on FI during appointments. We integrated a standardized FI screening into our SRFC's EMR to track patient FI status using the validated two-question Hunger Vital Sign questionnaire, which patients filled out when they checked in for their appointment. The FI coordinator documented patients who screened positive for FI in their EMR and notified the clinician teams, consisting of two medical students and one attending physician, of such patients. To support clinicians in counseling their patients on FI, we created a binder of resources featuring where to find local food resources and budget-friendly healthy eating tips, as well as a conversation guide. After each appointment, the FI coordinator would check with clinicians to determine whether they had a conversation about FI with their patients. If clinicians did not address it, the coordinator would counsel to the patient instead. Finally, clinicians and the coordinator documented the conversations and any resources provided in the patient's EMR.

Results
From May through August 2024, we attended the once weekly clinic nights offered at our SRFC. We found that collecting FI information from patients when they checked in for their appointment to be a feasible and effective method of gathering this information without interrupting clinic flow. In terms of documenting patient FI status and the discussion of resources provided in the EMR, we found this approach to be feasible, but it often fell to the responsibility of the FI coordinator rather than the clinicians or other volunteers. Similarly, discussions with patients who screened positive for FI were often relegated to the FI coordinator instead of being done by the clinicians directly. Informal feedback from clinicians indicated that there was often not enough time in clinic appointments to discuss FI.

Conclusion
Our project indicates that measuring and addressing FI in our SRFC was feasible, yet heavily relied on the FI coordinator. As a result, we will train and recruit a team of volunteers specifically assigned to managing FI in our clinic.

Abstract Title: Itemizing Patient Safety Events in a New Children's Mental Health Hospital

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Abstract

Introduction
Patient safety is an expanding field of interest for healthcare professionals and policymakers aiming to enhance quality of care and minimize preventable harm. Despite progress in patient safety across all medical specialties, challenges exist in newer domains such as pediatric psychiatric inpatient units. In October 2022, the Children's Hospital of The King's Daughters (CHKD) opened the Children's Pavilion (CP), a 60-bed pediatric unit for acute inpatient mental health care. This study aims to categorize the types of safety events and the frequencies at which they occur over the first 17 months of the CP's operation.

Methods
Safety events were tabulated with duplicate and non-patient events subtracted. The events were then divided into three broad categories: Behavioral, Care Management, and Patient Protection. Each category had specific subcategories such as assault (on patient/staff or patient/patient), communication issues, medication events, and contraband. Data on restraints and patient demographics (age, biological sex, race, ethnicity) were also collected. Descriptive statistics summarized the frequency and distribution of events.

Results
959 safety events were documented and classified into major categories. Removing duplicate and non-patient safety-related events resulted in 772 total events. Preliminary Results revealed that behavioral events accounted for 58% of all safety events, while care management and patient protection made up 20% and 22%, respectively. Assaults on staff constituted 70% of behavioral events, followed by patient assault on patients at 16%, and general aggression/escalation without assault at 11%. 209 events involving restraints were documented.

Conclusion
Initial findings suggest that behavioral events constitute most of the safety incidents at the CP, emphasizing the need for interventions to address issues related to aggression and violence within the unit. Enhancing staff training and implementing de-escalation techniques may help reduce assault-related incidents. These preliminary Results underscore areas for safety improvement in pediatric psychiatric inpatient units, particularly focusing on reducing behavioral events and strengthening staff support. Further analysis is crucial to refining these strategies and developing effective interventions.

Abstract Title: Analysis of Delayed-Phase CT in High-Grade Renal Trauma Patients and the Impacts on Intervention Rates and Length of Stay

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Abstract

Introduction
Delayed-phase CT (DPCT) after high-grade renal trauma is universally recommended to evaluate for collecting system injuries and urinary extravasation (UE). We aim to investigate the impact of DPCT on urological intervention rates and the consequences of undetected UE on length of stay.

Methods
This retrospective cohort study analyzed all patients with an AAST grade I-V renal injury at a Level 1 Trauma Center from 2018-2023. High-grade trauma was classified as AAST grades III-V. Patients were identified using the institutional trauma registry and data was collected from the registry and electronic medical records. Risk adjusted multivariate logistic regression was employed to analyze the impact of undergoing DPCT on urological intervention rates while controlling for ISS, AAST grade, age, sex, race, and mechanism. Risk adjusted multivariate linear regression was used to analyze the impact of late UE detection on length of stay (LOS), controlling for age, sex, race, ISS, arrival condition, concomitant abdominal injuries, comorbidities, and emergency department disposition.

Results
Of 255 renal trauma patients, 163 (63.4%) suffered high-grade injuries. 34 patients underwent immediate DPCT, with 6 patients having UE and 5 receiving subsequent urological intervention. 33 patients underwent follow-up DPCT, with 7 patients having UE and 6 receiving interventions. At follow-up DPCT, zero patients had UE if they were asymptomatic, defined as lack of leukocytosis, fever, flank pain, oliguria, and hematuria (NPV = 100%). Additionally, all 6 patients who had UE at follow-up were symptomatic (sensitivity = 100%). After performing risk adjusted multivariate logistic regression, patients who had DPCT were 13.9 times as likely to undergo urological intervention factors associated with undergoing a urological procedure were DPCT (OR 13.9, $p = 0.001$). Importantly, late detection of UE, defined as UE not detected on admission DPCT, was significantly associated with increased length of stay ($\beta = 10.63$, $p = 0.048$).

Conclusion
Patients who did not undergo DPCT had significantly lower rates of urological intervention, despite similar injury burden. Follow-up DPCT may potentially be safely omitted in asymptomatic patients, but admission DPCT should still be utilized in high-grade injuries to avoid the significant morbidity of undetected urinary extravasation.

Abstract Title: Effect of Sunscreen Ingredient Benzophenone-3 on Thyroid: A Cross-Sectional Nationwide Study

Investigator: Sadr, Nargiza
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Abstract

Introduction
Benzophenone-3 (BP-3), a sunscreen ingredient, is suggested to have endocrine-disrupting properties by interacting with hormone receptors and altering gene expression. In animal studies, BP-3 affects thyroid function by enhancing gene expressions related to thyroid hormone production, iodine uptake, and peripheral conversion of T4 to T3. However, small epidemiological studies in humans have provided inconsistent Results. Therefore, we examined the association between BP-3 and thyroid hormones using the nationally representative US population.

Methods
We used the continuous NHANES data from 2007-08 and 2011-12. Urinary BP-3 and urinary creatinine were used to calculate creatinine-normalized urinary BP-3 (CNBP3) to account for urinary dilution/concentration. Relationship between quartiles of BP-3 and thyroid stimulating hormone (TSH), thyroxine (T4), free T4, triiodothyronine (T3), and free T3 were examined using survey-weighted multivariable generalized linear regression models. Models were adjusted for age, gender, race, smoking, hypertension, diabetes mellitus, obesity, estimated glomerular filtration rate (eGFR), and serum albumin.

Results
Of the 3,966 participants, 1,985 (50%) were female, with a median (IQR) age of 42.9 (36.9) years. The cohort included 1,597 (40.3%) Whites, 905 (22.8%) Blacks, and 1,035 (26.1%) Hispanics, with a median (IQR) BP-3 level of 12.5 (47.5) µg/gm (Table 1). In unadjusted models, participants in the highest quartile of CNBP3 levels had 3% lower T4 levels compared to those in the lowest quartile (0.97; 95% CI: 0.95, 0.99; p=0.007). This association remained significant after adjustment (0.96; 95% CI: 0.94, 0.98; p=0.001). Similarly, the highest quartile of CNBP3 was associated with a 3% reduction in T3 levels in adjusted analyses (Table 2). There was no association between TSH, free T4, or free T3 and CNBP3.

Conclusion
In this large, nationally representative cohort, we found that higher levels of CNBP3 are associated with modest but significant reductions in T4 and T3. However, no significant relationship was seen with free T4, free T3, or TSH levels, suggesting that the functional thyroid hormones levels remain unchanged after CNBP3 exposure. Therefore, in the context of thyroid function, use of BP-3-containing sunscreens has no deleterious effects.

Abstract Title: Iron Deficiency Anemia Time Trends in the United States: A Nationwide Cross-Sectional Study

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Department: Department of Medicine
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Abstract

Introduction
Iron deficiency anemia (IDA) is a significant public health concern across the world. While a recent study has reported a rising prevalence of anemia in the United States (US), recent time trends of prevalence of IDA and prevalence estimates by age, gender, race, and socioeconomic status are lacking. Therefore, the objective of this study was to examine the time trends of IDA prevalence in the general US population from 1999 to 2020 (22 years) and examine how these estimates differ by age, gender, race and household income by using a population cohort representative of the US population.

Methods
We used continuous NHANES data from 1999 to 2020. Patients self-reported their age, gender, race, and household income. The household income to poverty threshold ratio (HIPR) was calculated to account for changes in purchasing power during the study period. Blood samples were obtained for laboratory studies such as complete blood count, serum creatinine, serum ferritin, and serum c-reactive protein levels. The presence of IDA was determined by combining the World Health Organization criteria for anemia and serum ferritin levels <15 ng/mL and <150 ng/mL in the absence or presence of inflammation (CRP>1 mg/dL), respectively. Survey-weighted raw and adjusted prevalence rates (PR) were determined using generalized linear models for the overall population and by gender, age, race, and HIPR. Additionally, we examined if age modifies the relationship of gender with IDA.

Results
Of the 39,814 study participants, 62% were females, 10.5% were older than 65 years, 24.3% were African Americans, 31.4% were Hispanics, and35.9% were non-Hispanic Whites (Table 1). Unadjusted IDA prevalence in the population was 5.1% (males = 1.4%; females = 7.7%). IDA prevalence increased from 2.7% during the 1999-2000 survey cycle to 3.7% during 2017-20 (P=0.001). In adjusted analyses, IDA prevalence was higher in women than men (PR=5.78, 95%CI=4.50, 7.41), in Blacks than Whites (PR=3.83, 95%CI=3.22, 4.54), and in those with HIPR≤1 than >4 (PR=1.32, 95%CI=1.05, 1.68) but was similar across age groups (Table 2). Importantly, we found that age modified the relationship between gender and IDA prevalence.

Conclusion
The IDA prevalence in the US has risen from 1999 to 2020 and remains high among women, minorities, and those with lower income. The difference in IDA prevalence between men and women varies significantly by age.

Abstract Title: Do you Need Viral Videos to be a Plastic Surgery Influencer?

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Abstract

Introduction
Influencers entice potential consumers of a product or service by promoting them on social media. Continuous social media user growth on platforms like TikTok has led more physicians to become influencers who use social media to showcase their services to potential patients through highly engaging content, often hoping to create viral videos. This study analyzes the content produced by two groups of plastic surgeons, those popular on TikTok (Influencers, over 99,999 followers) and those who lack a large following (Casuals, 10,000 to 99,999 followers), to determine if viral or Before & After videos are associated with Influencer or Casual status.

Methods
Terms like "plastic surgeon" were used to search TikTok for accounts matching Influencer or Casual status. Excluded accounts met at least one of the following criteria: residency/fellowship programs, organizations, non-plastic surgeons, practicing outside of the U.S., or less than 10,000 followers. Viral and Before & After videos of included accounts were examined. Statistical analyses were performed using Jamovi software.

Results
86.4% of Influencers (n = 44) and 62.1% of Casuals (n = 58) had viral videos with over a million views. 72.7% of Influencers had Before & After videos compared to 87.9% of Casuals. Most Before & After videos from Influencers focused on the Face while Casuals showcased mixed regions: Body, Breast, Face, and Hand/Extremity. Viral videos were significantly associated with Influencer status, while Before & After videos were insignificantly associated with Casual status.

Conclusion
It appears viral videos are not strictly required to be an Influencer but there is an association of those that do have them with Influencer status. Surprisingly, videos directly showing images before and after surgery are not associated with the most popular plastic surgeons. Instead, they are insignificantly associated with less popular plastic surgeons, suggesting these videos are not preferred on Influencer accounts.

Abstract Title: Factors Influencing Social Media Influencer Status

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Abstract

Introduction
Patients are using social media to guide decisions on aesthetic procedures, prompting many physicians to promote themselves on social media platforms like TikTok.1,2 We investigated the different social media account aspects of popular plastic surgeons (Influencer, over 99,999 followers) and those less popular (Casual, 10,000 to 99,999 followers) on TikTok.

Methods
Influencers and Casuals on TikTok were identified through searches like "plastic surgeon," excluding residency programs, non-plastic surgeons, or physicians practicing outside the U.S. Examined social media aspects include sensitive content warnings, advertising procedures/products in biographies, practice website links, and posting patterns. Statistical analysis was performed using Jamovi software.

Results
More Influencers posted without sensitive content warnings, while most Casuals used them. The majority of both groups did not advertise products/procedures in their biographies. Only five accounts in each group lacked websites linked to their social media. The most common posting pattern for both groups was Semi-Daily (posting multiple days a week, but not daily).

Conclusion
None of the examined aspects significantly distinguished Influencers from Casuals, suggesting unexamined factors might be more critical for achieving Influencer status. However, it seems avoiding the use of sensitive content warnings may correlate with more followers. In both groups, the absence of advertising in biographies and presence of practice website links indicates these are standard practices, not distinguishing factors. Frequent, but not daily, posting appears to be a common strategy among plastic surgeons on TikTok, regardless of follower count.

Abstract Title: Long-Term Outcomes of Free-Flap Breast Reconstruction

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Abstract

Introduction
Breast reconstruction aims to restore a sense of normalcy and improve quality of life. Implant-based and Autologous Flap techniques remain the two main Methods to achieve this goal. Autologous reconstruction uses the patient's own tissue and can be transferred using microvascular techniques (Free Flap) from different donor sites. Some of these include the abdomen (muscle sparing Transverse Rectus Abdominis Muscle flap [ms-TRAM], Deep Inferior Epigastric Artery Perforator flap [DIEP], and Superficial Inferior Epigastric Artery flap [SIEA]), the back (Latissimus Dorsi Myocutaneous flap [LD]), the hip area (Lateral Transverse thigh flap [LTT]), and the buttock (Superior Gluteal Artery Flap [SGA] and Inferior Gluteal Artery Flap [IGA]). The literature does not include long-term outcomes from these procedures as current literature on long-term outcomes is limited to 8 years. Our study will provide the longest-term outcomes of free-flap reconstruction (>20 years) which will help monitor its efficacy later in life. It is possible that over the >20-year period the overall cost of breast reconstruction is decreased when compared with implant-based reconstruction.

Methods
Consecutive electronic and written medical records of patients who had undergone free-flap breast reconstruction by a single surgeon from 1990-2004 were examined, and their demographics and surgical details were extracted from their written and electronic medical records. Patients were contacted by phone and email to complete the BREAST-Q survey to measure their Satisfaction and Quality of Life. Means, SD, and p-values were calculated by scoring Emotional, Physical, and Healthcare team satisfaction on a scale of 1-5. Donor-site complications, surgical history, and patient demographics were also recorded.

Results
208 female patients were identified with an average age of 72 and an average age at surgery of 44 years. Of 167 patients with identifiable flaps, 148 (87%) were muscle-sparing free TRAM flaps, with the other flaps coming from the other donor sites mentioned (SIEA, LTT, SGA, IGA). 67% of patients had unilateral reconstruction, while the other third had bilateral breast reconstruction. 17 BreastQ survey responses were received with most of the responses being unilateral (14) flaps. There were 14 TRAMs, 2 LTGs, and 1 TRAM+LD flap. The average satisfaction rating was 3.6. Unilateral flap patients had a lower major complication rate of 24% compared to the bilateral flap group with a major complication rate of 67% (p-value=0.01). Unilateral flap patients had an overall satisfaction score of 3.5 compared to 3.8 for the bilateral group (p-value=0.34). TRAM flaps had a lower complication rate (27%) compared to the LTT (100%) and TRAM+LD (100%) (p-value = 0.02). TRAM flap patients had an overall satisfaction score of 3.8 compared to 3.5 for the LTT flap patients and 3.8 for TRAM+LD flap patients (p-value=0.29).

Conclusion
Autologous reconstruction after breast cancer may be performed using a variety of techniques. Overall, patients had good satisfaction scores following free flap breast reconstruction at 20-34 years from surgery. Further research with additional patients is needed to better assess the difference between unilateral and bilateral surgery, flap types, the incidence of abdominal hernia from abdominally based flaps, and other factors that may affect patient satisfaction.

Abstract Title: The Impact of Obesity and Diabetes on Clopidogrel Resistance in Transcarotid Artery Revascularization Patients

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Abstract

Introduction
Clopidogrel is an FDA approved medication for treatment of unstable angina, myocardial infarction, carotid artery stenosis, and other cardiovascular thrombolytic deficits. Its therapeutic effect is mediated through the irreversible inhibition of the platelet P2Y12 adenosine diphosphate receptor, which leads to an inhibition of platelet aggregation. Clopidogrel is an inactive prodrug and is activated through metabolization by multiple liver enzymes of the cytochrome p450 (CYP) family. Clopidogrel resistance (CR) has been observed in diabetic and obese patients through downregulation of CYP enzymes. This study aims to evaluate the observed CR rate in the Transcarotid Artery Revascularization (TCAR) procedure specifically. In this procedure, blood flow in the carotid artery is reversed to prevent the travel of embolic debris to the brain, at which point a stent is placed in the carotid artery and normal blood flow is returned. All patients undergoing TCAR at a Sentara medical center are evaluated for CR through use of P2Y12 assay. The aim of this study primarily is to determine the impact BMI and diabetes status play on CR rates in TCAR patients, measured using P2Y12 assay values. Other variables will also be evaluated for their association with CR.

Methods
Patients ≥ 18 years who underwent TCAR with perioperative platelet reactivity testing between April 2016 and December 2023 were identified across four institutions. Platelet reactivity was measured with the VerifyNow P2Y12 Reaction Unit (PRU) Test (Instrumentation Laboratory, Bedford, MA), with CR defined as PRU ≥ 180. This study was performed via nonrandomized, nonblinded retrospective chart review of Sentara TCAR patients. Data concerning medications, comorbidities, perioperative events, and mortality were collected.

Results
Out of 469 TCAR patients, 134 (28.6%) were identified with associated P2Y12 values for inclusion in this study. Of the 134 patients included, the majority were male (59.7%) and Caucasian (82.8%), with a mean age of 72.4 years (±9, range 52-91). Perioperatively, 94.0% of patients were on aspirin and 89.6% on clopidogrel. At presentation, 58.2% had symptomatic carotid stenosis. The mean perioperative P2Y12 was 151 PRU (±78, range 2-367). In total, 50 (37.3%) patients met criteria for CR (mean PRU 231± 41; range 181-367). There were 6 patients which experienced 1-year mortality (4.48%). Analysis of these 134 patients found that diagnoses of obesity ($p = 0.686$), hypertension ($p = 0.854$), hyperlipidemia ($p = 0.790$), hypercholesterolemia ($p = 0.378$), and smoking status ($p = 0.416$) were not statistically significant indicators of CR status. There was however a significant association between CR and patient diabetic status: patients diagnosed with diabetes (type 1 or type 2) were over two times more likely to have CR than those who were not diagnosed with diabetes (OR = 2.23, $p = 0.047$). Women were also over two times more likely to have CR than men (OR = 2.23, $p = 0.043$). There was also a significant difference in the ages of patients based on CR status ($p = 0.045$), with resistant patients ($\mu = 74.5 \pm 9$, range 52-89) being older than non-resistant patients ($\mu = 71.2 \pm 9$, range 52-91) and each one-year increase in age found to increase the odds of CR by 5%.

Conclusion
Of the 134 TCAR who received P2Y12 testing, 37.3% were found to have clopidogrel resistance. Diabetes and female sex were associated with significantly higher rates of CR, and CR was associated with significantly higher patient age. Other evaluated comorbidities, including obesity, were not significant variables impacting CR. These data suggest a possible benefit to routine P2Y12 testing in the TCAR population, especially so in older, diabetic and female patients. Further research is warranted to examine the link between CR status and these variables.

Abstract Title: Bilateral Pneumothoraces Post-TCAR

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Abstract

Introduction
Transcarotid artery revascularization (TCAR) is a carotid stenting technique that offers a smaller incision than carotid endarterectomy (CEA), cerebrovascular protection through arterial flow reversal, and does not require crossing the aortic arch. Since approval, TCAR has demonstrated comparable postoperative stroke and complication rates to CEA. One rarely described TCAR complication is the occurrence of pneumothorax, as described in the case below.

Case Information
Case report of a 56-year-old female with a history of tobacco use, hyperlipidemia, rheumatoid arthritis, gastroesophageal reflux disease, and macular degeneration presenting with acute right eye vision loss and headache. Duplex study revealed total occlusion of the right internal carotid artery (ICA) and a critical 80-99% occlusion of the left ICA. Left TCAR was performed with postoperative chest radiograph (CXR) revealing large left-sided and moderate right-sided pneumothoraces. Bilateral percutaneous chest tubes were placed and the patient proceeded with recovery, which was uncomplicated. On Post Operative Day 3 (POD 3), both chest tubes were removed, followed by a CXR demonstrating no residual pneumothoraces. The patient was discharged that day. At one-month follow-up, the patient exhibited no further shortness of breath nor chest pain, and a repeat duplex study revealed a patent left internal carotid artery stent with no evidence of restenosis.

Discussion/Clinical Findings
We present, to our knowledge, the first case of bilateral pneumothoraces post-TCAR. Pneumothoraces resulting from TCAR may be avoided by identifying and screening high risk individuals preoperatively. Patients diagnosed with chronic obstructive pulmonary disease (COPD) and emphysema may require a close review of preoperative imaging to establish the proximity of the pleural apex to the common carotid artery (CCA). Careful and gentle dissection at the region of the root of the neck with preservation of the Sibson fascia is important to prevent this complication during TCAR. In cases where there is clear entry to the pleural space and a significant clinical concern for pneumothorax, a small-tube thoracostomy may be performed postoperatively to decompress the pleural space.

Conclusion
As a result of dissection into the base of the neck during TCAR, the Sibson fascia covering the apex of the lung may be compromised. Pneumothorax following low dissection is a common occurrence that has been described during thoracic outlet syndrome operations using a supraclavicular incision. A unilateral pneumothorax can potentially lead to pneumomediastinum or bilateral pneumothoraces if air from the ruptured lung leaks into the mediastinum, which can then spread into the contralateral pleural space. This can occur through anatomical pathways such as the pulmonary hila or the fascial planes surrounding the trachea and esophagus and can be treated with chest-tube placement.

Abstract Title: Characterizing Glycosylated Cargo of Extracellular Vesicles in Luminal Breast Cancer

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Abstract

Introduction
In the USA, one in eight women will be diagnosed with breast cancer sometime in their lifetime. In cancer biology, breast cancer is a heterogeneous and evolving disease. Unfortunately, the current standard of diagnosis cannot adequately recapitulate the inherent nature of breast cancer. Inadequate diagnostics often lead to suboptimal treatment, which could have grim consequences. Clinicians need a precision diagnostic technique that can reflect the biology of a patient's individual cancer. Extracellular vesicles (EVs), as the means of intercellular communication, hold the great potential for this purpose. Like their parent cells, EVs are highly glycosylated. However, little is known about the molecular basis of glycosylated EV cargos and their roles in breast cancer. Understanding EVs and their unique glycosylation patterns could provide a basis for a holistic EV-based diagnostic modality: EV-based liquid biopsy.

Methods
A luminal breast cancer model which includes a non-tumorigenic luminal epithelial cell line, MCF-10A, and three luminal breast cancer cell lines, MCF-7, LCC9, and BT474, were used in this study. EVs (including small extracellular vesicles (sEVs) and microvesicles (MVs)) were isolated from conditioned media by a differential ultracentrifugation approach. The quality and quantity of EVs were assessed by transmission electron microscopy, NanoSight, and western blotting with a panel of markers. Metabolic labeling (with ManNAz and GalNAz) and click chemistry were employed to characterize cellular and EV surface glycoproteins.

Results
Enriched particles with nanoscale size (sEV: 30-200 nm, MVs: 100-1000 nm) harbored membrane-encapsulated vesicular structure and presented typical EV markers, which are consistent with previous literature. On average, MCF10A produces the least sEVs per cell while MCF7 produces the most. There is no significant difference in MV production across all four cell lines. Abundant glycoproteins were detected on the surface of cells and sEVs with specific labeled signals. Glycosylation patterns and levels on the EV surface varied across different breast cancer cell lines.

Conclusion
These Results provide the foundation towards building sEV and MV "fingerprints" that are specific to each cell line and ergo the breast cancer subtypes.

Abstract Title: New Perspectives on Blood Pressure: a Systematic Review of the Association Between Serum Potassium and Hypertension

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Abstract

Introduction
For decades the discussion of modifiable risk factors for hypertension has been dominated by sodium intake. In recent years, there has been a growing interest in the role of potassium in modifying blood pressure. While the normal range for serum potassium is often accepted to be 3.5-5.2mmol/L, there is limited consensus on the relationship between serum potassium levels and risk for hypertension or on the ideal range of potassium for hypertensive patients.

Objective
To identify the current scientific consensus on the relationship between serum potassium to the prevalence, severity, and mortality of hypertension. Data Sources and Study Selection Pubmed and Medline were searched from 1999 to 2024. Search terms included hypertension and serum potassium. Included articles were peer reviewed studies on human participants with full English texts available. Secondary analyses and studies with non-generalizable data were excluded. Data Extraction and Synthesis Two reviewers independently investigated design, participant demographics, quality, and findings of studies. Due to heterogeneity of study designs, narrative synthesis was used to evaluate papers, and the consensus method was employed to resolve disagreements concerning quality and Conclusions of papers. Results 10 papers including retrospective (4), prospective (3), case-control (2), and cross-over clinical trial (1) studies met inclusion criteria and were assessed. Among them, the average MINORS score was 15.33±2.67, indicating they were of relatively high quality, while the single clinical trial showed evidence of high bias using the Cochrane RoB2 tool for cross-over studies. Four papers showed evidence that low to low-normal serum potassium was linked to higher prevalence of hypertension. Two papers suggested plasma concentration and intracellular potassium concentration in RBCs were significantly lower in patients with hypertension with one study suggesting a negative linear relationship between intracellular potassium and severity of hypertension. An experimental study showed that after a 10-day period of low potassium intake, average SBP increased by 5 mmHg. Two retrospective studies reported all-cause mortality in patients with hypertension was U-shaped when compared to serum potassium levels with the lowest mortality in the interval of 4.1-4.4mmol/L, and there was increased short-term mortality when serum potassium level was <3.7 or >4.6 in patients who were started on antihypertensive therapy. A single paper found that serum potassium above 4.8mmol/L increased risk of hypertension by 84%.

Conclusion
Serum potassium shows promise as a predictor of health in pre-hypertensive and hypertensive patients. This systematic review reveals that the normal range for serum potassium may include values correlated to higher rates of hypertension at the low-normal or high-normal ends, worse outcomes for hypertensive treatment at a high-normal concentration, and increased rates of mortality in hypertensive patients if outside of a narrow range. Few papers investigated intracellular potassium concentrations, which may be a valuable marker for evaluating hypertensive disease severity. The lack of low bias trials assessing serum potassium modification in treating hypertension leaves a major gap in the current scientific understanding of this topic. Further high quality research is needed to better explore the relationship between serum potassium levels and hypertension.

Abstract Title: Hippocampal Piezo1 after Status Epilepticus

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Department: Department of Biomedical & Translational Sciences

Abstract

Introduction
Piezo1 is a non-selective, mechanosensitive cation channel first described in 2010. It contains multiple transmembrane alpha helices and three-bladed propeller-like structure. Piezo1 is activated by mechanical forces on cell membranes, leading to calcium influx and many downstream effects. While Piezo1 has been implicated in neurodegenerative diseases such as Alzheimer's disease, it remains poorly studied in epilepsy, despite studies showing increased hippocampal sclerosis related to epileptic zone in patients with mesial temporal lobe epilepsy (MTLE) and increased hippocampal Piezo1 expression in mice 24 hours following MTLE, correlating with increased expression of pro-inflammatory cytokines. While several molecular mechanisms are involved in epileptogenesis, the goal of this study was to quantify early expression of Piezo1 immediately following Status Epilepticus (SE) relevant to epileptogenesis.

Methods
The Pilocarpine-induced SE model (250 mg/kg i.p. Pilocarpine) and its control (0.9% i.p. saline) were conducted in adult male C57BL/6J Mice (N=15, Jackson Laboratories). Clinical seizures were monitored using Rancine scores. After euthanasia, brain samples were prepared for histology studies. For immunohistochemistry, Piezo1 was detected using a rabbit anti-Piezo1 antibody (extracellular portion), a biotinylated goat anti-rabbit secondary antibody, and DAB. Sections were counterstained with Cresyl Violet. Images of the whole hippocampus were obtained blinded at 4x with an Olympus BX53F2 microscope. Piezo1 immunoreactivity levels were quantified in the whole hippocampus. Statistical analyses were conducted with JMP using a Wilcoxon two-sample test. In addition, publicly available Piezo1 RNAseq data from the Human Protein Atlas was analyzed to evaluate baseline differences in Piezo1 RNA expression by sex and age (40-49, 50-59, 60-69, 70-79 years) in control human brain samples (N=187).

Results
Preliminary data indicate that expression of Piezo 1 was localized to the hippocampus, particularly the dentate gyrus and stratum moleculare of CA1. Immunoreactivity analysis indicate that there is no statistically significant difference in the percent area of Piezo1 staining in the whole hippocampus. In human controls, there were no statistically significant differences in Piezo1 RNA levels in brain between sex and age groups.

Conclusion
Although Piezo1 may not be involved in the early stages of epileptogenesis, it can be activated late in the development of epilepsy. This data indicate a potential time window for translation intervention. Further analyses are needed, including colocalizing Piezo1 with synaptic markers, quantifying cortical expression, and a Piezo1 ELISA. While future experiments should include female mice, preliminary data in human brains showed no baseline difference in Piezo1 RNA expression. Future experiments could also use additional timepoints following SE and chronic epilepsy.

Abstract Title: Discussion of Management for the Pediatric Chiari 1 Deformity

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Mentor: Laura Hayes, MD
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Abstract

Introduction
This study is a comprehensive overview of the pediatric Chiari I Deformity, including the natural history and treatment approaches. Chiari I Deformity is defined as herniation of the cerebellar tonsils through the foramen magnum without caudal displacement of the brainstem (> 3mm in children and >5 mm in adults), which may present with a variety of neurological symptoms. The goal of this research is to discuss the disease course and management plan of this condition, including indications for surgical intervention or for a more conservative approach.
A majority of patients diagnosed with the Chiari I Deformity on neuroimaging are asymptomatic or very mildly asymptomatic and 93% of these patients remain clinically stable or improve as they age.1,2 This condition is often an incidental finding with little need for intervention in children. The definitive treatment for Chiari I is the posterior fossa decompression surgical maneuver. This relieves pressure from the herniated cerebellar tonsil and resolves associated symptoms. These symptoms include: occipital-region headache that is worsened by coughing and sneezing (termed a Chiari-associated headache), tinnitus, dizziness, and other symptoms associated with compression of the cerebellar tonsil and/or brainstem. The surgical treatment of Chiari I is often deemed a "cure" as the majority of issues related with the deformity are resolved. The Chiari-associated headache is effectively treated with little to no possibility of recurrence following a posterior fossa decompression.1 Of course, surgery comes with risks. Young children are more susceptible to surgical complications of the standard decompression procedure, including ventral compression and medullary dysfunction1. Additionally, certain complaints show little to no significant improvement following surgical intervention, such as preoperative sensory and cranial nerve deficits. Children also often have a shorter duration of symptoms than the adult form of Chiari I.4 This begs the question of whether or not surgery is necessary or if supportive, conservative care is more appropriate in certain pediatric patients affected by C1D.

Conclusion
Pediatric patients with the Chiari 1 Deformity may present asymptomatically or with a minimal range of symptoms, often discovered incidentally with neuroimaging. Many physicians may quickly jump to surgery to manage this condition, but surgery may not always be the most appropriate course in the pediatric population. Physicians should consider the severity of symptoms along with coexisting issues when deciding whether surgery is necessary in children with Chiari I. Children may outgrow the deformity with age and conservative management is often best, despite how complicated cerebellar tonsillar herniation may seem.

Abstract Title: The Social Media Gap: Potential Age-Related Platform & Procedure Preference Mismatch

Investigator: Shally, Zachary
Mentor: Yifan Guo, MD
Department: Department of Surgery, Division of Vascular Surgery
Co-Investigators: 1. William Lee, EVMS MD Program, MD2027 2. Naser Salem, EVMS MD Program, MD2027 3. Amir Latifian, EVMS MD Program, MD2027

Abstract

Introduction
More plastic surgeons are using social media to promote their practices, but different platforms attract specific age groups. According to the 2023 ASPS Procedural Statistics Release, certain age groups are more likely to seek specific procedures. This study examines whether there's a mismatch between the social media platforms plastic surgeons use and the preferences of their target patients based on age and procedure types.

Methods
Plastic surgeons, categorized as Influencers (over 99,999 followers) and Casuals (10,000-99,999 followers) from a previous study, were analyzed for their social media platform use. User age-group data was sourced from Sprout Social, a social media analytics tool, and the 2023 ASPS Procedural Statistics Release was used to identify the most common age groups for popular procedures. Statistical analysis was performed with Jamovi software.

Results
Instagram was the most common social media platform used by both Influencer and Casual plastic surgeons. Primary user age groups of 20-29 for Snapchat, 30-39 and 40-49 for LinkedIn, and 50-59 for Facebook, were identified from forty-four Influencers and fifty-eight Casuals. The most common procedures are rhinoplasty, brazilian butt lift, abdominoplasty, and rhytidectomy with most common age groups 20-29, 30-39, 40-49, and 50-59 respectively. There was a statistically significant difference between Influencers and Casuals using SnapChat ($\chi 2 = 0.025$) and Facebook ($\chi 2 = 0.009$), but not LinkedIn ($\chi 2 = 0.18$)

Conclusion
This study identifies Instagram as the predominant social media platform used by both Influencer and Casual plastic surgeons, underscoring its universal appeal in the field. However, distinct preferences are observed across other platforms: Snapchat is favored by younger users aged 20-29, LinkedIn by professionals aged 30-49, and Facebook by the older demographic of 50-59. The analysis of common cosmetic procedures-rhinoplasty, Brazilian butt lifts, abdominoplasty, and rhytidectomy-correlates with these age groups, reflecting targeted patient interests. Statistically significant differences in social media usage between Influencers and Casual surgeons were noted for Snapchat and Facebook, indicating varying engagement strategies, while LinkedIn usage did not show significant variation. Additionally, there seems to be a large gap in social media reach for both Influencer and Casual surgeon accounts because a vast majority of them do not use LinkedIn which has the widest range of predominant use by age. These surgeons could significantly increase their engagement on social media with an active LinkedIn account. These insights suggest that while Instagram serves as a common ground, tailored approaches on other platforms can effectively reach diverse patient age groups and optimize engagement.

Abstract Title: Analyzing Reddit: Insights and Experiences with FDA-Approved Rosacea Medications

Investigator: Sheetz, Emily
Mentor: Alice Roberts, MD, Ph.D.
Department: Department of Dermatology

Abstract

Introduction
Rosacea is characterized by dysregulated inflammatory processes, leading to erythema, flushing, telangiectasia, and pustules on the face.2,3 There are four subtypes of rosacea; erythematotelangiectatic, papulopustular, phymatous, and ocular2. Patients can present with characteristics of multiple subtypes and different areas of involvement over time3, making this condition difficult to treat. The purpose of this study was to utilize Reddit, an online forum, to evaluate patient's questions and experiences when using FDA approved medications for rosacea.

Methods
A medical student researcher used a search filter on r/Rosacea to screen for commonly prescribed FDA approved medications. The post was read in its entirety and then separated into its respective category.

Results
Nine medications were analyzed in this study. The most common categories were general experiences, followed by side effects, and then recommendations and how to use said medication.

Conclusion
Educating patients on topics such as usage instructions, potential side effects, and what to expect in terms of effectiveness can lead the patient to feel more confident in managing their conditions. Proper education also mitigates concerns about side effects and interactions, reduces misuse, and can improve adherence to treatment plans.

Abstract Title: A linear verrucous lesion on the left gluteal region of a child

Investigator: Sheetz, Emily
Mentor: Alice Roberts, MD, Ph.D.
Department: Department of Dermatology

Abstract

Introduction
Syringocystadenoma papilliferum is a benign tumor of apocrine or eccrine differentiation.1 While these lesions usually occur at birth and appear on the head and neck2, we present a case of a 10 year old female with a syringocystadenoma papilliferum along the left lateral gluteal region.

Case Information
A 10-year-old female presented with a verrucous plaque in a linear distribution along the left lateral aspect of the gluteal region. The patient appeared healthy, alert, and oriented with no atypical vitals. The lesion has been present since birth.

Discussion/Clinical Findings
Microscopic sections display a papillary and superficial reticular dermis permeated by inter-anastomosing sweat ducts surrounded by a bilayer of cuboidal epithelial cells. The sweat ducts connect directly to the epidermis. Additional observations include an inflammatory infiltrate of lymphocytes and plasma cells. Hyperkeratosis, parakeratosis, papillomatosis, and acanthosis with a granular layer are also present.

Conclusion
Our case reports a unique presentation of a syringocystadenoma papilliferum. Histopathological examination shows sweat ducts connected directly to the epidermis in addition to a bilayer of epithelial cells, confirming the diagnosis. This case demonstrates the atypical location of a benign skin lesion and serves as a learning instrument in identifying differential diagnosis of linear verrucous lesions on the body.

Abstract Title: The Effects of Contemporary and Historical Experiences on Black Breastfeeding

Investigator: Sheth, Anisha
Mentor: Sara Rothenberg, M.P.H.
Department: Department of Pediatrics
Co-Investigators: 1. Department of Pediatrics 2. Summer Scholars

Abstract

Introduction
Breastfeeding has several psychosocial, health, and financial benefits to the breastfeeding person and the baby.1 However, in the state of Virginia, the breastfeeding initiation rate for Black mothers is the lowest amongst all ethnic groups.2 Despite this, there is less representation of Black breastfeeding people in the research compared to others.2 This study aims to explore contemporary and historical experiences of racism to explain Black breastfeeding disparities which perpetuate maternal and child health inequities in Virginia.

Methods
This study utilized preparatory research and secondary data analysis as part of a community-engaged research project. We conducted a literature review, searching for peer reviewed articles focused on breastfeeding equity, Black breastfeeding, and breastfeeding initiation. We assessed state and local qualitative and quantitative data on Black breastfeeding rates and experiences. We held a listening session of healthcare providers and Black breastfeeding people. Based on the cumulative findings of these processes, a focus group question guide was developed as a research tool to assess barriers to breastfeeding equity faced in Black communities.

Results
The literature review findings include historical practices of slavery affecting breastfeeding, systemic racism influencing research biases, and a lack of outreach and education affecting the participation of Black breastfeeding people in research. Secondary data analysis and a listening session highlighted knowledge and accessibility of resources, biases in healthcare, and limited emphasis on breastfeeding during postpartum care as challenges. The resulting focus group question guide is categorized by: resources, knowledge of human milk, spouse/partner support, and cultural/generational experiences.

Conclusion
This research aims to understand historical and contemporary experiences that influence Black breastfeeding. Racial and historical practices of Black breastfeeding emphasized in the literature exemplifies the impact of the past on current practices. The data supports a need for easily accessible infant feeding education and resources specific to the needs of Black communities. Dismantling systemic bias and racism in healthcare is essential to reduce inequities in maternal and child health. The research tool created is unique as it was created alongside experienced community members and is an essential piece in removing racism and bias from breastfeeding research.

Abstract Title: Serious Psychological Distress by Arthritis Diagnosis, Immigration Status, and Race/Ethnicity Among US Adults

Investigator: Shimeles, Dagmawi
Mentor: Faustine Williams, Ph.D., M.P.H.
Department: National Institute of Minority Health & Health Disparities, National Institutes of Health
Co-Investigators: 1. Maryam Elhabashy, National Institute of Minority Health & Health Disparities, National Institutes of Health 2. David Adzrago, National Institute of Minority Health & Health Disparities, National Institutes of Health

Abstract

Introduction
Arthritis, characterized by joint inflammation, is associated with chronic pain, and significant physical and social limitations. While previous studies have linked arthritis to Serious Psychological Distress (SPD) in the general U.S. adult population, the relationship within specific subgroups, particularly immigrants and racial/ethnic minorities, remains unexamined. Understanding this relationship is crucial, as these groups face unique social determinants that may exacerbate both arthritis and SPD, potentially leading to health disparities that require targeted interventions.

Methods
We analyzed nationally representative 2002-2018 National Health Interview Survey data on U.S. adults aged ≥ 18 years (n = 439, 996) to examine how immigration status and race/ethnicity interact with arthritis to influence the risk of SPD. We fitted multivariable logistic regression models to assess associations, included interaction terms to examine moderating effects, and adjusted for sociodemographic (sex, age, employment status) and health/behavioral factors (health insurance status, BMI, smoking status, drinking status, comorbidities, functional limitation, social limitation, marital status). For statistically significant interactions, we calculated predicted marginal probabilities.

Results
Immigrants (n= 79,156) had higher odds of experiencing SPD than non-immigrants (n=351,840);($p<0.05$). Individuals with arthritis (n= 95,337) had higher odds of SPD than individuals without arthritis (n=335,659); ($p<0.001$). There were significant interactions between arthritis and immigration status as well as arthritis and race/ethnicity ($p<0.05$). Immigrants with arthritis were more likely to experience SPD compared to non-immigrants with arthritis as well as immigrants and non-immigrants without arthritis. NH Mixed individuals without arthritis had the highest likelihood of SPD among any racial/ethnic group, with or without arthritis, followed by Hispanic individuals with arthritis. A dose-response was observed between SPD and the number of functional and social limitations, with more limitations associated with higher SPD risk.

Conclusion
Immigrants and racial/ethnic minorities with arthritis experience disparities in poor health outcomes, particularly in relation to SPD. The observed relationship between SPD and functional/social limitations, which are also linked to arthritis, underscores the integration of physical and mental health. Our findings offer important insights into the relationship between arthritis and SPD among immigrants and racial/ethnic minorities; however, the findings should be interpreted with these limitations in mind. First, the reliance on self-reported data introduces the potential for reporting bias, which may affect the accuracy of the associations observed Second, the cross-sectional design of the study limits our ability to establish causality, as both the exposure (arthritis) and outcome (SPD) variables were assessed simultaneously, precluding the determination of a temporal sequence. To better understand these disparities and inform the development of targeted interventions, further research is necessary to investigate how common arthritic implications, such as functional and social limitations, may mediate the relationship between arthritis and SPD.

Abstract Title: Biomarker Analysis of Mechanically Ventilated Adults using Propofol or Dexmedetomidine

Investigator: Shirali, Sonali
Mentor: Christopher Hughes, MD
Department: VUMC Anesthesiology Department
Co-Investigators: 1. Christine Boncyk, MD, Vanderbilt University Medical Center, Department of Anesthesiology 2. Zachary Nix, Vanderbilt University Medical Center, CIBS Center

Abstract

Introduction
Increased inflammatory cytokines and biomarkers have been related to the degradation of the blood brain barrier. The fragility of this barrier can result in an increasing number of proteins that can enter the central nervous system circulation, which has been postulated to cause brain dysfunction like delirium. GM-CSF, granulocyte-macrophage colony stimulating factor, and MCP-1, monocyte chemoattractant protein 1, both stimulate macrophages/monocytes, specifically M1 pro-inflammatory macrophages. Medications like propofol and dexmedetomidine have been shown to mitigate inflammation by downregulating the polarization of M1 macrophages and instead upregulating M2 macrophages. M2 macrophages produce anti-inflammatory cytokines like IL-13. Anti-inflammatory cytokines attenuate inflammation and thus have a protective effect on the brain. Dexmedetomidine has been shown to cause greater attenuation of inflammation than propofol in mouse models.

Methods
The samples that were analyzed were from a double-blind, randomized, controlled trial conducted at 13 different medical centers. The population of this trial includes adults who were sequentially admitted to a medical or surgical ICU, with suspected or known infection, and were treated with continuous sedation for invasive mechanical ventilation. The medication used for sedation was either dexmedetomidine (5 µg per milliliter) or propofol (10 mg per milliliter). The samples from this trial were then sent for analysis to calculate the biomarker levels per sample.

Results
Prior research has shown that there is a significant difference in biomarker levels during states of inflammation. IL-13 was increased as a compensatory mechanism to downregulate inflammation from insulin resistance. Similarly, MCP-1 was increased in a critical limb ischemia state of inflammation. GM-CSF was significantly increased to more than 4 times the physiological level during an infectious inflammatory state. The significant difference between the physiologic and inflammatory states highlights how GM-CSF is increased in inflammation. For the pending samples, it is predicted that MCP-1 and GM-CSF will both be significantly increased in the patients in an inflammatory state. However, based on the prior research, it is unclear whether IL-13 will be significantly increased.

Conclusion
Analyzing the inflammation pathway can help determine how acute brain dysfunction and delirium develops. The confirmation of this correlation can provide mechanistic pathways to attenuate the inflammatory response to help reduce the risk for brain disease. Should one medication prove to be more efficient in attenuating the inflammatory response, further prospective work on implications among high-risk participants can be formulated to study. This can encourage further research into regulating the inflammatory response to protect the brain from developing acute dysfunction, including delirium.

Abstract Title: Investigating the Underlying Socioeconomic Barriers to Missed Appointments at the HOPES Clinic

Investigator: Sholi, Collette
Mentor: Alice Roberts, MD
Department: Department of Dermatology
Co-Investigators: 1. Emily Sheetz, M.S., EVMS MD Program 2027 2. June Choi, EVMS MD Program 2027

Abstract

Introduction
The Health Outreach Partnership of Students (HOPES), student run clinic provides free healthcare services to the underserved populations in the Hampton Roads region. Many of the patients at HOPES clinic do not have reliable access to healthcare nor do they have insurance, making their HOPES appointments even more important in their preventative healthcare. Studies have shown that a lack of preventative care, due to various reasons, leads to an increase in poor prognosis and emergency room admissions. Understanding the reasons behind missed appointments aids clinics in better serving their patient population. Therefore, this study aims to identify these barriers in the HOPES population to gain insight that can be used to decrease missed appointments at this clinic and across other free clinics.

Methods
Aim: To identify barriers that may cause appointment cancellations or no-shows at the HOPES clinic. Design: Retrospective, mixed-Methods, study in which patients who have missed an appointment at the HOPES clinic will be identified via Practice Fusion (the clinics patient record site). After identification, investigators will then contact the patients via phone call. Should the patients consent, the investigators will then ask a series of questions with the aim to identify reasons for missed or cancelled appointments. Inclusion criteria & sampling: All HOPES adult patients between 18 and 79 years old who have previously missed an appointment within the last two years (2021-2023). Data Collection/Convergent Analysis: The retrospective, mixed Methods study includes quantitative data elements.

Results
Data collection is currently in process. Preliminary data from patient surveys will be available at the time of the presentation.

Conclusion
This mixed Methods research project utilizes input from the HOPES clinic and EVMS. While the data has not been fully analyzed, we hypothesize that there will be common socioeconomic factors that impact appointment attendance to primary care appointments. Dissemination: Our data analysis will point to informed interventions to improve appointment attendance at the free clinics across the United States.

Abstract Title: Investigating Transportation Equity and Partnering with Patients in Outpatient Clinic Settings

Investigator: Sholi, Collette
Mentor: Julie Sill, Ph.D.
Department: Department of Medicine
Co-Investigators: 1. Mekbib Gemeda, EdD, Hackensack Meridian School of Medicine 2. Taylor Figgs, EVMS MD Progam 2025 3. June Choi, EVMS MD Program 2027 4. Mai Ly, Department of Medicine 5. Newzaira Khan, M.S.W., Hampton Roads Community Collaborative 6. Mary J. Riddle, Hampton Roads Community Collaborative 7. Cassandra Hammond, Hampton Roads Community Collaborative 8. Rosalene, Barnes-Savage, Hampton Roads Community Collaborative 9. Courtney Edney, Hampton Roads Community Collaborative 10. Latisha Carter, Hampton Roads Community Collaborative, 11. Senta Harris, Hampton Roads Community Collaborative 12. Shirley Larry, Hampton Roads Community Collaborative, 13. Derek Lathan, Hampton Roads Community Collaborative 14. Robin Peterkin, Hampton Roads Community Collaborative 15. Sheena Thomson, Hampton Roads Community Collaborative 15. Robert Bernstein, MD, Department of Medicine

Abstract

Introduction
Healthcare disparities are often fueled by obstacles that patients face when attempting to access care. Transportation is a necessary component when evaluating patient access. Though not always obvious to healthcare systems or providers, social determinants of health (SDoH) impact the availability, reliability, and safety of transportation. This can prevent patients from regularly accessing healthcare and negatively impact long-term population health outcomes. In order to positively impact transportation equity in the region, better understanding the problem from the patient perspective is crucial. This innovative research effort incorporates community member input in all phases of the research process to investigate how patient transportation to provider office visits may be impacted by SDoH.

Methods
Aims: To identify transportation barriers to outpatient healthcare services in Hampton Roads. To evaluate the influence of SDoH on transportation equity for medical appointments. Design: Prospective, mixed-methods research design utilizes an innovative participatory action/community engaged approach. Team members partnered with community members from the Hampton Roads Community Collaborative (HRCC) whose individual members are predominantly people of color from historically economically challenged neighborhoods in the Hampton Roads (HR) region. HRCC team members participated in the topic selection, research design, implementation, analysis, and dissemination of Results. Inclusion criteria & sampling: All adults 18 years or older residing in the HR region were eligible to participate in a 24-item community questionnaire. Convenience sampling was utilized at local community events, EVMS outpatient medicine clinics, & the Sentara Ambulatory Care Clinic. Data Collection/Convergent Analysis: The mixed methods study design includes both quantitative and qualitative data from: 1) community questionnaires, 2) individual interviews (EVMS patients), and 3) public observations of transportation used for medical appointments (EVMS locations). Recruitment flyers with links to questionnaires were strategically placed in areas of high foot traffic on the EVMS campus and at local businesses in the HR region. Team members also recruited participants from community events and completed observations of public behavior to note the types of transportation utilized for medical appointments and any barriers or supports that patients encountered when arriving to/departing from provider office visits. Convergence of the data will create a body of evidence that is focused on the types of transportation utilized for medical appointments, the quality, reliability, and safety of chosen transportation methods, and the self-reported patient barriers and needed supports of HR patients.

Results
Preliminary results (2.5 months of data collection) highlight self-reported information from N=76 participants in 6 out of 7 Hampton Roads cities via the community questionnaire. Observational data from 4 clinic sites reveal the utilization of 19 medical transport companies, 12 non-medical transportations companies, and 351 private/personal vehicles or types of public transportation utilized for medical appointments. Initial frequency counts & descriptive codes highlight transportation equity via four themes, 1) equipment, 2) location, 3) infrastructure, & 4) human support, demonstrating the barriers or supports that today's patients face with transportation for healthcare appointments. Dissemination/ Conclusion: Findings will point to better-informed, patient-directed interventions that aim to identify & reduce healthcare disparities, and improve transportation equity for all patients in HR.

Conclusion
This mixed methods, participatory-action research project leveraged input from patients & community members to identify transportation barriers for healthcare appointments. Preliminary Results highlight specific transportation hurdles that are associated with attending outpatient office visits. Community engaged approach elevated community partners and guided them in utilizing research as a catalyst for change, showing value to their interpretation/synthesis of data & to their chosen forms of dissemination.

Abstract Title: The Role of IgA in Atherosclerosis

Investigator: Sinha, Sejal
Mentor: Elena Galkina, Ph.D.
Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1., Basudha Habisyasi, Department of Biomedical & Translational Sciences 2. Kelly Wai, Department of Biomedical & Translational Sciences 3. Alex Coleman, Department of Biomedical & Translational Sciences 4. Jonee Lillard, EVMS MD Program Class of 2027 5. Shelby Ma, Department of Biomedical & Translational Sciences 6. Alina Moriarty

Abstract

Introduction
Atherosclerosis is the leading cause of death worldwide. The immune system plays an important role in atherogenesis. B cell response is a subset-specific with B1 and MZ B cells playing a protective role and FO B cells being atherogenic. One of the major B cell functions is to produce antibodies (Abs). IgA is primarily produced by B1 cells and supports the maintenance of balanced mucosal immunity. While IgM Abs are protective, IgG2a Abs play a pathological role in atherosclerosis. To date, the role of IgA in atherogenesis is unknown.

Methods
IgA-deficient low density lipoprotein-deficient (IgA-/-Ldlr-/-) and control Ldlr-/- male mice were fed a high fat diet for ~14-16 weeks and blood samples were obtained for total cholesterol. Aorta and brachiocephalic artery (BCA) were analyzed for plaque burden. Whole blood, spleen, omentum, and peritoneal lavage were collected and total cell distribution was compared between experimental groups. Significance was tested using a unpaired, two-way Student's T Test with a significance at $p<0.05$.

Results
The IgA deficiency resulted in reduced lesions in IgA-/-Ldlr-/- compared with Ldlr-/- controls. Unexpectedly, we found no significant differences in plaque burden in BCA. IgA-deficiency attenuated total cholesterol levels and this reduction correlated with a moderately reduced body weight in IgA-/- Ldlr-/- vs Ldlr-/- mice. Chronic activation is associated with increased leukocyte numbers within the local and secondary lymphoid tissues. While splenic cell counts were not different between the groups, the peritoneal leukocytes were elevated in IgA-/-Ldlr-/- vs Ldlr-/- mice. The omentum and carotid cell counts were lower in the IgA-/-Ldlr-/- vd Ldlr-/-mice. FACS showed a difference in circulating blood leukocytes, especially in neutrophils.

Conclusion
Overall, our Results suggest that IgA plays a site-specific role in atherosclerosis, particularly contributing to atherogenesis in large blood vessels such as the aorta. IgA deficiency also alters leukocyte numbers in different tissues, highlighting the role of IgA in the regulation of local immunity. Our next goals would be to analyze the immune response in gut, PP, and omentum as the main sites of IgA production and dissect mechanisms by which IgA modulated lesions formation at different vascular beds.

Abstract Title: Final Results: Will Space Radiation Exposure Lead to Altered Risk-Taking Behavior

Investigator: Smits, Elliot
Mentor: Richard Britten, Ph.D.
Department: Department of Radiation Oncology
Co-Investigators: Richard Britten, Department of Radiation Oncology

Abstract

Introduction
Last year, I presented preliminary data from a study I have been conducting with Dr. Richard Britten entitled, "Will Space Radiation Exposure Lead to Altered Risk-Taking Behavior?" The Britten lab has previously demonstrated that space radiation (SR) exposure has a marked impact on executive functions related to cognitive flexibility [1]. This finding is significant because executive functions also regulate response inhibition, impulse control, processing and regulating effect, motivation, and arousal [2], all of which are crucial components when making decisions. Of particular interest is that in humans, risk behaviors demonstrated from decision-making tasks correlate with baseline risk propensities [3,4] and overall risk behaviors in real life [3,5,6]. These previous studies provide a strong foundation for our current research. Our study is breaking new ground in the field, as there is currently no information on how SR exposure will impact risk decision-making. The basis for this NASA grant-sponsored study was to evaluate whether the SR-induced loss of executive function performance is not just confined to cognitive functions but also impacts impulsivity and mood regulation.

Methods
Our research involved a rigorous process of training and assessing male and female Wistar rats in rodent risk decision-making touchscreen tasks. The rats were subsequently irradiated, and their post-exposure performance was meticulously assessed at one-month intervals for three months. The post-exposure performance at these times was contrasted to their pre-exposure performance status, ensuring a comprehensive understanding of the effects of SR exposure on risk decision-making.

Results
I will include graphs of male and female performance after radiation and their reaction times when performing the task (I want to consult with Dr. Britten about which specific graphs we will include).

Conclusion
Dr. Britten and I are currently formulating our final thoughts about what can explain the male and female performance after radiation and their reaction times when performing the task. Our study's findings could have important implications for NASA's understanding of the effects of space radiation on decision-making and for the broader body of work on ground-based rodent studies assessing SR effects on executive function.

Abstract Title: Metabolomic Profiles of Metastatic Renal Cell Carcinoma

Investigator: Spiers, Liam
Mentor: Dean Troyer, MD
Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1. Aditya Chakraborty, Leroy T. Canoles Jr. Cancer Research Center, 2. Brian Main, Department of Biomedical & Translational Sciences, Leroy T. Canoles Jr. Cancer Research Center 3. Liang Li, Chemistry, University of Alberta 4. Ya-Chun Chan, Chemistry, University of Alberta 5. Xiaohang Wang, Chemistry, University of Alberta 6. Nico Verbeeck, Aspect Analytics, Genk, Belgium 7. Mike Williams, MD, Department of Urology, Urology of Virginia

Abstract

Introduction
Patients who are status-post radical or partial nephrectomy to treat renal cell carcinoma (RCC) undergo clinical surveillance regimes to investigate the presence of recurrent or metastatic disease. The clinical problem we're addressing is the frequency and intensity of surveillance after surgical resection of RCC. The aim of this study was to identify biomarkers which were statistically demonstrated to predict the development of metastatic disease. Identification of such biomarkers would create a diagnostic tool to aid clinicians in the management of patients on RCC surveillance.

Methods
We conducted a retrospective case control study of RCC patients, treated with surgical resection. Tumor samples were classified based on patients who either did or did not develop metastatic disease within 3 years. Freshly obtained RCC samples were collected, frozen, processed, and sent for metabolomic analysis using liquid chromatography-mass spectrometry (LC-MS). Three different types of chemical groups were analyzed for each sample: Carboxyl, Amine-Phenol, and Hydroxyl. Metabolites were identified using a chemical library for crossreference. LC-MS Results were then analyzed with machine learning approaches and statistical models. Unsupervised machine learning (UMAP, Non-negative Matrix Factorization) was used for exploratory analysis of the data. Supervised machine learning, using both linear and nonlinear Support Vector Machines was used to construct classification models to distinguish between cases and controls, showing good classification performance with an area under the Precision-Recall curve (AUPRC) of 0.92 for the best-performing model. Repeated crossvalidation was used to avoid overfitting and gain representative classification performance of the model.

Results
Statistical analysis yielded metabolites which were predominantly involved in differentiating metastatic from control samples. Definitively identified metabolites included the following: 4-Hydroxybutanoic acid, 3-Aminosalicylic acid, Indoxyl sulfate, Norcotinine, 3,4Dihydroxyphenylpropanoic acid, Glutamyl-Glutamic acid, and N-ethylglycine.

Conclusion
This study identifies certain metabolites which predict RCC metastasis. Metabolomics is a promising method of biochemical analysis for predicting outcomes such as RCC metastasis. Directions of future studies would include samples obtained from multiple centers to increase the sample size of identified metabolites. More research is necessary to strengthen support for using this diagnostic tool with certainty.

Abstract Title: The effect of harvest site closure on knee outcomes following ACL reconstruction with patellar tendon autograft

Investigator: Stephens, Senah
Mentor: Kevin Bonner, MD
Department: Department of Surgery, Jordan-Young Institute for Orthopedic Surgery & Sports Medicine
Co-Investigators: 1. Emily M. Pilc, B.S., Macon & Joan Brock Eastern Virginia Medical School at Old Dominion University2. Rebecca P. Liu, MD, University of Texas Southwestern Medical Center, Physical Medicine & Rehabilitation Residency 3. Jillian L. Meyers, M.S., Jordan-Young Institute for Orthopedic Surgery & Sports Medicine 4. Katherine S. Worcester, M.S., Jordan-Young Institute for Orthopedic Surgery & Sports Medicine 5. Robert B. Patton, MD, Jordan-Young Institute for Orthopedic Surgery & Sports Medicine 6. Justin W. Griffin, MD, Jordan-Young Institute for Orthopedic Surgery & Sports Medicine

Abstract

Introduction
The patellar tendon autograft is a popular graft choice for anterior cruciate ligament reconstruction (ACLR) in skeletally mature athletic populations. However, it has been historically debated whether to leave the patellar tendon (PT) open or to close it with suture following harvest. There is conflicting evidence as to whether closure of the PT defect can result in excessive scarring, tendon shortening, and incidence of patella baja. The aim of this study was to assess the impact of PT autograft site closure on the size of the residual PT defect and knee functional outcomes.

Methods
This was a retrospective cohort study. Patients of two surgeons who underwent ACLR with PT autograft between 2011 and 2023 at a private practice were identified. One surgeon routinely reapproximated the PT with sutures and the other left the tendon open and only closed the overlying paratenon. Patients from both groups underwent the same postoperative protocol, including physical therapy. Included patients were at least one-year post-op and 13 years or older at the time of surgery. Exclusion criteria were: revision ACLR, workman's compensation case, or chronic pain condition. Enrolled patients underwent ultrasound evaluation of the operative knee by an independent examiner to determine PT width and PT defect width and depth. The Knee Injury and Osteoarthritis Outcome Score (KOOS), International Knee Documentation Committee (IKDC), and Single Assessment Numeric Evaluation (SANE) were collected. Percent residual defect of the PT was calculated by dividing the postoperative width of the PT defect by the width of the harvested PT autograft. Summary statistics were calculated, and comparative tests were performed using JMP Pro 18.0.1.

Results
Eighty-one subjects met criteria and completed the ultrasound and surveys. There were 57 patients in the PT left open group and 24 patients in the PT closed group. Their average age was 23.6 years ± 7.6 and 27.0 years ± 6.4, respectively ($p = 0.05$). The average PT width was 3.1 cm (2.2 - 3.8 cm), which was not significantly different between groups ($p = 0.23$). A PT defect was present in all patients after a mean follow-up of 2.97 years (1.0 - 9.6 years). Mean PT defect width was significantly larger in the patients who had the PT left open (4.3 mm ± 1.4) compared to the patients who had the PT closed with sutures (2.2 mm ± 1.1, $p < 0.001$). Mean depth of the PT defect was 3.7 mm ± 0.8 in the patients who had the PT left open and 3.3 mm ± 1.0 in the patients who had the PT closed ($p = 0.082$). Mean percent residual defect of the PT was significantly greater in the patients who had the PT left open (41.7% ± 13.4) than the patients who had the PT closed (22.0% ± 10.7, $p < 0.0001$). There were no differences between the PT left open and closed groups regarding KOOS (83 ± 13.4 vs. 80.1 ± 13.5, $p = 0.29$), IKDC (83.9 ± 14.8 vs. 78.4 ± 14.7, $p = 0.052$), and SANE (89.5 ± 13.0 vs. 84.3 ± 16.9, $p = 0.061$) scores.

Conclusion
A PT defect was present in all patients at the time of follow-up. In contrast to previous studies, closure of the PT autograft site with sutures did not result in increased depth of the PT defect but did result in decreased defect width. Outcomes were the same between those who had the PT closed and those that had the PT left open. Intraoperative closure of the PT with suture may not be necessary for patients undergoing ACLR with PT autograft.

Abstract Title: Review of outcomes and treatments of pulmonary embolism (PE)

Investigator: Sunkara, Meghana Devi
Mentor: Animesh Rathore, MD
Department: Department of Surgery, Division of Vascular Surgery

Abstract

Introduction
Pulmonary embolism (PE) is a life-threatening medical condition associated with increased risk of cardiovascular fatalities. The keystone treatment for PE is anticoagulation; however, this comes with an increased risk of bleeding. Moreover, untreated prolonged PE can lead to increased right heart strain and right ventricle dysfunction known as cor pulmonale. In addition to anticoagulation, there are surgical interventions that are used on patients based on risk stratification from PESI score criteria. Although each PE treatment strategy has shown to be effective to some degree, there is still limited data on how each approach compares. The goal of this study is to evaluate the outcomes of treatment options for patients with PE.

Methods
A Retrospective chart review will be performed of all patients gathered by Sentara Health Research Center utilizing Sentara's Data Research Request Form; collected on the PE treatment success and patient outcomes. Statistical analysis was performed by using REDCap.

Results
Upon review of 40 charts, it was found that 7 (17.5 %) patients were found to have an elevated troponin trending up, 4 (10%) had a troponin trending low and 2 (5%) had a stable troponin. Post-intervention troponin showed that 3 (7.5 %) patients were found to have an elevated troponin trending up, 7 (17.5%) had a troponin trending low and 2 (7.5%) had a stable troponin. While more data is required to determine statistical significance, post-intervention troponin levels were trending lower, and we were unable to determine data for 27 charts. Of the 40 charts reviewed, 26 (65%) received Anticoagulation only, 3 (7.5%) received systemic thrombolysis, 7 (17.5%) received catheter-directed lysis, and 4 (10%) received mechanical thrombectomy. Moreover, 1 (2.5%) chart showed a patient who passed away at time of discharge or 7 days post intervention.

Conclusion
Using an ANOVA test after gathering more data will be helpful in determining a statistical significance in the troponin differences before and after intervention. Moreover, data shows that there is a relatively even distribution among the procedures that patients receive. Analyzing further data will be helpful to determine any significant differences in interventional procedures.

Abstract Title: Factors Influencing Social Media Influencer Status

Investigator: Sunkara, Meghana Devi
Mentor: Yifan Guo, MD
Department: Department of Pediatrics, Plastic & Oral Maxillofacial Surgery
Co-Investigators: 1. William Lee 2. Himali Patel 3. Jashanna Walia 4. Phavon Sage

Abstract

Introduction
Patients are using social media to guide decisions on aesthetic procedures, prompting many physicians to promote themselves on social media platforms like TikTok.1,2 We investigated the different social media account aspects of popular plastic surgeons (Influencer, over 99,999 followers) and those less popular (Casual, 10,000 to 99,999 followers) on TikTok.

Methods
Influencers and Casuals on TikTok were identified through searches like "plastic surgeon," excluding residency programs, non-plastic surgeons, or physicians practicing outside the U.S. Examined social media aspects include sensitive content warnings, advertising procedures/products in biographies, practice website links, and posting patterns. Statistical analysis was performed using Jamovi software.

Results
More Influencers posted without sensitive content warnings, while most Casuals used them. The majority of both groups did not advertise products/procedures in their biographies. Only five accounts in each group lacked websites linked to their social media. The most common posting pattern for both groups was Semi-Daily (posting multiple days a week, but not daily).

Conclusion
None of the examined aspects significantly distinguished Influencers from Casuals, suggesting unexamined factors might be more critical for achieving Influencer status. However, it seems avoiding the use of sensitive content warnings may correlate with more followers. In both groups, the absence of advertising in biographies and presence of practice website links indicates these are standard practices, not distinguishing factors. Frequent, but not daily, posting appears to be a common strategy among plastic surgeons on TikTok, regardless of follower count.

Abstract Title: ¡Oye! It›s Not Always Sarcoid!

Investigator: Sweidan, Gorjeite
Mentor: Xian Qiao, MD
Department: Department of Medicine, Division of Pulmonary, Critical Care & Sleep Specialists
Co-Investigators: Olivia Markert, B.S., EVMS MD Program MD2026

Abstract

Introduction
Sarcoidosis has been called "the great mimicker" [1]. Due to its nonspecific laboratory and imaging findings, it's essential to remember it is a rule out diagnosis. It is imperative to maintain a level of suspicion based on patient history to determine whether an underlying etiology for the granulomatous process can be established.

Case Information
We present the case of a previously healthy 24-year-old male welder who presented to an outside emergency department with one month of nonradiating upper and lower back pain, progressive lower extremity weakness, and muscle spasms necessitating the use of a walker beginning shortly after a minor workplace accident in which a plexiglass window fell on his helmeted head. Magnetic resonance imaging (MRI) revealed a disc herniation at the C6-C7 level with spinal cord compression with central/medullary hyperintensity extending from C2-3 to T4-5, leading to a finding of longitudinally extensive transverse myelitis (LETM). Incidentally, there were bilateral lung opacities and possible bilateral hilar lymphadenopathies. Findings were confirmed on chest computed tomography (CT) that showed bilateral hilar lymphadenopathy with multiple non-focal ground glass densities throughout both lung fields. The patient was transferred to our hospital, where he underwent anterior cervical discectomy and fusion (ACDF) of the C6-C7 spine. Neurosurgery noted extensive inflammation in the cervical spine, out of proportion to neck injury alone. No biopsies were taken due to high risk of further neurologic damage. Pulmonary was consulted for bronchoscopy and endobronchial ultrasound-guided (EBUS) bronchoscopy immediately following the ACDF. Bronchoalveolar lavage was significant for high lymphocyte count with multinucleated giant cells, normal CD4/CD8 ratio on flow cytometry, and the EBUS showed non-necrotizing granulomas and lymphocytes without evidence of malignancy. Blood work at the time of admission was notable for peripheral eosinophilia, elevated angiotensin-converting enzyme (ACE) level, and negative serum aquaporin-4 antibody. Heavy metal testing was remarkable for significantly elevated serum aluminum and minimally elevated serum copper levels, leading to a diagnosis of aluminum toxicity with pulmonary and neurological involvement. Despite successful cord decompression and disc fusion, MRI conducted 4 months postoperatively revealed persistent cervical spinal cord edema and lung opacities with bilateral hilar lymphadenopathy. Multiple attempts were made to see the patient in the clinic and start anti-inflammatory treatment, but the patient was lost to follow-up.

Discussion/Clinical Findings
LETM is typically associated with an autoimmune process, most commonly neuromyelitis optica [2], which was ruled out in our patient with his negative serum aquaporin-4 antibody. As a chronic granulomatous inflammatory disease, sarcoidosis can also induce LETM changes [3]. Bilateral hilar lymphadenopathies are the most common pulmonary sarcoidosis findings, while alveolar opacities are atypical [4]. ACE elevation is a nonspecific finding that is often associated with, but not limited to, sarcoidosis. Given the initial findings, it would be valid to conclude sarcoidosis as the correct diagnosis. However, given the patient's history as a welder, chemical related occupational lung disease was pursued and the underlying condition was determined. In this case, it would be essential for the patient to abstain from further welding work at the time of the diagnosis and would potentially be eligible for work-related compensation. These findings would not have been possible if the team settled on the diagnosis of sarcoidosis alone.

Conclusion
This is a case of a 24-year-old male with acute neurologic and pulmonary pathology likely due to chronic occupational aluminum inhalation. Cases such as this underscore the necessity of keeping a wide differential diagnosis when working up an unusual patient presentation and highlight the importance of proper protective equipment in careers such as welding and metalworking, where improper workplace safety practices can lead to detrimental health consequences.

Abstract Title: A Retrospective Review of Metformin Discontinuation among Patients at Ghent Family Medicine

Investigator: Sword, Maren
Mentor: Richard Whalen, MD
Department: Department of Family & Community Medicine

Abstract

Introduction
Type 2 diabetes mellitus develops from chronically increased blood sugar (glucose) levels. Insulin normally regulates movement of glucose into cells, but in type 2 diabetes mellitus, cells develop insulin resistance and thus take in less glucose from the blood. Furthermore, with type 2 diabetes mellitus, the pancreas does not produce enough insulin to effectively reduce blood sugar levels. In use for type 2 diabetes mellitus, Metformin functions to increase insulin sensitivity of cells and reduce blood sugar levels. Metformin remains first line medical therapy for most patients with type 2 diabetes mellitus but is felt to be underutilized due to a high discontinuation (DC) rate. The DC rate in one large study was 50% within one year after starting. This rate is similar to the discontinuation rate of other DM medications which highlights the importance of proactively addressing issues related to medication adherence for all DM patients. The reasons for stopping Metformin are multiple, but many are felt to be preventable patient factors, provider actions, or omissions. A common patient factor is GI side effects. One review showed that this factor is often related to not using the recommended Metformin ER formulation at the lowest dose initially with no titration upwards until any GI symptoms abate. At Ghent Family Medicine (GFM), one recent example of provider actions leading to Metformin discontinuation was Metformin being dropped off the medication list on hospital discharge summary despite no medical indication. This change was not addressed after discharge until the 3rd office visit 1 year later, at which time A1c had increased from 7.8 to 9.1 on insulin alone. A more common provider factor is concern for renal effects of Metformin, with some providers not aware of more recent guidelines recommending Metformin for glomerular filtration rate (GFR) > 30, changed from >45 previously. Additionally, Metformin has been shown to be more effective than sulfonylureas or insulin (both of which are often used as Metformin replacements) in preserving GFR. Another impact of Metformin DC is the increased cost for the US Health Care system and taxpayers. The increasingly popular glucagon like peptide (GLP-1) and sodium glucose transporter (SGLT) inhibitors are at least 15 times more expensive than Metformin yet show similar A1c improvement as first line monotherapy as demonstrated in one large study. A 2022 cost effectiveness analysis concluded that for GLP-1 and SGLT2 agents to be as cost effective as Metformin as a first line monotherapy, the prices would need to fall by 90% and 70% respectively.

Methods
Medical records of eligible patients will be reviewed to collect retrospective data related to their type 2 diabetes mellitus diagnosis and Metformin discontinuation. Medical records from January 1, 2018 up to December 26, 2023 will be reviewed. Data to be collected includes: age at time of initial DM diagnosis, BMI, A1c, GFR, Metformin start date, Metformin dose with dose frequency and changes, reason for Metformin discontinuation, Metformin discontinuation date, and other DM medications. Statistical analyses will be mainly descriptive. Reasons for Metformin discontinuation will be classified as preventable, possibly preventable, not preventable, or unable to be determined. Metformin discontinuation will be calculated as a percentage at 1 and 2 year intervals overall and among classifications. Average and changes in A1c and BMI values will be compared between patients remaining on Metformin and those who have discontinued it.

Results
Data collection is currently in process.

Conclusion
We will be determining Metformin discontinuation rate at Ghent Family Medicine. Additionally, we will be reviewing reasons for Metformin discontinuation and comparing A1c and BMI in patients remaining on Metformin to those who discontinued it. With this analysis, we aim to identify trends that would better inform future strategies in lowering Metformin discontinuation rates as well as overall DM management.

Abstract Title: The Effect of Climate on Free Clinic Attendance by Individuals Experiencing Housing Insecurity

Investigator: Temple, Austin
Mentor: Joshua Edwards, M.P.H.
Department: School of Health Professions
Co-Investigators: 1. Julia Cornelius, B.S., EVMS MD Program 2. Austin M. Temple, M.S., EVMS MD Program 3. Joshua Edwards, M.P.H.

Abstract

Introduction
Individuals experiencing housing instability are a population with inherently transient needs and resources and are particularly vulnerable to climate events such as extreme temperatures and precipitation. Prior studies have examined the relationship between weather and clinic attendance, but few focus specifically on the housing insecure. This study evaluated the effect of weather events on attendance to a once-weekly, student-run, walk-in free clinic in the urban population of Norfolk, Virginia.

Methods
Clinic attendance and weather data were retrospectively reviewed for clinic dates in 2021-2022. Descriptive statistics and ANOVA were performed using SAS v9.4 to analyze attendance against temperature and precipitation, as well as monthly and seasonal trends.

Results
In this 2 year period there were a total of 101 clinic dates and 775 patient visits. The warmer months of August and September were found to have statistically significantly higher attendance rates when compared to June ($p<0.05$), February ($p<0.05$), and March ($p<0.05$). There was also a positive correlation between clinic attendance and the average temperature on the day before, night before, and day of clinic ($r=0.2$, $p<0.05$). No significant differences were found when comparing all four seasons, though significant differences were seen when comparing Summer and Spring attendance (mean difference=2.93, $p=0.032$). No significant findings were found when examining the effect of precipitation on the day before, night before, or the day of clinics.

Conclusion
Although limited by small clinic size and a relatively short period of analysis, this data helps us understand which climate factors most significantly impact individuals experiencing housing insecurity, which then allows us to allocate clinic resources more appropriately and address these climate barriers in the future.

Abstract Title: Leveraging Machine Learning to Predict Mobility Outcomes in Traumatic Brain Injury: A Retrospective Analysis

Investigator: Toronka, Sheku
Mentor: Nathan Rowland, MD, Ph.D.
Department: MUSC Neurosurgery

Abstract

Introduction
Traumatic brain injury (TBI) is a significant global health concern, impacting over 69 million individuals annually and leading to high rates of death and disability. Despite extensive research on TBI, there remains considerable variability in patient outcomes, largely due to differences in treatment approaches across various medical centers. This inconsistency underscores the urgent need for more accurate predictive models. Our research aims to develop a machine-learning model capable of predicting Johns Hopkins Highest Level of Mobility (JH-HLM) scores, a critical metric for assessing hospital performance and patient progress. Specifically, we focus on distinguishing whether a patient's JH-HLM score falls below 4 or meets/exceeds 4.

We hypothesize that a machine-learning model, integrating both demographic and clinical data, can reliably predict short-term recovery outcomes as indicated by the JH-HLM scale. This approach has the potential to enhance medical decision-making, improve patient outcomes, and minimize treatment variability across healthcare institutions.

Methods
Study Design and Data Collection: We conducted a retrospective cohort study using data from 134 patients with diverse medical histories. The dataset included critical features such as the Glasgow Coma Scale (GCS) score at admission, patient age, gender, lesion size, midline shift, admitting diagnosis, past medical history (PMH), and the number of comorbidities.

Inclusion Criteria: •Patients aged 16 years or older •Confirmed diagnosis of traumatic brain injury (TBI) •Complete data records for all key features •Underwent assessment using the Johns Hopkins Highest Level of Mobility (JH-HLM) scale Target Variable: The primary outcome was the JH-HLM score, which was binarized into two categories: •Non-Mobile (0): JH-HLM score less than 4 •Mobile (1): JH-HLM score of 4 or greater Class Distribution: •Non-Mobile Group: 42 patients (31.3%) •Mobile Group: 92 patients (68.7%) Software and Data Analysis: •Tools: Python, Scikit-learn •Analysis Approach: o Conducted feature importance analysis to identify key predictors o Evaluated model performance using metrics such as accuracy, precision, recall, F1-score, and AUC-ROC

Results
Fig 1. Model Accuracy and Recall Scores The bar plot visualizes the performance of six different machine learning models in terms of two key metrics: accuracy and recall. These models were trained to predict whether patients fall into one of two categories based on their JH HLM scores: less than 4 or 4 and greater. The bar plot demonstrates that several models, particularly SVC, KNN, Random Forest, and XGBoost, perform well in terms of both accuracy and recall. This suggests they are reliable for predicting patient categories based on JH HLM scores. Logistic Regression also shows strong performance, while Naive Bayes, despite lower accuracy, maintains a high recall, making it useful in specific contexts.

Table 1. Model Performance Comparison Accuracy: Most models, such as SVC, KNN, Random Forest, and XGBoost, achieved high accuracy (0.9268), indicating they correctly predicted the outcomes for over 92% of cases. This high accuracy underscores the reliability of these models in general predictions. Precision and Recall: Precision values are consistently high across models, with Naive Bayes achieving the highest precision (0.9286). Recall is perfect (1.0) for several models, including SVC, KNN, Random Forest, and XGBoost, indicating these models are highly effective in identifying true positive cases of patient mobility. F1 Score: The F1 Score balances precision and recall, with most models showing a high F1 score (0.962), suggesting a robust performance in identifying true positives while minimizing false positives. However, the Naive Bayes model's F1 score is lower (0.7879), indicating potential trade-offs between precision and recall. AUC-ROC: The AUC-ROC values are notably lower, with some models performing at the level of random guessing (0.5). The Naive Bayes model stands out slightly with an AUC-ROC of 0.5088, but this still indicates limited discriminative ability. This discrepancy suggests a need to re-evaluate the models' capacity to distinguish between different levels of mobility accurately. Fig. 2 - Feature Importance Analysis This figure shows that the feature that influenced our output variable (JH-HLM Binarized) was "Age at Admission". Future models should focus on incorporating this feature and similar ones into their predictive analysis.

Conclusion
In Conclusion, our study on predicting Johns Hopkins Hospital Levels of Mobility (JH HLM) scores using machine learning models has revealed both promising results and important limitations. We've demonstrated that advanced algorithms like Random Forest and XGBoost can potentially aid in predicting patient mobility outcomes, which could significantly impact treatment planning and resource allocation in clinical settings. However, we must acknowledge the constraints of our current approach. The limited sample size of 134 patients and class imbalance in our target variable pose challenges to the model's generalizability. Moreover, the complexity of some models raises concerns about interpretability, a crucial factor in medical applications where transparency in decision-making is paramount. Moving forward, our research opens up several exciting avenues for future work. Expanding our dataset, addressing class imbalance, and exploring more interpretable models are key priorities. We also recognize the need for external validation to ensure our models perform consistently across diverse patient populations and healthcare settings. Ultimately, this study represents a significant step towards leveraging artificial intelligence in enhancing patient care. By continuing to refine our methods and addressing the limitations we've identified, we aim to develop robust, clinically relevant tools that can truly make a difference in patient outcomes.

Abstract Title: The Odds of Finding a Plastic Surgeon on TikTok

Investigator: Torres-Gomez, Jhobani
Mentor: Yifan Guo, MD
Department: Department of Surgery, Division of Plastic & Reconstructive Surgery
Co-Investigators: 1. Andrew Bahhouth, EVMS MD Program 2. William M. Lee, EVMS MD Program

Abstract

Introduction
In the past, physicians primarily relied on websites to advertise their practice to patients. With social media platforms becoming a predominant method to engage with the public, physicians are provided another outlet to give knowledge to clients and promote their practices. The issue with social media is that anyone could masquerade as a plastic surgeon and provide misinformation if their account fits the algorithm TikTok has in place. This study aims to see how many accounts that appear under a search term are plastic surgeons and promote content that is in scope for their practice. We collected analytics from accounts on TikTok between 10,000-100,000 followers to exclude niche accounts and influencers, over two weeks from June 30th, 2024 to July 16th, 2024.

Methods
We queried TikTok with several search terms like "labiaplasty" and "mommy makeover" based on the most popular procedures from the 2023 American Society of Plastic Surgeons Procedures Statistics Release. We recorded number of likes, total videos, and follower count. The accounts were split into plastic surgeon, non-plastic surgeon, and unrelated. Plastic Surgeons and Non-Plastic Surgeons were verified by their board certification and any physicians outside the US were excluded. Statistical analysis was run with Jamovi for frequencies of search terms and account types associated with search terms.

Results
Three Hundred and Seventy accounts were included in the study. Breast Augmentation was the search term with the most accounts with 30 accounts, Butt Lift was the search term that had the most plastic surgeons associated with 4 out of 13 accounts. Only 22 were associated with plastic surgeons (5.9%). Rhinoplasty had the most videos, Cheek Fat Removal had the highest follower count, and Eyelid Surgery had the most total likes on average.

Conclusion
Plastic Surgery is a popular topic on TikTok with many accounts associated with the most popular procedures and the different search terms having various levels of interest and engagement. Only 5.9% of accounts are associated with board-certified plastic surgeons, suggesting that most accounts associated with plastic surgery terms are not qualified to represent plastic surgery, making this media type not preferred for viewers.

Abstract Title: An Interesting Case of Pneumomediastinum and Review of Traditional Fluoroscopic Esophagram versus CT Esophagram.

Investigator: Trivedi, Shikha
Mentor: Christopher O'Neill, MD
Department: Department of Radiology
Co-Investigators: Dylan Steffey, MD, Resident, Department of Radiology

Abstract

Introduction
Pneumomediastinum is a generally uncommon entity, reportedly occurring in approximately 1/44,500 accidental and emergency attendances, and refers to air or other gases tracking into the mediastinum. There are multiple possible etiologies for this condition including posttraumatic, atraumatic, iatrogenic, and idiopathic causes. Not only are there multiple causes of pneumomediastinum, but there are also numerous sources of air/gas. For example, there may be a direct air leak into the mediastinum related to perforation of the larynx, trachea, bronchus, or esophagus. Alternatively, in the setting of rapidly increasing intrathoracic pressure, alveolar rupture may occur where gas dissects along the bronchovascular sheaths and spread into the mediastinum, commonly referred to as the "Macklin Effect". Still other sources including extension from the abdominal cavity via the diaphragmatic hiatus in the setting of perforated hollow abdominal viscera or along the fascial planes of the neck in the setting of facial trauma have been described. Pneumomediastinum in and of itself is often inconsequential and self-limited but can be the first signs of more serious etiology such as esophageal injury which can progress to life threatening complications. Diagnosis of pneumomediastinum can be made on ultrasound or conventional chest radiography, however relatively large volume is necessary to be seen on these modalities and thus most frequently identified on computed tomography (CT) imaging. Once identified, most patients will undergo fluoroscopic contrast esophagram or CT esophagram to evaluate for esophageal injury.

Case Information
Patient is a 71-year-old female with past medical history of hypertension and diabetes who presented to emergency department after presumed ground level fall with unknown down time. . Following standard trauma protocols, this patient underwent CT of the Chest, Abdomen, and Pelvis which was largely negative except for numerous small locules of gas tracking along the intercostal space, the posterior mediastinum, and into the central spinal canal. There were also subtle anterior endplate deformities of the T7 and T8 vertebral bodies raising the question of vertebral body fractures with possible esophageal injury from the fragments. Patient's initial hospital course was complicated by concerns for ischemic stroke and altered mentation. Stroke work up was negative. Patient underwent limited fluoroscopic esophagram which demonstrated no evidence of esophageal perforation and then subsequently underwent CT esophagram, which was also limited but did not definitively show an underlying injury. Patient reportedly remained asymptomatic during their hospital course, and no subsequent imaging has been performed.

Discussion/Clinical Findings
While pneumomediastinum can be seen as an incidental and self-limited finding, evaluation to rule out potential devastating sources such as esophageal injury is often necessary. Fluoroscopic esophagram performed with water soluble contrast has long been the gold standard for radiological evaluation of esophageal injury, however evaluations can often be limited secondary to patient condition (unable to stand, difficult to appropriately position, challenges complying with swallowing on command, etc) and requires direct involvement of a radiologist or other trained fluoroscopist and a radiology technologist to perform the exam. CT esophagram has been shown in multiple trials to be at least equal too, if not superior to, fluoroscopy in the evaluation of esophageal injury. Additionally, CT esophragram has shown to be better at predicting which cases would require intervention versus conservative management in a relatively small trial, as well as other diagnostically beneficial information. Nonetheless, CT esophragram is not without technical challenges as patient still needs to be relatively compliant and able to swallow on cue for optimal evaluation. Furthermore, the possibility of aspiration and subsequent negative sequala must be considered for both exams. Lastly, as CT esophagram is relatively new, one must consider that there may not be a standard protocol, there is variable acceptance among ordering providers, and there may be differences in interpretation among users.

Conclusion
In Conclusion, this is an interesting case of pneumomediastinum because of the lack of clear source or etiology. While the evaluations for esophageal injury were both somewhat limited; the otherwise negative exams, the lack of progression during hospitalization, and the relatively minor trauma may support an alternative etiology. The classic case scenario for spontaneous pneumomediastinum involves younger patients, typically thin, tall, males. Spontaneous pneumomediastinum is generally thought uncommon in the elderly given differences in physiology. However, could this be an atypical case of the "Macklin" effect, or self-limiting esophageal injury. Unfortunately, a definitive explanation is unlikely to be reached.

Abstract Title: Change in Heart: Traumatic left anterior descending arterial thrombus and dissection following blunt chest trauma in a patient requiring multiple interventions and ultimately a heart transplant: A case report.

Investigator: Trivedi, Shikha
Mentor: Christopher O'Neill, MD
Department: Department of Radiology
Co-Investigators: 1. Shikha Trivedi, EVMS MD Program 2. Fiora McRae, MD, Department of Radiology

Abstract

Introduction
Blunt chest trauma may provoke various thoracic and cardiac injuries. Rarely, patients may develop life threatening coronary artery injuries. Early detection is critical to reduce morbidity and mortality.

Case Information
A 24-year-old male presented to the emergency department with complaints of chest pain with breathing following blunt chest trauma sustained in a motorcycle accident in which he was thrown from his motorcycle. On exam, the patient was tachycardic with bruising noted to the right anterior lower ribs and tenderness to palpation overlying the anterior middle chest wall. The patient received trauma protocol CT scans of the head, cervical spine, and combined chest, abdomen, and pelvis. He was noted to have a non-displaced sternal fracture in addition to a right lower lung contusion and mild vertebral compression fractures at T4 and T6. Cardiac enzymes were initially mildly elevated with subsequent significant elevation with associated ECG changes. Echocardiogram revealed reduced biventricular function with a decreased ejection fraction. Coronary angiography demonstrated a left anterior descending thrombus with arterial dissection requiring thrombectomy and coronary artery stenting. Patient improved and was soon discharged home. Approximately one week later, the patient developed pericarditis with pericardial effusion and tamponade physiology requiring pericardiocentesis and pericardial window. His admission was further complicated by hemorrhagic shock and intra-abdominal bleeding requiring exploratory laparoscopy for control of the hemorrhage. The patient was eventually discharged with a LifeVest wearable defibrillator. Several months later, the patient presented to the emergency department for ventricular tachycardia arrest after removing his LifeVest to ride his motorcycle. Cardiothoracic surgery was consulted for cardiogenic shock, and the patient underwent Impella support and ultimately a heart transplant. His postoperative course was complicated by bradycardia requiring theophylline. The patient eventually improved and was discharged in stable condition with future consideration of a permanent pacemaker.

Discussion/Clinical Findings
While most patients do not undergo such a significant hospital course, it is imperative to suspect cardiac injury in a patient with blunt chest trauma to reduce morbidity and mortality. Chest trauma protocol with cross-sectional imaging combined with ECG, cardiac enzymes, and patient observation is essential in quickly recognizing cardiac injury.

Conclusion
Coronary artery injury such as thrombus and/or dissection following blunt chest trauma is an uncommon but life-threatening presentation. Appropriate imaging, ECG, and cardiac enzyme monitoring are critical in prompt recognition and diagnosis to prevent significant morbidity and mortality.

Abstract Title: Simulation of basic radiology procedures improves medical student confidence and knowledge.

Investigator: Ukekwe, Chukwuka
Mentor: Sarah Shaves, MD
Department: Department of Radiology
Co-Investigators: 1. Jacob Graham, MD, Department of Radiology Resident 2. Kevin Nguyen, MD, Department of Radiology Resident

Abstract

Introduction
Medical students desire competency in basic procedures to be successful in their future internships and residencies. However many students do not have experience performing these procedures, and subsequently lack confidence in most procedural skills. Education focused on developing procedural skills has been shown to increase medical student procedural proficiency and decrease procedure anxiety. As performing procedures - including lumbar puncture, biopsy, paracentesis, and thoracentesis - is a basic expectation of radiology residents, we endeavored to develop a curriculum to teach and simulate these procedures to medical students during their radiology rotation.

Methods
A standardized curriculum was developed in collaboration with radiology residents and faculty to emphasize specific learning objectives related to each of four procedures: fluoroscopically guided lumbar puncture, ultrasound guided paracentesis, ultrasound guided thoracentesis, and ultrasound guided fine needle aspiration. Two radiology residents demonstrated each of the aforementioned procedures on purpose-built phantoms while explaining the details of each procedure's indication, preparation, technique, risks, and expected outcome. The medical students were then given ample time to practice and gain familiarity with each of the procedures. To assess whether the hands-on procedure simulations were successful at increasing knowledge and confidence, the students were asked to participate in an anonymous pre-test and post-test, as well as complete a Likert scale evaluation to rate their subjective assessment of the experience.

Results
So far 11 medical students have participated in the experience. Our data demonstrates that total medical student performance regarding these procedures increased by about 25% following the simulation exercise. When analyzed separately, medical student knowledge increased for each of the simulated procedures. Furthermore, medical students reported a high amount of confidence in their procedural skills following the experience, with an average total rating of 4.7 out of 5 on Likert inventory questions asking participants to self-assess their understanding of the procedure, as well as their comfort level both performing the procedure under direct supervision, and explaining the procedure to a peer.

Conclusion
Gaining confidence and familiarity with common procedures can be an overlooked part of medical student education, specifically during radiology rotations. Our project demonstrates that near-peer education and coaching provided by radiology residents can serve to increase medical students' knowledge and confidence regarding common radiology procedures.

Abstract Title: The Cruciate Flap: A novel use of dual opposing A-to-T flaps for a Mohs defect of the mid-brow and forehead

Investigator: Vuturo-Brady, Caitlin
Mentor: James Bota, MD
Department: Mohs Surgery, Pariser Dermatology Specialists
Co-Investigators: Theodore Gutches, B.S., Pariser Dermatology Specialists

Abstract

Introduction
Defects involving multiple cosmetic subunits, particularly of the eyebrow and forehead, are common in Mohs micrographic surgery. An important consideration when repairing these defects is maintaining continuity in the positioning and hair direction of the mid brow, which is crucial for facial cosmesis, and respecting the borders of adjacent cosmetic subunits.

Case Information
A 67-year-old male was referred for Mohs micrographic surgery of a biopsy-proven basal cell carcinoma on the right eyebrow with a pre-operative size of 1.6 x 1.2 cm. The tumor was cleared in two stages with a postoperative defect measuring 2.0 x 1.4 cm, involving and extending into the majority of the mid-eyebrow and the lower forehead.

Discussion/Clinical Findings
A multi-tier approach involving dual, opposing A-to-T flaps-collectively termed the "Cruciate Flap"-was used to recruit temporal laxity to close the defect under minimal tension and restore the position of the mid-brow. Bilateral relaxing incisions were made along the relaxed skin tension lines of the superior border of the brow, and a standing cone was excised from both the superior and inferior aspects of the defect, allowing for closure of the portions of the defect that extended into the forehead and mid-eyebrow, respectively.

Conclusion
A variety of reconstructive options were considered, but a local advancement flap from the ipsilateral side was deemed most suitable to (1) match hair color, density, and directionality of the recipient site; (2) maintain symmetry of the brow shape and height relative to the contralateral brow; (3) maintain the position of the medial brow, which is most significant to cosmesis; (4) allow horizontal incisions to be hidden along the hairline of the eyebrow.

Abstract Title: Literature Review and Educational Symposium of Three Commonly Used PET Tracers: FDG, PSMA, and Dotatate

Investigator: Wagner, Madison
Mentor: Lester Johnson, MD, M.P.H.
Department: Department of Radiology
Co-Investigators: Philip Olivares, MD, Department of Radiology

Abstract

Introduction
Cancer is one of the leading causes of death worldwide, currently rated the first or second most common contributor to premature mortality in most countries. The global number of patients with cancer is expected to rise over the next 50 years, with some models predicting a doubling of incidence of all cancers combined by 2070 relative to 2020. Therefore, accurate diagnosis, staging, and restaging are essential for the optimal therapeutic management of cancer patients. Positron Emission Tomography (PET) continues to emerge as an imaging modality with reliable clinical value in the management of cancer patients. PET imaging utilizes radioactive molecules called radiotracers that can provide a higher level of detail of specific physiological processes over more conventional cross-sectional imaging. In many tumor types, the rate of glucose utilization is significantly enhanced compared to normal tissues. The altered metabolism of tumor cells can be detected by using radiotracers. Different types of tumors display varying affinity for different radiotracers; thus a range is available depending on the type of cancer being investigated. Facing the increasing worldwide prevalence of cancer, clinicians of all specialties should be familiar with commonly used radiotracers. The following is a literature review and educational symposium of three major PET radiotracers - FDG, PSMA, and Dotatate.

A comprehensive literature review was conducted using PubMed. The review included articles reporting FDG, PSMA, and Dotatate, summarizing the mechanism of action, indications, pathologic distribution, and unique areas of activity for each radiotracer. FDG is the most commonly used radiotracer for oncologic indications. It has high sensitivity for a wide variety of tumors but is not tumor-specific. It is used in the following cancers: lung, lymphoma, head and neck tumors, breast, esophageal, colorectal, pancreatic, gynecological, GU, and melanoma. Prostate specific membrane antigen (PSMA) is specific to prostate cancer. It is a protein found in normal prostate tissue but significantly over expressed in prostate cancer tissue. PSMA expression can also be found in the salivary and lacrimal glands, nasopharynx and larynx, liver, spleen, bowel, the kidneys and the sympathetic ganglia. PSMA uptake is also found in other tumors including glioblastoma, thyroid, breast, lung, colon and renal carcinomas. PSMA uptake is also seen in benign tumors, e.g., hemangiomas, thyroid and adrenal adenomas, schwannomas and desmoid tumors. It is also seen in some reactive/inflammatory conditions and Paget's disease. Dotatate is used for the assessment of well-differentiated neuroendocrine tumors (NETs). Dotatate is a somatostatin analog. It is beneficial for molecular imaging of NETs as most types demonstrate high levels of somatostatin receptor expression. Normal tissues with high physiological uptake of Dotatate include spleen, kidneys, liver, pituitary gland, thyroid gland, and adrenals. High uptake is also seen in the pancreas uncinate process.

Conclusion
The increasing incidence of cancers of all types places growing importance on utilizing accurate Methods for diagnosis and staging. PET-CT continues to emerge as a promising modality in the management of cancer patients. This presentation focused on a review of three commonly used radiotracers: FDG, PSMA, and Dotatate. FDG is the most commonly used radiotracer for oncologic indications. It functions as a marker of cellular metabolic activity and is sensitive for a wide variety of tumors, though not-tumor specific. PSMA and Dotatate function more as cellular markers and are more specific for prostate cancer and neuroendocrine tumors, respectively.

Abstract Title: Adolescent Perspectives of COVID-19's Impact on Sexual and Reproductive Health Services: A Qualitative Study

Investigator: Walia, Jashanna
Mentor: Tracy Fu, Ph.D.
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Co-Investigators: 1. Kyzwana Caves, MD, M.P.H., CHKD 2. Jeik Yoon M.S., Macon & Joan Brock Virginia Health Sciences at Old Dominion University 3. Christiana King M.S., Macon & Joan Brock Virginia Health Sciences at Old Dominion University 4. Katherine Johnson B.S., Macon & Joan Brock Virginia Health Sciences at Old Dominion University 5. Hongyun "Tracy" Fu Ph.D, Macon & Joan Brock Virginia Health Sciences at Old Dominion University

Abstract

Introduction
Despite numerous studies documenting the multifaceted effects that COVID-19 has had on U.S. populations, there has been limited research exploring its effect on adolescent sexual and reproductive health (SRH). This study investigates COVID-19's impact on adolescent SRH services and health outcomes through in-depth interviews (IDIs) with adolescents receiving care at outpatient facilities at a single coastal children's health care system.

Methods
We employed a purposive sampling method to recruit key informants for IDIs using four sampling criteria: 1) aged 13-19 years old; 2) had received reproductive health services (i.e. birth control, sexually transmitted infection testing, etc.) in the past year; 3) able to complete an interview in English; 4) provided informed consent. As of July 2024, semi-structured IDIs have been completed by trained medical students with 9 key informants via Zoom. Recruitment continues through the fall of 2024 with an anticipated sample size of 15 key informants. Thematic analysis was performed guided by the grounded theory.

Results
Adolescents reported seeking healthcare services less during COVID due to fear of contracting the virus, as well as noting that it was "a lot harder to get appointments". Most teens reported using contraceptives (e.g. Depo-Provera and birth control pills). Few teens received counseling about pregnancy or STI by their doctors. The vast majority experienced isolation brought on by COVID which triggered the onset of anxiety, depression, self-harm and suicidal tendency. Many noted: "after Covid hit, I just became a more quiet person", "I just feel like it made me depressed", and "it sent me into a bad depressive episode". Several teens reported parental bereavement, adverse childhood experience, substance use, commercial sex work, use of dialectical behavior therapy, and other treatments since the COVID-19 pandemic.

Conclusion
Findings revealed significant unmet needs for SRH education, counseling and screening services among teens during and post COVID-19 pandemic, as well as syndemics of substance use, ACE, and mental health decline among adolescents who received SRH services.

Abstract Title: Elucidating Fungal Laryngitis Associated with Inhaled Corticosteroids

Investigator: Yang, Anna
Mentor: Benjamin Rubinstein, MD
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Co-Investigators: 1. Sara Sun, MD, Resident Physician, Department of Otolaryngology 2. Suhas Bharadwaj, MD, Resident Physician, Department of Otolaryngology 3. John Sinacori, MD, Department of Otolaryngology

Abstract

Introduction
Inhaled Corticosteroids (ICS) are widely used therapeutics, commonly used for disorders such as asthma, chronic obstructive pulmonary disease (COPD), and vocal process granulomas. Side effects seen in users of ICS include dysphonia, chronic cough, sore throat, odynophagia, and dysphagia. One of the most commonly reported side effect is dysphonia, with up to 58% of users reporting a change in voice. These unwanted effects may be caused by fungal laryngitis. The actual rate of fungal laryngitis in ICS users is unclear, with values ranging from 0 - 77% in current literature. Reasons for this lack of clarity include subtle and variable findings on exam, lack of existing information associating fungal laryngitis and laryngoscope findings, empiric treatment, and lack of referrals for laryngoscopy.

Methods
In order to determine within ICS users, the true prevalence and laryngeal features of fungal laryngitis, a prospective observational cohort study aimed to recruit 50 subjects with 5 controls. Patients using a regiment of daily ICS for at least a month, were recruited from the Sentara Pulmonary Specialists and screened using inclusion & exclusion criteria. Identified subjects visited the EVMS Otolaryngology Clinic for single in-office visit and completed questionnaires (including the voice handicap index (VHI)), a fungal culture, and a scope exam.

Results
From May 2024 to July 2024, 30 patients meeting the ICS criteria were screened, 8 consented, and 1 completed their in-office visit.

Conclusion
Recruitment and completion of in-office visits will continue in 2024 until the recruitment goal of 50 patients is achieved. Information collected through the questionnaires and laryngoscopy will be reviewed and evaluated. The association between these findings and those seen with culture data will help establish an informative framework for diagnosing and establishing prevalence of fungal laryngitis in ICS users.

Abstract Title: Comparative Analysis of PCR and Standard Urine Culture in Detecting Uropathogens and Antibiotic Resistance in Urinary Tract Infections

Investigator: Yoon, Jeik
Mentor: Ilya Sobol, MD
Department: Department of Urology
Co-Investigators: 1. Emily Sheetz, EVMS MD Program

Abstract

Introduction
Urinary tract infections (UTIs) are among the most prevalent bacterial infections, with an estimated 150 million cases occurring annually worldwide. The rising incidence of antibiotic resistance poses a significant challenge, with studies showing resistance in over 90% of samples to at least one drug and 80% to two or more. Traditional diagnostic methods like standard urine culture (SUC) have been the gold standard for identifying uropathogens and determining antibiotic susceptibility. However, advances in diagnostic techniques such as Polymerase Chain Reaction (PCR) offer higher sensitivity, specificity, and faster Results, potentially improving diagnostic accuracy. This study aimed to evaluate the agreement between antibiotic resistance genes (ABR) detected by PCR and antibiotic susceptibility Results from SUC within the Hampton Roads community to determine the value of integrating these diagnostic methods for improved patient outcomes.

Methods
This retrospective study analyzed patient data from Urology of Virginia, focusing on individuals who underwent both PCR analysis and SUC between January 1, 2022, and February 23, 2024. The study included patients presenting with persistent or recurrent UTIs or those requiring routine analysis before surgical treatment. Exclusion criteria included patients on antibiotics for reasons other than UTIs or those with an indwelling catheter for more than 10 days. Pooled antibiotic susceptibility testing (P-AST) was conducted on bacteria identified by PCR, and concordance between ABR genes detected by PCR and SUC Results was calculated. Data extracted from electronic medical records included bacteria and ABR genes identified by both methods, along with antibiotic sensitivity and bacterial colony counts.

Results
The study analyzed 145 patient charts, with PCR showing positive Results in 40.7% of cases and SUC in 41.4%. In 31.7% of cases, both PCR and SUC were positive, and in these instances, antibiotic treatment based on PCR was implemented in 89.13% of cases. Notably, when PCR was positive and SUC was negative, the detected uropathogens were generally more virulent, such as Aerococcus urinae and Corynebacterium. Conversely, when PCR was negative and SUC was positive, the identified uropathogens were often less virulent, including Staphylococcus epidermidis and Enterococcus faecium. This pattern underscores the complementary nature of PCR and SUC: PCR may detect more virulent pathogens that SUC misses, while SUC may identify less pathogenic organisms overlooked by PCR. Additionally, yeast was detected in 3.45% of cases, with PCR identifying specific Candida species. There were also instances where PCR did not detect resistance genes identified by SUC, particularly for antibiotics such as ampicillin, levofloxacin, and ciprofloxacin.

Conclusion
This study demonstrated comparable positive detection rates between PCR and SUC in diagnosing UTIs, highlighting their diagnostic effectiveness. PCR proved valuable in guiding antibiotic treatment due to its rapid and detailed identification of resistance genes, although discrepancies between PCR and SUC Results underscore the importance of using both methods. While PCR showed higher sensitivity for detecting certain pathogens, SUC remained essential for identifying less virulent organisms and confirming antibiotic resistance. The integration of PCR and SUC in clinical practice could enhance the accuracy of pathogen detection and antibiotic resistance profiling, ultimately leading to more effective treatment strategies and better patient outcomes.

Abstract Title: Effects of Picosecond Pulsed Electric Field Delivery on Differentiation State of Induced Pluripotent Stem Cells

Investigator: Zamponi, Martina, Ph.D.
Mentor: Peter Mollica, Ph.D.
Department: Department of Biomedical & Translational Sciences
Co-Investigators: Mackenzie Tardif, Ph.D., Department of Biomedical & Translational Sciences

Abstract

Introduction
Induced pluripotent stem cells (iPSCs) are a widely utilized cellular model in regenerative medicine. Their ability to differentiate into any adult cell type makes them an extremely versatile tool for the development of cellular models for any tissue in the body. Currently, the standard Methods for the derivation of differentiated cell types from iPSCs entail a combination of biomechanical and biochemical stimuli delivered in vitro. Our laboratory has previously shown that electro-stimulation of neural stem cells can be achieved in vitro via the delivery of pulsed electric fields in the picosecond range, resulting in metabolic and gene expression changes in the treated cells. Of particular interest was the upregulation of genes associated with terminal neural differentiation. The ability to stimulate stem cells in a non-contact manner, and without relying on chemically induced differentiation, could lead to novel neural and tissue engineering techniques. Here, we explored the effects of picosecond pulsed electric field delivery on induced pluripotent stem cells, and whether electro-stimulation of undifferentiated cells affects their lineage commitment.

Methods
A commercial 3D printer model, Felix 3.0 (FELIXrobotics, Ijsselstein, Netherlands), was adapted in our laboratory to enable the delivery of pulsed electric fields to biological cells in vitro, in a controlled and non-contact manner. The electrode configuration consisted of a coaxial cable transitioning into a pair of electrodes, which were consequently fixed to the head of the 3D printer. The picosecond pulses were generated by a 10 kV pulser (FID GmbH, Burbach, Germany) with a repetition rate of 1 kHz. Wild type pluripotent stem cells were previously generated in our laboratory from a human breast adipose tissue cell line. Cells were cultured and maintained in their undifferentiated state until treatment with pulsed electric fields at varying intensities: 20, 40 or 100 kV/cm. Following treatment, differential gene expression of control and treated cell populations was measured. Gene expression data were obtained through RNA extraction and purification, cDNA synthesis, and Real-Time quantitative PCR assays. Gene expression analysis was conducted using the $2^{-\Delta\Delta Ct}$ of the average Ct for each subsample.

Results
Expression of all the pluripotency genes taken into consideration was upregulated following pulsing at 20kV/cm. A non-significant downregulation of the same target genes was observed when cells were pulsed at the higher intensities of 40kV and 100kV.

Conclusion
We observed a significant elevation of gene expression markers associated with pluripotency when 20kV pulses were applied, and a slight but not significant elevation at higher pulse intensities. Moreover, significant downregulation of germ layer markers, associated with stem cell differentiation, was observed when 40kV picosecond pulses were delivered. Finally, we showed that delivery of multiple pulses does not have a significant impact in the alteration of pluripotency markers expression.

Overall, we show that picosecond pulse delivery has a protective effect and promotes the maintenance of pluripotency in iPSC colonies.

Abstract Title: Differential Effects of Spaceflight Hazards on Gross Sensorimotor Function in Male Mice

Investigator: Colliver, Anneliese
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Abstract

Introduction
Astronauts will be exposed to space radiation (SR) during lengthy space expeditions like the planned Mars missions. Because the effects of SR cannot be studied experimentally in humans, our understanding of its effects depends on animal models. Using the balance beam (BB) task to test gross motor function, we have seen that SR causes substantial handicaps in rat performance. Studies are needed in additional animal models in order to fully understand the effects of SR on motor function in ways that will provide better insight into how SR may impact astronauts on deep space missions. In this study, we are comparing gross motor function and learning in mice and rats while also considering emotional and cross-species factors that may impact performance.

Methods
Male outbred, retired breeder C57BL/6 strain mice served as subjects. Animals were 8-9 months old at the start of study. Prior to behavioral experiments, mice were exposed to 15 cGy GCRsim and were individually housed (SR), or were individually housed (control; SHAM). At least 90 days following irradiation, time and age matched groups of mice began the BB task to assess gross motor function. The BB task uses a 1 meter long, 0.635 cm wide beam divided/marked lengthwise in equivalent sections (1, 2, 3, and 4/platform) and requires mice to traverse from a starting point to a goal box. When the animal is placed on the beam, the trial begins. The trial is considered over when the mouse has either succeeded (reached the goal box) or failed (fallen off the beam or 120 seconds has elapsed). They then return to their home cage for a 5 minute intertrial interval. Mice are trained starting at position 1 (closest to the goal box). If they succeed (all four paws reach the goal box) the next trial will start 1 position farther from the goal box (and so on to position 4), if they fail (120 second timeout or the mouse falls off) the next trial will start 1 position closer to the goal box (or position 1). This task consists of five trials per day for seven consecutive days.

Results
Male outbred, retired breeder C57BL/6 strain mice served as subjects. Animals were 8-9 months old at the start of study. Prior to behavioral experiments, mice were exposed to 15 cGy GCRsim and were individually housed (SR), or were individually housed (control; SHAM). At least 90 days following irradiation, time and age matched groups of mice began the BB task to assess gross motor function. The BB task uses a 1 meter long, 0.635 cm wide beam divided/marked lengthwise in equivalent sections (1, 2, 3, and 4/platform) and requires mice to traverse from a starting point to a goal box. When the animal is placed on the beam, the trial begins. The trial is considered over when the mouse has either succeeded (reached the goal box) or failed (fallen off the beam or 120 seconds has elapsed). They then return to their home cage for a 5 minute intertrial interval. Mice are trained starting at position 1 (closest to the goal box). If they succeed (all four paws reach the goal box) the next trial will start 1 position farther from the goal box (and so on to position 4), if they fail (120 second timeout or the mouse falls off) the next trial will start 1 position closer to the goal box (or position 1). This task consists of five trials per day for seven consecutive days.

Conclusion
We have implemented BB tests to assess gross motor performance and learning in mice and rats. Our preliminary data shows that differences in behaviors like fear responses and exploration will be important for understanding how the effects of SR impact animal model performance on tests like the BB. This data will help provide critical ground-based models of spaceflight hazards to better understand the effects of SR on astronauts during long-duration space flights and deep space missions.

Abstract Title: Implementing School-Based Comprehensive Sex Education among Adolescents in Norfolk - Findings from the Sixth Grade Program

Investigator: Johnson, Nikia
Mentor: Tracy Fu, Ph.D.
Department: Department of Pediatrics, Community Health & Research
Co-Investigators: 1. Morgan Ellis, Teen Health 360 Summer Scholar 2. Brianna Marshall, Teen Health 360, Program Assistant 3. Anne Moriarty, Teen Health 360, Program Assistant 4. Kelli J. England, Department of Pediatrics, Community Health & Research 5. Amy C. Paulson, Department of Pediatrics, Community Health & Research 6. Matthew C. Herman, Department of Pediatrics, Community Health & Research

Abstract

Introduction
High rates of teen pregnancy and sexually transmitted infections (STIs) have been consistently reported in Eastern Virginia. Access to comprehensive sex education (CSE) for adolescents is limited due to socioeconomic, cultural, and structural barriers. EVMS Pediatrics Department collaborated with Norfolk Public Schools (NPS) to Implement the Get Real Comprehensive Sex Education That Works curriculum as a Family Life Education (FLE) Course in Middle Schools and High Schools. This study examined the effect of the program on sexual health knowledge among Grade Six program participants.

Methods
Get Real was implemented as the first round school-based FLE at NPS in nine middle schools in May/June 2024, using a parent opt-out scheme. Academy sessions were delivered in-person by trained NPS Health and Physical Education teachers, covering nine lesson topics: classroom climate; communication and refusal skills, relationships and boundaries, anatomy, reproduction, and body parts; puberty, abstinence, decision making and values, Conclusion and review. Program monitoring data were collected using pre- and post-assessments, fidelity logs and feedback forms. Descriptive statistics and regression analysis were performed to examine differences in sexual health knowledge between pre- and post-assessment, and differential changes across sub-group of program participants.

Results
A total of 977 Six Grade program participants completed the pre-assessment, and 822 (84%, 844/977) completed the post-assessment. Significant increases were revealed from pre to post-assessment among participants in knowledge about relationship and sexual consent (mean scores: 6.23 vs 7.43, $P<0.001$), anatomy and reproductive system (mean scores: 2.92 vs 3.83, $P<0.001$); and a significant increase in the proportion of students who achieved 75% accurate answers (23.4% vs 49.8%, $P<0.001$). The extent of increase in knowledge about relationships and sexual consent was larger among students who self-identified as gender minority (23%), relative to those who self-identified as females (20%) and males (18%) ($P<0.001$).

Conclusion
The study revealed significant increase in knowledge about puberty, development, reproduction, relationship and communication among Grade six program participants. Findings indicated that it is feasible and effective to implement school-based CSE intervention to improve adolescents' knowledge about sexual health and communication needed to maintain their health.

Abstract Title: Effects of sleep fragmentation and high-fat diet on prostate pathology in mouse models

Investigator: Julianingsih, Dita
Mentor: Petra Popovics, Ph.D.
Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1. Samara Silver, Department of Biomedical & Translational Sciences, Leroy T. Canoles Jr. Cancer Research Center 2. Adnan Alsamaraee, Department of Biomedical & Translational Sciences, Leroy T. Canoles Jr. Cancer Research Center 3. Mariah Jensen-Wachspress, Department of Biomedical & Translational Sciences, Leroy T. Canoles Jr. Cancer Research Center 4. Petra Popovics, Department of Biomedical & Translational Sciences, Leroy T. Canoles Jr. Cancer Research Center

Abstract

Introduction
Benign Prostate Hyperplasia (BPH) poses a significant health burden among aging males, impacting urinary function and quality of life. While the etiology of BPH is multifactorial, emerging evidence suggests that lifestyle factors such as sleep quality and dietary habits play crucial roles in its pathogenesis. Sleep fragmentation, a common occurrence driven by factors like shift work, stress, and age-related sleep disturbances, has drawn attention for its association with various adverse health outcomes. Individuals with BPH may experience sleep fragmentation due to the need to wake up frequently during the night to urinate, further disrupting their sleep patterns. Chronic sleep fragmentation induces systemic inflammation, which may worsen prostatic inflammation, promote fibrosis development and contribute to BPH progression. Moreover, high-fat diet can induce systemic inflammation and alter hormonal profiles, potentially influencing prostate tissue remodeling and hyperplasia. This study aimed to determine the impacts of sleep fragmentation and high-fat diet on BPH-related pathologies using mouse models. We aimed to provide insight into the underlying mechanisms linking lifestyle factors to BPH pathogenesis by characterizing immune cell infiltration, collagen accumulation, and lipid droplet deposition in prostate tissue.

Methods
Sleep fragmentation was conducted on three-month-old black 6 (C57BL/6J) mice in a sleep fragmentation chamber with a rod moving every two minutes during sleep period, from 6am-6pm, for three months. To explore the impact of a high-fat diet on benign prostatic hyperplasia (BPH), two-month-old mice were fed with a high-fat diet comprising 60% fat, 20% protein, and 20% carbohydrates for a duration of 4 months. Control mice were maintained on a standard diet. Immunohistochemistry (IHC) with CD45 antibody was employed to evaluate immune cell infiltration in the anterior, dorsal, ventral, and lateral prostate lobes. Collagen accumulation was assessed using Picrosirius staining (PSR) for sleep fragmentation groups, while lipid droplets were analyzed using Oil Red O staining for high-fat diet groups. Statistical analysis was performed using the Mann-Whitney test.

Results
In mice with sleep fragmentation, significant elevation in CD45-positive immune cells was observed across all prostate regions compared to sham groups ($p < 0.05$). However, collagen accumulation was not changed significantly. In mice subjected to a high-fat diet, a significant increase in CD45-positive immune cells was observed in all prostate regions compared to controls ($p < 0.001$). Lipid droplet accumulation was significantly higher in the ventral (2.44-fold, $p < 0.05$) and anterior prostate (3.19-fold, $p < 0.05$) compared to sham groups, indicative of metabolic perturbations induced by high-fat diet. Collagen level was only significantly elevated in the lateral lobe (1.28-fold, $p<0.05$).

Conclusion
Our findings indicate that both sleep fragmentation and high-fat diet contribute to inflammation in mouse models, as evidenced by increased immune cell infiltration and tissue remodeling. Additionally, a high-fat diet induces notable lipid metabolic alterations and influences the development of fibrosis. These Results underscore the complex interplay between lifestyle factors and BPH pathogenesis.

Abstract Title: Connecting the Dots: Provider Characteristics and Perceptions of HIV Care Barriers in Virginia

Investigator: McKeithan, Vonda
Mentor: Catherine Derber, MD
Department: Doctor of Medicine, Division of Infectious Diseases

Abstract

Introduction
Social Determinants of Health (SDOH) significantly impact HIV care outcomes, yet their integration into clinical practice remains challenging. This study investigated the perceptions, attitudes, and practices of HIV healthcare providers regarding SDOH in Virginia, addressing a critical gap in understanding the barriers to comprehensive HIV care.

Methods
A cross-sectional, web-based survey was conducted among 124 HIV healthcare providers in Virginia (response rate: 32.8%). The survey instrument, developed through expert consultation and pilot testing (Cronbach's $\alpha = 0.86$), assessed providers' SDOH-related perceptions and practices. Data were analyzed using descriptive statistics, bivariate analyses, and multiple linear regression.

Results
While providers widely acknowledged SDOH importance ($M = 3.93$, $SD = 1.19$ on a 5-point scale), significant discrepancies emerged between recognition and action. Housing insecurity (24.9%), financial instability (18.7%), and food insecurity (15.0%) were identified as primary SDOH barriers. Provider characteristics, including race, job role, and geographic location, significantly influenced SDOH perceptions ($p < 0.05$). Key barriers to SDOH integration included time constraints, lack of standardized screening tools, and limited reimbursement for SDOH-related activities.

Conclusion
This study reveals a complex landscape of provider perspectives on SDOH in HIV care, highlighting a critical gap between awareness and practice. Findings underscore the need for tailored educational interventions, standardized SDOH screening tools, and policy changes to facilitate SDOH integration in HIV care settings. By elucidating provider-level barriers, this research informs targeted strategies to enhance SDOH consideration in clinical practice, potentially improving HIV care outcomes and reducing health disparities.

Abstract Title: Planaria as an invertebrate model for experimental acute seizure

Investigator: Miller, Taylor
Mentor: Alberto Musto, MD, Ph.D.
Department: Department of Biomedical & Translational Sciences
Co-Investigators: 1. Jenny Vu 2. Charles J. Tran, MD canidate 3. Abheek Ritvik, Department of Biomedical & Translational Sciences 4. Kaleem Haq 5. Bernadette Musto

Abstract

Introduction
Epilepsy is one of the most prevalent neurological disorders, characterized by recurring spontaneous seizures. These seizures result from uncontrolled and excessively synchronized neural activity and are the primary manifestation of epilepsy. Although antiseizure medications (ASMs) are effective in controlling seizures, there remains no fully effective therapy for epilepsy, highlighting the urgent need for new treatments with minimal side effects. Current ASMs, while attenuating seizure activity, often come with adverse effects and do not provide a complete cure. The first step in drug discovery for epilepsy involves evaluating potential candidates in preclinical in vitro and in vivo models to assess their susceptibility to seizures. This process is complex, requiring substantial infrastructure, specialized tools, and significant expenses. Traditional models used in this process, such as murine models, are costly and resource intensive. To address these challenges, we identified Dugesia dorotocephala, a species of planarian worm, as a potential invertebrate model for epilepsy research. Planarians possess neural structures that share similarities with vertebrate systems, making them suitable for screening compounds that may affect neural activity and seizure susceptibility. This study aimed to evaluate whether Dugesia dorotocephala could serve as a viable model for studying acute seizures and contribute to the identification and development of new ASMs.

Methods
Planarians (Dugesia dorotocephala) were placed in separated wells and exposed to different concentrations of pilocarpine solutions to induce seizure-like behaviors. Video-recording system were used to record spontaneous and induced behavior. To evaluate behavior responses against ASMs, planarians were subsequently exposed to pilocarpine followed by increasing concentrations of lamotrigine (ASM, blocks sodium channels, and expressed in planarias). The behavioral responses were analyzed using automatic video tracking software and quantified based on parameters shape, motility, frequency, duration, and rotation direction. In addition, the morphology of the nerve fibers was analyzed using Golgi staining and immunohistofluorescence techniques and analysis using cell profile and Image J programs.

Results
The study identified six distinct behavioral phenotypes in response to pilocarpine, with ODE being the most prominent and increasing in frequency in a dose-dependent manner: oscillating dorsal expansion (ODE), head and tail dorsal expansion, C-shape, head flick, and tail flick. lamotrigine mainly at doses 4 and 6mM resulted in a significant attenuation of ODE and other seizure-like behaviors. Preliminary neurohistological analysis revealed nerve damage in pilocarpine-exposed planarians but is preserved after lamotrigine treatment.

Conclusion
The findings of this study support the use of Dugesia dorotocephala as a model for studying acute seizures and screening potential ASMs. The planarian model not only offers a cost-effective alternative to traditional vertebrate models but also provides valuable insights into the neural mechanisms underlying seizure activity. Further histological and genetic studies are recommended to fully explore the potential of Dugesia dorotocephala in the development of therapeutic interventions for epilepsy in humans.

Abstract Title: Comparative Analysis of RNA Seq and PCR Array Data Implicates BDNF as a Potential Therapeutic Target for Alzheimer's Disease

Investigator: Owens, James
Mentor: Frank Castora, Ph.D.
Department: Department of Biomedical & Translational Sciences

Abstract

Introduction
A mutation in mitochondrial DNA (mtDNA) that is strongly associated with Alzheimer's disease (AD) has been discovered by the Castora lab. This T9861C mutation changes a phenylalanine into a leucine at amino acid position 219 of cytochrome c oxidase subunit 3, resulting in a significant reduction of cytochrome oxidase activity. Effects of this mutation on gene expression in AD brains have previously been studied using PCR array analysis and more recently using RNA bulk sequencing. The genes included in the array analysis focused on mitochondrial function and ATP production while the RNA bulk sequencing analysis included all cellular RNA species. In this study, we compared all data from both analysis Methods to better understand the effects of the mutation on gene expression in AD brains and to identify potential therapeutic targets for AD and AD+ patients.

Methods
Qiagen Ingenuity Pathway Analysis (IPA) software was used to analyze the data for each gene as three expression log ratios: AD brains/control brains, AD+ brains/control brains, and AD+ brains/AD brains. These ratios were run through an IPA core analysis filtered to only include genes whose expression log ratios were between -2.0 to 2.0 in the comparisons. IPA connected the PCR Array and RNA Bulk datasets to findings from literature stored in IPA's knowledge base and identified relationships, pathways, mechanisms, and functions relevant to each dataset. The two analyses were compared. Regulator effects were grown to connect with other molecules, and the downstream and upstream effects of activating and inhibiting molecules were observed using the molecule activity predictor (MAP). We created a pathway using regulators and molecules, in the datasets, directly related to AD and used MAP to identify potential therapeutic targets.

Results
Our IPA analysis identified the top canonical pathways related to the genes in the datasets, the most expressed regulators in the datasets, the top diseases and functions affected by the expression of the genes in the dataset, and the downstream and upstream effects of the changing expression of genes in the dataset. The RNA bulk sequencing analysis provided more data, resulting in IPA returning more canonical pathways; regulators, regulator effects; diseases and functions related to the genes in the datasets. However, these Results were less statistically significant than those returned by the PCR array analysis. Another difference between the datasets was that the AD/Control ratio was the most statistically significant between the three for PCR array analysis while AD+/Control was the most statistically significant for RNA bulk sequencing analysis.

Conclusion
The difference in the amount of data and statistical significance provided by the RNA bulk sequencing analysis and the PCR array analysis provides evidence that the focused number of genes in the PCR array analysis Results in greater statistical significance while sacrificing breadth. Through exploring the relationships between and manipulating the expression of regulators, molecules, and diseases retrieved from IPA's database for the two datasets, we identified activating brain derived neurotrophic factor (BDNF) as the most effective therapeutic approach for inhibiting Alzheimer's disease. BDNF will be added to a mathematical model to evaluate and optimize the therapeutic potential of activating BDNF to significantly inhibit AD in patients, including those possessing the T9861C mtDNA mutation.

Abstract Title: Differential Effects of Spaceflight Hazards on Fine Sensorimotor Function in Male Mice

Investigator: Wellman, Teagan
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Abstract

Introduction
During future proposed space expeditions to Mars, astronauts will be exposed to approximately 13cGy of space radiation (SR) annually. SR affects multiple systems in ways that can negatively impact mission performance including fine sensorimotor function. Our lab has shown that SR has differential effects on fine motor performance in male rats, but cross-species data are needed to fully understand and model the impact of SR in ways that are applicable to astronauts. In this study, we implemented the bilateral tactical adhesive removal (BTAR) task, a test of fine motor control, in mice to provide comparison data for prior studies in rats. We also describe modifications required to conduct BTAR in mice and are obtaining data for cross-species comparisons.

Methods
Male outbred, retired breeder C57BL/6 strain mice served as subjects. Animals were 8-9 months old at the start of the study. Prior to behavioral experiments, mice were either individually housed and received 15 cGy GCRsim (SR) or were individually housed (control group; SHAM). At least ninety days following irradiation, time and age matched groups of mice were assessed on the BTAR task during the 7th hour of "lights on". The task required the animal to remove an adhesive sticker applied to the hairless area on their forepaw within 120 seconds. Two trials a day for each forepaw (alternating right and left), with an intertrial interval of 5 minutes, was performed over 4 consecutive days.

Results
The utilization of the mouse model presented challenges. The equipment needed to be downsized; however, the smaller size introduced new difficulties. The mice were able to intentionally remove their sticker before being put into the observation container by clenching their forepaw, a behavior not previously observed in rats. Interestingly, this occurred more often by the SR mice than the SHAMs. Moreover, a greater number of personnel were needed to run the task and observe behaviors and when the sticker was noticed/removed. Unfortunately, the smaller size of the mouse and sticker resulted in null trials, where none of the personnel were able to detect when a sticker fell off. In addition, looking at observed behaviors, SHAM mice had nearly 16 times more recorded aggressions than their SR counterparts when placing the sticker, and both expressing more aggression than rats. While preliminary, data so far shows that SR mice have a shorter average notice and average removal time when compared to Resilient and Vulnerable SR and SHAM rats.

Conclusion
This study presents modifications and considerations needed to conduct the BTAR task in rats and mice and to perform cross-species comparisons. Some modifications were required due to the differences in size between rats and mice, but some may also be due to species-specific behaviors. Mice and rats are both used in ground-based models of spaceflight hazards including SR, and determining their similarities and differences will be critical for better understanding the effects of SR as NASA prepares astronauts for long-duration, deep space missions.

Abstract Title: Using Endobronchial Ultrasound-Guided Forceps Biopsy to Improve Yield of Rapid On-Site Examination During Bronchoscopy

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Abstract

Introduction
The diagnostic yield of endobronchial ultrasound-guided fine needle aspiration (EBUS-FNA) can approach 72-95% in mediastinal and hilar lymph nodes. However, these percentages refer to the final diagnosis made by the pathologist after the procedure is completed. Rapid On-Site Evaluation (ROSE) is used during the procedure to obtain a preliminary pathology report. When performed on FNA samples, ROSE is frequently non-diagnostic, compelling the bronchoscopist to sample additional lymph nodes or switch modalities to navigational bronchoscopy for direct sampling of the lesion. Here, we investigate the utility of performing intranodal forceps biopsies under EBUS guidance to improve the diagnostic accuracy of ROSE.

Methods
42 adult patients with mediastinal or hilar lymphadenopathy were included in this single-center retrospective study with procedure dates between February 2021 and January 2023. A single bronchoscopist performed all procedures. After identification of the pathologic lymph node(s), EBUS-FNA sampling was performed with samples being evaluated by ROSE. If these specimens were non-diagnostic, then intranodal forceps biopsy was attempted. When successful, forceps biopsies underwent ROSE as well. The diagnostic sensitivity for biopsy ROSE was calculated using the final pathology reports as the "gold standard" for diagnosis.

Results
In our 42 patients, 43 lymph nodes underwent forceps biopsy. 83% (36/43) of the lymph nodes sampled had ROSE performed on both FNA and the biopsy. In 34 of the 36 cases, the reason for biopsy was a non-diagnostic FNA. Of these, 17 (50%) had a positive biopsy ROSE. In one patient, there was a false positive with ROSE of the biopsy being read as "lesional cells", but the final pathology having a diagnosis of "reactive cells." When used as an add-on procedure for negative FNA ROSE, intranodal forceps biopsies had a sensitivity of 61.5%, specificity of 87.5%, positive predictive value of 94.1%, and negative predictive value of 41.2%. No complications were attributed to the intranodal forceps biopsies.

Conclusion
While EBUS-FNA is an excellent diagnostic tool, false negative preliminary Results on ROSE frequently occur. Our study shows that intra-nodal forceps biopsy can be performed safely and effectively on a wide array of mediastinal lymph node stations, and that it can improve the immediate diagnostic yield of ROSE. In our experience, the use of intranodal forceps biopsy as an add-on procedure for negative FNA ROSE reduced the need for additional procedures in approximately 50% of cases. Further studies are recommended to generalize these findings as well as investigate the overall meaningful clinical benefits of intranodal forceps biopsy.

Abstract Title: Venom in the Garden: A Copperhead Snakebite

Investigator: Ahn, Jaeun, MD
Mentor: Sami Tahhan, MD
Department: Department of Medicine, Division of Cardiology

Abstract

Introduction
Snakebite evaluation and management review with a Copperhead snakebite

Case Information
A 46-year-old male presented for worsening swelling and pain from a copperhead snake bite on his left palm, extending up to his left shoulder. On the prior day, he had initially been admitted to another hospital for the same snakebite but with only minor swelling and pain in his palm (Figure 1). Poison Control recommended reserving antivenom for symptom progression, and he left AMA. Upon arrival here, his entire left upper extremity was swollen and tender up to the shoulder without ecchymosis or bleeding and with soft compartments (Figure 2). Laboratory findings were unremarkable except for slightly elevated d-dimer. Despite antivenom therapy, diffuse edema worsened, limiting elbow flexion from swelling and pain. The affected arm was positioned below the level of his heart per Poison Control. His CBC, CPK, and coagulation studies remained stable. 48 hours after envenomation, his swelling decreased to mid-forearm level, and he was discharged without complications.

Discussion/Clinical Findings
Almost 5000 venomous snake bites are reported yearly, mostly from Crotalinae snakes (rattlesnakes, cottonmouths, and copperheads), with copperheads causing about half. While 25% of bites involve no venom and result in only local irritation needing supportive care, envenomation raises the main concern for hemotoxicity (for rattlesnake, cottonmouth, copperhead) and neurotoxicity (for rattlesnakes, coral snakes), in addition to local tissue damage, bleeding tendency, rhabdomyolysis, compartment syndrome, gastrointestinal distress, and shock although true anaphylaxis is rare. Venom from these snakes contains toxic compounds like phospholipase, metalloproteinases, and etc. Bites with envenomation typically show two puncture wounds and have local toxicity in over 90% of cases, with pain, swelling, erythema, and ecchymoses developing within an hour or more. Proximal spread of swelling or tenderness signals progressive envenomation, requiring antivenom treatment. Hemotoxicity includes prolonged PT, thrombocytopenia, and hypofibrinogenemia and is monitored with CBC, fibrinogen, and PT/INR, though life-threatening bleeding is rare. Neurotoxicity is uncommon but can cause paresthesia and myokymia with rattlesnake bites, and delayed weakness beginning with ocular and bulbar weakness with coral snake bites, necessitating observation for 24 hours. Airway monitoring is crucial, as myokymia, bulbar symptoms, or face/neck bites can lead to airway compromise. Additional tests like Chest X-ray, EKG, creatine kinase, and BMP are warranted for systemic toxicities, such as hypotension and rhabdomyolysis. Consultation with a toxicologist or poison control center is advised for all snake bites. Antivenom therapy is recommended for the proximal spread of local reaction, hemotoxic, neurotoxic, or systemic venom effects. It functions through the fragment antigen binding (Fab) portion of digested IgG antibodies, neutralizing the venom. However, it may lead to acute severe reactions, with or without hypersensitivity, and delayed onset hemotoxicity. Although some experts suggest elevation of the affected extremity, its appropriateness should be individualized due to potential risks of exacerbating systemic toxicity.

Conclusion
For venomous snakebites, it is important to identify different snake species, monitor any sign of progression of local reaction, and monitor hematologic, neurologic, and systemic toxicities for appropriate resuscitation and airway monitoring, and early antivenom administration.

Abstract Title: A Antibiotic gone rogue

Investigator: Fiaz, Saif, DO
Mentor: Sami Tahhan, MD
Department: Department of Medicine

Abstract

Introduction
Drug associated neutropenia is commonly described secondary to Intravenous beta lactam antibiotics. It is believed that the incidence ranges from 2.4 to 15.4 cases per million with a 5% mortality rate. Antibiotic related neutropenia typically presents 2 weeks after initiation of treatment. Limited literature exists for neutropenia associated with oral cephalexin use.

Case Information
An 81-year-old male with pertinent past medical history of paroxysmal atrial fibrillation, prosthetic mitral valve and total left hip revision with spacer presented to the Emergency Department. The patient had been recently discharged after receiving treatment for methicillin sensitive staph aureus (MSSA) prosthetic valve endocarditis where he was treated with 6 weeks of intravenous cefazolin. He was then transitioned to indefinite suppressive therapy with oral cephalexin due to concerns for orthopedic hardware involvement for which he was deemed not to be surgical candidate. The patients had chief complaints of bilateral lower extremity swelling, rigors, diffuse papular erythematous pruritic rash and a clinical picture consistent with decompensated heart failure, he had thrombocytopenia, elevated liver associated enzymes and Severe Neutropenia with an absolute neutrophil count (ANC) of 0 Cells. He was placed on Neutropenic precautions and received a 5-day course of Granulocyte-Colony Stimulating factor {G-CSF). Eventually, he was found to have positive anti-granulocyte antibodies. A tagged white blood cell scan found no foci or evidence of reaction indicating remaining infection. Cephalexin was stopped due to concern for cephalexin induced neutropenia. The patient stabilized with resolution in symptoms and lab abnormalities off of cephalexin and was eventually discharged without antibiotics due to no evidence of harboring infection. He was diagnosed with cephalexin induced neutropenia, thrombocytopenia with abnormal liver enzymes and rash.

Discussion/Clinical Findings
Drug induced neutropenia has an incidence of 2.4 to 15.4 cases per million which can occur many weeks after initiation of a drug and carries a 5% mortality rate. Neutropenia is associated more commonly with intravenous antibiotic administration and is rarely associated with oral antibiotic use. In this case, the observed neutropenia can be correlated in temporal fashion to have happened approximately 2 to 3 weeks after the transition to oral cephalexin use was initiated. We also link the neutropenia to cephalexin rather than cefazolin as the patient tolerated several weeks of cefazolin without side effects. Though the pathophysiology is believed to be multifactorial and is an area that needs further research, it is believed that direct antibody formation leads to peripheral destruction of neutrophils and myelosuppression which can also typically present with rash and liver enzyme elevation as seen in our patient. Treatment consists of removal of the offending agent and G-CSF administration to relieve the neutropenia. Beta lactams are also associated with liver toxicity as seen in our patient, specifically through immune-allergenic mechanisms or through direct toxicity. However, the exact mechanism is still in need for further investigation. Similar mechanism have been described for platelet destruction, with the presence of anti-platelet antibodies.

Conclusion
Drug induced neutropenia can present with concurrent thrombocytopenia, skin findings and elevation in liver associated enzymes. Patients can present with laboratory findings as soon as 2 weeks after initation of antibiotic therapy. Therapy consists of cessation of offending medication and use of G-CSF. Drug induced neutropenia carries significant mortality and morbidity. Further investigation and research is needed into the pathophysiology of this phenomenon. This case report once again highlights the potential for antibiotics to have profound side effects and that antibiotic stewardship is crucial.

Abstract Title: An Original Cause for a Fever of Unknown Origin

Investigator: Flathers, Ethan, DO
Mentor: Sami Tahhan, MD
Department: Department of Medicine
Co-Investigators: 1. Dustin Platter, EVMS MD Program, MS4 2. Abdul Moeez, EVMS MD Program, MS4

Abstract

Introduction
Fever of unknown origin (FUO) is a difficult conundrum for clinicians. Technically, the definition requires a minimum of three weeks of fever duration despite adequate workup rather than fever without readily apparent cause. Per some meta-analyses, no diagnosis is made in nearly one-quarter of the cases. We present a case of FUO in a patient who underwent an extensive three-week inpatient workup and was ultimately diagnosed with a disease that often does not present classically.

Case Information
A 70-year-old female presented to the emergency room complaining of fevers and fatigue for three days. Upon arrival, she was febrile and tachycardic. Initial laboratory findings demonstrated leukocytosis, lactic acidosis, elevated Erythrocyte Sedimentation Rate of 98 mm/hr, and mild transaminitis. She was initially started on antimicrobial therapy; however, after having persistent fevers, antibiotics were discontinued. Extensive workup, including testing for sexually transmitted diseases, HIV, tick-borne illnesses, Brucella, Q fever, EBV, and malaria, found no infectious cause. Due to the presence of ankle hardware from a previous surgery, a tagged WBC scan was completed, which demonstrated no localizable areas of inflammation. Her only symptoms besides near-daily fevers were diffuse myalgias and fatigue. She repeatedly denied any vision changes, headache, jaw claudication, temporal tenderness, or arthralgias of the hips or shoulders. Lumbar puncture, liver biopsy due to transaminitis, and bone marrow biopsy due to persistent leukocytosis were completed and were all negative. Rheumatology recommended temporal artery biopsy even though she did not exhibit classic symptoms of giant cell arteritis (GCA), as it is in the differential of FUO. Temporal artery biopsy demonstrated transmural arterial inflammation with giant cells. She was diagnosed with GCA and started on high-dose steroids, which led to the resolution of fevers and improvement of symptoms, and was subsequently discharged with close outpatient Rheumatology follow-up.

Discussion/Clinical Findings
GCA, or Temporal Arteritis, is a vasculitis that affects large and middle-sized blood vessels with a predisposition to involve the cranial arteries derived from the carotid artery in individuals older than 50. GCA has been classically described to present with headache, temporal artery tenderness, and acute vision loss. In reality, only 66% of patients have new headaches, 50% have non-specific constitutional symptoms, only 20-30% have visual disturbance that can be transient, only 50% have jaw claudication, and approximately 50% have extracranial musculoskeletal symptoms presenting as polymyalgia rheumatica. Non-classic presentations without temporal tenderness or visual changes may delay diagnosis. The gold standard for diagnosis is temporal artery biopsy.

Conclusion
Empiric antibiotic therapy is not given to patients with FUO unless they are suspected of having a potentially life-threatening infection. Additionally, for patients with FUO, empiric glucocorticoids are not administered unless the patient is severely ill and suspected of having a steroid-responsive illness. GCA may cause 15% of FUO cases in patients over 65 years of age, and it is important to consider GCA in the differential diagnosis of a patient presenting with FUO, even in the absence of classic symptoms. Early treatment of GCA with steroids can prevent potentially irreversible complications from the disease.

Abstract Title: Not Your "Tick"-pical Headache

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Abstract

Introduction
Subarachnoid hemorrhage is a medical emergency in which blood develops between the arachnoid and pia mater requiring prompt head imaging and potential neurosurgical intervention. It can be caused by trauma or aneurysm rupture and is associated with significant mortality and morbidity [1]. We present a case of a patient developing non-traumatic subarachnoid hemorrhage in the setting of a tick-borne illness.

Case Information
A 60-year-old female with past medical history significant for immunosuppression secondary to polycystic kidney disease status post living donor kidney transplant in 2020 and without history of blood disorders presented with flu-like symptoms and required admission for new pancytopenia. Lab findings included elevated ferritin and transaminases with concern for hemophagocytic lymphohistiocytosis (HLH) as well as positive parvovirus, ehrlichiosis, CMV, EBV, and BK. Initially, the patient was mentating appropriately with negative CT head imaging. Despite steroids, transfusions, IVIg, antibiotics, and antivirals, she had persistent fevers with progressive pancytopenia and subsequent encephalopathy requiring intubation. Follow-up CT head showed new bifrontal subarachnoid hemorrhages (SAH) and repeat imaging in the following days demonstrated progression of the SAH's and a new intraparenchymal hemorrhage. MRI and CTA head did not demonstrate any predisposing structural etiologies such as stenosis, occlusions or aneurysms. Lumbar puncture was delayed due to severe thrombocytopenia but ultimately showed minimal pleocytosis without infection. The patient initially had a period of clinical improvement with Ehrlichia resolution and some viremic suppression. However, she then decompensated again in the setting of new GNR bacteremia and aspergillosis with inability to wean immunosuppression and eventual transition to comfort care.

Discussion/Clinical Findings
This was a challenging case given difficulty managing the underlying hyper-inflammatory disorder with subsequent co-infection from multiple pathogens. Ehrlichia, a small gram negative bacteria initially specific to canines, was found to have human transmission as recently as 1986. Common non-specific symptoms include fever, fatigue, leukopenia, thrombocytopenia, transaminitis, and rarely encephalopathy, but it has also been linked to bone marrow hypoplasia causing pancytopenia and HLH [2]. Lumbar puncture typically demonstrates lymphocytosis with elevated protein but this was not the case in our patient potentially due to doxycycline initiation prior to sampling. Cytomegalovirus (CMV) PCR was also positive later in the course but the hemorrhages were stable at that point. CMV is associated with intraventricular hemorrhages mainly in premature infants with thrombocytopenia, but was unlikely related to this patient's bleeds given the timeline [3]. We hypothesize that the Ehrlichia induced thrombocytopenia and adjunctive HLH predisposed our patient to the SAH. The patient showed clinical improvement after restarting doxycycline but continued to require persistent immunosuppression in an attempt to mitigate the persistent maladaptive immune response. This led to an augmentation of her already profound immunosuppression with unremitting pancytopenia predisposing her to the emergence of multiple other infectious processes including CMV, GNR bacteremia and aspergillosis.

Conclusion
We present this case to highlight a rare presentation of Ehrlichia induced subarachnoid and intraparenchymal hemorrhages in the setting of pancytopenia.

Abstract Title: Are you sure this is not Multiple Sclerosis? Atypical manifestation of aseptic meningitis presenting as bilateral internuclear ophthalmoplegia.

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Department: Department of Medicine
Co-Investigators: 1. Taylor Marie Figgs, EVMS MD Program MD2025 2. Hira Sarfraz, MD, Resident Physician, Department of Medicine

Abstract

Introduction
Internuclear Ophthalmoplegia (INO) is a condition characterized by impaired lateral gaze. While various conditions can cause unilateral INO, bilateral INO is typically associated with multiple sclerosis. In this abstract, we present a case of bilateral INO caused by aseptic meningitis, which is an atypical manifestation.

Case Information
A 29-year-old female presented to the emergency department with double vision, frontal headache, and gait instability. Ophthalmic examination revealed asymmetric bilateral internuclear ophthalmoplegia. Laboratory tests showed mild leukocytosis and elevated inflammatory markers. MRI scans of the spine and head did not indicate any demyelinating illness. Further review of the patient's history revealed a recent upper respiratory tract illness followed by neck stiffness and cold sores. The patient was empirically given Acyclovir, leading to a significant improvement in symptoms. Subsequent cerebrospinal fluid (CSF) analysis showed lymphocytic pleocytosis, suggesting aseptic meningitis. However, CSF and serum PCR tests were negative for common viral pathogens. Multiple sclerosis workup was negative, and the patient was discharged with oral valacyclovir.

Discussion/Clinical Findings
Internuclear Ophthalmoplegia (INO) is caused by damage to the Medial Longitudinal Fasciculus, a bundle of neurons connecting the nuclei of cranial nerves III and VI. It is characterized by impaired eye adduction on the affected side and impaired abduction of the contralateral eye.1 Typical symptoms include nystagmus, horizontal diplopia, dizziness, gait instability, and headaches. While imaging can help visualize lesions, INO is primarily diagnosed clinically.2 CSF analysis is reserved for cases where infection or multiple sclerosis is suspected. Treatment involves managing the underlying cause. Multiple sclerosis is the most common cause of INO, but other causes include brainstem infarctions, trauma, vasculitis, and infections.3 Bilateral INO is highly suggestive of multiple sclerosis and requires a complete workup. However, aseptic meningitis should also be considered, as preceding infections can be subtle.4 Aseptic meningitis is diagnosed through CSF analysis, cultures, and PCR tests. It is important to note that CSF is sterile in most cases, especially if antimicrobials have been administered. References: 1- Feroze KB, Wang J. Internuclear Ophthalmoplegia. 2023 Jun 26. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. PMID: 28722999. 2- Tien CW, Donaldson L, Parra-Farinas C, Micieli JA, Margolin E. Sensitivity of Magnetic Resonance Imaging of the Medial Longitudinal Fasciculus in Internuclear Ophthalmoplegia. J Neuroophthalmol. 2024 Mar 1;44(1):107-111. doi: 10.1097/WNO.0000000000001783. Epub 2023 Jan 4. PMID: 36626595. 3- Keane JR. Internuclear ophthalmoplegia: unusual causes in 114 of 410 patients. Arch Neurol. 2005 May;62(5):714-7. doi: 10.1001/archneur.62.5.714. PMID: 15883257. 4- Bakker SL, Gan IM. Temporary divergence paralysis in viral meningitis. J Neuroophthalmol. 2008 Jun;28(2):111-3. doi: 10.1097/WNO.0b013e3181782561. PMID: 18562842.

Conclusion
Bilateral internuclear ophthalmoplegia is commonly associated with Multiple Sclerosis and requires a complete workup. However, it can also be a presenting sign of Aseptic Meningitis.

Abstract Title: Bordetella bronchiseptica pneumonia with concurrent disseminated cryptococcosis in HIV

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Co-Investigators: 1. Catherine J. F. Derber, MD, Department of Medicine, Division of Infectious Diseases 2. Max P. Prokopy, Research Manager, Department Of Medicine

Abstract

Introduction
Bordetella bronchiseptica is a well-known pathogen that causes respiratory illnesses in dogs, rabbits, and pigs. Although it is an unusual source of human respiratory infections, it has been described in immunocompromised populations. Here we present a case of an immunocompromised patient who had B. bronchiseptica with a concurrent infection of Cryptococcus neoformans.

Case Information
A 40-year-old male with a medical history of advanced HIV and schizophrenia was admitted for altered mental status. He was found to have septic shock with hypoxic respiratory failure, and no known animal exposures. A CT Head without contrast did not reveal any acute findings. A lumbar puncture (LP) was remarkable for high opening pressure of 55cmH20 and a Cryptococcal Ag titer above 1:2560, followed by a CSF culture positive for C. neoformans. Routine blood cultures also grew C. neoformans. Induction therapy with liposomal amphotericin B and Flucytosine was started promptly and continued for 14 days. The patient had been through serial LP consecutively for 4 days, resulting in lumbar drain placement to control intracranial pressure. As 11 days of repeated post-treatment CSF culture came back without growth, treatment was transitioned to consolidation therapy with fluconazole for 8 weeks. Subsequent blood culture Results (3 days after the initial blood cultures) showed no growth. A CT Chest showed multiple bilateral cavitary nodules and the patient required intubation for acute hypoxic respiratory failure. A sputum culture was positive for B. bronchiseptica and MRSA, which was later confirmed through BAL culture from bronchoscopy 2 days later. The procedure also revealed mucopurulent secretions in the mainstem bronchi bilaterally. AFB sputum tests were performed three times at least 8 hours apart, which were negative. The patient was able to wean off ventilation and extubated successfully upon treatment. He received IV vancomycin for MRSA which was switched to oral linezolid on discharge for 2 weeks. As B. bronchiseptica can cause significant disease in immunocompromised hosts, azithromycin was started. Based on sensitivity data, treatment was changed to doxycycline to complete the 2-week course. Given the patient's low CD4 count of 28 (1.7%) with undetectable viral load, Atovaquone for prophylaxis of PJP and Toxoplasma was also administered. Despite a history of non-adherence to antiretroviral therapy (ART) in the past, the patient reported taking ART and Biktarvy consistently for the past couple of months. His ART was held for 4 weeks to prevent immune reconstitution inflammatory syndrome.

Discussion/Clinical Findings
Though it is not common, there have been several cases of of human infection with B. bronchiseptica in both healthy and immunocompromised people. The infection is most common in severely immunocompromised patients including those with HIV/AIDS, malignancy, hematopoietic stem cell transplant, or solid organ transplantation. B. bronchiseptica primarily causes infection in the respiratory tract and is less likely to cause bacteremia. As this gram-negative coccobacillus mainly causes upper respiratory diseases in mammals like dogs, rabbits, rats, or pigs, animal exposure can be an important clue from history taking. Our case patient had no known recent pet or animal exposures. From a diagnostic point of view, chest imaging from B. bronchiseptica can vary from cavitary pneumonia to interstitial ground-glass opacities. Also, it can mimic the imaging of Pneumocystis jiroveci. Cavitary pneumonia by B. bronchiseptica has been described in patients living with advanced HIV, which may explain our patient's imaging. However, other possible co-infections might cause cavitary lung lesions. Firstly, this case patient is coinfected with S. aureus which also is well-known for forming necrotizing cavities. Secondly, like other fungal infections of the lungs, disseminated cryptococcosis can also cause cavitary lung lesions due to a respiratory infection. Given the three consecutively negative AFB sputum smears, pulmonary tuberculosis was felt to be less likely. Even though there are no standard antibiotics for B. Bronchiseptica, it has been successfully treated with fluoroquinolones, aminoglycosides, tetracyclines, co-trimoxazole, and piperacillin in the past. The regimen is then tailored to susceptibility testing for a total of 2-4 weeks. For our case patient, we started with azithromycin and then changed to doxycycline, which was found to be susceptible to sputum culture sensitivity Results with plans for a 2-week course. Initially, we thought B. bronchiseptica could be a contaminant from sputum culture. However, his bronchoalveolar lavage also indicated the same microbe. Based on prior cases and journals, this pathogen requires prompt treatment, especially for immunocompromised patients. Previous research suggested B. bronchiseptica can be considered an HIV-related opportunistic infection. Recommendations include reducing the risk of infection from this bacteria by avoiding zoonotic exposure. However, only a few cases have focused on the actual risk of zoonosis among pet owners. To improve the diagnosis and treatment of B. bronchiseptica, future research on the risks of this population is warranted.

Conclusion
Bordetella bronchiseptica, well known for respiratory infection in mammals, can cause significant respiratory infection, especially among immunocompromised patients. Infected patients may require immediate treatment. Chest imaging can include various findings, including even cavitary lesions. Even though this particular case did not indicate exposure via animal contact, a thorough history-taking, including animal contact, can be a clue to the origins of infection.

Abstract Title: Central Neurocytoma: A Case Report and Brief Review of Intraventricular Lesions on Neuroimaging

Investigator: Kumar, Virang, MD
Mentor: Suraj Jaisinghani, MD
Department: Department of Radiology

Abstract

Introduction
Primary intraventricular lesions are rare among all intracranial tumors, accounting for less than 2% of such lesions. These lesions originate within the ventricular system of the brain, from structures such as the septum pellucidum, choroid plexus, and walls of the lateral, third, and fourth ventricles. The differential for such lesions encompasses a wide range of pathologies, for which demographic, clinical, and imaging findings can help in the identification of appropriate diagnoses. Neuroimaging with computed tomography (CT) and particularly magnetic resonance (MR), holds a key role in the diagnosis of intraventricular masses. We report a case of an adult patient with a non-enhancing intraventricular mass suspicious for a central neurocytoma followed by a brief literature review of the imaging features of intraventricular lesions.

Case Information
A 39-year-old female presented to the emergency department with an acutely worsening headache and vomiting. The patient had a Glasgow Coma Scale rating of 14 and was able to follow simple commands on the initial exam, however, further evaluation was complicated by acute obtundation and confusion of the patient. Prompt non-contrast CT imaging of the head revealed a heterogenous mass with areas of hyper-attenuation, centered right of midline around the right thalamus and third ventricle with possible hemorrhagic component. There was apparent extension into the ventricles with obstructive hydrocephalus with dilation of the posterior horn of the third ventricle, and an associated midline shift. Repeat CT imaging demonstrated drooping of the cerebellar tonsils and herniation into the foramen magnum. The patient was transferred to the ICU with prompt placement of an external ventricular drain for decompression. MR Imaging of the brain revealed that the mass was intraventricular and arose from the atrium of the right lateral ventricle, crossing midline with mass effect on the septum pellucidum, measuring 5 cm. The mass demonstrated heterogenous signal on T2-weighted FSE (fast spin echo) imaging with largely hypointense signal on SWI (susceptibility weighted imaging) suggesting hemorrhage. On T1-weighted imaging, the mass was hypointense with scattered hyperintense pre-contrast signal. The central portion of the mass was predominately non-enhancing, with some marginal peripheral enhancement related to displaced choroid plexus. Primary differential diagnosis for minimal to non-enhancing intraventricular masses includes central neurocytoma with hemorrhage, as well as possibly a subependymoma with hemorrhage. Given the clinical status of the patient, however, the patient was transitioned to comfort measures and expired prior to histopathologic confirmation.

Discussion/Clinical Findings
Central Neurocytomas comprise <0.5% of all primary brain lesions and are much more commonly intraventricular than extra-ventricular. Such lesions are typically found in the anterior lateral ventricles attached to the septum pellucidum or arise from the ventricular wall. Most commonly, the lesions are noted near the foramen of Monro, but have been noted in lateral and third ventricles. These lesions are associated with obstructive hydrocephalus. Prognosis is typically good; however, rarer cases are associated with death and hemorrhage. Additionally, these lesions normally present around the third decade of life, with no gender predominance. On CT imaging, these lesions typically are hyperdense to the surrounding parenchyma, with calcifications and/or intratumor cystic structures. MR imaging typically demonstrates heterogenous lesions on T1-weighted imaging that are isointense with gray matter and demonstrate mild enhancement, while T2-weighted imaging demonstrates hyperintense lesions with multiple cystic structures resembling a "bubbly" or "Swiss-cheese" appearance with attenuation on FLAIR (fluid attenuated inversion recovery). On SWI, hemorrhage occurs on large tumors, and the lesions typically demonstrate diffusion restriction on DWI (diffusion weighted imaging). The characterization of intraventricular lesions using MR and CT features is critical for diagnostics, prognostics, and management. Thus, a summary of key imaging features of common intraventricular masses is highlighted in this study, including focal solid lesions (such as ependymoma, subependymoma, subependymal giant cell astrocytoma, choroid plexus papilloma), focal cystic lesions (colloid cyst, epidermoid cyst, ependymal cyst), infectious or inflammatory lesions, and metastases.

Conclusion
This report highlights an uncommon poor outcome of a central neurocytoma with hemorrhage, which otherwise has a relatively positive prognosis. As a result, the case emphasizes the importance of accurate and early identification of lesions using imaging in conjunction with clinical findings. The review portion of this study provides a comprehensive overview of key imaging features for the broad differential of intraventricular lesions which can guide diagnosis. Further research and reporting of rare cases should be undertaken to solidify the characterization of intraventricular lesions on imaging.

Abstract Title: Hemolysis After Dark

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Co-Investigators: 1. Zahra Tasneem, MD, Department of Medicine 2. Saif Fiaz, DO, M.S., Department of Medicine 3. Leeann Hu, MD, Department of Medicine 4. Giovanni Torres, MD, Department of Medicine 5. Laura Beamer, EVMS MD Program, MS3

Abstract

Introduction
Hemolytic anemia has a broad differential with common causes including infections and autoimmune causes. Diagnosis can present a challenge since it can be seen as a subsequent pathology from a larger unifying diagnosis or as the cause of many of the symptoms patients might present with. Paroxysmal nocturnal hemoglobinuria(PNH) is a rare disease that affects approximately 16 people per million worldwide. If left untreated and undiagnosed, it can lead to significant morbidity and mortality.

Case Information
34 year old male with limited to no contributory past medical history with occupational exposure to non-ionizing radiation and frequent outdoor exposure and recent unknown origin dog bite approximately a week ago. Coming in with a chief complaint of intermittent episodic non-exertional chest pain, dizziness, pre-snycope, and darkened urine. He states this has been ongoing and most recently has worsening. Laboratory and clinical workup was revealing for Anemia 9.8 g/dl, Troponins of 414 ng/L, WBC 5.1 K/ul , LDH 268 U/L, Haptoglobin <10 mg/dl, ESR 77, CRP 6.4, negative direct and indirect coombs testing, without evidence of schistocytes or other abnormalities on blood smear, Initial CT head non-revealing, Coronary CT without coronary calcifications with concerns for possible myocarditis confirmed on cardiac MRI, Echocardiogram and EKG without acute concerns. Lumbar puncture with CSF was non-revealing on both fluid analysis and microbiological analysis. Serological microbial analysis was non-revealing. An autoimmune workup only revealed mildly elevated anti-cardiolipin that did not meet diagnostic criteria. Infectious disease started on empiric complete 10 day course of doxycycline due to concerns of tick-bite-induced infection and started on tx regimen for rabies given dog bite. Hematology and oncology started on intravenous immunoglobulin and steroids for empiric treatment of autoimmune hemolytic anemia. Cardiology started on colchicine for 60 days without further intervention needed. Patient remained stable without chest pain during visit. Patient experienced dizziness and anterograde amnesia in which CT-Angiography, CT head and MRI revealed new onset strokes not previously seen. Eventually due to clinical suspicion,Glycosylphosphatidylinostiol(GPI) CD55/59 testing was performed and returned with 3.7% partial and 15.14% complete deficiency of surface protein consistent with diagnosis of paroxysmal nocturnal hemogloburia due to rarity of this presentation the test was confirmed on repeat. Patient was started on eliquis due to increase risk of thrombosis and is to be evaluated for outpatient evaluation to start on anti-c5 biologic such as ravulizumab after proper vaccination against streptococcal and meningococcal infections.

Discussion/Clinical Findings
PNH is an X-linked acquired genetic mutation of hematopoietic stem cells involved in the production of glycosylphosphatidylinositol (GPI) surface protein which connects CD55 and CD59 for cellular modulation of complement activation(1). When not seen on surface, this leads to paroxysmal stress-induced complement-mediated hemolysis. Symptoms include thrombosis, shortness of breath, fatigue(1). Laboratory findings are characteristic of hemolytic anemia without findings of auto-antibodies. Diagnosis is confirmed with flow cytometry for GPI associated CD55 and 59. Treatment revolves around anti-complement biologic therapies to avoid hemolysis with ultimate goal to prevent hemolysis and need for transfusion(1). Without treatment, life span is significantly shortened to approximately 1 to 2 decades after diagnosis and development of the disease(1). With treatment, life expectance approaches that of the population. The most frequent cause of mortality and morbidity in those with PNH is due to the hypercoagulable state of their(1). This case corroborates with the typical findings seen in PNH, however myocarditis is not typically reported nor exact source cannot be elucidated from clinical and laboratory diagnosis. Other studies indicate the theoretical that severe anemia can lead to cardiac cellular dysfunction(2). Given his likely prolonged anemia, this might be considered complication of PNH and will need to monitor for resolution and recurrence with treatment of underlying disease before more definitive answer can be given.

Conclusion
Hemolytic anemia can present with elusive multiorgan system involvement. A rare but serious cause of this is PNH, clinical suspicion should remain high if infectious and other autoimmune causes have been ruled out as this can significantly increase lifespan. This is important as those who typically present are in their 3rd and 4th decade of life(1).

Abstract Title: Preimplantation Genetic Testing for Chromosomal Structural Rearrangements - What Should We Expect?

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Abstract

Introduction
Patients with a known chromosomal structural rearrangement, can utilize preimplantation genetic testing for aneuploidy (PGT-A) and structural rearrangements (PGT-SR) to transfer a chromosomally balanced embryo to mitigate infertility, miscarriage, and recurrent pregnancy loss due to chromosomal imbalances. This study aimed to determine the time and number of oocyte retrievals needed to achieve a live birth for patients undergoing combined PGT-A/PGT-SR.

Methods
We performed an IRB approved retrospective data query of a large, national private practice for patients utilizing PGT-A/PGT-SR from 2013 to 2022. The primary outcomes were number of oocyte retrievals to live birth and time (months) from ovarian stimulation start to frozen embryo transfer (FET), clinical pregnancy (CP), and live birth (LB) following a euploid, chromosomally balanced FET. Secondary outcomes included the number of FET cycles to LB and proportion of patients that did not achieve FET, CP, or LB. Kaplan-Meier curves were used to calculate median time to FET, CP, and LB.

Results
There were 68 patients who underwent combined PGT-A/PGT-SR with a mean age of 33.8 and AMH of 2.7 (1.5, 4). For all included cycles, the median number of embryos biopsied was 5. Of these, 1 was both euploid and structurally balanced. In order to achieve a LB, the median number of oocyte retrievals was 2 (2,3) and transfers was 1 (1,2). For patients who underwent oocyte retrieval, 23.8% did not have a transfer within 1 year and 7.4% (5 of 68) ultimately did not have an unaffected, euploid embryo to transfer. At two years, the live birth rate was 65.4% (50.3, 75.9). Overall, the miscarriage rate after a euploid, structurally balanced transfer was 11.5%. The median times to FET, CP, and LB were 3.1, 7.0, and 15.9 months, respectively.

Conclusion
In a group of patients with normal ovarian reserve pursuing combined PGT-A and PGT-SR, there was a median requirement of 2 oocyte retrievals and 1 transfer of an unaffected, euploid embryo to achieve LB. The median time to LB was 15.9 months with the caveat that 34.6% of patients had not achieved a LB within 2 years of cycle start. Despite excellent ovarian reserve, the timeline to achieve a LB may extend over years. This study characterizes the treatment history for patients utilizing PGT-SR and will contribute to improved patient counseling and managing expectations prior to undergoing treatment.

Abstract Title: Impact of State Insurance Mandates on Fertility Preservation Access

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Co-Investigators: Eliana Fine, Dept of OBGYN, Jersey Shore University

Abstract

Introduction
Coverage for in vitro fertilization (IVF) and fertility preservation varies widely state by state and is relatively limited across the country. Prior to 2017, 15 states had varying degrees of coverage for fertility, with 8 specifically mandating IVF coverage. From 2017-2020, 9 states enacted some level of fertility coverage with fertility preservation included. The primary outcome of this study was to assess the impact of state insurance mandates that include fertility preservation coverage for medically-induced (iatrogenic) infertility enacted between 2017-2020 on fertility preservation utilization rates using aggregated data from the Center for Disease Control (CDC) from 2016 (pre) and 2021 (post).

Methods
We conducted a retrospective cohort study using cycle information compiled from CDC national summary reports. FP utilization in 2016, pre-mandate, was compared to utilization in 2021, post-mandate in states with and without FP-inclusive insurance mandates enacted between 2017-2020. Risk ratio and Poisson regression models were utilized to determine differences in the mean number of FP cycles amongst states with FP-inclusive insurance mandates compared to states without. A p-value <0.05 indicated statistical significance.

Results
There were 9 states with FP-inclusive insurance mandates and 43 states (including Washington DC and Puerto Rico) without. From 2016-2021, FP cycles increased between 36.1-90.5% in the states with FP mandates. There was a significant increase in FP cycle utilization in states with an inclusive insurance mandate compared to those states without such a mandate over the study period (RR 1.80 vs 1.37; $p<0.001$). New Hampshire enacted a mandate in 2020, but clinics did not report data to the CDC in 2016 and were therefore excluded.

Conclusion
In 2021, there were 8 states that provided CDC data, that enacted insurance mandates including FP between 2016-2020. States with FP-inclusive insurance coverage for patients with iatrogenic infertility had increased utilization rates compared to non-mandated states. States that have implemented insurance coverage for fertility preservation in cases of medically induced infertility have experienced increases in FP utilization. This study emphasizes the importance of ongoing efforts to enhance patient access to fertility preservation services.

Abstract Title: Disjointed Diagnosis: Identifying a Multisystem Culprit

Investigator: Nguyen, Lily, MD
Mentor: Aaron Mills, MD
Department: Department of Medicine
Co-Investigators: 1. Omar Jafar, Department of Medicine 2. John Janousek, Department of Medicine 3. Lyeba Shahid, Department of Medicine 4. Ryan Krafty 5. Elizabeth Batchelor, Department of Medicine, Division of Pulmonary & Critical Care 6. Aaron Mills, Department of Medicine

Abstract

Introduction
Fever of unknown origin has a broad differential, including infectious and rheumatologic etiologies. The following case describes a febrile patient with symptoms affecting multiple organ systems, that were all connected by an unusual diagnosis.

Case Information
A 42-year-old male with recently diagnosed rheumatoid arthritis presented with right upper quadrant abdominal pain. He had been taking methotrexate, indomethacin, and acetaminophen for a 6-month history of subjective fever, fatigue, and diffuse arthralgias. He also had oral ulcers on his tongue and lower lip. Initial liver function tests were significant for AST 623, ALT 527, alkaline phosphatase 162, and total bilirubin 1.4. Patient was subsequently admitted for acute liver injury of unknown etiology, and methotrexate was discontinued.

Methotrexate, acetaminophen, salicylate, and phosphatidylethanol levels were within normal ranges. Sedimentation rate was 77 and C-reactive protein was 5.8. Hepatitis panel was negative for acute disease; smooth muscle, ANCA, LKM-1, and mitochondrial M2 antibodies were negative. Elastography resulted in increased liver echogenicity, with mild fibrosis. ANA, rheumatoid factor, and anti-CCP antibody were negative. Plain films of his extremities and sacroiliac joints were unremarkable other than mild soft tissue swelling of the right hand. During admission, transaminitis improved, but the patient developed repeated febrile episodes and new dyspnea on exertion with hypoxemia. Leukocytosis peaked at 16,300; CT imaging was negative for pulmonary emboli and showed scattered pulmonary nodules with peripheral predominance. Infectious disease and pulmonology were consulted. A broad workup followed, only significant for a positive respiratory culture of H.influenzae that was treated with ceftriaxone. Oral ulcer biopsy was positive for HSV, and a lung biopsy from bronchoscopy yielded abundant macrophages. After 10 days, the patient had an afebrile period of 48 hours and was discharged with a diagnosis of fever of unknown origin.

The patient had continued follow-up in the outpatient setting, including PFTs that indicated interstitial lung disease. Three months after the inpatient admission, the patient presented to outpatient pulmonology. He endorsed bilateral hand pain and recent facial swelling with erythema around both eyes; physical exam was significant for Gottron's papules. He was given a short course of prednisone, and autoimmune workup was reordered, along with creatine phosphokinase and myositis panel. CPK was not elevated, but the myositis panel was positive for MDA-5 antibody. With a new diagnosis of anti-MDA-5 dermatomyositis, the patient had expedited referrals to rheumatology and dermatology, and began an immunosuppressive regimen of mycophenolate and continued prednisone. He has reported significant improvement since.

Discussion/Clinical Findings
Discovered in 2009, anti-MDA-5 dermatomyositis is a subtype of dermatomyositis that can be hypomyopathic or amyopathic, with low or no muscle inflammation. Symptoms include fever, arthralgias without joint erosions, oral and skin ulcers, Raynaud's disease, transaminitis, and dermatologic signs including Gottron's papules and heliotrope rash. There is also a strong association with ILD, which can contribute to mortality. Management is focused on immunosuppression and symptom control.

Conclusion
In Conclusion, lack of muscle involvement does not exclude dermatomyositis. Anti-MDA-5 dermatomyositis can be difficult to identify but can explain a constellation of symptoms.

Abstract Title: A Mass That's Heart to Believe

Investigator: Nguyen, Lily, MD
Mentor: Aaron Mills, DO
Department: Department of Medicine
Co-Investigators: 1. Ryan Saal, Department of Medicine 2. Aaron Mills, Department of Medicine

Abstract

Introduction
Cardiac metastases are rare and associated with poor prognosis. We report a case of bladder cancer with associated cardiac metastasis; moreover, the abnormal cardiac mass presented as the initial finding.

Case Information
A 63-year-old male with a past medical history of ulcerative colitis and benign prostate hyperplasia presented with shortness of breath. The patient denied history of tobacco use. CTA was significant for small to moderate burden of pulmonary emboli in the right lower lobe, hilar and mediastinal lymphadenopathy, and a right middle lobe pulmonary nodule. An Echo revealed a 5.7 cm x 1.4 cm echogenicity in the right ventricular outflow tract, crossing the pulmonic valve. Ejection fraction was 58% and no other abnormalities were noted. After initiation of anticoagulation, he developed a lower gastrointestinal bleed, that required transfer to a tertiary care center. A colonoscopy was performed with findings of ulcers in the rectosigmoid colon and quiescent ulcerative colitis. A cardiac MRI was obtained and confirmed an enhancing right ventricular mass, concerning for malignancy. CT of the abdomen and pelvis demonstrated extensive retroperitoneal lymphadenopathy, and irregular prostate mass invading the bladder and rectum. The patient underwent radiology-guided retroperitoneal lymph node biopsy, and pathology resulted in squamous cell carcinoma. Cardiothoracic surgery and cardiology were consulted regarding the RV mass; there was no intention for surgical procedure. Cystoscopy with prostate biopsy was conducted, and pathology resulted in invasive urothelial carcinoma with predominant squamous differentiation. The cardiac mass was presumed to be metastatic urothelial carcinoma. Oncology started systemic chemotherapy and palliative pelvic radiation. However, the hospital course was prolonged and included multiple complications; the cardiac mass remained stable but metastatic tumor burden continued to rapidly progress throughout the abdomen and pelvis. Ultimately, the patient chose comfort measures and passed away in the hospital.

Discussion/Clinical Findings
This was a rare presentation of a cardiac metastasis of urothelial carcinoma. Urothelial cancer has been reported to metastasize to the heart; a review of 20 cases in literature resulted in 68% of urothelial cancer metastases in the heart were located in the right ventricle. Unfortunately, such presentation is indicative of advanced disease and outcomes are typically poor.

Conclusion
In Conclusion, cardiac metastases can have unusual origins that are not always apparent. This case demonstrates the importance of a broad differential and thorough evaluation of patients presenting with an unexpected mass in the heart.

Abstract Title: Pembrolizumab and immune-related adverse events: A Case Report

Investigator: Sadaieva, Diana, MD
Mentor: Sami Tahhan, MD
Department: Department of Medicine

Abstract

Introduction
Immune checkpoint inhibitors (ICIs) like Pembrolizumab have been revolutionary in treating cancer, but they can cause severe side effects. In this case report, we will discuss immune-related adverse events (irAEs) due to ICIs

Case Information
Our patient is a 61-year-old man with a history of Renal Cell Carcinoma with pancreatic metastases. The patient presented to the ER with fatigue, polyuria, polydipsia, and poor oral intake two days after completing his third monthly infusion of Pembrolizumab. The exam revealed new onset Atrial Fibrillation with rapid ventricular response. His labs were significant for a blood sugar of 780 mg/dl (normal range 70-99mg/dl), moderate Acetone levels in the blood, glucosuria, and ketonuria. He had a low TSH (<0.01 mcU/mL) and high FT4 (>2.0 ng/dl, with the normal range being 0.9 to 1.8 ng/dl)). Thyroid Stimulating Immunoglobulins were elevated. His Diabetic ketoacidosis was resolved with fluids and an insulin drip, and he was transitioned to a basal-bolus insulin regimen, which controlled his glucose well. His tachycardia was controlled with beta-blockade. He was discharged on propranolol, apixaban, and methimazole. His final diagnoses were Pembrolizumab-induced new onset Type 1 Diabetes Mellitus and Pembrolizumab-induced Graves' Disease.

Discussion/Clinical Findings
Immune checkpoint inhibitors (ICIs), also known as checkpoint inhibitor immunotherapy, are immunomodulatory antibodies that enhance the immune system. These agents have substantially improved the prognosis for patients with many advanced malignancies. Despite important clinical benefits, ICIs are associated with a unique spectrum of side effects known as immune-related adverse events (irAEs). IrAEs include dermatologic, gastrointestinal, hepatic, endocrine, and other less common inflammatory events. IrAEs are believed to arise from general immunologic enhancement. Temporary immunosuppression with glucocorticoids and other immunosuppressants is effective in treating irAEs in most cases. Although rare, fulminant and even fatal toxicities may occur with ICIs. Therefore, prompt recognition and management of irAEs is important. The most common endocrinopathies due to ICIs are hypothyroidism, hyperthyroidism, and hypophysitis. The incidence rate for Pembrolizumab-induced hyperthyroidism is 0.6 %. Autoimmune thyroid disease due to ICIs can be manifested as primary hypothyroidism secondary to destructive thyroiditis or rarely as hyperthyroidism associated with Graves' disease. ICI-related Graves' disease is treated similarly to non-ICIs-related Graves' disease, and thyroid function should be monitored before each dose of an ICI for early detection of thyroid dysfunction.

Conclusion
Treatment with ICIs has also been associated with acute onset of type 1 diabetes mellitus in approximately 0.2 to 0.9 % of cases. Patients who develop immunotherapy-induced type 1 diabetes mellitus are typically treated with insulin therapy and, unfortunately, will remain Insulin-dependent. In contrast to other immune-related adverse events from ICIs, treatment with glucocorticoids or other immunosuppressive agents is not effective in these patients due to the almost complete destruction of the pancreatic beta cells by immunotherapy. It is recommended to monitor glucose with each dose of ICI for early detection of new-onset Diabetes mellitus due to ICIs. A brief literature review did not show other cases of Pembrolizumab-related combined new-onset Diabetes and Graves' disease.

Abstract Title: Implementation of a Diversity, Equity, and Inclusion Committee Improves Residency Research Output

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Abstract

Introduction
Established in 2021, through our program's strong commitment to promoting a diverse, equitable, and inclusive (DEI) residency experience, our resident-led DEI committee strives to provide our self-identifying Black, Indigenous, and People of Color (BIPOC) and allies the resources and opportunities to succeed in residency to better serve the diverse races, ethnicity, and socioeconomic status of our local community. One of the goals of this committee is to create a safe space for like-minded BIPOC residents and allies to collaborate on scholarly activities.

Methods
Since 2021, our resident-led DEI committee fostered a scholarly environment to be able to innovate medical education, mentorship, solidarity with the community, recruitment, and advocacy. Bi-annual meetings and frequent smaller meetings were held amongst the committee members to discuss project ideas, roadblocks, and statuses. Program and community DEI leaders were present for guidance. When necessary, program scholarly activity support was utilized. In 2023, the resident-led DEI committee performed a literature review and voluntary resident interviews in search of resident authorships and local, regional, and national conference acceptances from 2021-2023. Authorships were recorded per resident and grouped as committee members and non-members. Results are shown as counts and percentages.

Results
In 2021, 2022, and 2023, there were 15, 20, and 23 members and 53, 51, and 53 non-member residents respectively. 3(20%), 10(50%), and 19(82.6%) of the members and 31(58.5%), 28(54.9%), and 25(47.2%) non-member residents were authors in this time period. The total authorship ratio of members vs non-members in this period are 0.07(3/44), 0.61(28/46), and 0.82(40/49).

Conclusion
During our collection time frame, our residency-led DEI committee has continued to improve upon our research output throughout the years at an accelerated rate since the committee's establishment. Compared to the residency, which has a stable to slightly decreased percentage of scholarly output in the same time frame, the DEI committee is leading our residency's research efforts. This is due to a strong emphasis on not only scholarly activity, but the desire to determine which inequities exist in our residency and community and how we can work to alleviate these. With strong advocates in our administration as well as senior residents leading the committee that continues to provide support to new interns each year, we have continued to initiate and carry out an increasing number of DEI projects that have focused on a multitude of topics, such as pronoun education, microaggression education, and workshops, as well as the development of educational material for families of children with learning disabilities. Implementation of a DEI committee in residency programs can be an important catalyst for not only improving diversity from program-wide and patient-based standpoint, but also encourages increasing amounts of resident-driven research on such subjects.

Abstract Title: Riboflavin Deficiency: An unusual cause of Type B lactic acidosis.

Investigator: Sarfraz, Hira, MD
Mentor: Sami Tahhan, MD
Department: Department of Medicine
Co-Investigators: Muhammad Usman Javed, MD, Department of Medicine

Abstract

Introduction
Lactic acidosis is a potentially life-threatening type of anion gap metabolic acidosis caused by lactic acid build, either due to excessive production or decreased excretion. In this case report, we discuss a unique case of lactic acidosis and its management.

Case Information
The patient was a 61-year-old female with a medical history of hypertension, type II diabetes mellitus, and uterine carcinosarcoma with peritoneal carcinomatosis, and ascites who presented with abdominal pain and shortness of breath. Admission labs were significant for leukocytosis and an elevated lactic acid level of 2.6 nmol/L. A sepsis workup was initiated, and she was started on broad-spectrum antibiotics. Abdominal and Pelvic imaging did not reveal any definitive source of infection. Despite adequate fluid resuscitation and broad-spectrum antibiotics, her lactic acid levels remained elevated. Due to her hemodynamic stability and negative blood cultures, antibiotics were discontinued. Liver function tests were normal, suggesting that lactic acidosis was possibly secondary to malignancy and the Warburg effect. Her thiamine level was normal but her Riboflavin level was found to be <5 nmol/L (normal range: 6.2-39 nmol/L). She was diagnosed with Riboflavin deficiency due to poor oral intake and started on daily Riboflavin supplementation, which ultimately resolved her lactic acidosis.

Discussion/Clinical Findings
Lactic acidosis is broadly divided into 2 major types: type A caused by tissue ischemia leading to anaerobic metabolism and excessive lactic acid production, and type B caused by impaired cellular metabolism and lactic acid buildup without tissue hypoperfusion. There are also some less common types of Lactic Acidosis such as type D lactic Acidosis caused by intestinal overproduction. Type A lactic acidosis is the most common and dangerous type due to its association with hypoxemia and shock. Type B lactic acidosis is less common but can indicate serious underlying issues such as hematologic and solid organ malignancies with or without the Warburg effect, or liver failure. The Warburg effect is due to increased rates of lactate production by the neoplastic cells that shift to primarily anaerobic glycolysis. Other causes of type B lactic acidosis include thiamine or riboflavin deficiency, alcoholism, toxic alcohol ingestion/poisoning, and medication side effects from metformin, linezolid, propofol, or IV epinephrine. Riboflavin, a water-soluble vitamin, is essential for the coenzymes flavin mononucleotide and flavin adenine dinucleotide. The impaired function of those enzymes disrupts cellular metabolism and mitochondrial energy production, resulting in impaired pyruvate metabolism and lactic acid accumulation. Riboflavin deficiency is seen in patients with anorexia nervosa, malabsorptive syndromes, prolonged use of barbiturates, and HIV patients on HAART therapy. Overt Riboflavin deficiency is rare as it is found in many commonly consumed foods, including milk, meat, eggs, cereal, and green leafy vegetables. Treatment with oral or intramuscular supplementation typically resolves symptoms quickly. If deficient, then the recommended daily riboflavin replacement is 1.7 mg/day, found in most multivitamin preparations.

Conclusion
Riboflavin deficiency is an important cause of type B lactic acidosis to remember, as its diagnosis can avoid unnecessary testing and therapeutics.

Abstract Title: Hitting the Bullseye: A Rare Case of Bullous Amyloidosis

Investigator: Shahid, Lyeba, DO
Mentor: David Pierce, MD
Department: Department of Medicine
Co-Investigators: David Pierce, Department of Medicine

Abstract

Introduction
Amyloidosis is the extracellular deposition of mutated proteins consisting of insoluble amyloid fibrils in the body [1]. This condition can further be subdivided into systemic and localized forms affecting either multiple organ systems or being limited to a single organ. Systemic forms include primary amyloidosis in cases such as plasma cell dyscrasias (i.e. multiple myeloma), secondary amyloidosis which is associated with chronic diseases such as inflammatory or infectious processes, dialysis related and transthyretin amyloidosis [2]. Bullous amyloidosis a rare condition that can present as cutaneous lesions representing an underlying systemic process such as AL amyloidosis. We present a case of a gentleman previously diagnosed with bullous pemphigoid presenting with a new oral lesion.

Case Information
A 75-year-old gentleman presents as a new patient for primary care visit after moving from Peru a few months ago. His past medical history included prostate cancer status post prostatectomy and bullous pemphigoid which was treated with steroids and tacrolimus. In clinic he presented with a new oral lesion that he noted 3-5 months ago. He noted oral cavity pain at the base of his tongue without any dyspnea or dysphagia. He endorsed rare alcohol use and denied any history of smoking or new medication changes. Physical exam was notable for macroglossia, and he was found to have a tender 4mm ulcer in the right retromolar trigone region associated with surrounding leukoplakia. On presentation his vital signs were stable, and CBC revealed macrocytic anemia. CMP was unremarkable. After being referred and evaluated by ENT, he underwent biopsy of the oral ulcer, and the pathology report revealed areas of amorphous debris within the submucosal tissues that were positive for amyloid by Congo Red staining under polarized light. This sample was further sent for amyloid subtyping which did express IgG. Chromogenic in situ hybridization stains revealed that plasma cells demonstrated a strong kappa light chain expression with some background lambda light chain expression. These findings were consistent with bullous amyloidosis. Since bullous amyloidosis is often related to AL amyloid, an underlying plasma cell dyscrasia work-up was started in clinic. This revealed a protein electrophoresis with a monoclonal band in the mid-gamma region, increased serum free lambda light chains and immunofixation with a faint band of free lambda chains and lambda IgG migration. Echocardiogram did not show evidence of amyloidosis. Given these findings and concern for IgG gammopathy, he was sent a referral for evaluation by hematology/oncology. He was then scheduled for bone marrow biopsy and referred to stem cell transplant physician for further management. Due to the rarity of cases of bullous amyloidosis, there are few set guidelines regarding treatment. Of the patient cases described in the literature, many were treated for the underlying malignancy i.e. multiple myeloma associated amyloidosis which consisted of cyclophosphamide, bortezomib and dexamethasone. [4]

Discussion/Clinical Findings
Primary systemic amyloidosis can present with mucocutaneous lesions 30 to 40% of the time which include skin thickening, plaques, purpura, nodules or bullae (3). Bullous amyloid is a rare amyloidosis phenomenon with few reported cases. It is thought that the amyloid deposits in capillaries which weaken blood vessel walls forming bullae secondary to friction or trauma [3]. This can be an exceedingly difficult diagnosis to make as multiple and more common dermatological conditions can present with similar blistering skin lesions. This includes bullous pemphigoid, porphyria cutanea tarda, epidermolysis bullosa, drug induced bullous reactions, IgA disease and pseudoporphyria [3]. Correct and timely diagnosis is crucial as bullous amyloid is often associated with an underlying plasma cell dyscrasia such as multiple myeloma. Clinical features such as macroglossia can also be a physical exam finding associated with bullous amyloidosis as seen in this patient's case. Our patient who was previously diagnosed with bullous pemphigoid presented with an ulcerated oral lesion with leukoplakia which is atypical of bullous pemphigoid as it usually spares the oral cavity and manifests with tense blisters. This prompted further investigation with a biopsy that led to the diagnosis bullous amyloid and further work up concerning for IgG gammopathy. It is important that clinicians challenge pre-existing diagnoses especially when a patient presents with new symptoms or atypical findings. In this case a previously thought diagnosis of bullous pemphigoid was later revealed as bullous amyloidosis associated with an underlying a plasma cell dyscrasia which caused a delay in appropriate treatment.

Conclusion
Bullous amyloidosis is a rare disease that is associated with an underlying plasma cell dyscrasia. Unfortunately, these skin lesions are often misdiagnosed which can delay treatment for malignancy. It is important to recognize and keep different forms of cutaneous amyloidosis on one's differential particularly when patients present with atypical features or refractory symptoms.

Abstract Title: Paraneoplastic Subepidermal Immunobullous Dermatosis Associated with Primary Systemic Amyloidosis and Multiple Myeloma

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Department: Department of Dermatology
Co-Investigators: 1. Joanna L. Twist, Dermatology 2. Yanci A. Algarin, Dermatology

Abstract

Introduction
Multiple myeloma (MM) is a plasma cell proliferative disorder characterized by the neoplastic proliferation of plasma cells resulting in a monoclonal gammopathy. MM rarely presents with cutaneous involvement; however, amyloidosis and autoimmune bullous dermatoses have been reported as the initial presentation of MM (Bhutani, Engineer). We report a case of a 75-year-old male who initially presented with a subepidermal IgG immunobullous dermatosis and was later diagnosed with oral amyloidosis and IgG lambda multiple myeloma-associated systemic AL amyloidosis.

Case Information
A 75-year-old male presented with hemorrhagic bullae involving the extremities and groin. Punch biopsy revealed a pauci-inflammatory subepidermal blister, and direct immunofluorescence showed IgG in a serrated pattern along the dermoepidermal junction, suggestive of either epidermolysis bullosa acquisita or bullous pemphigoid. Several years later he developed oral mucosal ulcers, in which amyloid deposition was found. Additional studies confirmed systemic AL amyloidosis and IgG lambda multiple myeloma.

Discussion/Clinical Findings
Primary systemic amyloidosis (AL amyloidosis) is commonly associated with plasma cell dyscrasia, where amyloid deposits in various organs can result in a broad spectrum of clinical manifestations, including rare dermatologic presentations like bullous lesions. The diagnosis is typically confirmed via Congo Red staining, which highlights amyloid deposits through apple-green birefringence under polarized light; however, false negatives can occur, necessitating electron microscopy in some cases. In this case, Congo Red positivity in the oral mucosa confirmed amyloid deposits, suggestive of amyloidosis. However, the differential diagnosis also included bullous pemphigoid (BP) and epidermolysis bullosa acquisita (EBA), given the presence of IgG at the dermoepidermal junction without eosinophilic amyloid deposits. The absence of multiple immunoreactants and the histopathological findings leaned more towards BP or EBA. Since immunobullous lesions can be an early manifestation of underlying plasma cell dyscrasia, recognizing this association is vital for prompt diagnosis and treatment, potentially improving patient outcomes in systemic AL amyloidosis.

Conclusion
We report an exceptionally rare case of a patient presenting initially with a SABD, who was subsequently diagnosed with systemic AL amyloidosis and multiple myeloma. This case emphasizes the rare intersection of immunobullous dermatoses, amyloidosis, and multiple myeloma, highlighting the need for a broad differential diagnosis when dealing with blistering disorders, and the importance of multidisciplinary management in similar presentations.

Abstract Title: Clostridium Septicum Bacteremia and Aortic Dissection in the Setting of Large Cell Neuroendocrine Carcinoma of the Colon

Investigator: Valle, Nicholas, DO
Mentor: Jody King, MD
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Co-Investigators: 1. Lyeba Shahid, DO, PGY-3, Department of Medicine 2. Ekaterine Dzamelashvili, MD, Clinical Observer 3. Nima Singh, EVMS MD Program, MS4 4. Anika Shah EVMS MD Program, MS4

Abstract

Introduction
Large cell neuroendocrine carcinoma of the colon is a rare and aggressive type of cancer associated with a poor prognosis as it tends to be metastatic at the time of initial diagnosis (1). Clostridium Septicum (C. septicum) bacteremia has a well-established association with right-sided colonic malignancy (2, 3) C. septicum aortitis is a rare complication of bacteremia with C. Septicum and carries a poor prognosis (4). We present a gentleman with persistent C. Septicum bacteremia complicated by aortic dissection in the setting of a newly diagnosed large cell neuroendocrine tumor of the colon.

Case Information
59-year-old male with a past medical history of hypertension, Type II Diabetes, and schizophrenia presents to the ED with abdominal pain, acute hypoxic respiratory failure, and septic shock refractory to fluids. CT abdomen/pelvis showed pericecal stranding. Respiratory status continued to worsen requiring intubation. CTA chest to evaluate for pulmonary embolism revealed Type A and B aortic dissection. Repeat CT abdomen/pelvis was concerning for contained cecal perforation. Repeated blood cultures were positive for C. septicum. Antibiotics were narrowed to IV Piperacillin/Tazobactam to which the organism was sensitive. The patient underwent repair of his cecal perforation, with pathology showing large cell neuroendocrine carcinoma of the colon with lymph node invasion. The patient remained bacteremic for several weeks despite antibiotic therapy. Repeat CT scan showed an area of myonecrosis in the left gluteal region. Initial transthoracic echocardiogram was concerning for new vegetation and aortic regurgitation. Transesophageal echocardiogram 17 days later was negative for vegetation but did show moderate to severe aortic regurgitation. MRI was suspicious for embolic phenomena. Indium tagged white blood cell scan showed positive uptake in the distribution of the thoracic descending aorta. In the setting of metastatic large cell neuroendocrine tumor and numerous comorbidities, goals of care discussions were initiated with the patient's next of kin.

Discussion/Clinical Findings
Bacteremia from Clostridium Septicum is rare, usually observed in the setting of hematologic or colonic malignancy, with at least one case report describing its occurrence in the setting of colonic neuroendocrine adenocarcinoma (3, 5, 9). There are few case reports describing aortitis and endocarditis in individuals with C. septicum bacteremia. Both aortitis and endocarditis carry a poor prognosis, mortality has been reported at 50-100% and 33.3% respectively (6, 7). Seeding of the aorta from C. Septicum usually presents with periaortic gas infiltration with subsequent rapid progression to acute aneurysm and aortic dissection, however, 7% of cases report an absence of periaortic gas (8, 10). Due to the scarcity of cases described, there are no established guidelines for the management of C. Septicum aortitis. One review investigating C. Septicum aortitis concluded that early open aortic repair vs. endovascular aortic repair is the best way to improve the odds of survival in patients eligible for high-risk vascular surgery (4). Additionally, the authors note that antibiotic therapy may be considered to "bridge" high-risk patients to eventual surgery (4). The same group found that antibiotic therapy without surgical or endovascular therapy had a six-month mortality rate of 100% in patients with C. Septicum aortitis (4).

Conclusion
Clinicians should be aware that Clostridium septicum bacteremia is associated with hematologic and colonic malignancy, and that an extensive search for cancer should be initiated whenever a patient presents with bacteremia from this organism. Endocarditis and aortitis are rare complications of C. Septicum bacteremia, and both carry a poor prognosis. Antibiotics may be used to bridge patients who are too ill to undergo immediate surgical repair or may be used as long-term therapy in those seeking palliative therapy over a long-term cure. Early identification, antibiotic administration, and surgical intervention are key to giving patients the best chance for recovery.

Abstract Title: Chromosomal Analysis of Blastocysts Derived From 0Pn and 1Pn Zygotes

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Abstract

Introduction
Current guidelines recommend against the use of abnormally fertilized oocytes due to concerns that these embryos have abnormal chromosome content [1]. Therefore, most clinics default to culture of 2PN embryos and discard of embryos with other pronuclear configurations. Prior studies have shown that a portion of 0, 1, 2.1, and 3PN zygotes can result in good quality euploid blastocysts, however, parental origin of ploidy (diploid vs. haploid or triploid) remains a concern and cannot be detected with conventional pre-implantation genetic testing for aneuploidy (PGT-A) [2,3]. The objective of this study is to determine whether PGT-A with short tandem repeat (STR) analysis can identify which abnormally fertilized embryos (0PN and 1PN, respectively), ultimately develop into usable, euploid-diploid blastocysts.

Methods
All 0PN and 1PN embryos that developed to the blastocyst stage between September 1, 2021 to February 24, 2023 at 61 embryology labs in the United States were included. Blastocyst trophectoderm biopsies were performed on day 5 and day 6 for PGT-A. Embryos classified as euploid then underwent STR analysis to determine ploidy status in the same genetics laboratory.

Results
A total of 279 0PN and 153 1PN embryos that developed to the blastocyst stage were collected. The mean maternal age of the 0PN group was 38.3 $\pm$ 6.2 years, compared to 36.3 $\pm$ 5.4 years in the 1PN group ($p = 0.001$). Of the 0PN embryos, 177 (63.4%) resulted as euploid and of those 171 (96.1%) were true diploid. Of the 1PN embryos, 85 (62.7%) resulted as euploid and of those 54 (56.8%) were true diploid. Forty-two percent of the embryos categorized as 1PN and euploid were chromosomally haploid.

Conclusion
In this study the majority of embryos that appeared to be abnormally fertilized were found to be euploid-diploid after PGT and STR analysis. Two-thirds of the embryos initially classified as 0PN by morphologic assessment were found to be euploid and of those almost all were found to be diploid. Similarly, two-thirds of the embryos initially classified as 1PN were found to be euploid and of those less than half of the embryos were found to be truly chromosomally haploid. While current guidelines recommend against the use of abnormally fertilized embryos, for some patients the ability to use these embryos would mean a substantial increase in their chance of success. In addition to standard morphologic assessment, extended culture with PGT and STR should be considered.

A special note of appreciation and gratitude goes to Alfred Abuhamad, MD
Executive Vice President of Macon & Joan Brock Virginia Health Sciences at
Old Dominion University, Dean of Eastern Virginia Medical School
Mason C. Andrews Distinguished Professor in Obstetrics and Gynecology

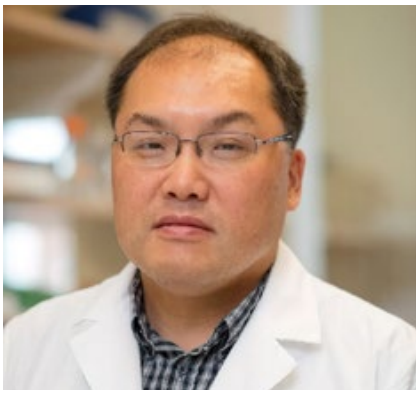
and the Research Advisory Committee
for the Administrative and Research Community support of
Research Day.

Special appreciation and gratitude for their support of
Research Day
are also extended to the

Research Office Leadership:

Milton L. Brown, MD, Ph.D., FNAI

Professor of Medicine,
Sr. Associate Vice President for Research
Prudence and Louis Ryan Chair of Research



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