RUSH UNIVERSITY

TRAINEE RESEARCH DAY

ABSTRACT BOOK

MARCH 27, 2025

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Welcome from President

Welcome to Trainee Research Day!

This is a great opportunity for us to highlight the tremendous research taking place every day at Rush, focusing on the creativity and hard work of our students and other trainees. It is also a time to recognize the many faculty members who provide valuable training and mentorship to this next generation of leaders.

I invite you to review this booklet of abstracts. I know that you will be as impressed as I am by the breadth and quality of the work.

Please stop by one or all of the Trainee Research Day events on March 27. You can find the full schedule below:

Time & Location	Sessions
9 a.m. - 4 p.m. Atrium Lobby	**Poster Viewing**
9 a.m. - 12:15 p.m. Room 540 AAC	**Oral Presentation Awards**
2 - 4 p.m. Atrium Lobby	**Poster Presentations** • **Odd** poster numbers: 2 - 3 p.m. • **Even** poster numbers: 3 - 4 p.m.
4:30 - 6 p.m. Room 500, Main Lounge	**Award Ceremony and Reception**

Both oral and poster presentations are an important part of the education of our trainees, and by attending and interacting with presenters you can assist in this process and learn a lot as well.

Please also join us for the Room 500 reception to follow where we can celebrate our trainees and come together as a community. The award ceremony and reception will be held from 4:30 to 6 p.m.

I look forward to seeing you there.

With thanks and appreciation.

Robert S.D. Higgins, M.D., M.S.H.A.
President and Chief Academic Officer, Rush University
Chief Clinical and Academic Officer and Senior Vice President, Rush University System for Health

Acknowledgement

During the Trainee Research Day please take a moment to say “thank you” to everyone who helped organize this event.

Deans:
- Jason S. Turner, PhD, MAE, interim dean, College of Health Sciences
- Christine M. Kennedy, PhD, RN, FAAN, interim provost, Rush University and dean, College of Nursing
- Cynthia Brincat, MD, PhD, FACOG, acting dean, Rush Medical College

Vice Deans for Research:
- Lauren M. Little, PhD, OTR/L, associate dean of Research, College of Health Sciences
- Barbara A. Swanson, PhD, RN, FAAN, ACRN, associate dean for Research, College of Nursing
- Lena Al-Harthi, PhD, vice dean for Research, Rush Medical College

Rush Services:
- Antonio Mendoza, Quick Copy
- Room 500 Staff
- Laurie Ann Bender, Office of the Registrar
- Creative Media Group, Rush

Volunteers:
To our returning volunteers David Gerard, Monique Austin, Rita Eaddy, Aleksandra Danilovic and Evelyn Jackson.

A huge “**thank you**” to Norma Sandoval! Norma makes Trainee Research Day happen and we are incredibly grateful.

Regards,

Bethany Martell
Vice President, Research Operations

Trainee Research Day

Thursday, March 27, 2025
At-A-Glance

Time & Location	Time & Location
9 a.m. - 4 p.m. Atrium Lobby	**Poster Viewing**
9 a.m. - 12:15 p.m. Room 540 AAC	**Oral Presentation Awards** *15-minute presentations & 5-minute Q&A*
9 - 9:15 a.m.	**Ruby Crawford, MS in Clinical Nutrition** (CHS: MS) **&** **Medha Murali, MS in Clinical Nutrition** (CHS:MS)
9:20 - 9:35 a.m.	**Dean Howdeshell, B.S.N.** (CON: DNP)
9:40 - 9:55 a.m.	**Morgan Allen, B.S.** (RMC: M2)
10 - 10:15 a.m.	**Jocelyn Jaen, Ph.D.** (RMC: Post-Doctoral Research Fellow)
10:20 - 10:35 a.m.	**Itzel Lazcano, B.S., M.S.** (RMC: DTS)
10:40 - 10:55 a.m.	**Rae Peitzmann, B.S.** (CHS: Clinical Doctorate)
11 - 11:15 a.m.	**Michael Hulburt, D.N.P.** (CON: DNP)
11:20 - 11:35 a.m.	**Megan Seferian, B.S.** (RMC: M2)
11:40 - 11:55 a.m.	**Karaj Singh, B.A**. (RMC: M2)
12 - 12:15 p.m.	**Ishwarya Venkatesh, M.S., B.E.** (RMC: DTS)
2 - 4 p.m. Atrium Lobby	**Poster Presentations** • **Odd** poster numbers: 2 - 3 p.m. • **Even** poster numbers: 3 - 4 p.m.
4:30 - 6 p.m. Room 500, Main Lounge	**Award Ceremony and Reception**

Visit the Trainee Research Day webpage for the most up-to-date information. Event information can also be found in the Rush Research Calendar.

For questions, contact Norma Sandoval.

Awardees

Oral Presentation Awardees
○ **Morgan Allen, B.S.** (RMC: M2) - IMPLEMENTATION OF A WIRELESS LOCALIZATION PROGRAM FOR PATIENTS WITH BIRAD 4C AND 5C LESIONS UNDERGOING IMAGE GUIDED BIOPSIES ○ **Ruby Crawford, M.S.** in Clinical Nutrition (CHS: MS) & **Medha Murali, M.S.** in Clinical Nutrition (CHS:MS) - PREVALENCE AND CLUSTERING OF HEALTH BEHAVIORS AMONG WOMEN WITH METASTATIC BREAST CANCER ○ **Dean Howdeshell, B.S.N.** (CON: DNP) - A TARGETED APPROACH FOR OPTIMIZING CONGENITAL CYTOMEGALOVIRUS (cCMV) TESTING: A DOCTOR OF NURSING PRACTICE PROJECT ○ **Michael Hulburt, D.N.P.** (CON: DNP) - EVALUATION OF THE FRAILTY ASSESSMENT PROGRAM IN A KIDNEY TRANSPLANT CENTER ○ **Jocelyn Jaen, Ph.D.** (RMC: Post-Doctoral Research Fellow) - ADVERSE CHILDHOOD EXPERIENCES AND COGNITIVE DECLINE IN OLDER ADULTS FROM THE MEMORY AND AGING PROJECT (MAP) ○ **Itzel Lazcano, B.S., M.S.** (RMC: DTS) - ESTABLISHING THE MECHANISMS OF TENOFOVIR DISOPROXIL FUMARATE (TDF) AND TENOFOVIR ALAFENAMIDE (TAF) IN OSTEOGENESIS ○ **Rae Peitzmann, B.S.** (CHS: Clinical Doctorate) - BEYOND SURVIVAL: SUCCESS IN SUSTAINED HOUSING AMONG THOSE WHO HAVE EXPERIENCED HOMELESSNESS ○ **Megan Seferian, B.S.** (RMC: M2) - EPISODIC VIREMIA IN WOMEN WITH HIV ON cART ALTERS IgG GALACTOSE, IgG3 gp120, AND INFLAMMATORY CYTOKINES ○ **Karaj Singh, B.A.** (RMC: M2) - IMPACT OF AREA OF DEPRIVATION INDEX ON ALLERGEN SENSITIZATION IN CHICAGOLAND ○ **Ishwarya Venkatesh, M.S., B.E.** (RMC: DTS) - COBALT AND TITANIUM ALLOYS COMMONLY USED IN TJA IMPLANTS INCREASES AMYLOID-β PROTEIN EXPRESSION IN iPSC-DERIVED ASTROCYTES-COULD THIS CONTRIBUTE TO EARLY-ONSET OR EXACERBATE ALZHEIMER'S DISEASE?
The Health Equity Research Poster Award
Melissa Rangel, MD, BS (Clinical Resident) - EVALUATING THE GAIL MODEL: RACIAL DISPARITIES IN BREAST CANCER RISK ASSESSMENT
The Irwin Press Patient Experience Research Poster Awardee
Regan Curtis, B.A. (RMC: M1) - THE OHANA PROJECT: EVALUATING KĀNAKA MAOLI-INSPIRED, EVIDENCE-BASED EMOTIONAL SUPPORT METHODOLOGIES IN ADDRESSING LONELINESS IN THE EMERGENCY DEPARTMENT SETTING

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Abstract #: 1
Trainee Rank: RUSH Matriculated Student
CHS: MS
Theme: Cancer and Translational Medicine
Cluster: Breast Cancer Research

Ruby Crawford, Master of Science in Clinical Nutrition

Crawford R (Rush U), Murali M (Rush U), and Gomez SL (Rush U)

PREVALENCE AND CLUSTERING OF HEALTH BEHAVIORS AMONG WOMEN WITH METASTATIC BREAST CANCER

INTRODUCTION: While there is no cure, women with metastatic breast cancer (MBC) are living longer due to advancements in treatment with a 5-year U.S. survival rate of 91%. The needs of these survivors and how best to improve quality of life (QOL) and outcomes have not been well documented. Cancer survivorship guidelines recommend 150-300 minutes of moderate physical activity (PA), and ≥5 servings of fruits/vegetables (FV) daily. Existing evidence shows poor adherence to recommendations. This study examines the prevalence and clustering of health behaviors (smoking, PA, and FV intake) in women with MBC to inform interventions that improve adherence to recommendations and QOL.

METHODS: Data from a cross-sectional pilot study of 65 women (18+) with MBC were used for this study. Participants were receiving cytotoxic therapies and had an ECOG performance score of 0-3. Risk behaviors included inadequate FV intake (<5 servings/day), smoking (yes/no), and self-reported PA (Godin-leisure score <24). ASA24 software was used for collection of two 24-hour diet recalls, and SPSSv29 was used to generate frequency distributions.

RESULTS: Mean age of the sample was 55.5 ± 11.5 years, mean body weight was 77.3 ± 18.5 kg, and mean BMI was 28.1 ± 6.9 kg/m². Smoking and PA data were collected for 64 of 65 participants, while FV intake data was available for all. Among the 64 participants, 4 (6.2%) reported smoking, and 60 (92.3%) did not. A total of 46 participants (71.9%) had inadequate PA levels, while 18 (28.1%) met the criteria for adequate PA. Similarly, 46 participants (70.8%) consumed <5 FV servings/day, and 19 (26.2%) consumed 5 or more servings/day. Most common cluster (46%) involved low FV intake and low PA, followed by 20.6% with low FV intake alone and 19% with low PA alone. Only 4.8% exhibited all three risk behaviors.

CONCLUSIONS: The largest health risk behaviors were coupling of <5 FV/day (~70%) and low PA (46%). Findings reflect suboptimal PA and FV intake and low adherence to cancer survivorship guidelines. Further investigations will focus on a larger sample of MBC survivors as well as developing interventions based on findings to bridge identified gaps.

Abstract #: 2
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Cancer and Translational Medicine
Cluster: Breast Cancer Research

Israel Delgado, BS in Biological Sciences

Israel Delgado (Rush); Lei Duan (Rush)

TARGETING PROTEIN TRANSLATION ELONGATION IN TRIPLE NEGATIVE BREAST CANCER

INTRODUCTION Triple-negative breast cancer (TNBC) is an aggressive subtype of breast cancer associated with limited treatment options and a poor prognosis. Therapeutic approaches primarily include chemotherapy, radiotherapy, and immunotherapy. Notably, TNBC is characterized by deregulated signaling pathways such as MAPK-ERK and PI3K-AKT-mTOR, which play a key role in tumor progression. Protein translation, a crucial downstream process of these pathways, is influenced by the elongation factor eEF1A. High expression levels of eEF1A are associated with worse outcomes in TNBC patients. Plitidepsin, a marine-derived compound that inhibits eEF1A, is clinically approved for the treatment of multiple myeloma. This study seeks to evaluate the therapeutic potential of plitidepsin in TNBC cell lines.

METHODS Multiple TNBC cell lines were treated with varying doses of plitidepsin or siRNAs targeting EEF1A1 and MYC. Additionally, the cell lines were treated with different doses of the translation initiation inhibitor EFT508 and the translation elongation inhibitor HHT. Drug efficacy and gene dependency were assessed using MTT and colony formation assays. Protein expression was analyzed via immunoblotting, and gene expression was assessed using qPCR. These assays identified cell lines as either sensitive or resistant to plitidepsin. Subsequently, Gene Set Enrichment Analysis (GSEA) was performed to identify pathways differentially upregulated in sensitive versus resistant cell lines, providing insights into the molecular mechanisms underlying sensitivity to plitidepsin.

RESULTS MDA-MB-231, BT-549, and HCC1937 cell lines were identified as sensitive to plitidepsin while BT-20, MDA-MB-453, and HCC1143 cell lines were classified as resistant. Immunoblot analysis revealed that MYC is rapidly downregulated by plitidepsin. Knockdown of MYC and EEF1A1 using siRNA selectively induced greater cell death in sensitive cell lines compared to resistant ones, suggesting that MYC is a key target of plitidepsin. GSEA analysis identified protein translation pathways as enriched in sensitive cell lines, with five genes (eIF1AX, eIF3B, RPL5, RPS14, and RPS25) commonly upregulated in these lines.

CONCLUSIONS Plitidepsin has potential as a treatment for certain TNBC cells with heightened protein translation pathways. MYC is a critical gene in these sensitive cells and serves as an effective target of plitidepsin. Additionally, the five genes from the GSEA may serve as a gene signature for identifying sensitivity to plitidepsin.

Abstract #: 3
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Cancer and Translational Medicine
Cluster: Breast Cancer Research

Quinn Fitzpatrick, Bachelor's of Science in Biochemistry
Quinn Fitzpatrick (Rush); Annie Fritsch (Rush); George Kokosis MD (Rush)

IMPACT OF NOVEL CANCER TARGETING MEDICATIONS ON DIEP FLAP BREAST RECONSTRUCTION OUTCOMES

INTRODUCTION: In recent years novel therapeutic agents such as immunotherapy and antibody therapies have increasingly been utilized for breast cancer due to their ability to provide targeted treatment of disease. Although implant-based reconstruction (IBR) remains the most popular method of post-mastectomy reconstruction, autologous reconstruction with DIEP (Deep Inferior Epigastric Perforator) flap has increased in popularity due to its' ability to provide a more natural appearance and higher patient satisfaction. This project aims to address a current literature gap by comparing outcomes of DIEP flap reconstruction in patients receiving novel therapeutic agents combined with chemotherapy versus chemotherapy alone.

METHODS: A retrospective review of patients who underwent DIEP flap breast reconstruction from 2018-2024 at Rush University Medical Center was conducted. The study included patients with a history of chemotherapy alone (CA) or chemotherapy and targeted therapy (CT) (Trastuzamab, Trastuzamab+Pertuzumab, Olaparib, Abemacilib, and Pembrolizumab). Variables studied included patient demographics, medical history, oncologic treatments, and surgical outcomes. Descriptive and comparative statistics were utilized to demonstrate rates of various complications between cohorts.

RESULTS: A total of 113 patients with an average age of 50.54 (10.50) years were included in the review, 35 patients (30.97%) were included in the CT arm and 78 (69.03%) CA arm (Table 1). There were 20 complications reported with 9 (25.71%) in CT patients and 11 (15.07%) in CA (p=0.135). The most common complication was hematoma. Hematoma occurred in 3 (8.57%) CT patients and 4 (5.12%) CA patients (p=0.675). There was no statistically significant difference for any complication between the CA and CT arms (Table 2).

CONCLUSION: As treatment and reconstruction techniques evolve, understanding their interaction is vital for optimizing outcomes and minimizing complications. Our study indicates that DIEP flap reconstruction remains a safe option for patients undergoing targeted-therapeutic treatments.

Abstract #: 4
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Cancer and Translational Medicine
Cluster: Breast Cancer Research

Allie Heller, BS, MS

Allie Heller- Molecular Pathogens and Immunology and Internal Medicine Hematology-Oncology Savanna Nalamliang- Molecular Pathogens and Immunology Noah King- Internal Medicine Hematology-Oncology Sarthak Shah- Internal Medicine Hematology-Oncology Amanda Marzo- Internal Medicine Hematology-Oncology Jeffrey Schneider- Molecular Pathogens and Immunology

IN-HOUSE IL-15RA-FC FUSION PROTEIN DECREASES TUMOR BURDEN IN A LUMINAL-B CELL BREAST CANCER MODEL

INTRODUCTION Breast cancer is responsible for 650,000 deaths globally per year. Despite treatment efforts, aggressive forms such as triple negative (HER-, ER-, PR-) and metastatic tumors lead to lower survival rates in patients. Current treatments harbor limited potency, negative side effects, and costly treatment maintenance. Advancements to current immunotherapies that we investigate involve glycomanipulation, or modifications of sugars on proteins and fusion proteins to optimize the biochemical properties, stability, and efficacy. IL-15 and IL-15Ra-Fc-based immunotherapies in combination with anti-PD-1 have shown improved outcomes in treatment of breast cancer models, so we targeted these proteins for glycomanipulation to further improve their efficacy.

METHODS IL-15Ra-Fc plasmid was designed and transfected into HEK293T cells, and the protein was isolated and purified from supernatant of these cultures. The protein was validated and quantified using SDS-PAGE, Western Blot, and BCA assays. Glycoforms were characterized by Lectin Blot and Mass Spectrometry. The IL-15Ra-Fc was complexed with recombinant IL-15 and injected intratumorally (i.t.) into E0771 luminal B cell breast tumors in C57BL/6 mice, in combination with anti-PD-1 intraperitoneally (i.p.) to measure effect on tumor burden and survival analysis.

RESULTS IL-15Ra-Fc antibody was successfully produced, isolated, and validated. The IL-15Ra-Fc fusion protein produced in-house was able to decrease tumor burden in mice, by achieving tumor reduction or complete ablation of tumor, similarly to the commercially purchased IL-15Ra-Fc therapeutic.

CONCLUSION The IL-15Ra-Fc can now be glycomanipulated via enzymatic and genetic manipulation to modify the sugar patterns within the Fc portion of our fusion protein. Readouts of the various forms of glycomanipulation will be utilized such as visualization and assessment of cellular localization via immunofluorescent (IF) and light sheet microscopy. Binding for Fc gamma receptor engagement will be quantified via surface plasma resonance (SPR) assay. Future studies aim to understand if optimizing IL15Ra-Fc treatment increases effector cell function in the tumor microenvironment (TME) and increase efficacy in a 4T1 triple negative breast cancer model. The work here can be expanded beyond cancer studies for other disease settings that utilize fusion protein therapeutic modalities.

Abstract #: 5
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Cancer and Translational Medicine
Cluster: Breast Cancer Research

Malia Leifheit, BS Health Science and Biology, MS Integrated Biomedical Sciences

Preston Daniels (Rush University), Jeffrey Schneider (Rush University), Amanda L Marzo (Rush University)

ENHANCING ANTI-PD-1 TREATMENT WITH THE HEPATITIS B VACCINE AND IL-15 AS A NOVEL TREATMENT FOR TRIPLE NEGATIVE BREAST CANCER

INTRODUCTION The pursuit of novel therapeutic strategies remains a cornerstone of research in triple negative breast cancer (TNBC). TNBC tumors are generally characterized as immunologically "cold", or devoid of immune infiltrate. Immune checkpoint inhibitor (ICI) treatment has been explored as an avenue for TNBC treatment, however, most studies found ICIs are ineffective in treating these "cold" tumors. Thus, another agent is necessary to enhance immune infiltrate into the tumor. Repurposing pathogen vaccines for cancer immunotherapy can utilize the immune system's natural affinity to establish potent immune responses within the tumor. Preliminary data has validated this approach by showing increased anti-tumor immune responses by intratumoral (i.t) administration of Influenza vaccine followed by a combination of anti-PD-1 and IL-15 induces tumor rejection and long-term immunity. Additionally, we show that Hep B alone increases tumor immunity compared to controls. In the context of TNBC, exploiting pathogen vaccines for cancer treatment is relatively unexplored. Here we elucidate the effectiveness of the Hep B vaccine alone or in combination with anti-PD-1 and IL-15 in clearing breast tumor and demonstrate using this combination induces and maintains tumor rejection.

METHODS Female BALB/c mice were injected with the TNBC cell line 4T1 into the right mammary fat pad. Once tumors developed, mice were injected i.t. with either Hep B alone, or Hep B plus the novel combination treatment. For mice who received the combination, anti-PD-1 was administered intraperitoneally (i.p.), and Il-15 was administered i.t. Mice were monitored for tumor volume and survival.

RESULTS AND CONCLUSION Mice who received Hep B alone (x1 and x3) initially displayed tumor regression with a greater response in Hep B x3 mice, however, both groups experienced relapse around D29. Mice who received Hep B (x1 and x3) plus combination treatment experienced enhanced tumor regression compared to Hep B alone. Three mice who received one dose of Hep B and combination treatment completely cleared the tumor by D42. We have demonstrated that the Hepatitis B vaccine and IL-15 improves ICI treatment effectiveness. Finally, we identified that the Hep B vaccine is effective against the 4T1 TNBC model and facilitates remodeling of the tumor microenvironment at just one dose.

Abstract #: 6
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Cancer and Translational Medicine
Cluster: Breast Cancer Research

Sophia Mense, M.D.

Mense SA (Rush U); Bojko M (RUMC); Esler G (RUMC); and Gomez SL (Rush U)

EXAMINING ALLOSTATIC LOAD, CANCER STAGE, COMORBIDITIES, AND SOCIAL DETERMINANTS OF HEALTH AT DIAGNOSIS IN WOMEN WITH BREAST CANCER

INTRODUCTOIN Allostatic load (AL), a cumulative measure of physiological stress, has been linked to adverse health outcomes, including cancer progression and correlates with social determinants of health (SDOH). In breast cancer (BC), elevated AL may influence cancer stage (CS) and hormone receptor (HR) status. This study examines the relationship between AL, CS, HR status, comorbidities, and SDOH in women with BC at diagnosis.

METHODS This retrospective cross-sectional study obtained clinical data from women diagnosed with BC (n=63) at Rush University Medical Center from 2014-2019. AL score was calculated from nine biomarkers representing cardiovascular (blood pressure, resting heart rate), metabolic (BMI, glucose, creatinine), and immune (white blood cell count, albumin, hemoglobin) systems. Each biomarker exceeding its predefined sex-specific (hemoglobin) clinical threshold was assigned 1 point, resulting in AL scores ranging from 0 to 9. Patients were categorized into high and low AL groups based on sample median AL score. Relationships between AL group, CS, HR status, comorbidities (e.g., sleep apnea, dyslipidemia), and SDOH were evaluated using Chi-square and Fisher's Exact tests.

RESULTS Sample mean age and BMI were 58.5 years (SD = 13.6) and 29.3 (SD = 6.0) respectively, with 27% normal weight, 30% overweight, and 43% obese. Mean AL score was 1.98 (SD = 1.37) and median AL score was 2.0; with 51.6% of patients classified as high AL (≥2). Significant associations with high AL were found for sleep apnea, dyslipidemia, and stroke ($p<0.001$). Non-significant associations were observed for smoking, alcohol use, race, hypertension, history of cancer ($p>0.05$), age ($p=0.69$), and NLR ratio ($p=0.471$). High AL was significantly associated with late-CS compared to early-stage (61% vs. 39%, respectively; $p = 0.013$). No significant differences were observed for HR status, with estrogen receptor (ER)+ tumors present in 59% of high AL group and 76% of low AL group ($p = 0.326$).

CONCLUSIONS Findings suggest associations between high AL and advanced CS, sleep apnea, dyslipidemia, and stroke, underscoring the role of chronic stress and metabolic health as risk factors for BC. Future research will explore how SDOH, adiposity, and body composition factors interact with AL to influence BC outcomes.

Abstract #: 7
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Cancer and Translational Medicine
Cluster: Breast Cancer Research

Shreya Patel, MS

Shreya Patel1, Marcus Winogradzki1, Waddell Holmes1, Alan Blank2, Niyati Patel1, and Jitesh Pratap1 1 Department of Anatomy and Cell Biology, Rush University Medical Center, Chicago, IL, 2 Section of Orthopedic Oncology, Rush University Cancer Center, Chicago IL.

MICROTUBULE DYNAMICS IN REGULATING BONE METASTASIS OF BREAST CANCERS: A NOVEL FUNCTION OF TUBULIN β-2 AND TUBULIN β-3

INTRODUCTION: Bone metastases (BM) pose a significant challenge in advanced cancer management, with median survival ranging from 12 to 50 months. Current therapies, including surgical resection and microtubule (MT)-targeting agents like paclitaxel, primarily provide palliative outcomes. Microtubules, composed of α- and β-tubulin heterodimers, are essential for cellular processes such as division, migration, and trafficking. Dysregulated expression of specific β-tubulin isotypes, TUBβ2 and TUBβ3, has been associated with chemoresistance, but their precise roles in breast cancer bone metastases (BMBC) remain unclear. This study investigates the distinct functions of TUBβ2 and TUBβ3 and their therapeutic potential by targeting their unique C-terminal domains.

METHODS: RNA-Seq datasets and patient survival data from publicly available databases were analyzed to evaluate the expression of TUBβ2 and TUBβ3. Immunohistochemistry (IHC) was performed on matched primary and BM tumor biopsies (n=16) from BC patients. CRISPR/Cas9-mediated knockdowns (KDs) in bone-derived MDA-MB-231 cells were employed to assess cell growth, survival, adhesion, migration, and metastatic properties. MT polymerization rates were evaluated using MT regrowth assays, subcellular trafficking was analyzed via immunofluorescence imaging. Focal adhesion turnover was assessed by western blotting, and IL6 secretion-analyzed by ELISA.

RESULTS: Elevated expression levels of TUBβ2 and TUBβ3 significantly correlated with poor survival in breast cancer patients and were markedly higher in BM tumors compared to primary and normal breast tissues. CRISPR KD revealed distinct morphological changes, with TUBβ2KD inducing giant cell formation and TUBβ3KD leading to elongated cytoplasmic extensions. Metastatic Properties: Loss of both TUBβ2KD, TUBβ3KD show diminished migration and adhesion. resulting in reduced focal adhesion kinase (FAK) levels were observed in both KDs, impairing adhesion and migration. MT Dynamics: KDs delayed MT repolymerization, suggesting isotype-specific integration into MT polymers. Cytokine Secretion: TUBβ2 loss increased IL6 secretion twofold, while TUBβ3 loss reduced IL6 by 70%. Subcellular Trafficking: Loss of perinuclear endosomal puncta indicated novel roles in endosomal trafficking.

CONCLUSIONS: This study identifies TUBβ2 and TUBβ3 as critical regulators of MT dynamics and metastatic properties in BMBC. Their roles in cell adhesion, migration, and trafficking underscore their potential as therapeutic targets. Current clinical approaches to BM focus largely on palliative care, but targeting TUBβ2 and TUBβ3 offers a promising strategy for more precise interventions that could improve patient survival and quality.

Abstract #: 8
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Cancer and Translational Medicine
Cluster: Breast Cancer Research

Ilana Spitz, MS, BS

Ilana Spitz, MS (RUSH Cancer Center, Presenting Author) Lisa Stempel, MD (Diagnostic Radiology, RUMC) Mia Levy, MD (RUMC) Rosalinda Alvarado, MD (General Surgery, RUMC) Dipti Gupta, MD (Diagnostic Radiology, RUMC) Lauren Green, MD (Diagnostic Radiology, RUMC) Shirlene Paul (RUSH Cancer Center) Chelsea McPeek (RUSH Cancer Center)

EVALUATING UPGRADE RATES IN HIGH-RISK BREAST LESIONS: DOES TYRER-CUZICK SCORE MATTER?

INTRODUCTION: Risk assessment models, like Tyrer-Cuzick (TC), are important for stratifying the risk of breast cancer development; however, they are limited. This study investigates upgrade rates of high-risk lesions (HRLs) to breast cancer based on imaging modality and correlates upgrade with the patient's TC score.

METHODS: HRLs were assessed in patients who underwent imaging studies at an academic medical center between July 2020 and July 2023. Patients with a TC score, breast imaging, and excisional biopsy at the institution were included. Patients with a personal history of breast cancer or concurrent breast cancer diagnosis on core needle biopsy (CNB) were excluded. The imaging modality was documented at the time of biopsy. Lesions on CNB considered HRLs include atypical ductal hyperplasia (ADH), lobular carcinoma in situ (LCIS), atypical lobular hyperplasia (ALH), radial scar, intraductal papilloma with atypia, and flat epithelial atypia (FEA). Patients with multiple HRLs were classified by the lesion with the highest upgrade risk. Lesions were considered upgraded if excision confirmed invasive cancer or ductal carcinoma in situ. Regression models tested the significance of the differences in upgrade rates by modality, TC score, and pathology codes.

RESULTS: Of the 114968 imaging studies, 4854 CNBs were performed. 150 HRLs were detected, 15 of which were upgraded, resulting in a 10% upgrade rate. When classified by modality, upgrade rates were as follows: screening mammogram (8.2%), diagnostic mammogram (19.1%), MRI (3.1%), and screening ultrasound (0.0%). ADH and intraductal papilloma with atypia were upgraded by 13.8% and 20%, respectively. While classifying by TC score, patients scoring <20% had an upgrade rate of 10.6% while their high-risk counterparts had an upgrade rate of 8.7% (OR=0.9992).

CONCLUSION: Our results indicate that TC score does not reliably predict upgrade rates for HRLs. Despite lack of statistical significance, HRLs detected by diagnostic mammogram are more likely to be upgraded than others. MRI produced a small number of upgrades, possibly due to larger amounts of tissue taken during biopsy, resulting in a breast cancer diagnosis. ADH is the most likely HRL to be upgraded while ALH, FEA, and intraductal papilloma with atypia are more likely to be upgraded than LCIS.

Abstract #: 9
Trainee Rank: RUSH Matriculated Student
RMC: M4
Theme: Cancer and Translational Medicine
Cluster: Lung Cancer Research and Barriers to Treatment

Artemis Markopoulos, MA, BA

Artemis Markopoulos MA BA, Robin Powszok MD MS, You J. Kim BS, Nikhil Joshi MD, Michael J. Jelinek MD, Daniel W. Golden MD MHPE, Vanessa C. Stubbs MD, Samer Al-Khudari MD, Mihir K. Bhayani MD (All authors are affiliated with RUSH)

ACCURACY OF A CIRCULATING TUMOR DNA ASSAY IN HPV-NEGATIVE HEAD AND NECK CANCER SURVEILLANCE

INTRODUCTION: Head and neck cancers (HNC) are the seventh most common cancer globally. Yet, advances in surveillance methods have been limited. This study aimed to evaluate whether SignateraTM, a personalized tumor mPCR-NGS assay that detects minimal residual disease in the form of circulating tumor DNA (ctDNA), can accurately predict disease status in human papillomavirus (HPV) negative HNC.

METHODS: Retrospective review of HPV-negative HNC patients with at least one blood draw for ctDNA monitoring during disease treatment and surveillance between June 2022 and March 2024 at a single tertiary care center. IRB approval was obtained. Study data was collected through electronic medical records and managed via REDCap. Initial analysis included descriptive statistics using IBM SPSS Statistics (Version 29; IBM Corporation, Armonk, New York). Then, clinical disease status and ctDNA detectability were compared to determine the performance and reliability of these personalized assays using sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV).

RESULTS: 53 patients were included in the analysis with a median age of 64 (range 19-88). Analyses were performed on a per-patient (n=53) and a per-test (n=128) basis. For the per-patient analysis, results from patients' initial ctDNA test were analyzed with a sensitivity of 90%, specificity of 92%, PPV of 97%, and NPV of 73%. Per-test analysis found a sensitivity of 89%, specificity of 95%, PPV of 98%, and NPV of 79%. Subgroup analyses were performed for patients with oral and non-oral cavity primaries and patients with and without distant metastatic disease. For oral cavity primaries, on a per-patient basis (n=23), sensitivity was 88%, specificity 83%, PPV 94%, and NPV 71%. For non-oral cavity primaries (n=30), sensitivity was 92%, specificity 100%, PPV 100%, and NPV 75%. For patients with metastases, sensitivity was 88%, and specificity was unable to be calculated because all patients were disease-positive, PPV was 100%, and NPV 0%. For patients without metastatic disease, sensitivity was 91%, specificity 92%, PPV 97%, and NPV 79%.

CONCLUSION: ctDNA may be leveraged as a surveillance method in patients with HPV-negative HNC. However, prospective studies are needed to further explore clinical utility and influence on treatment decision-making.

Abstract #: 10
Trainee Rank: Clinical Resident
Theme: Cancer and Translational Medicine
Cluster: Lung Cancer Research and Barriers to Treatment

Margo Mekjian, MD

Melissa Gunchenko, MD (RUMC) Allison Poles, MD (RUMC) Margo Mekjian, MD (RUMC)

Lung Cancer Screening: Rates and Barriers at RUMC

INTRODUCTION The American Lung Association 2022 report demonstrated that only 5.8% of eligible Americans have been screened for lung cancer, and some states have screening rates as low as 1%. Early detection often allows for a higher likelihood of successful treatment. However, approximately 75% of lung cancer patients have advanced disease at the time of diagnosis and, despite advancements in treatment, survival remains poor. We aimed to assess the lung cancer screening rate at RUMC, as well as address potential barriers to lung cancer screening that residents and medical assistants (MAs) have encountered.

METHODS We conducted a CDA of patients aged 50-80 who presented to RUI resident clinic between 1/1/2024 and 6/30/2024. 11 MAs and 43 internal medicine residents were surveyed at RUI.

RESULTS 317 of 3802 patients (8.3%) were eligible for lung cancer screening based on smoking history, but LDCTs were only ordered for 22 of 317 (6.9%) patients. Of 3802 patients, 2428 (63.9%) did not have smoking history inputted into Epic. 6 of 11 MAs (54.5%) felt confident correctly entering smoking history into Epic. 63.6% of MA's often or always edit smoking history during primary care H&P visits, and 63.7% of MA's often or always edit smoking history during follow-up visits. Only 1 of 11 MAs (9.1%) felt confident in lung cancer screening eligibility criteria. 32 of 43 (74.4%) residents have added or edited smoking history into Epic, but only 22 of 43 residents (51.2%) felt confident accurately doing so. 30.3% of residents often or always input smoking history during initial H&P visits, and 9.3% often or always edit smoking history during follow-up visits. 21 of 43 residents (48.9%) felt confident in lung cancer screening eligibility criteria. The most common reasons for not ordering low-dose screening CTs (LDCT) were forgetting or lack of Epic reminder due to incorrect smoking history documentation, time constraints with need to address more urgent problems, and patient declining LDCT.

CONCLUSION Lung cancer screening rates at RUMC are suboptimal, largely because smoking history is not documented in Epic. Both residents and MAs expressed uncertainty regarding correct smoking history documentation. One major, fixable barrier to lung cancer screening is ensuring accurate documentation.

Abstract #: 11
Trainee Rank: Post-Doctoral Research Fellow
Theme: Cancer and Translational Medicine
Cluster: Lung Cancer Research and Barriers to Treatment

Wara Naeem, MD

Wara Naeem MD (RUMC); Arsalan A. Khan MD (RUMC), Minha Ansari (RUMC), Gillian C. Alex MD (RUMC), Nicole M. Geissen DO (RUMC); Michael J. Liptay MD (RUMC); Christopher W. Seder MD (RUMC)

ASSOCIATION BETWEEN LUNG DENSITY AND PROLONGED AIR LEAK FOLLOWING LUNG CANCER RESECTION

INTRODUCTION: Low-density lung tissue is susceptible to structural compromise after lung cancer resection, increasing the risk of postoperative air leaks. This study quantified low-density lung volume and examined its association with the risk of prolonged air leak (PAL) after resection for non-small cell lung cancer (NSCLC).

METHODS: Patients who underwent lung resection for pathological stage I-IIIA NSCLC at a single institution between 2010 and 2021 were identified. Exclusion criteria included patients receiving neoadjuvant therapy, pneumonectomy or bilobectomy, and those who had missing preoperative chest CT scans. Chest CT segmentation was performed using the segmentation software Data Analysis Facilitation Suite (DAFS) to determine the percentage of low-density lung tissue in the ipsilateral lung, defined as tissue with density less than -950 Hounsfield units (HU). Prolonged air leaks were defined as those lasting more than five days, based on the Society of Thoracic Surgeons (STS) definition of PAL. Univariable and multivariable logistic regression analyses were conducted to assess the association between the percentage of low-density lung tissue and the incidence of prolonged air leak.

RESULTS: A total of 548 patients met inclusion criteria, of whom 58% (317/548) identified as female, and 77% (424/548) identified as white. The median age was 71 years (IQR 65-76), median pack-years was 40 (IQR 20-50), median BMI was 27 kg/m² (IQR 23-30), and median tumor size was 2 cm (IQR 1.4-3.2). Approximately 67% (366/548) of the patients underwent a lobectomy, of which 67% (246/366) were upper lobe resections. Additionally, 78% (428/548) patients underwent a minimally invasive surgery and 15% (84/548) had a history of cardiothoracic surgery. In multivariable analysis, after adjusting for age, gender, BMI, surgical approach, tumor location, procedure performed, pack-years, prior cardiothoracic surgery, and tumor size, percentage of low-density lung tissue (OR 1.04, 95% CI 1.01-1.07, p=0.02) and a history of cardiothoracic surgery (OR 2.68, 95% CI 1.14-6.28, p=0.02) were associated with prolonged air leak.

CONCLUSION: Our findings suggest that lung density is independently associated with prolonged air leak following lung cancer resection and may serve as a valuable tool for preoperative risk stratification.

Abstract #: 12
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Cancer and Translational Medicine
Cluster: Lung Cancer Research and Barriers to Treatment

Evan Patel, MS

Evan A. Patel (RMC) Sushanth Neerumalla (RMC) Russell Whitehead (RMC) Dr. Elias Michaelides (RMC)

IMPACT OF TUMOR SIZE AND PATIENT DEMOGRAPHICS ON SURGICAL OUTCOMES IN VESTIBULAR SCHWANNOMA RESECTION: A RETROSPECTIVE ANALYSIS

INTRODUCTION: Larger vestibular schwannomas present unique challenges during surgical resection, potentially affecting various surgical outcomes. Identifying the relationships between tumor size, patient demographics, and perioperative outcomes is essential to improve risk stratification and surgical planning. This study examines the association between maximum tumor size on MRI and outcomes such as estimated blood loss (EBL), surgical time, and specific patient factors, including sex.

METHODS: We conducted a retrospective review of patients undergoing vestibular schwannoma resection at an academic medical center from 2014 to 2024. The primary independent variable was maximum tumor length on MRI. Outcome measures included EBL, surgical time, and demographic variables. Spearman correlation and Kruskal-Wallis tests were used to evaluate associations between tumor size and outcomes, with a focus on statistically significant relationships.

RESULTS: The study revealed significant associations between larger tumor size and several critical outcomes. Larger tumor size was positively correlated with increased EBL (correlation 0.264, $p = 0.0023$, $n = 131$) and prolonged surgical time (correlation 0.426, $p < 0.0001$, $n = 110$), indicating that larger tumors are associated with more complex, resource-intensive procedures. Additionally, sex (male) was a significant factor influencing EBL (Kruskal-Wallis $H = 4.679$, $p = 0.0305$, $n = 153$), with male patients showing higher EBL during surgery. These findings highlight the combined impact of tumor size and patient sex on perioperative demands and risks.

CONCLUSION: This study underscores the influence of larger tumor size on increased EBL and extended surgical duration in vestibular schwannoma resections. The association between male sex and higher EBL further emphasizes the need for tailored preoperative planning. These insights can guide surgical teams in anticipating challenges associated with larger tumors and specific patient demographics, enhancing patient safety and surgical efficiency. Further research is warranted to explore strategies that may mitigate these risks in patients with larger tumors and male sex.

Abstract #: 13
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Cancer and Translational Medicine
Cluster: Lung Cancer Research and Barriers to Treatment

Jacob Scott, B.S.

Jacob Scott (Rush), Sushanth Neerumalla (Rush), Rachel Akers (Rush), Peter Filip MD (Rush)
Presenting/first author: Jacob Scott

AIRBORNE RISKS: EXAMINING A LINK BETWEEN POLLUTION AND SINONASAL MALIGNANCIES

INTRODUCTION: Sinonasal malignancies, though rare, are aggressive cancers with complex etiologies influenced by environmental and behavioral factors. This study investigates the relationship between fine particulate matter (PM2.5) exposure and sinonasal malignancies in patients of Rush-affiliated clinics and hospitals, aiming to challenge assumptions about urban versus non-urban risks and provide insights into the environmental determinants of sinonasal cancer.

METHODS: A retrospective chart review of 148 patients who had undergone surgical treatment for sinonasal malignancies was conducted. Patients were excluded if demographic data and zip code were not available. Data extracted included zip codes, tumor characteristics, and potential confounding variables like tobacco use, alcohol use, and occupational exposures. Geospatial air quality data sourced from the U.S. Environmental Protection Agency were linked to patient zip codes to calculate average PM2.5 exposure over nine years. Statistical analyses, including Mann-Whitney U tests, Fisher's exact tests, and logistic regression, assessed relationships between PM2.5 levels, area deprivation index (ADI), and tumor characteristics.

RESULTS: PM2.5 mean 9-year exposure levels varied by county from 8.89-10.31 $\mu g/m^3$, with Winnebago County, IL, as the lowest mean exposure and St. Joseph County, IN, as the highest. This patient cohort was 65% male and 65% White, with an average age of 58 years (ages ranged from 15-96). Logistic regression models, accounting for ADI, smoking, alcohol use and occupational exposure showed no significant associations between ADI and malignancy types, including squamous cell carcinoma and adenocarcinoma. Similarly, Mann-Whitney U and Fisher's exact tests found no significant differences in malignancy prevalence when stratified by PM2.5 exposure (e.g., squamous cell carcinoma, $p = 0.44$).

CONCLUSION: These findings demonstrate the multifaceted pathology of sinonasal tumorigenesis and how socioeconomic determinants impact tumor development. Further multi-institutional studies should seek to clarify the role of pollution as an environmental risk factor for sinonasal cancer, while clinicians should dispel the assumption that areas with "cleaner" air reduces sinonasal cancer risk. Larger cohort studies should be performed to stratify risk factors of sinonasal malignancies to better inform preventative health measures.

Abstract #: 14
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Cancer and Translational Medicine
Cluster: Social and Inflammatory Impacts in Cancer

Minha Ansari, Bachelors of Science

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Social Vulnerability Index is Associated with Major Morbidity and Mortality After Esophagectomy

OBJECTIVE: This study aims to explore the impact of the Social Vulnerability Index (SVI) on 30-day outcomes in patients undergoing esophagectomy for esophageal cancer.

METHODS: All patients who underwent esophagectomy for esophageal cancer at a single institution from 2010 to 2021 were identified. The Society of Thoracic Surgeons' definition of major morbidity, which includes seven adverse postoperative events, was used. Patients were excluded if they had missing clinical stage, metastatic disease, were non-Illinois residents, or had an incomplete address listed. SVI was calculated by mapping the zip codes of patients' addresses to the census-tract-level SVI values determined by the Centers for Disease Control and Prevention. Univariable and multivariable logistic regression analyses were used to examine the association between SVI and the composite outcome of 30-day major morbidity or mortality.

RESULTS: A total of 118 patients, with a median age of 63 (IQR 56-70), met the inclusion criteria. Out of these, 25.4% (30/118) were female, 73.7% (87/118) were White, 45.8% (54/118) underwent minimally invasive surgery, 81.4% (96/118) received neoadjuvant therapy, 65.3% (77/118) were smokers, and 47.5% (56/118) experienced major morbidity, including 2 mortalities. On multivariable analysis, after adjusting for age, gender, race, smoking status, receipt of neoadjuvant therapy, surgical approach, histology, clinical T and N stage, and postoperative upstaging or downstaging, a higher SVI was associated with increased composite 30-day morbidity and mortality (OR 10.4, 95% CI 1.5-70.0, p = 0.02).

CONCLUSION: Higher SVI is associated with worse 30-day major morbidity and mortality after esophagectomy for esophageal cancer.

Abstract #: 15
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Cancer and Translational Medicine
Cluster: Translational Research in Other Cancer Types

Rachel Akers, MS

Rachel Akers, MS (Rush, presenting), Peter Filip, MD (Rush); Tasher A Losenegger, MD (Rush); Glen D Souza, MD (Rush); Jacob Scott (Rush); Sarah Khalife, MD (McMaster University); Edward C Kuan, MD (University of California Irvine); Pete S Batra, MD (Rush); Bobby A Tajudeen (Rush)

IDENTIFYING GENES THAT COULD DETERMINE PROGNOSTICATION IN SINONASAL SQUAMOUS CELL CARCINOMA

BACKGROUND: Sinonasal squamous cell carcinoma (SNSCC) is a multifaceted pathology, with several different genetic components and known etiologies. RNA and DNA sequencing can help with identifying prognostic factors as well as in the development of molecular targets in the management of sinonasal squamous cell carcinoma. While individual genes and their role in prognosis have been studied, the effect that a group of genes have on prognosis is unclear.

METHODS: 19 SNSCC samples were analyzed using the Tempus xT panel, a third-party DNA and RNA sequencing service, with accompanying chart review for demographic and survival data. This panel detects single nucleotide variants, indels, and copy number variants in 648 genes and chromosomal rearrangements in a subset of 21 genes. A log-rank test was performed for each gene type to compare overall survival. Logistic regression was also performed to analyze the association between mutation type and demographic characteristics.

RESULTS: 79% of research subjects were male with a mean age of 67 years (range 48-92). At time of diagnosis, 84% of participants were stage T4, and 3 tumors were associated with inverted papillomas. Among patients with documented mortality, mean survival was 23 months, while those without documented mortality had a mean follow-up of 42 months. Gain of function mutations in CUL1 and EZH2 were found to be associated with higher risk of mortality ($p = 0.0247$). Increased mortality rates were associated with deletion of several genes including ING5, BRAF pseudogene, PRDM11, MAP2K, PSMD2, ELMOD1, LGMN, RMND5B, PNLIPRP1, RAI1, RP11, and TMEM66 ($p = 0.0359$). Deletions of APOA1, CYP2D6, EMC3, FCRL3, HLADBQ1, HOXA11, RBPMS, SEC24A, and TMC4 were also found to be associated with higher mortality ($p < 0.001$). No specific gene mutations were associated with mortality within 12 months of diagnosis, T4 status at diagnosis, or poorly differentiated tumors. Similarly, overall tumor mutation burden did not correlate with these outcomes.

CONCLUSION: This study provides a comprehensive genomic analysis of SNSCC and identifies new targets associated with increased mortality risks. Larger studies are required to confirm these findings and help with possible molecular treatment strategies.

Abstract #: 16
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Cancer and Translational Medicine
Cluster: Translational Research in Other Cancer Types

Kelsey O'Hara, BS
Kelsey O'Hara, RUMC Carl Maki, RUMC

p53/RB1-DEFICIENT SCLC CELLS ARE SENSITIVE TO SYNERGISTIC KILLING BY COMBINED AURKB AND SUV420 INHIBITION

INTRODUCTION: Small cell lung cancer (SCLC) accounts for ~15% of all lung cancer cases and is an aggressive disease, resulting in a 5-year mortality rate of over 90%. SCLCs are quick to spread, causing the disease to often be diagnosed at an advanced stage. The majority of SCLCs have loss of function alterations in the tumor suppressors p53 and RB1. While many cases respond well initially to chemotherapy and radiation, a lack of oncogenic targets makes effective treatment options for SCLC patients scarce. Our lab has demonstrated that the combination of Barasertib (an AURKB inhibitor) and A196 (an SUV420 enzyme inhibitor) is synergistically lethal in p53 and/or RB1-deficient NSCLC and triple negative breast cancer cells. Hypothesis: The combination of AURKB and SUV420H1/H2 inhibitors will also be synergistically lethal to p53 and RB1-deficient SCLC cells and tumors.

METHODS: HTB175 (p53 MUT/RB1 NULL) SCLC cells were inoculated in the flank of immune compromised mice to induce tumor formation (n=5/group). When tumors became palpable, mice were treated with vehicle, or Barasertib (fixed 10mg/kg) plus increasing A196 concentrations (20mg/kg, 50mg/kg or 75mg/kg). Daily intraperitoneal (IP) injections were done for 4 weeks or until the tumor reached 10% of the mouse's body mass. Tumor volume and mouse weight were monitored over the course of treatment.

RESULTS: Vehicle control treated tumors reached 10% of the mouse's body mass at an average of 18.5 ± 5.5 days with a final mean tumor volume of 1867.65mm3. The 75mg/kg dose had only one tumor reach 10% of the mouse's body mass, while the other four mice received the full 28 days of treatment (26.6 ± 3.13 days to completion). The 75mg/kg group had a final mean tumor volume of 831.87mm3. Furthermore, there were no apparent toxic effects seen in any group.

CONCLUSION: While the combination treatment effectively reduced the growth rate of the tumors, the tumors still formed, indicating the survival of these cells even at the highest dose. However, due to the lack of toxic effects, both drug concentrations could be increased to try and enhance the inhibitory effects seen at 75mg/kg.

Abstract #: 17
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Cancer and Translational Medicine
Cluster: Translational Research in Other Cancer Types

Jacob Riccio, BS

Jacob Riccio (RU), Kathryn Solka (RU)

GLIOBLASTOMA AND NESTIN

INTRODUCTION The challenge of treating glioblastoma (GBM) lies in its diffuse, infiltrative, and elusive growth pattern. Often, the proverbial hemispherectomies of Walter Dandy are invoked: patients with GBM confined to a single hemisphere frequently experience postoperative recurrence in the contralateral hemisphere, initially thought to be free of the malignancy. GBM invades brain parenchyma at the cellular level, poorly demarcated like wisps of smoke. We believe that therapeutic approaches aimed at containing GBM, rather than merely killing tumor cells, are more promising at this stage. We hypothesize that Nestin plays a key role in the white matter tract infiltration of glioblastoma. If clinically significant, the malignancy is relegated from death sentence to chronic disease.

METHODS A review of the literature was conducted using terms "glioblastoma", "high grade glioma", and "nestin."

RESULTS Nestin is a class VI intermediate filament and neural stem cell marker whose expression is correlated with GBM [1, 11, 17]. It is virtually absent in mature neural tissue. This intermediate filament has been shown to direct axon growth [2]. White matter tracts, like the corpus callosum, serve as highways for glioblastoma migration [3], therefore Nestin may facilitate this process. Expression is an effective measure of invasiveness into surrounding brain tissue [4] and correlates with both the grade of astrocytoma and prognosis [5, 6, 7, 8, 12,13]. Glioblastoma tumor cells generally express high levels of Nestin, while expression in lower-grade gliomas is found only in proliferative endothelium [9]. Suppressing Nestin in GBM cells results in reduced aggressiveness [10], with markedly decreased migration and invasion into matrigel. Notably, Nestin has also been shown to facilitate invasion in melanoma [14], lung adenocarcinoma [15], and prostate and pancreatic cancers [16].

CONCLUSION The key to treating glioblastoma is to contain it first. We propose directing resources towards demonstrating the clinical efficacy of this containment approach in vivo. Eventually, this would involve revising the current standard of practice to include a tumor-containing drug, which targets Nestin, administered after maximal safe resection and continuing with conventional chemotherapeutics. The key to our lack of progress in treating GBM lies in targeting Nestin to arrest its spread.

Abstract #: 18
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Cancer and Translational Medicine
Cluster: Translational Research in Other Cancer Types

Hosein Saboorizadeh, Bachelor of Science

Hosein Saboorizadeh (Rush); Jeffrey Borgia, PhD (Rush); Kajal Gupta, PhD (Rush/UChicago)

DISCOVERY OF INNOVATIVE BIOMARKERS IN PEDIATRIC SERUM SAMPLES FOR NEUROBLASTOMA DETECTION

INTRODUCTION Neuroblastoma, a fairly common and aggressive pediatric tumor, poses significant challenges in diagnosis and treatment. Current methods for detecting disease and monitoring treatment response are often insufficiently specific or sensitive. Identifying novel biomarkers could enhance early detection, prognostication, and therapeutic targeting. The objective of this study aims to discover and detect novel serum biomarkers associated with neuroblastoma in pediatric patients, potentially offering improved diagnostic and prognostic capabilities.

METHODS This study was completed with IRB exemption. Using two targeted biomarker assays, the MILLIPLEX Human Immuno-Oncology Checkpoint Protein Panels 1 and 2, we identified and quantified protein biomarkers differentially expressed in neuroblastoma patients. Numerical analysis of outliers (Observed Value > Q3 + 1.5IQR or <Q1 - 1.5IQR) was completed. Heat maps were used as well to determine overall trends. In addition, a comprehensive literature review was completed. Further statistical analysis is still underway.

RESULTS Our analysis identified several novel biomarkers with significant differential expression between neuroblastoma patients and controls. Forty unique patient samples were used examining a total of 48 total proteins across the two panels. FGL1/Hepassocin was the dominant protein (50%), followed by E-Cadherin (35%), PVR/CD155 (12.5%), and LAG-3 in just 1 case. In terms of treatment targets, APRIL/BAFF, DNAM-PVR axis, and members of the B7 superfamily appeared to have some support for further investigation. Further statistical analysis will include Mann-Whitney U rank sum test upon various additional variables such as gender, diagnosis, risk group classification, and will be completed awaiting the availability of this data.

CONCLUSION This study highlights the potential of newly identified serum biomarkers in enhancing the diagnosis and management of pediatric neuroblastoma. Due to a lack of information on the clinical parameters involving the samples, there are various extraneous variables that may act as confounders upon the data set. Further statistical analysis is planned to control for these variables once the data is available. The biomarkers identified offer promise for more precise and individualized approaches to monitoring and treating neuroblastoma, warranting further investigation and clinical validation.

Abstract #: 19
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Cancer and Translational Medicine
Cluster: Translational Research in Other Cancer Types

Ariel Stepankovskaya, BS

Ariel Stepankovskaya BS (Rush University), Rohith Nellivalasa MA (Rush University), Darbaz Adnan MBChB (Rush University), Faraz Bishehsari MD, PhD (Rush University)

EXPLORING CIRCADIAN CLOCK MECHANISMS IN PANCREATIC CANCER

INTRODUCTION: Pancreatic Duodenal Adenoma (PDA) is a leading cause of cancer deaths, with cases exceeding 400,000 in recent decades. Late diagnosis and limited efficacy of current treatments, such as surgery and chemotherapy, result in poor survival outcomes. Our study investigates whether aligning treatments with tumor circadian rhythms could enhance drug efficacy in vitro. Circadian rhythms, regulated by molecular clocks involving BMAL1 and PER2 proteins, are often disrupted in tumors, potentially accelerating their growth. We analyzed the expression of BMAL1 and PER2 in PDA cells to better understand their role in circadian regulation.

METHODS: MIA-PaCa 2 (MP2) pancreatic cancer cells were cultured in DMEM supplemented with 10% FBS and 1% penicillin/streptomycin. Cells were passaged by trypsinization, centrifugation, and resuspension in fresh media. Transfection was performed using a reverse transduction approach with Bmal1-Luc/Per2-Luc lentivirus, followed by incubation with polybrene (10 µg/mL) for 24 hours. Stable cell lines were established using puromycin selection. Dexamethasone was applied for synchronization, and bioluminescent signals were measured over five days using a Kronos Dio machine. Data were exported to BioDare for rhythmicity analysis, with a p-value threshold of <0.001. Parameters such as period, phase, amplitude, peak, and trough were calculated for both genes.

RESULTS: Transfection of MP2 cells was efficient, and rhythmicity analysis confirmed statistically significant circadian rhythms for MP2-Per2 and MP2-Bmal1, with a p-value of 0.00001. Period analysis revealed a 24-hour cycle for both genes, consistent with the body's circadian rhythm. Phase analysis showed that Per2 and Bmal1 exhibited antiphasic expression: Per2 peaked when Bmal1 was at its lowest and vice versa, reflecting their roles in opposite limbs of the circadian clock.

CONCLUSION: Our findings demonstrate the presence of functional circadian rhythms in PDA cells and provide a proof of concept for circadian regulation in pancreatic cancer. Future studies will explore these rhythms in other cell lines and assess the potential for circadian-based therapies to optimize cancer treatment outcomes.

Abstract #: 20
Trainee Rank: Clinical Resident
Theme: Clinical Practice I: Case Studies
Cluster: Cardiovascular and Pulmonary Cases

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MACKENZIE J GRIFFITH, MARYLOUISE K WILKERSON, MD Rush University Medical Center

BRAIN-LUNG-THYROID SYNDROME: A UNIQUE GENETIC MUTATION IDENTIFIED IN A PATIENT WITH PERSISTENT HYPOXIC RESPIRATORY FAILURE

INTRODUCTION: Brain-Lung-Thyroid syndrome (BLTS) is an autosomal dominant condition that can present with varied phenotypic expressivity in neurologic, pulmonary, and thyroid symptoms. We present a case of BLTS presenting in a 7-month-old infant hospitalized for chronic hypoxic respiratory failure.

CASE PRESENTATION: A 7-month-old female presented to the hospital ED with fever and respiratory distress for one day and was found to have sepsis due to MSSA pneumonia and hypercapnic respiratory failure requiring invasive mechanical ventilation in the Pediatric ICU. Her PICU hospital course was complicated by multiple ventilator associated infections and fluctuating ventilator support requirements. A month after admission, the patient was re-evaluated for chronic hypoxic respiratory failure without improvement despite antibiotic treatment, respiratory support, and a trial of inhaled nitric oxide. Her history was significant for late-preterm birth at 35 weeks gestation, a partial chromosome 14 deletion (del 14q12-21.2), and a five-month neonatal ICU stay for respiratory failure requiring intubation for two weeks, surfactant, and inhaled nitric oxide, congenital aqueduct stenosis requiring ventriculoperitoneal shunt placement and antiepileptic management. She was discharged with a diagnosis of bronchopulmonary dysplasia (BPD), pulmonary hypertension, microcephaly, corpus callosum dysgenesis, and epilepsy. Physical examination revealed a sedated, intubated, minimally responsive infant. Infectious workup was negative. Serial chest X-rays and transthoracic echocardiograms were unremarkable. The original genetic consultation lacked linkage between her chromosomal abnormalities with pulmonary effects, so genetics was consulted again. Re-evaluation revealed that this deletion is associated with BLTS through a deletion of NKX2-1 gene. A Chest CT revealed findings suggestive of interstitial lung disease (ILD). In the following months, the patient was placed on azithromycin, steroids, and hydroxychloroquine for ILD management. Her vent settings stabilized to allow for tracheostomy tube placement.

DISCUSSION: Until Brain-Lung-Thyroid syndrome was diagnosed, the patient's condition was thought to be from pulmonary hypertension, BPD, and chronic lung infections. Further analysis showed an absence of the NKX2-1 gene, which helps encode synthesis of pulmonary surfactant and can lead to a phenotypic presentation of ILD. This case serves as a reminder to avoid anchoring bias and create the time for further investigation when diagnosis and clinical presentation fail to align.

Abstract #: 21
Trainee Rank: Clinical Resident
Theme: Clinical Practice I: Case Studies
Cluster: Cardiovascular and Pulmonary Cases

Isna Khaliq, MD

Isna Khaliq, MD (Rush University Medical Center) Fareed Collado, MD (Rush University Medical Center)

UTILIZATION OF MULTIMODAL IMAGING IN DIAGNOSIS AND MANAGEMENT OF A CARDIAC MASS

INTRODUCTION Cardiac masses have a wide range of differential diagnoses. Cardiac Magnetic Resonance (CMR) demonstrates high diagnostic performance in distinguishing tumors from non-tumor masses, with sensitivity and specificity exceeding 90%.

CASE PRESENTATION A 71-year-old man with a history of Sick Sinus Syndrome status post Permanent Pacemaker (PPM) placement, Atrial Fibrillation (AF) (on apixaban), and diastolic Heart Failure (HF) presented with lower extremity edema. He was admitted for HF exacerbation and started on IV diuretics. Transthoracic Echocardiogram (TTE) revealed a new mass of 5 cm x 4 cm in the right atrium. The patient was started on a heparin drip for a presumed thrombus. CTA Chest and CT venogram Abdomen and Pelvis were unremarkable. Repeat TTE after two days showed some decrease in mass size. As the mass appeared to be connected to the PPM lead and shrank with heparin, it was concluded that the thrombus had likely formed due to apixaban refractoriness. The patient was discharged on Coumadin. CMR was obtained as an outpatient and revealed a right atrial mass up to 6.4 cm with characteristics suggestive of a myxoma. The patient underwent open-heart surgery for mass resection.

CONCLUSION Given the patient's history of AF, there was a suspicion of a thrombus. We first wanted to rule out common causes of a cardiac mass, specifically thrombus and metastatic cancer. Therefore, CTA chest and CT venogram were initially obtained. Distinguishing between a thrombus and a mass on a TTE can be challenging. A follow-up TTE after a few days of heparin showed a slight decrease in the mass size, but this was not enough for a definitive diagnosis. Consequently, CMR was performed for further classification. CMR is a non-invasive approach that provides specific details on tissue characteristics to aid in classifying the suspected cardiac mass. Particularly, CMR offers images with rest perfusion, T1 and T2 weighted sequences, and late gadolinium enhancement. This case illustrates a systematic approach to investigating a cardiac mass while also considering the clinical course and the indication, sensitivity, specificity, and yield of each diagnostic test. Most importantly, CMR was the key to accurately identifying the mass and allowing timely intervention.

Abstract #: 22
Trainee Rank: Clinical Resident
Theme: Clinical Practice I: Case Studies
Cluster: Cardiovascular and Pulmonary Cases

Evan Klein, MD
Evan Klein, MD (Rush), Maria-Isabel Planek, MD (Rush), Vinh Chau, MD (Rush)

A PHENOTYPIC PUZZLE: THE MISNOMER OF LEFT VENTRICULAR NONCOMPACTION

INTRODUCTION Left ventricular noncompaction (LVNC) is a genetic disorder originally characterized by the congenital formation of an uncompressed inner endocardial wall with trabeculae associated with a compact mesocardial wall. However, newer embryological studies demonstrate that the formation of two layers is uncommon, introducing "LV hypertrabeculation" as a more inclusive diagnosis. Further, while TTE has historically been used to diagnose, the presence of multiple LV trabeculae with blood-filled intratrabecular recesses, as in this patient, are only 64% and 54% sensitive, respectively. Thus, TTE is a poor diagnostic tool and cardiac MRI (CMR) must be obtained.

CASE PRESENTATION Patient is a 40 year-old male with past medical history of juvenile seizures who presented with two days of lower extremity edema. On arrival, his workup was notable for BNP 602, CXR with volume overload, and ECG with prolonged QTc 523, diffuse T-wave inversions, and LV hypertrophy. TTE demonstrated an EF of 15% with severe diffuse hypokinesis, marked LV/LA dilation, and multiple LV trabeculae with intratrabecular recesses. Patient was diagnosed with HFrEF due to LVNC and was started on guideline-directed medical therapy (GDMT). CMR was never obtained due to patient preference. Four years later, the patient is undergoing evaluation for heart transplant now with NYHA class II symptoms, new paroxysmal atrial fibrillation (pAF), EF 20%, and rising pulmonary artery diastolic pressures on maximum tolerated GDMT.

CONCLUSION This patient represents one of many given a diagnosis of 'LVNC' without CMR. We now know that this diagnosis has nine accepted phenotypes, with each warranting a unique emphasis on medical management, electrophysiology evaluation, and lifestyle modification. In addition, this patient is in the highest category for major adverse cardiovascular events from LV hypertrabeculation, with his age (>35 years), LVEF (<35%), abnormal ECG findings (prolonged QTc), and gender (male) being poor prognostic markers of disease. Therefore, without comprehensive diagnosis from CMR including gadolinium enhancement, we will not know if his progressive symptoms and new pAF represent disease refractoriness or an incomplete diagnosis. Finally, without phenotypic classification of his disease process, this patient may be undergoing major transplant surgery earlier than expected.

Abstract #: 23
Trainee Rank: Clinical Resident
Theme: Clinical Practice I: Case Studies
Cluster: Cardiovascular and Pulmonary Cases

Ramkumar Narendran, MD

Ramkumar Narendran, MD (Rush University Medical Center, Department of Internal Medicine) Nicholas Kosinski, BA (Rush Medical College) Christopher Heinrich, MD (Rush University Medical Center, Department of Internal Medicine, Division of Cardiovascular Medicine) Fareed Moses Collado, MD (Rush University Medical Center, Department of Internal Medicine, Division of Cardiovascular Medicine)

PERCUTANEOUS REVASCULARIZATION OF PROXIMAL LIMA-LAD GRAFT STENOSIS 14 YEARS STATUS-POST CABG

INTRODUCTION The incidence of ostial stenosis in left internal mammary artery (LIMA) grafts is rare due to their high patency rates. These grafts are biologically durable and self-reparative, which contributes to their success as bypass conduits for diseased coronary arteries. However, these same properties can lead to complications such as vasospasm and dissection. Evidence suggests that LIMA graft patency remains as high as 95% at 15 years post-coronary artery bypass grafting (CABG), with stenosis typically occurring at the distal LIMA or anastomotic site. We present a rare case of delayed stenosis of the LIMA graft at its origin from the left subclavian artery.

CASE PRESENTATION A 67-year-old woman with multivessel coronary artery disease, heart failure with reduced ejection fraction (HFrEF) secondary to ischemic cardiomyopathy, peripheral artery disease, and hyperlipidemia presented with worsening dyspnea and orthopnea. Fourteen years prior, she underwent quadruple CABG, including LIMA to the left anterior descending artery (LAD). Her evaluation revealed hypertension (BP 152/95), BNP level 3161 pg/mL, and troponin level 92 ng/L. Imaging showed cardiomegaly, pulmonary edema, and an ejection fraction <20%. Coronary angiography revealed chronic total occlusion of the right coronary artery and high-grade stenosis at the LIMA-LAD junction. Her heart failure exacerbation was attributed to LIMA graft stenosis. The cardiology team recommended stenting and transferred her to a tertiary center for further evaluation of stent placement and possible need for mechanical circulatory support in the setting of her low ejection fraction. At the tertiary center, percutaneous coronary intervention (PCI) was performed with deployment of a Synergy XD 3.0x12mm drug-eluting stent at the LIMA graft ostium. Post-procedure angiography demonstrated TIMI III flow with no restenosis. She was discharged on dual antiplatelet therapy and optimized guideline-directed medical therapy, with follow-up arranged with a heart failure specialist.

CONCLUSION This case highlights the rare occurrence of symptomatic LIMA graft ostial stenosis more than a decade after CABG. It underscores the role of PCI as a safe, effective alternative to redo CABG in managing such complications, contributing to the evolving management strategies for late graft failures.

Abstract #: 24
Trainee Rank: Clinical Resident
Theme: Clinical Practice I: Case Studies
Cluster: Cardiovascular and Pulmonary Cases

Arnav Singla, MD

Arnav Kumar Singla (RUMC), Shannon Li (ROPH), Stuart Chen (RUMC)

INCIDENTAL DIAGNOSIS OF DOUBLE-CHAMBERED LEFT VENTRICLE IN A YOUNG WOMAN WITH SUBSEQUENT DEVELOPMENT OF PREMATURE CORONARY ARTERY DISEASE

INTRODUCTION We illustrate a unique presentation of a double-chambered left ventricle (DCLV) in a patient with no cardiac history at diagnosis who experienced an ST-elevation myocardial infarction (STEMI) 3 years later.

CASE PRESENTATION A 26-year-old woman with no medical history presented with lower extremity pain and dyspnea following cosmetic surgery. A deep venous thrombosis was diagnosed. Chest CT showed no pulmonary embolism, but an incidental abnormality of the lateral left ventricle (LV) was noted and described as a pseudoaneurysm. Transthoracic echocardiogram (TTE) revealed an accessory chamber in parallel along the LV lateral wall measuring 6 cm, separated by a septum, contracting synchronously with the main LV chamber consistent with DCLV (Figure 1). Cardiac MRI confirmed similar findings. 3 years later and a month after childbirth, she presented to the ER with chest pain and was diagnosed with an anterior STEMI. Cardiac catheterization showed acute occlusion of the mid left anterior descending artery without dissection; a drug eluting stent was placed. TTE showed a severely reduced ejection fraction which improved but with stable appearance of the DCLV.

CONCLUSION DCLV is a rare congenital condition amongst 0.04-0.4% of the population with unknown significance. Multimodal imaging with TTE and MRI is useful to distinguish it from a diverticulum or aneurysm. Our patient was subsequently diagnosed with premature coronary artery disease (CAD) without risk factors. DCLV is diagnosed so rarely that its own risks for ischemic events and arrhythmias are not well studied. Unique complications following an acute ischemic event, which may depend on DCLV anatomy, and with risk for post-infarct complications such as pseudoaneurysm or rupture or increased frequency of follow-up imaging, remains unclear. These warrant careful consideration in the follow-up period for patients with DCLV and CAD.

Abstract #: 25
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice I: Case Studies
Cluster: Neurological and Psychiatric Cases

Suzanna Coyne, BS

Coyne, Suzanna; Rush Medical College Khaliq, Isna, MD; Rush University Medical Center, Department of Internal Medicine Lopez, Susan, MD; Rush University Medical Center, Department of Internal Medicine

BURNING QUESTIONS: AN UNEXPLAINED FEVER SUCCESSFULLY TREATED WITH BACLOFEN

INTRODUCTION: A Fever of Unknown Origin (FUO) is defined as a temperature > 38.3°C (100.9°F) on multiple occasions for over 3 weeks, with no identified cause despite proper evaluation. Symptomatic FUO is life-threatening and requires careful evaluation and intervention.

CASE PRESENTATION: A 27-year-old male with sickle cell disease presented with four days of fevers and hip pain. Initial vitals were unremarkable. Labs showed a white blood cell count of 10.9 K/uL, hemoglobin of 11 g/dL, bilirubin of 4.3 mg/dL, and evidence of hemolysis. X-ray excluded Acute Chest. The patient was admitted for presumed sickle cell vaso-occlusive crisis. By day three, the patient's pain had resolved, but he remained febrile to 104°F. His unexplained fevers without pain crisis symptoms required further investigation. The patient was started on broad-spectrum antibiotics, and a workup was obtained to rule out osteomyelitis, thrombosis, and bacteremia. Although the patient had recent strep pharyngitis, the criteria for rheumatic fever were not met. No etiology was identified after evaluating for rheumatologic or infectious causes of fevers. The patient's fevers did not resolve with antibiotics or antipyretics. He also began to show signs of hemodynamic instability with tachycardia and hypotension when febrile. His initial neutrophilic leukocytosis (77%) shifted to severe lymphocytic predominance (66%) with monocytosis (12%). Due to the rise in cell lines and acute phase reactants, there were concerns about a hematologic issue, but a bone marrow biopsy and a PET scan were unremarkable. Despite a negative CT head, we suspected a central cause of the fevers and initiated baclofen at 5 mg three times daily. After 72 hours with no improvement, we increased the dosage to 10 mg thrice daily, leading to a resolution of fevers within 24 hours. The patient was discharged and continued baclofen with no reported breakthrough fevers.

CONCLUSION: In this unusual case of FUO, our patient ultimately required empirical treatment. Baclofen is typically used to address central fever that arises after a neurological incident. However, our patient did not have a clear source for the fevers, prompting us to explore unconventional treatment options. Our treatment approach with baclofen successfully addressed the patient's fevers and clinical symptoms.

Abstract #: 26
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice I: Case Studies
Cluster: Neurological and Psychiatric Cases

Nicole Khanna, BA

Nicole Khanna (Rush Medical College) Aniruddha Deka, MD (Rush University Medical Center Department of Psychiatry)

MIND OVER MATTER: UNDERSTANDING CALCINEURIN-INHIBITOR INDUCED PSYCHOSIS IN TRANSPLANT RECIPIENTS

Calcineurin inhibitors (CNIs) such as tacrolimus and cyclosporine are immunosuppressive medications which are frequently used after solid-organ transplantation to blunt a T-lymphocyte response. CNIs are known to cause psychiatric manifestations including psychosis, mania, catatonia and akinetic mutism. The mechanism of these psychiatric and behavioral manifestations is not clear, although there have been postulations of the blood brain barrier playing a role in this pathogenesis. The onset of psychosis symptoms may not correlate to initiation of the medication, or medication serum level [1]. One of the frequent strategies when there is evidence of CNI-induced psychosis is to switch to another immunosuppressant, sometimes within the same class of CNI, which generally eliminates recurrence of psychosis once this switch is made. Here, we report a case of a 50 year old male post-renal transplant who initially developed delayed onset psychosis due to tacrolimus, which resolved after switching from tacrolimus to cyclosporine, and then experienced subsequent delayed recurrence of psychosis with cyclosporine, which once again resolved after switching to a non-CNI immunosuppressive (ie sirolimus). The significance of this case report is to guide future investigations of evidence that CNI-induced psychosis may present in the absence of toxic drug levels, and that clinical consideration of this etiology for psychosis must be prioritized, even if onset of psychosis is delayed. Additionally, this case illustrates recurrence of psychosis despite switching the patient's immunosuppressant from one CNI another; this will hopefully guide future investigations to understand the variables that can put patients at risk for a) CNI-induced psychosis, b) delayed CNI-induced psychosis, and c) recurrence of CNI-induced psychosis despite switching agents. This future risk stratification will hopefully open the door to investigate whether there is a role for prophylactic agents, such as antipsychotics, to prevent CNI-induced psychosis in high risk populations.

[1] Ithman M, Malhotra K, Bordoloi M, Singh G. Treatment-Refractory Mania with Psychosis in a Post-Transplant Patient on Tacrolimus: A Case Report. Clin Med Res. 2018 Jun;16(1-2):47-49. doi: 10.3121/cmr.2018.1409. Epub 2018 May 18. PMID: 29776917; PMCID: PMC6108512.

Abstract #: 27
Trainee Rank: Clinical Resident
Theme: Clinical Practice I: Case Studies
Cluster: Neurological and Psychiatric Cases

Sumbul Liaqat, MD

Sumbul Liaqat (Rush University), Syed Basir Hussaini (Rush University), Katrina Burns (Rush University)
Presenting author: Sumbul Liaqat

REVERSE CEREBRAL VASOCONSTRICTION SYNDROME WITH VENLAFAXINE: A CASE REPORT

INTRODUCTION: Reversible cerebral vasoconstriction syndrome (RCVS) is a rare but potentially reversible condition characterized by sudden onset of neurological symptoms, including severe headaches, focal deficits, or seizures, often associated with transient cerebral vasoconstriction. This case explores a 57-year-old female patient with multiple risk factors, including serotonergic medications, chronic pain, substance use, and psychiatric comorbidities, who presented with possible RCVS. Understanding the interplay between these factors highlights the complexity of managing RCVS in patients with diverse medical and psychiatric backgrounds.

CASE PRESENTATION: MW, a 57-year-old female with a history of hypothyroidism, lumbar radiculopathy, and chronic neck/back pain presented to an outside hospital with sudden onset right-sided weakness, facial droop, and aphasia. Vital signs were stable, but imaging revealed a large intraparenchymal hemorrhage in left basal ganglia with adjacent subarachnoid hematoma in left insular lobe. Further workup was notable for CTA with no large vessel occlusion or high-grade stenosis. She was transferred to RUMC for escalation of care. Her psychiatric history includes major depressive disorder, anxiety, panic disorder, alcohol use, and marijuana use. She had been stable on Venlafaxine, Bupropion, and Alprazolam. Psychiatry was consulted due to concerns about reversible cerebral vasoconstriction syndrome (RCVS), possibly triggered by serotonergic medications. Venlafaxine was discontinued and low-dose Mirtazapine was initiated to address both mood and sleep issues. Psychiatry recommended continuing Bupropion and Alprazolam. Blood pressure was managed with nicardipine, and her condition improved with recovery of speech and strength. Neurological and psychiatric follow-ups were scheduled, and the patient was encouraged to engage in outpatient therapy.

CONCLUSIONS: This case underscores the importance of a multidisciplinary approach in the diagnosis and management of RCVS, especially in patients with multiple risk factors, including serotonergic medication use, substance use, and psychiatric disorders. The discontinuation of potential triggers, initiation of appropriate mood treatment, and blood pressure management were integral to the patient's recovery. Follow-up with neurology and psychiatry is crucial to address underlying issues and reduce recurrence risk. This case highlights the need for further research into the pathophysiology of RCVS and the role of psychiatric medications in its onset.

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Abstract #: 28
Trainee Rank: Clinical Resident
Theme: Clinical Practice I: Case Studies
Cluster: Neurological and Psychiatric Cases

Sydney Rabin, MD
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MIND THE GAP! NOT ALL ANION GAPS ARE INFECTION OR HYPOPERFUSION.

INTRODUCTION: Calculation of the anion gap is common practice in the intensive care unit in order to determine the etiology of a patient's acidosis. The most common calculation for the anion gap is (Na+) - (HCO3- + Cl-), but there are more complete formulas that can be used to account for other unmeasured compounds.

CASE PRESENTATION: The patient is a 63-year-old female with DLBCL status post 3 cycles of R-CHOP who was initially admitted to the Oncology unit for diarrhea and electrolyte abnormalities. Several days into admission, patient became newly tachypneic and was found to have a pH of 7.26, bicarbonate of 9, lactate of 12, and anion gap of 24.5. She was initiated on a bicarbonate drip to temporize her acidosis and was transferred to the intensive care unit (ICU) for escalation of care. In the ICU, the patient's bicarbonate failed to improve despite the bicarbonate drip. She became progressively more acidotic with uptrending lactate and increased work of breathing requiring intubation. Her lactic acidosis was thought to be secondary to infection vs. ischemic bowel but both infectious work-up and imaging were unrevealing. It was also considered that the etiology might be a type B lactic acidosis from her DLBCL, however this was thought less likely due to stable imaging findings. Repeat calculation of her anion gap accounting for lactate, albumin, and phosphate revealed that her anion gap was entirely explained by her lactate, making it more likely that her current presentation was from her DLBCL. She was initiated on chemotherapy with significant improvement in her lactate and acidosis and was ultimately extubated and transferred back to the Oncology floor.

CONCLUSION: The classic anion gap formula is quick and easy to use at the bedside, but it fails to account for unmeasured anions such as lactate, albumin, and phosphate. Utilization of the full anion gap calculation allows us to account for these unmeasured anions, giving a more complete picture of the patient's acid-base disturbance. While a more tedious calculation, it's essential to use the complete anion gap formula to correctly identify the etiology of a patient's acidosis, especially when the cause is unclear.

Abstract #: 29
Trainee Rank: Clinical Resident
Theme: Clinical Practice I: Case Studies
Cluster: Neurological and Psychiatric Cases

Yazmin Rustomji, MD
Yazmin Rustomji (Rush), Jenna Nikolaides (Rush)

EXPANDING THE DIFFERENTIAL: A UNIQUE CASE OF GAMMA-HYDROXYBUTYRATE WITHDRAWAL SYNDROME

INTRODUCTION: With the rise of gamma-hydroxybutyrate (GHB) use in the United States, physicians are encountering more cases of GHB intoxication and withdrawal in the acute setting. Early recognition of withdrawal symptoms can prevent progression to severe delirium with autonomic instability.

CASE PRESENTATION: A 26-year-old male with PMHx of anxiety, depression c/b previous suicide attempt, and recreational drug use presented by EMS with minimal responsiveness. He was found to have multiple hydrochloric acid and acetone bottles at the scene. In the ED, he was tachycardic; labs with bicarb 18, Cr 1.12, elevated LFTs, CK 85. CBC wnl. PCO2 23.8. Serum toxicology was negative for acetaminophen, alcohol, and salicylates. Urine toxicology was positive for THC. CT Head was normal. While in the ED, he was making delusional statements and had several episodes of alternating quickly between agitation and somnolence. He received IV midazolam, his symptoms improved, and he was admitted to the ICU. He described a sensation of "acid leaking from skin." Toxicology was consulted; he reported using alcohol, GHB, 1,4-butanediol, LSD, psilocybin, alcohol, MDMA, methylphenidate, and lisdexamfetamine. He was determined to have GHB withdrawal and was started on diazepam and baclofen with improvement of symptoms.

DISCUSSION: GHB is a short-chain fatty acid related to gamma-aminobutyric acid (GABA), essentially acting as a GABA agonist. GHB and its precursors, including amma-butyrolactone and 1,4-butanediol, are abused for bodybuilding, euphoria, sexual enhancement, and sexual assault (1, 2). Current studies defining withdrawal symptoms and medical management are limited (2). GHB withdrawal can mimic alcohol and benzodiazepine withdrawal, serotonin syndrome, and neuroleptic malignant syndrome (1). Additionally, simultaneous use of other substances complicates diagnosis. Delirium is reported in 50% of cases, involving intense hallucinations and anxiety (1). Benzodiazepines are most commonly used for delirium, often requiring high doses in an intensive care setting. Barbiturates, baclofen, and pharmaceutical GHB tapering are other reported methods (1, 3). Physicians should consider GHB withdrawal as a differential diagnosis in patients presenting with acute withdrawal or intoxication.

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Abstract #: 30
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice I: Case Studies
Cluster: Neurological and Psychiatric Cases

Thomas Shao, BS, MPH

Thomas Shao (Rush), John Wong (Rush), Shahood Fazal (Rush), Andrew Savoia (Rush), Elizabeth Van Opstal (Rush)

UNRAVELING RHUPUS: A RARE OVERLAP SYNDROME IN AN ADOLESCENT

INTRODUCTION: Autoimmune overlap syndromes blur the boundaries between distinct autoimmune diseases, posing significant diagnostic challenges. Rhupus is a rare condition combining systemic lupus erythematosus (SLE) and rheumatoid arthritis (RA). This case highlights the clinical course of a patient with a sudden, severe illness, underscoring the necessity of a systematic diagnostic approach to identify and manage rare autoimmune overlap syndromes.

CASE PRESENTATION: A previously healthy 16-year-old female presented with a five-day history of worsening fatigue, headaches, vomiting, abdominal pain, dysuria, and joint pain. She also reported recent episodes of painful finger discoloration triggered by cold temperatures. The combination of systemic symptoms and multi-organ involvement raised concern for a serious underlying condition. On examination, the patient was febrile, mildly tachycardic, and borderline hypotensive. Physical findings included cervical lymphadenopathy and suprapubic tenderness but no rashes, oral ulcers, or joint swelling. Laboratory studies revealed pancytopenia, nephrotic-range proteinuria, hypocomplementemia, transaminitis, and elevated creatine kinase. Imaging showed cardiomegaly, pleural effusion, and retroperitoneal lymphadenopathy. Echocardiography revealed a small pericardial effusion without functional compromise. Initial differential diagnoses focused on infections due to fever and systemic symptoms. However, blood and urine cultures, viral panels, and tuberculosis testing were negative. Hematologic malignancy was considered due to pancytopenia and lymphadenopathy, but peripheral smear and malignancy markers excluded this. A strongly positive antinuclear antibody (ANA) with hypocomplementemia and nephrotic-range proteinuria raised suspicion of an autoimmune process. Initially, no relevant family history was disclosed, but a follow-up history revealed maternal SLE and paternal diabetes mellitus, increasing suspicion of SLE. The patient met Systemic Lupus International Collaborating Clinics (SLICC) criteria for lupus, including serositis, proteinuria, thrombocytopenia, leukopenia, positive serological markers, and hypocomplementemia. Persistent joint stiffness and elevated anti-RNP antibodies indicated RA overlap, confirming Rhupus. Renal biopsy revealed lupus nephritis (stage V).

TREATMENT AND FOLLOW-UP: The patient received IV methylprednisolone, oral prednisone, hydroxychloroquine, and mycophenolate mofetil. Subcutaneous belimumab was added for persistent lupus manifestations. Follow-up includes kidney monitoring and a repeat biopsy.

CONCLUSION: This case highlights the importance of a structured diagnostic approach and multidisciplinary collaboration in diagnosing rare syndromes like Rhupus. Early recognition and targeted therapy were vital for this patient's recovery.

Abstract #: 31
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice I: Case Studies
Cluster: Rare and Complex Diagnoses

Sara Chitlik, BA

Sara Chitlik, BA (RUSH); Joshua Dein, MD (RUSH); Carol Burke, MD (RUSH)

A HAIRY SITUATION - A UNIQUE CASE OF HAIRY CELL LEUKEMIA PRESENTING AS A BONY LESION

CASE PRESENTATION A 49-year-old male with right biceps tendonitis, atrial fibrillation (not on anticoagulants), and chronic thrombocytopenia was referred to an orthopedist for 3 months of worsening right arm pain. MRI revealed a 2 x 3 cm lesion in the right humeral head, and bloodwork showed WBC 3.2k and platelets 41k. Given the bony lesion and CBC abnormalities, he was directly admitted to the hospital. On admission, he had no constitutional symptoms, medications, alcohol, or drug use. Thrombocytopenia had been present for at least two years without easy bruising or bleeding. Examination revealed mild right forearm flexion weakness. Admission CBC showed WBC 2.92k, ANC 700, and platelets 49k. Bloodwork from 2022 revealed WBC 3.67k, ANC 1200, and platelets 60k, with normal CBC in 2019. Hematology consultation and peripheral flow cytometry revealed 2% kappa-restricted B cells consistent with hairy cell leukemia (HCL). Bone marrow and humeral head biopsies confirmed 40% marrow involvement and confluent humeral marrow infiltration by HCL. Staging CT showed splenomegaly. He was discharged with plans to initiate cladribine.

DISCUSSION HCL is a mature B-cell disorder comprising 2% of adult leukemias, more common in middle-aged men. It typically presents with fatigue, hypersplenism, and cytologic abnormalities from marrow infiltration. This patient's presentation was unique in that his HCL was discovered inadvertently after evaluation of worsening tendonitis with MRI revealing a humeral bone lesion. Although rare, lytic bone lesions have been described with HCL, most often affecting the proximal femur and occasionally associated with other paraproteinemias like multiple myeloma. Chronic, even mild cytologic abnormalities, such as leukopenia and thrombocytopenia, should raise suspicion for HCL. In the presence of symptoms, like arm pain with a bony lesion, treatment with chemotherapy is warranted.

CONCLUSION Underlying myelodysplastic conditions, including HCL, should be considered in hematologic abnormalities. Clinicians should recognize the association of HCL with osteolytic bone lesions, as symptoms like localized pain and lesions may guide diagnosis and prompt treatment.

Abstract #: 32
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice I: Case Studies
Cluster: Rare and Complex Diagnoses

Mary Dyrland, BS

Mary Dyrland, BS; Madeline Carlson, MD; Lisa Giordano, MD Rush University Medical Center

14 YEAR OLD FEMALE WITH MACROCYTOSIS AND MOSAIC TRISOMY 8

BACKGROUND: Constitutional trisomy 8 mosaicism (T8M) exhibits a phenotypic spectrum ranging from asymptomatic to severe manifestations. Common findings include dysmorphic features, intellectual delay, corpus callosum agenesis, renal, cardiac, skeletal abnormalities, and an increased risk of acute myelogenous leukemia (AML) and myelodysplastic syndrome (MDS).1,2, 3 We report a case of a patient with T8M with renal and skeletal abnormalities and an uncommon finding of persistent macrocytosis without cytopenias.

CASE PRESENTATION: A 14 year old female was referred for pediatric hematology evaluation due to persistent macrocytosis identified on complete blood count (CBC). Her past medical history was significant for chronic kidney disease and recurrent UTIs due to hydronephrosis, scoliosis, motor delay, and poor weight gain. There was no history of cardiac abnormalities or intellectual disability. Physical exam showed mild hypertelorism, clinodactyly of the toes, scoliosis, and weight < 5th percentile for age. CBC showed mean cell volume (MCV) that ranged from 100 - 105 and no cytopenias. Reticulocytes were minimally elevated to 1.98%. Further laboratory work-up revealed thyroid studies, folic acid, copper, zinc, transaminases, homocysteine, and methylmalonic acid were within normal limits. Vitamin B12 was elevated to 1,615 pg/mL. Paroxysmal nocturnal hemoglobinuria was ruled out by flow cytometry. A pregnancy test was negative. Peripheral blood cytogenetics revealed mosaic trisomy 8. A bone marrow exam showed normocellular marrow with no dysplasia, increased blasts or megaloblastic red cell precursors. There was no flow cytometric evidence of myeloid neoplasm. Bone marrow cytogenetics revealed mosaic trisomy 8. Brain MRI was normal.

DISCUSSION: The differential diagnosis for macrocytosis in a child includes drug effect, reticulocytosis, bone marrow failure, vitamin B12 or folate deficiency, myelodysplastic syndrome, hypothyroidism, and liver disease. While our patient's scoliosis, renal abnormalities, and clinodactyly of the toe are well recognized in those with T8M, there are fewer cases of macrocytosis and myeloid neoplasm in patients with T8M in the literature.3,4 Macrocytosis in our patient likely represents early bone marrow dysfunction and she will require regular monitoring for early signs of myeloid malignancy.

Abstract #: 33
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Clinical Practice I: Case Studies
Cluster: Rare and Complex Diagnoses

Joyce Jeong, BSc
Joyce Jeong (Rush); Rachel Akers (Rush); Kerstin Stenson, MD, FACS (Rush)

NECK MASSES ORIGINATING FROM THE CAROTID SHEATH: CHALLENGES IN DIAGNOSIS

INTRODUCTION: Carotid body tumors (CBT) and vagal schwannomas (VS) arise from carotid body glomus cells and vagal myelin. Both present with similar symptoms, such as dysphagia, dysphonia, neck mass, and stridor, making differentiation challenging. While angiography can assess tumor vascularity, highly vascularized VS can mimic CBT. Surgery carries significant risks, including swallowing and speech difficulties, gastroparesis, and dizziness from iatrogenic vagal damage. Embolization may reduce tumor blood supply and provide a diagnostic clue for distinguishing VS from CBT but remains controversial.

CASE PRESENTATION: A 38-year-old female presented with a sore throat and an incidental neck mass identified via CT. Flexible laryngoscopy showed a pulsatile, submucosal mass narrowing the oropharyngeal inlet. MRI revealed a 4.9 x 2.6 x 4.6 cm mass at the bifurcation of the right common carotid artery with splaying of the internal and external carotid arteries. The patient opted for surgical removal. Preoperative embolization targeted the tumor's blood supply, including two vascular pedicles, one from a tortuous facial artery. Dimethyl sulfoxide injection into the branch caused temporary asystole, which resolved with glycopyrrolate and indicated vagal nerve involvement. Post-embolization, surgical exploration revealed a tumor extending to the skull base, involving the right vagal nerve. The vagus nerve was dissected from the mass, along with some splayed branches and both branches of the common carotid artery. After detaching the mass from the vagus nerve and the internal and external carotid arteries, it was fixed superiorly to the right jugular foramen. Frozen pathology ruled out paraganglioma and indicated a spindle cell neoplasm, though vagal schwannoma could not be ruled out. Postoperatively, the patient experienced dysphagia, dysphonia, and impaired tongue mobility.

CONCLUSION: CBT and VS are challenging to distinguish preoperatively due to similar presentations and nonspecific imaging findings. In this case, asystole during embolization provided a critical diagnostic clue, confirming the tumor's vagal nerve origin and aiding in differentiating VS from CBT. While fine needle aspiration and open biopsy may offer definitive diagnoses, their high neurovascular risk limits use. A multidisciplinary approach, involving head and neck surgeons, vascular surgeons, and neurosurgeons, is key when managing neck masses with broad differential diagnoses to enhance safety and outcomes.

Abstract #: 34
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice I: Case Studies
Cluster: Rare and Complex Diagnoses

Shwetha Sekar, B.S.

Shwetha Sekar (Rush); David Hodge (Rush)

RARE CASE OF FOOD DEPENDENT EXERCISE-INDUCED ANAPHYLAXIS

INTRODUCTION: Food dependent exercise-induced anaphylaxis (FDEIA) is a rare condition in which anaphylaxis occurs only when the patient exercises shortly before or after ingesting food to which they are sensitized. An IgE-mediated reaction to wheat is a common food allergy involved in FDEIA. The case presented here describes a 57-year-old male with a case of FDEIA presenting to the Rush Emergency Department with features of anaphylaxis after eating a sandwich and subsequently walking on the treadmill.

CASE PRESENTATION: A 57 year old male with a past medical history of colon cancer, type 2 diabetes, hypertension, and hyperlipidemia presented to the ED with lightheadedness. On the day of admission, he exercised on the treadmill 30 minutes after eating a sandwich. He subsequently developed lip swelling, diarrhea, hives, and persistent lightheadedness for which he presented to the ED. Upon arrival at the ED, he was afebrile, tachycardic, tachypneic, and hypotensive with a BP of 94/61. He had an elevated lactate of 7.9 mmol/L, creatinine of 1.89 mg/dL, D-dimer >35mg/L (CTA chest negative for pulmonary embolus), and evidence of demand ischemia. He also had significantly elevated tryptase (90.3 ug/L) and anti-wheat gliadin IgE (5.39 kU/L), suggestive of an allergic reaction to wheat, a common culprit allergen in FDEIA. Given the combination of diarrhea, hives, and hypotension occurring shortly after eating wheat and exercising, it is most likely that this patient had FDEIA. Treatment for FDEIA is food trigger avoidance before exercise. He was also instructed to always carry an EpiPen and follow up with Allergy/Immunology.

CONCLUSION: This case highlights the importance of considering FDEIA as a rare cause of shock. The patient was presenting with cardinal features of shock, including hypotension and poor organ perfusion, yet no consistent features of more common causes of shock (e.g. cardiogenic, septic, hypovolemic). The mechanism behind FDEIA is thought to be due to exercise increasing gastrointestinal permeability, giving allergens increased contact with the gut-associated immune tissue. Exercise can also redistribute blood flow from food-sensitized gut-associated immune cells to muscle and skin cells, which can lead to an allergic reaction.

Abstract #: 35
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice I: Case Studies
Cluster: Rare and Complex Diagnoses

Dina Simon, BA

Dina Simon (RMC); Emily Kadish, MD (RUMC); Rakhee Bowker, MD (RUMC); Cyndi Sosnowski, MD (RUMC); Suhagi Kadakia, MD (RUMC)

RETROSPECTIVE CASE SERIES OF ISOLATED PREMATURE CLOSURE OF THE FORAMEN OVALE: ANALYSIS OF MATERNAL FACTORS AND NEONATAL INTERVENTION

INTRODUCTION: Isolated premature closure of the foramen ovale (FO) in utero, rather than postnatally, is a rare condition seen in neonates. There is a spectrum of effects on fetal hemodynamics and fetal and postnatal outcomes if the FO is prematurely closed in fetal life. Neonatal health outcomes including prematurity, increase in NICU admissions, and neonatal mortality are seen with this diagnosis. We sought to identify maternal factors associated with the presentation of isolated premature closure of the FO and to analyze the types of interventions that neonates with this condition are receiving post-birth.

METHODS: This study was a retrospective chart review of all patients, who presented at a level 3 center, found to have a diagnosis of isolated premature closure of the FO on fetal echocardiogram between January 1st, 2018 to December 31st, 2023. The maternal and neonate dyad demographics, medical history, hospital course, and echocardiogram results were abstracted and analyzed.19 patients were identified via fetal echocardiogram imaging.

RESULTS: Of the 19 patients, 100% of neonates received a postnatal echocardiogram, 84% had a positive postnatal echocardiogram confirming the diagnosis, and 63% received an echocardiogram post discharge. 68% of the neonates were admitted to the NICU, with 10% receiving milrinone. Of the 68% admitted to the NICU, the most common interventions received were CPAP and intravenous fluids. There were no infants that required inhaled nitric oxide, ECMO watch, or any PICU transfers. The average gestational age was 38 weeks and 0 days. 26% of all maternal subjects had a medical history of diabetes, 26% had a diagnosis hypertension, and 15% had a diagnosis both diabetes and hypertension. In addition, 26% of all maternal subjects were taking aspirin.

CONCLUSION: We conclude that prenatal diagnosis is essential for these infants' post-birth interventions. Of the infants diagnosed with premature closure of the FO, the majority required NICU admission and intervention post-birth. Potential associated maternal factors that were found included diabetes, hypertension, and aspirin use. Future studies should include broadening the sample size across multiple institutions to identify predisposing maternal factors and types of interventions received by the neonates associated with this cardiac finding.

Abstract #: 36
Trainee Rank: Clinical Resident
Theme: Clinical Practice I: Case Studies
Cluster: Rare and Complex Diagnoses

Stephanie Trautmann, MD MS
Stephanie Trautmann, MD MS (Rush); John Konen, MD (Rush)

I'M FLOORED! A RARE PELVIC MASS IN A YOUNG FEMALE

INTRODUCTION Aggressive angiomyxoma (AA) is a rare, female-predominant mesenchymal tumor first described in a 1983 case series of locally infiltrative pelvic tumors. Pathology shows stellate and spindle cells separated by collagen-rich myxoid stroma with abundant vascular supply. While often found incidentally, significant tumor growth can induce abdominopelvic mass effect symptoms. MRI is the preferred imaging modality, and diagnosis is determined with histopathology. The mainstay of treatment involves surgical resection, but alternative or adjunct modalities include gonadotropin-releasing hormone (GnRH) agonists, radiotherapy and embolization.

CASE PRESENTATION We present a 43-year old female who noted a painless perianal nodule in 2020. CT imaging demonstrated a 6.5 x 4.4 x 8.7 cm peri-anorectal mass without aggressive features, which was evaluated with multiple non-diagnostic biopsies over four years. She continued to have progressive pain and constipation, and presented to our institution in 03/2024 with an acute exacerbation of symptoms. Repeat MRI imaging showed a circumscribed 9.4 x 4.8 x 20 cm hypodense mass in the presacral space displacing the rectum laterally with violation of the mesorectal fascia and extension through the right levator ani muscles. Repeat endoscopic and percutaneous biopsies were similarly non-diagnostic, and excision was recommended. She underwent open excision where a gelatinous, rubbery mass was found enveloped within the right mesorectum extending through the levators into the ischiorectal fat. It was mobilized and separated off the lateral wall of the rectum to the anorectal junction inferiorly. Flexible sigmoidoscopy confirmed no leak after completion of the dissection. She recovered uneventfully and was discharged home. Pathology revealed aggressive angiomyxoma with greatest dimension of 31.7 cm. She was recovering well at follow-up and recommended surveillance with MRI in one year.

CONCLUSION This case highlights important considerations for management of AA. First, diagnosis can be difficult to obtain via percutaneous or endoscopic means given the myxomatous nature of these tumors. Patients often present with significant local disease burden, increasing the morbidity of excision for diagnostic and therapeutic purposes. While we achieved resection without significant morbidity, neoadjuvant angioembolization may be considered if upfront resection is expected to be unacceptably morbid. Despite high risk of local recurrence, there are no definitive guidelines on surveillance.

Abstract #: 37
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice I: Case Studies
Cluster: Surgical and Procedural Innovations

Stephanie Armas, Bachelor of Science

Stephanie Armas, Annie Fritsch, Nicholas Schmidt, Mamtha Raj Rush University Medical Center

RECOVERY VERSUS DURABILITY: AN ANALYSIS OF VERTEX AND OCCIPITAL SCALP WOUND RECONSTRUCTION IN THE PALLIATIVE PATIENT

INTRODUCTION: The goals of reconstruction in palliative care shift from traditional durability and longevity to maximizing comfort, minimizing recovery time, and avoiding invasive interventions. Palliative scalp reconstruction in cancer patients present unique reconstructive challenges due to advanced oncologic treatments which significantly compromise wound healing and tissue quality in addition to the anatomic location of the defect on the posterior scalp contributing to an increased risk for complications such as pressure ulcers. Bi-pedicle occipital artery flaps offer distinct benefits by providing robust local blood supply, minimizing the need for extensive tissue mobilization, accelerating healing, shortening hospital stays, and lowering the risk of complications. This report explores the advantages of bi-pedicle occipital artery flaps for achieving comfort-focused outcomes.

CASE PRESENTATION: A 65-year-old female with a history of metastatic colorectal adenocarcinoma and brain metastases presented with cerebral edema and brain compression requiring an urgent left craniotomy for resection of an occipital tumor. Due to prior cranial surgeries and radiation the patient's scalp tissue was compromised. A bi-pedicle occipital artery flap was selected for its proximity and strong vascular support, facilitating tension-free coverage of the defect. The wound preparation involved a 20 x 12 cm fasciocutaneous flap based on the occipital arteries. To support healing at the donor site, a Biodegradable Temporizing Matrix was applied, promoting granulation and reducing morbidity. Postoperatively, the bi-pedicle flap integrated well displaying excellent perfusion and she reported satisfaction with the healing process. Given that areas of the calvarium were devoid of pericranium due to prior radiation, a split-thickness skin graft was planned for further granulation. Home nursing services were arranged to assist with wound care, lessening the burden on caregivers.

CONCLUSION: The use of the bi-pedicle occipital artery flap was pivotal in reducing the overall hospital stay, decreasing postoperative care requirements, and enhancing the patient's quality of life by enabling a smoother recovery with minimal interventions. Literature on scalp reconstruction in palliative patients supports the use of local pedicled flaps for complex defects, particularly in the posterior scalp, due to their proximity and ability to expedite healing without extensive mobilization.

Abstract #: 38
Trainee Rank: Clinical Resident
Theme: Clinical Practice I: Case Studies
Cluster: Surgical and Procedural Innovations

Erik Rabin, MD

Erik Rabin (RUSH), Samantha Betman (RUSH), Ryan Kuhn (RUSH), Kristine U. Makiewicz (Cook County Health), Steven R. Bonomo (Cook County Health)

DUODENAL VOLVULUS IN THE SETTING OF SUPERIOR MESENTERIC ARTERY SYNDROME

INTRODUCTION Small bowel obstructions are common, but are rarely caused by volvulus. Duodenal volvulus is an exceedingly rare cause of obstruction, only documented in a handful of cases. Here we present a case of duodenal volvulus following rapid weight loss in the setting of SMA syndrome.

CASE PRESENTATION A 60-year-old male presented with three days of abdominal pain and bilious emesis in the setting of an 80 pound weight loss over the previous year. On presentation, he was tachycardic, but normotensive with a mildly distended abdomen. Labs were notable for leukocytosis, severe electrolyte derangements, and lactic acidosis. CT scan demonstrated a distended stomach and first two portions of the duodenum with decompression of the third and fourth portions of the duodenum, along with the remainder of the small bowel. Additionally, the entirety of his small bowel was oriented in the right hemiabdomen, an acute change from a scan performed one month prior. At the time of his previous scan, his SMA had an acute angle off the aorta, consistent with SMA syndrome. The patient was taken to the ICU for nasogastric decompression, fluid resuscitation and correction of his electrolytes. The following day, he underwent diagnostic laparoscopy which demonstrated laxity of the ligament of Treitz, which caused the distal duodenum to volvulize under the SMA, bringing the small bowel into the right upper quadrant. The duodenum was detorsed, repositioned in the correct anatomic position, the small bowel mesenteric defect was sutured to the retroperitoneum, and a duodenojejunostomy was performed for treatment of presumed SMA syndrome. The patient ultimately recovered well and was discharged home after tolerating a diet and having normal bowel function.

CONCLUSION Duodenal volvulus is a rare phenomenon that may be seen secondary to downward migration of the duodenum, laxity of connective tissues, and loss of the intra-abdominal fat pad, due to weight loss or advanced age. Our patient developed duodenal volvulus from significant weight loss leading to SMA syndrome, ultimately causing a small bowel obstruction requiring ICU admission and surgical treatment. Operative exploration is warranted for treatment of a duodenal volvulus, and this case demonstrates the benefit and utility of a laparoscopic approach.

Abstract #: 39
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice I: Case Studies
Cluster: Surgical and Procedural Innovations

Nicholas Schmitz, B.A.

Nicholas A. Schmitz (Rush); Annie Fritsch (Rush); Stephanie Armas (Rush); Mamtha Raj, MD (Rush)

RECONSTRUCTIVE CHALLENGES AFTER STERNECTOMY USING REGIONAL FLAPS

BACKGROUND: Reconstruction following sternectomy for mediastinal infections poses significant challenges due to the complex nature of the defects and the risk of complications. This case report highlights a multi-staged reconstructive approach using omental and pectoralis major flaps to manage a complicated mediastinal wound.

CASE PRESENTATION: A 58-year-old female with a history of mediastinal infection secondary to a laminectomy underwent sternectomy for osteomyelitis and mediastinitis. Initial reconstruction utilized a bi-pedicled omental flap with Integra application, followed by staged procedures involving split-thickness skin grafting and pectoralis major myocutaneous flaps. Despite multiple complications, including necrosis and recurrent infections requiring surgical revisions, wound healing was achieved with the use of a biodegradable temporizing matrix and wound VAC therapy. The patient tolerated all procedures well and continues to recover without further surgical interventions.

CONCLUSION: This case underscores the utility of combining regional flaps and advanced wound management techniques to address complex defects. The staged approach highlights the importance of multidisciplinary collaboration and postoperative vigilance, especially in patients with atypical infection pathways. A multi-staged reconstructive strategy using omental and pectoralis flaps provides durable and effective coverage for sternectomy defects, demonstrating valuable insights for addressing similarly challenging cases.

Abstract #: 40
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice I: Case Studies
Cluster: Unusual Infectious and Inflammatory Cases

Anam Adil, Bachelors of Science

Ummesalmah Abdulbaseer, MD, Wanna Zhang, MD

UNRECOGNIZED IgG4-RELATED DISEASE: EXPLORING A CASE OF PREOPERATIVE OVERSIGHT PRIOR TO A HEPATECTOMY

INTRODUCTION IgG4-associated cholangitis can present with nonspecific symptoms that mimic disease processes of different organ systems depending on sites of deposition, including malignancies such as hilar cholangiocarcinoma. When working up a suspected biliary tract malignancy, it is important to perform a basic hematologic work up to assess for Immunoglobulin Associated Cholangitis (IAC) as it can prevent unnecessary surgery and complications.

CASE PRESENTATION A 74-year-old woman presented to her PCP with jaundice, right upper quadrant pain, and 40-pound weight loss. Labs showed bilirubin 7.5, ALP 952, AST 200, ALT 188. CA-19-9 was elevated to 190; AFP and CEA were normal. CT AP revealed irregular mass-like gallbladder with wall thickening and intrahepatic dilation, lymphadenopathy, and a lung nodule, suggesting metastatic gallbladder or biliary malignancy. She was admitted when she developed acute pancreatitis and acute renal failure thought to be tumor lysis syndrome. She was treated with aggressive hydration and allopurinol with improvement in renal function. Additional lab workup showed abnormal immunoglobulins with elevated kappa/lambda ratios IgG 1727 and IgM 389. She underwent planned Whipple Procedure with a right hepatectomy for presumed cholangiocarcinoma. Her post-operative course was complicated by new atrial fibrillation, deep vein thrombosis, ileus, biliary leak, and pleural effusions. Pathology unexpectedly revealed a non-malignant condition, IgG4 associated cholangitis (IAC). She was referred to Rheumatology after discharge and started on prednisone and rituximab for IgG4 disease.

CONCLUSION IgG4-associated cholangitis can masquerade as hilar cholangiocarcinoma. Further hematologic workup to assess for IAC here could have prevented unnecessary surgery and complications, thus suggesting need for more thorough preoperative evaluation in gallbladder malignancies.

Abstract #: 41
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice I: Case Studies
Cluster: Unusual Infectious and Inflammatory Cases

Mohan Bhadriraju, BA

Mohan Bhadriraju (Rush), Dylan Raikar (Rush), Rishabh Gupta, MD (Rush)

AN ATYPICAL CASE OF UNILATERAL ACUTE RETINAL NECROSIS: HSV-2 REACTIVATION AND COMPLICATIONS OF ANTIVIRAL THERAPY IN AN IMMUNOCOMPETENT PATIENT

INTRODUCTION We present a case of unilateral acute retinal necrosis (ARN) with optic disc edema without characteristic retinal whitening, caused by HSV-2 reactivation in an immunocompetent patient. The patient developed progressive outer retinal necrosis while on prophylactic antiviral therapy and experienced a DRESS-like reaction to valacyclovir.

CASE PRESENTATION A 49-year-old man presented with blurry vision in the right superotemporal field and moderate eye movement pain. His history included left eye blindness from HSV and retinal detachment. Exam revealed grade 2 papilledema OD, and AC fluid confirmed HSV-2 ARN. He was hospitalized for observation. Workup ruled out systemic infections, thrombotic and autoimmune causes. Lumbar puncture revealed mild leukocytosis and elevated protein. Vision declined to 20/200 with serous retinal detachment and optic disc edema. He was treated with intravitreal foscarnet and intravenous steroids. A valacyclovir-induced rash was tentatively diagnosed as DRESS after biopsy, resolving with topical steroids and a taper. Visual acuity improved to 20/50, and he was discharged on oral antivirals. The patient was transitioned to famciclovir for long-term prophylaxis. Post-discharge, visual acuity fluctuated with famciclovir and intravitreal foscarnet. Weeks later, vision declined to 20/80 with elevated IOP and new retinitis. Suspected famciclovir failure led to readmission for intravenous acyclovir. Despite initial stabilization, worsening retinitis and new retinal detachment required high-dose intravitreal foscarnet. Visual acuity briefly improved to 20/20 but later declined to 20/70. Stabilization was achieved with intravitreal foscarnet and prednisone. Valacyclovir was reintroduced, and subsequent exams showed regressing necrosis and phlebitis. The patient was discharged with 20/30 vision and weekly follow-ups.

CONCLUSION ARN is a severe viral retinal disease that can cause significant visual impairment. Optic nerve edema is common in ARN, and its isolated presentation does not rule out infectious causes. Early diagnosis and antiviral therapy are critical to prevent progression, with close monitoring for recurrence and drug-related complications.

Abstract #: 42
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice I: Case Studies
Cluster: Unusual Infectious and Inflammatory Cases

Natalia Caprile, BA in Sociology

Natalia Caprile, MS3, (Rush University) Nanno Dandi, MS3 (Rush University) Dr. Daniel Bianchi, MD (Rush University)

UNMASKING THE UNSEEN: BROADENING THE DIFFERENTIAL FOR ASCITES IN CIRRHOSIS - A CASE FOR PERITONEAL TUBERCULOSIS AND BEYOND

INTRODUCTION In ascites, determining the cause is crucial. A rare etiology is peritoneal tuberculosis, which is usually an extrapulmonary TB manifestation via hematogenous spread from lung foci. Peritoneal TB presents insidiously with "symptoms including ascites (93%), abdominal pain (73%), and fever (58%)" [Chow]. Symptoms often persist for months before diagnosis. Diagnosis involves clinical evaluation, peritoneal fluid analysis, and imaging. Patients may have pulmonary TB history, but peritoneal involvement can also present initially.

CASE PRESENTATION FM was a 69-year-old female who immigrated from Mexico to the US 30 years ago with a history of primary biliary cholangitis complicated by cirrhosis, hepatic encephalopathy, and esophageal varices presented to the emergency department with worsening abdominal distension. She was a former smoker with no history of alcohol or recreational drug use. Her medical and family histories were negative for colitis, colon cancer, or irritable bowel disease. On admission, paracentesis showed SAAG 0.4, PMN 343, LDH 110, protein 3.7, and ADA 23 with no organism growth. Spontaneous bacterial peritonitis was presumed and FM started Ceftriaxone and albumin. A Transjugular Intrahepatic Portosystemic Shunt procedure was delayed due to infection. Repeat paracentesis showed SAAG 0.7 and PMN 399. With low SAAG, persistent ascites, a known left adnexal mass, and elevated CA125 and CA19-9, Gynecological Oncology was consulted. The absence of mass growth and normal inhibin B, AFP, and CEA made ovarian malignancy unlikely. After nine days with persistent symptoms, FM began trimethoprim sulfamethoxazole and underwent a TIPS procedure. The same day, a QuantiFERON GOLD test was strongly positive. Abdominal CT revealed omental caking and enlarged mediastinal lymph nodes, suggesting TB peritonitis. CT chest showed no pulmonary TB. After discharge, ascitic fluid cultures grew acid-fast bacilli confirmed as Mycobacterium tuberculosis via MTB probe. At follow up with Infectious Disease post-discharge, FM started RIPE therapy.

CONCLUSION FM's case underscores the critical need for a broad differential diagnosis in patients with ascites, particularly in those with cirrhosis, where conditions like peritoneal TB, SBP, and malignancy may present with overlapping clinical features. This case reinforces the importance of comprehensive analysis of ascitic fluid parameters and vigilance for atypical causes such as peritoneal TB.

Abstract #: 43
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice I: Case Studies
Cluster: Unusual Infectious and Inflammatory Cases

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THE COAGULATION ENIGMA: ACQUIRED HEMOPHILIA A (AHA) IN POLYAUTOIMMUNITY

INTRODUCTION Acquired hemophilia A (AHA) is a rare bleeding disorder caused by autoantibodies against Factor 8, often presenting in adults over 60 and associated with autoimmune conditions or malignancy. It is distinct from genetic hemophilia A, which is X-linked and manifests in childhood. Diagnosing AHA can be challenging, as its symptoms may mimic other conditions like vasculitis, cellulitis, or thrombosis. The diagnosis is confirmed through prolonged PTT that does not correct with a mixing study and a positive Bethesda assay.

CASE PRESENTATION A 66-year-old female with a history of Sjogren's disease, vasculitis, and membranoproliferative glomerulonephritis presented with progressive left arm pain, ecchymosis, and swelling extending to the left neck after cutting her finger while cooking. She denied fevers, chills, decreased sensation, prior bleeding episodes, and use of anticoagulants. An ultrasound ordered by her PCP showed no clots. Physical examination revealed multiple ecchymoses on the right arm and a large hematoma at the IV site. Lab tests showed normal CMP and CBC, elevated CRP (19.6) and ESR (41), and a high PTT of 82.2, though PT and INR were normal. A CT angiogram indicated soft tissue swelling in the left neck and arm. Hematology consultation revealed a low Factor 8 level, an abnormal mixing study, and an elevated Factor 8 Bethesda assay (20), leading to a diagnosis of acquired hemophilia A due to a Factor 8 inhibitor associated with her autoimmune conditions. The patient was treated with prednisone, Rituximab, and recombinant Factor VIIa. Although Emicizumab was considered, it was not initiated due to insurance coverage issues. Her PTT improved, and her symptoms of ecchymosis and swelling resolved. She was discharged with outpatient hematology follow-up.

CONCLUSION This case highlights the presentation of AHA in the context of polyautoimmunity in patients presenting with ecchymosis and coagulopathy. Typically treatment involves immunosuppression and managing bleeding episodes. Autoantibody eradication is achieved with steroids, Rituximab, or cyclophosphamide, and bleeding control typically with Emicizumab, recombinant Factor VIIa, or activated prothrombin complex concentrate. Effective management requires careful attention to both clinical needs and potential insurance constraints, which can impact treatment options.

Abstract #: 44
Trainee Rank: Clinical Resident
Theme: Clinical Practice I: Case Studies
Cluster: Unusual Infectious and Inflammatory Cases

Annie McGregor, DO

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POSITIVELY PARASITIC! A CASE OF CUTANEOUS STRONGYLOIDES

INTRODUCTION Strongyloidiasis is caused by infection with its namesake hookworm, which is usually found in warm climates, often in soil or sand contaminated by human feces. Its clinical presentation can be broad though most often includes gastrointestinal, dermatologic, or respiratory symptoms. The dermatologic manifestations of cutaneous strongyloidiasis may often mimic other common rashes such as atopic dermatitis, contact dermatitis, or fungal infection.

CASE PRESENTATION A 39-year-old female presented to allergy clinic for a rash. The rash was described as a pruritic, erythematous rash under the breasts and axillae, which later spread to her back, abdomen, groin, and palms of hands. Prior to symptom onset, she traveled to Florida, and symptoms started on the last day of her trip. She initially presented to urgent care where she was prescribed ketoconazole and nystatin cream for presumed fungal infection without improvement. Of note, her mother also had a similar rash which preceded her symptoms. In allergy clinic, she was noted to have a rash consisting of scattered vesicular lesions and erythematous papules on hands, and lower back, coalescing into plaques on her bilateral wrists. Given the appearance of the rash in conjunction with a presumed co-infected family member, there was concern for possible infectious etiology of symptoms. The patient was prescribed permethrin for presumed scabies infection and provided with a dermatology consult. A complete blood count was also ordered which revealed mild eosinophilia to 7.7%, which was increased from 0.2% on prior blood count. The patient was contacted due to concern for parasitic infection and additional lab work for toxoplasmosis, strongyloides, and stool ova and parasites was ordered. Strongyloides-specific IgG was positive, consistent with strongyloidiasis. The patient was prescribed two courses of ivermectin with complete resolution of symptoms.

CONCLUSION Strongyloidiasis, while relatively rare in the United States, may still be found in warm climates, especially in the Southeastern region. Strongyloidiasis can lead to cutaneous manifestations, which may mimic other benign skin conditions. This case highlights the importance of considering strongyloidiasis on the differential diagnosis for a patient presenting with skin manifestations and eosinophilia not responding to typical treatments for dermatitis.

Abstract #: 45
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice II: Cohort Studies
Cluster: Eye and Vision Research

Nikpreet Boparai, BA

Nikpreet Boparai, BA (Rush); Matthew Lim, BS (Rush); Marco Metry, BS (Rush); Oscar Chen, MD, MS (Rush); Anjali Tannan, MD (Rush)

A COMPARISON OF INTRAOCULAR PRESSURE MEASUREMENTS VIA GOLDMANN APPLANATION TONOMETRY, ICARE REBOUND TONOMETRY, TONO-PEN, AND OCULAR RESPONSE ANALYZER IN PATIENTS WITH CORNEAL EDEMA AFTER CATARACT SURGERY

INTRODUCTION: Goldmann applanation tonometry (GAT) is considered the standard modality utilized to measure intraocular pressure (IOP), however, variation in corneal parameters may affect the accuracy of IOP values measured using GAT. We aim to compare intraocular pressure (IOP) measurements using GAT, Tono-pen XL (TXL), iCare Rebound Tonometry (RT), and Ocular Response Analyzer (ORA) in patients presenting with corneal edema secondary to cataract surgery.

METHODS: A prospective, comparative study was performed on 1-day post-operative cataract surgery patients. The study population included patients from the Rush University Eye Center Physicians and Rush University Ophthalmology Associates populations. Informed consent was obtained for all subjects, and the study is IRB-approved. Central corneal thickness (CCT) measurements via ultrasound pachymetry, and IOP measurements via GAT, TXL, RT, and ORA were collected from 93 eyes of 93 patients. Goldmann-correlated IOP (IOPg) and corneal-compensated IOP (IOPcc) values were obtained using ORA. Averages of three measurements were collected per modality and analyzed with Microsoft Excel. Patients younger than 18 years of age, or with a history of glaucoma, ocular hypertension, keratoplasty, refractive surgery, or taking antiglaucoma medications were excluded from the study.

RESULTS: Mean GAT-IOP was 16.2 ± 5.9 mmHg (range, 4.0-21.0) and mean CCT was 596.2 ± 63.5 µm (range, 474.3-828.0). Mean RT-IOP was 17.1 ± 7.0 mmHg (range, 7.5-41.6) and was not statistically different from GAT-IOP (p=0.057). Mean TXL-IOP was 18.5 ± 6.3 mmHg (range, 5.0-36.3) and was statistically higher than GAT-IOP (p=0.00). Mean IOPcc was 22.4 ± 8.4 mmHg (range, 11.4-48.0) and was statistically higher than GAT-IOP (p=0.00). Mean IOPg was 20.4 ± 7.8 mmHg (range, 8.2-43.6) and was statistically higher than GAT-IOP (p=0.00).

CONCLUSION: Corneal edema resulting from cataract surgery can lead to an overestimation of IOP when measured using various methods of tonometry. No statistically significant difference in IOP was observed between GAT and RT, however, IOP measured via ORA and TXL modalities were significantly greater than GAT-IOP measurements. These results can provide clinicians with a better understanding in determining which modality provides the most accurate IOP readings in patients presenting with corneal edema following cataract surgery.

Abstract #: 46
Trainee Rank: RUSH Matriculated Student
CHS: MS
Theme: Clinical Practice II: Cohort Studies
Cluster: Eye and Vision Research

Catherine Clifft, nutrition sciences, BS

Presenting Authors: Clifft C (Rush U), Frens K (Rush U) Co-Authors: Maino D (Illinois College of Optometry/IEI), Gomez SL (Rush U)

VITAMINS AND MINERALS RELATED TO EYE HEALTH AND FUNCTION IN OLDER ADULTS - A SCOPING REVIEW

INTRODUCTION Age-Related Macular Degeneration (AMD) is a common cause of blindness in older adults. Older adults are a growing population with 1 in 6 Americans being >65 years who also report a rising use of vitamin/mineral (V/M) oral supplements for a variety of reasons, including eye health (EH). However, scientific evidence of their effectiveness remains largely unknown. The Age-Related Eye Disease study 2 (AREDS 2), tested a specific V/M formulation that reduced the risk of wet AMD in older adults. However, additional evidence on the effectiveness of this formulation or similar formulations and dosage recommendations for older adults remains largely unknown or inconclusive. The purpose of this scoping is to determine the scientific evidence on the role of V/M supplements on EH and function.

METHODS A scoping review using the Arksey and O'Malley framework is being conducted using PubMed, (CINAHL), Scopus, and EMBASE databases to identify studies related to age-related eye diseases and oral supplements commonly used by older adults for eye conditions. The studies to be included are randomized controlled trials, cohort studies, case-control studies, systematic reviews, and other scoping reviews. Studies to be excluded are reviews or narrative reviews, editorials, letters to editors, special reports, correspondences, and case studies or case series. Only human studies written in the English language, published in peer-reviewed journals involving older adults (65+ or >50 post-menopausal), examining oral supplements like the AREDS2 formulation, vitamin C, vitamin E, lutein, zeaxanthin, zinc, copper, or omega 3/6 will be included.

RESULTS Using a curated MESH string created by a reference librarian, 3,558 articles were identified (after duplicates removed). Of these 3,304 articles were excluded for irrelevance or failure to meet inclusion criteria. After full-text review of 250 articles, only 97 full text articles were included. Data extraction of these articles is currently underway. Timeline for completion is April 2025.

CONCLUSIONS While the results are pending, this review will summarize the available evidence on the use and effectiveness of the AREDS-2 or similar V/M supplements to manage EH and function among older adults. Mapping of this evidence will reveal gaps, key concepts, and inform future research.

Abstract #: 47
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice II: Cohort Studies
Cluster: Eye and Vision Research

Matthew Lim, BS

Matthew Lim, BS (Rush); Oscar Chen, MD, MS (Rush); Nikpreet Boparai, BS (Rush); Marco Metry, BS (Rush); Anjali Tannan, MD (Rush)

COMPARING GOLDMANN, ICARE, TONO-PEN, AND OCULAR RESPONSE ANALYZER MEASUREMENTS IN PATIENTS WITH CORNEAL EDEMA DUE TO FUCHS' ENDOTHELIAL CORNEAL DYSTROPHY

INTRODUCTION: Although Goldmann applanation tonometry (GAT) remains the gold standard for intraocular pressure (IOP) measurements, alterations in corneal parameters can impact the accuracy of GAT-IOP. This study aims to compare IOP measurements across GAT, iCare Rebound Tonometry (RT), Tono-Pen AVIA (TP), and the Ocular Response Analyzer (ORA) in patients with corneal edema due to Fuchs' endothelial corneal dystrophy (FECD).

METHODS: A prospective IRB-approved study was conducted on patients with FECD. The study population included Rush University Eye Center Physicians and University Ophthalmology Associates patients. Central corneal thickness (CCT) was measured via ultrasound pachymetry, and IOP was obtained using GAT, RT, TP, and ORA from 19 eyes of 19 patients. Corneal-compensated IOP (IOPcc) and Goldmann-correlated IOP (IOPg) were measured with the ORA. Corneal edema was diagnosed clinically based on the slit lamp examination. Exclusion criteria included age under 18 years, history of glaucoma, ocular hypertension, antiglaucoma medication use, keratoplasty, refractive surgery, contact lens use, and inability to complete testing.

RESULTS: Mean GAT-IOP was 11.8 ± 2.8 mm Hg (range, 5-17), and mean CCT was 596.0 ± 53.8 µm (range, 514-695). Mean RT-IOP was 9.8 ± 2.0 mm Hg (range, 4.7-13.3), which was significantly lower than GAT-IOP ($p = 0.00$). Mean TP-IOP [13.8 ± 3.8 mm Hg (range, 5-19.7)], IOPcc [15.0 ± 3.7 mm Hg (range, 6.7-22)], and IOPg [12.8 ± 3.4 mm Hg (range, 3.7-18.8)] were all significantly higher than GAT-IOP ($p = 0.01$, 0.00, and 0.02, respectively).

CONCLUSION: FECD may lead to either underestimation or overestimation of IOP depending on the tonometry modality used. RT-IOP was significantly lower than GAT-IOP, while TP-IOP and ORA measurements were significantly higher. These findings provide insight into the accuracy of different tonometers for patients with FECD, aiding in their clinical management.

Abstract #: 48
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice II: Cohort Studies
Cluster: Health Behavior and Psychological Studies

Michelle Boamah, BS

Michelle Boamah (Rush University) Tiana Kimble (Rush University) Matthew Johnson (Rush University) Ami Shah, MD (Rush University)

EFFECTIVENESS OF A 12-WEEK COACHING PROGRAM IN IMPROVING WELLNESS PARADIGMS AMONG PHYSICIANS.

INTRODUCTION Physician burnout is known to be harmful, not only to physicians and patients, but to the healthcare system at large. Among this group, residents face well documented challenges including difficulty with work-life integration, lack of autonomy, excessive workload and inequities that impact their work and quality of life. Ineffective or maladaptive coping skills increase the likelihood of burnout. This study utilized a 12-week coaching program to assess the long-term effectiveness of coaching on mitigating burnout in academic physicians.

METHODS This coaching program was conducted at Rush University Medical Center and consisted of a 12-week coaching program with both individual and group sessions between faculty and residents across 2 cohorts. Participants completed questionnaires pre-intervention as well as post-intervention at the 4-, 8- and 14-month time point from initiation of the program. Multiple evaluative assessments were utilized including Maslach Burnout Inventory (MBI), Professional Fulfillment Inventory (PFI), negative impact of work on relationships (NIWR), self-valuation (SVS), Utrecht Work Engagement Scale (UWES) and the Clance Imposter Phenomenon Scale (CIPS).

RESULTS 59 faculty and 58 residents were assessed. There was a decrease in reported burnout among both residents and faculty from baseline to the 14-month checkpoint. There was a significant increase in professional fulfilment, self-valuation, and work engagement scores among residents from baseline to the final assessment. The work exhaustion and interpersonal disengagement aspect of the PFI showed significant decrease at the end of the program. Faculty and residents were also assessed based on whether they completed all of the post-intervention surveys. Residents who did not complete all post-intervention surveys had significantly higher self-valuation scores at the 4-month check-in, compared to those who completed the surveys up to the 14-month check-in. While faculty who failed to complete all post-program questionnaires showed significantly higher MBI scores at the 4-month time point compared to those who completed all surveys.

CONCLUSION These findings illustrate the effectiveness of a 12-week coaching program in improving many of the factors that contribute to overall well-being in physicians relative to pre-intervention. This suggests that coaching programs may be a useful tool in providing trainees with the skills necessary for their well-being.

Abstract #: 49
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Clinical Practice II: Cohort Studies
Cluster: Health Behavior and Psychological Studies

Luisa Cedin, PT, MS

Luisa Cedin (RUSH); Christopher Knowlton (RUSH); Camila Antognini (RUSH), Christopher Ferrigno (RUSH), and Markus A. Wimmer (RUSH)

MUSICAL FEEDBACK AND THERAPIST GUIDANCE: ENHANCING KNEE ADDUCTION MOMENT REDUCTION IN HEALTHY PARTICIPANTS

INTRODUCTION Osteoarthritis (OA) is the most common joint disease in adults. Gait modifications can reduce joint loading and improve pain and physical function in knee OA. The knee adduction moment (KAM) serves as a biomarker for OA progression, suggesting that gait training to reduce the KAM may effectively manage knee OA. In this pilot, we aim to reduce KAM in healthy subjects by using musical feedback based on pressure-sensing insoles.

METHODS Healthy subjects were recruited to walk using this system and were further analyzed by marker-based motion capture. COP and plantar pressure were captured in real time from a wireless 16-sensor pressure insole. To provide musical feedback, a lowpass filter muffled a pre-selected music playlist when the real-time center of pressure exceeded a predetermined lateral threshold. Participants received basic verbal instruction during their first visit to avoid the muffling of the music with slight adjustments in their walking. A year later, the participants were invited for a second visit, receiving the same musical feedback but with more detailed guidance from a therapist to medialize plantar pressure. Participants commented on the musical feedback via a questionnaire at the end of the session.

RESULTS Of the 20 subjects who participated in Visit 1 (29 ± 5 years old, 75.9 ± 10.5 Kg, 1.73 ± 0.07 m), 10 returned for Visit 2. All participants significantly medialized their COP (-9.38% ± 4.37, range -2.3% to -19%) during the first visit, guided solely by the musical feedback. Participants were still able to reproduce this new walking pattern after removing the musical feedback. At the first visit, while all KAM peaks showed a reduction, only the second peak (KAM 2) on the right side significantly lowered (8.37%). At the second visit, all 10 participants walked with a significant reduction of the KAM 2 bilaterally (-14.76%, left; -13.23%, right). The participants reported enjoying the system and suggested they would adopt such a system for rehabilitation.

CONCLUSION Musical feedback cued the participants to medially shift their gait line and reduce their KAM. The KAM reduction was further enhanced by the therapist's guidance.

Abstract #: 50
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice II: Cohort Studies
Cluster: Health Behavior and Psychological Studies

Paarsa Haque, B.S.
Paarsa Haque (Rush); James Moy (Rush)

CHANGE IN FEAR OF COVID-19 IN A VACCINATED COHORT OVER TIME

INTRODUCTION: COVID-19 remains a significant concern due to its rapid mutations, burden of disease, and post-acute sequelae, known as "long COVID."As the burden of long COVID grows, understanding how certain populations avoid COVID-19 becomes increasingly important. Previous studies have examined the role of the "behavioral immune system," an idea coined by psychologist Mark Schaller that attributes pathogen avoidance to not only innate and adaptive immune systems but also to proactive behavior. This study aims to examine changes in behaviors and attitudes toward COVID-19 over time.

METHODS: 190 Participants were recruited from a previous COVID-19 study in which their blood was drawn every three months from December 2019 through December 2022. Those who participated in at least one of the last three blood draws were given an IRB-approved electronic survey. Participants were asked to recall their behavior and perceived fear of COVID-19 over 6-month intervals from January 2021 to December 2023. A "mean fear score" was calculated from responses on a Likert scale ranging from 1-5 (where 1 = strongly disagree and 5 = strongly agree) to the question "How fearful were you of COVID-19?" Excel and Jamovi were used to perform ANOVA and Pearson correlation tests.

RESULTS: Of 190 survey respondents, age was positively correlated with fear of COVID-19 during the last four of six time periods from January 2022 to December 2023, $p < 0.001$. Perceived fear of COVID-19 significantly decreased over each time period, with $F(5,25) = 71.49$, ($P < 0.001$). Depictions of changes in mean fear score over time, where each Time Period (1-6) denotes a 6 month interval beginning from January 2021 and ending in December 2023, are shown in Figure 1.

CONCLUSION: The results indicate a decrease in fear of COVID-19 that is consistent with current literature. Age was weakly positively correlated with fear of COVID-19, suggesting that other factors could influence this relationship. Although this study has limitations due to sample size and representations of age, gender, and socioeconomic status, it can help guide research efforts to better understand how behavior and attitudes are related to COVID-19 infection rates.

Abstract #: 51
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice II: Cohort Studies
Cluster: Neurological and Cognitive Studies

Fedra Britvic, B.A.

Fedra Britvic (RMC), Rachel Akers (RMC), Claudia Perez DO, MS (RUMC)

DIAGNOSTIC COMPLEXITY OF AUTOIMMUNE ENCEPHALITIS AND PARANEOPLASTIC SYNDROMES

INTRODUCTION: Autoimmune encephalitis (AE) is a neurological condition often comorbid with autoimmune disease and rarely presents as a paraneoplastic syndrome indicative of occult malignancy. Literature on patients presenting with neuropsychiatric symptoms and undiagnosed breast cancer is limited. Autoimmune encephalitis may be the first indicator of breast malignancy in patients with low health literacy and access to healthcare, especially routine primary care. This case report and accompanying literature review aims to increase clinician awareness of AE secondary to occult breast malignancy and provide diagnostic and therapeutic clinical pearls

CASE PRESENTATION: A 31-year-old female with past medical history of hypertension, bipolar disorder, amnesia, depression, dementia, lupus, and asthma presented to her local emergency department (ED) complaining of agitation, weakness, and memory problems. She had multiple prior ED visits with similar complaints and was admitted to both inpatient and psychiatric services several times. During these past admissions, multiple imaging studies and extensive neurology work-up was performed, but the patient often left against medical advice. Seventeen days after her most recent discharge from a psychiatric facility, the patient returned to the ED accompanied by her father, who reported extreme mental decline over 5 days. She was admitted with concern for AE and received an MRI of the brain with results suggestive of AE. A CT chest revealed a rounded right axillary lesion consistent with an enlarged lymph node, which was biopsied and showed metastatic carcinoma consistent with breast primary ER+/PR+. Paraneoplastic involvement was confirmed by presence of anti-APMA antibodies. Her symptoms improved significantly once Tamoxifen was initiated. Chart review revealed an abnormal mammogram several months prior. The patient had obtained this after reporting a right breast mass and white nipple discharge to her primary care physician. The mass was attributed to a fibroadenoma, and repeat mammogram was recommended but not obtained.

CONCLUSION: This case demonstrates the complexity of diagnosing autoimmune encephalitis and paraneoplastic syndromes, particularly in the context of psychiatric comorbidities and delayed follow-up on suspicious findings. It highlights the importance of comprehensive diagnostic workups, timely follow-up of imaging and pathology, and a multidisciplinary approach in managing patients with overlapping psychiatric and neurological symptoms.

Abstract #: 52
Trainee Rank: Clinical Resident
Theme: Clinical Practice II: Cohort Studies
Cluster: Neurological and Cognitive Studies

Katie Brundage, MA

Katie Brundage (Presenting, RUMC; Ferkauf Graduate School of Psychology, Yeshiva University); Roee Holtzer (Ferkauf Graduate School of Psychology, Yeshiva University; Albert Einstein College of Medicine)

SEX DIFFERENCES IN THE ASSOCIATION OF PERCEIVED SUBJECTIVE COGNITIVE COMPLAINTS WITH COGNITION IN OLDER ADULTS WITH MULTIPLE SCLEROSIS

INTRODUCTION: Subjective Cognitive Complaints (SCCs) are linked to cognitive dysfunction in older adults, with evidence suggesting sex differences in their reporting and relationship to objective performance. However, these patterns remain unexplored in older adults with MS (OAMS). While women are more affected by MS, men often experience worse disease progression. This study examined associations between SCCs, cognitive performance, and the impact of MS-related disability severity in female and male OAMS.

METHODS: Community-dwelling adults aged ≥60 years with MS, all dementia-free and on Disease Modifying Treatment (DMT) for ≥6 months, were included. SCCs were measured using the Ascertain Dementia 8 (AD8) and Multiple Sclerosis Neuropsychological Questionnaire (MSNQ). The Oral Symbol Digits Modality Test (SDMT) assessed speed of processing/executive functions, while the Hopkins Verbal Learning Test-Revised (HVLT-R) assessed verbal memory. Disease severity was measured using Patient Determined Disease Steps (PDDS). Significant analyses controlled for age, education, general health, and depressive symptoms.

RESULTS: The sample included 92 participants (mean age = 64.54 ± 4.23; 67.39% female). AD8 scores were categorized into three groups (AD8: 0, n = 35; 1, n = 32; ≥2, n = 25); MSNQ scores were normally distributed (M = 18.79, SD = 10.38). PDDS scores were dichotomized (0-2, ≥3). SCCs were negatively associated with SDMT performance in females (MSNQ: ß = −0.03, p = .045; AD8 ≥2 vs. AD8 = 0: ß = −1.19, p = .012), but not in males. Interaction effects showed significant SCC × PDDS associations on SDMT performance in females but not males. Adjusted models revealed that higher AD8 endorsement remained negatively associated with SDMT performance in females (AD8 ≥2 vs. AD8 = 0: ß = −0.99, p = .035), while other significant associations were attenuated.

CONCLUSION: Higher SCCs were linked to worse cognitive performance in older women but not men with MS. Although covariate adjustments weakened several findings, the association between elevated SCCs on the AD8 and poorer SDMT performance in women persisted.

Abstract #: 53
Trainee Rank: Post-Doctoral Research Fellow
Theme: Clinical Practice II: Cohort Studies
Cluster: Neurological and Cognitive Studies

Jocelyn Jaen, Ph.D.
Jocelyn Jaen1, Melissa Lamar1,2, David A Bennett1,3, Francine Grodstein1,4
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ADVERSE CHILDHOOD EXPERIENCES AND COGNITIVE DECLINE IN OLDER ADULTS FROM THE MEMORY AND AGING PROJECT (MAP)

INTRODUCTION. The pernicious effects of adverse childhood experiences (ACEs) on adult health are well documented. Yet, research exploring the association between childhood adversity and cognitive trajectories in older age is limited and has found mixed results. The aim of this analysis was to evaluate the association between ACEs and cognitive decline in older adults from Rush MAP.

METHODS. MAP is an ongoing cohort initiated in 1997, recruiting older adults from retirement communities in Illinois. In this analysis, we included 1869 MAP participants free of dementia at baseline, with information on ACEs, and at least two cognitive assessments. Exposure to childhood adversity was reported at baseline using a 16-item questionnaire identifying five dimensions of adversity: emotional neglect, financial need, parental intimidation, parental violence, and family turmoil. Scores in each domain were created by adding the frequency of the relevant adversity items. The total ACEs score, ranging from 0 to 58, summed all domain scores, with higher scores indicating more ACEs.

RESULTS. Baseline mean age was 80 years; 26% of participants were male, 92% non-Latino White, and average education of 15 years. The mean follow-up was 7.6 years (SD 4.9). Overall, 12% reported no ACEs, and the total ACEs' score averaged 8.3 (SD 7.6). The total ACEs score was not associated with baseline global cognition or cognitive decline overtime. However, when considering ACEs dimensions, we found suggestions of associations with global cognition. Parental violence and family turmoil were related to lower baseline cognition (mean difference=-0.032, p=0.004; mean difference=-0.27, p=0.007 respectively), although not to cognitive decline. Emotional neglect was associated with faster cognitive decline (mean difference=-0.0014, p=0.027). Generally, this pattern of association was mirrored across the cognitive domains.

CONCLUSIONS. Overall, there was no clear association between ACEs and cognition in older US adults. However, specific ACEs dimensions warrant further exploration to better understand their potential relationships with cognitive outcomes in aging.

Abstract #: 54
Trainee Rank: Clinical Resident
Theme: Clinical Practice II: Cohort Studies
Cluster: Neurological and Cognitive Studies

Iram Nasreen, PharmD

Giles Slocum, PharmD, BCCCP, BCEMP, Rush University Medical Center Nicholas P. Cozzi, MD, MBA, FACEP, FAEMS, Rush University Medical Center Sonia Winandy, RN, MBA, Rush University Medical Center Kristen Fisher, DNP, APRN, Rush University Medical Center Laurel J. Cherian, MD, MS, Rush University Medical Center

An Institutional Evaluation of the Cincinnati Prehospital Stroke Scale (CPSS) in EMS Stroke Notification: Sensitivity, Specificity, and Large Vessel Occlusion Detection

INTRODUCTION: Prehospital stroke notification has greatly advanced the timeliness of acute stroke treatment; however, its integration into established clinical systems presents challenges, particularly regarding optimal use of prehospital stroke scoring tools. The aim of our study was to evaluate trends in the prehospital notification system at our institution, with a focus on the effectiveness of the Cincinnati Prehospital Stroke Scale (CPSS) in facilitating the early and accurate identification of acute stroke patients by emergency medical services (EMS). This analysis aimed to identify both strengths and areas for improvement within the system.

METHODS: We conducted a retrospective, single-center cohort study of patients who arrived at the hospital via the Chicago Fire Department with subsequent code stroke activation between December 2023 and May 2024. Data collected included patient demographics, EMS time intervals (dispatch to scene, on-scene, transport, prenotification to destination, and door-to-scanner time), CPSS outcomes, 3-item stroke scale scores (3-ISS), EMS impressions, event type, and interventions. Descriptive statistics were performed for all outcomes.

RESULTS: A total of 140 patients were included in the analysis, with 70 diagnosed with stroke or transient ischemic attack (TIA). The proportion of positive CPSS, 3-ISS, and EMS impressions was higher in stroke and TIA patients, though statistical significance was not assessed. CPSS identified 88% of acute stroke and TIA cases, but its specificity was low at 36%. Notably, all patients with large vessel occlusion (LVO) tested positive on CPSS, demonstrating 100% sensitivity and specificity for LVO detection. Forty-five percent of acute ischemic stroke patients received thrombolytic therapy and/or endovascular intervention.

CONCLUSION: At our institution, the CPSS demonstrates trends consistent with prior studies, showing high sensitivity for identifying acute stroke and TIA. Notably, it exhibits 100% sensitivity and specificity for LVO cases, surpassing previous studies. However, its low specificity (36%), consistent with earlier findings, indicates a need for refinement. While CPSS is valuable for early stroke detection in the prehospital setting, future research at our institution should focus on optimizing cutoff scores, improving specificity, and assessing impact of CPSS on patient outcomes. This will help reduce false positives, improve treatment precision, and better allocate resources for stroke patients.

Abstract #: 55
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice II: Cohort Studies
Cluster: Neurological and Cognitive Studies

Sushanth Neerumalla, BS

Sushanth Neerumalla, Evan Patel, Russel Whitehead, Rithik Palaniappan, Elias Michaelides

FACTORS IMPACTING BLOOD LOSS AND SURGICAL TIME IN ACOUSTIC NEUROMA RESECTION: A RETROSPECTIVE ANALYSIS

INTRODUCTION: Vestibular schwannoma surgery is a complex procedure often requiring significant operating room time and potentially high estimated blood loss (EBL). Identifying variables influencing surgical time and EBL can improve perioperative planning, patient outcomes, and resource allocation. This retrospective study aims to analyze patient data to determine factors associated with surgical time and EBL in vestibular schwannoma resection.

METHODS: A retrospective review of patients undergoing vestibular schwannoma resection at an academic medical center from 2014 to 2024 was conducted. The primary outcomes were total surgical time and EBL, with independent variables including body mass index (BMI), estimated blood loss, tumor size on MRI, approximate tumor removal percentage, prescription radiation dose, surgical time, and sex. Spearman correlation and Kruskal-Wallis tests were employed to assess associations.

RESULTS: Data from 147 patients were analyzed. Statistically significant correlations were found between surgical time and BMI ($r = 0.222$, $p = 0.0179$, $n = 113$), tumor size on MRI ($r = 0.426$, $p < 0.0001$, $n = 110$), and estimated blood loss ($r = 0.416$, $p < 0.0001$, $n = 110$). Higher BMI, larger tumors, and increased EBL were associated with longer surgical times. Additionally, higher radiation doses ($r = 0.485$, $p = 0.0304$, $n = 20$), male sex (72.7 mL higher EBL for males), larger tumor sizes ($r = 0.264$, $p = 0.0023$, $n = 131$), and longer surgical times correlated with increased EBL. Conversely, a higher tumor removal percentage ($r = -0.380$, $p = 0.0001$, $n = 97$) was associated with reduced surgical time.

CONCLUSION: This study identifies BMI, estimated blood loss, tumor size, surgical time, and male sex as significant factors impacting surgical outcomes in vestibular schwannoma resections. These findings highlight opportunities for preoperative optimization and intraoperative strategies to improve efficiency, minimize bleeding, and enhance patient safety. Future prospective studies are warranted to validate these associations and guide intervention development.

Abstract #: 56
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Clinical Practice II: Cohort Studies
Cluster: Neurological and Cognitive Studies

Krunal Patel, Bachelor of Science

Krunal Patel (Rush); Graham Cross (Rush); Michael Chojnacki (Rush); Sameer Ansari (Rush); Michael Chen (Rush)

INVESTIGATION OF PREDICTIVE FACTORS ON INSUFFICIENT REPERFUSION IN ISCHEMIC STROKE PATIENTS WITH UNSUCCESFUL THROMBECTOMIES

INTRODUCTION Mechanical thrombectomy (MT) is an endovascular procedure that is currently the standard of care for treating large vessel occlusive strokes. Its potential benefits are rooted in rapid recanalization and high procedure success rates. However, not all thrombectomies result in sufficient reperfusion, and there is a need to characterize patient populations in which these surgeries are unsuccessful.

METHODS In order to identify risk factors that may be associated with failed thrombectomies, ischemic stroke patients who underwent mechanical thrombectomy at a Tertiary Care Urban Medical Center were reviewed. Utilizing a retrospective chart study, variables of interest were selected and compared between those who underwent successful or unsuccessful thrombectomies to determine any associations.

RESULTS The data analysis of our study is ongoing and the results are still to be determined. This will be completed before the Research Trainee Day**.**

CONCLUSION We hope to find significant associations in our variables of interest between successful and unsuccessful mechanical thrombectomies. These anticipated findings will provide more insight for practitioners to identify high risk characteristics that may impact surgery success, prognosticate potential benefits, and perhaps influence patient selection for this procedure.

Abstract #: 57
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice II: Cohort Studies
Cluster: Neurological and Cognitive Studies

Ivy Sullivan, B.S.

Ivy Sullivan, BS (Rush), Elsa Olsen, MD (Rush), Qianyi Pu, BS, MS (Rush), Krstana Milunovic (University of Illinois), Stephan Munich, MD (Rush)

INTENSIVE CARE RESOURCE UTILIZATION FOR POST-OPERATIVE CRANIAL PATIENTS

INTRODUCTION Patients undergoing craniotomies and craniotomies for tumor excision, vascular lesions, and intracranial hemorrhages have routinely been transferred to the intensive care unit for post-operative care. It has recently been suggested that this high level of care may not be necessary for routine neurosurgical procedures. The historical standard of immediate ICU admission has been rightfully challenged in recent years, and we aim to examine the subtleties of neurosurgical ICU utilization post-craniotomy and craniotomy to determine the best option.

METHODS We conducted a retrospective, non-randomized study of approximately 1600 patients who underwent a craniotomy or craniectomy for tumor excision, vascular lesion, and/or intracranial hemorrhage between January 1st, 2022 and January 30th, 2023 to evaluate the utilization of ICU level care for all patients that underwent craniotomy or craniectomy. In order to analyze common patient factors associated with post-operative ICU level interventions to better predict if ICU level admission is warranted post-operatively, chart review of all eligible patients was completed to examine the use of the following: intravenous medications including but not limited to vasopressors for hypotension and nicardipine hydrochloride for hypertension, imaging such as a STAT CT scan due to neurological deficit (unplanned imaging), external ventricular drain placement/management (EVDs), arterial lines (A-line), emergent procedures that require ICU-specific equipment, intubation, and retreatment.

RESULTS The data collection of 601 patients is almost complete. We suspect that our data collection will be complete within the next month, so by the time of the Trainee Research Day in March, there will be a significant amount of data to report.

CONCLUSION We predict that the majority of patients who undergo a craniotomy or craniectomy do not utilize enough resources during their post-operative time in the ICU to justify a use of an ICU bed for every craniotomy/craniectomy patient. It is expected that there will be certain patients and/or procedures who warrant the immediate transfer post-operation to the ICU and to remain there for a specified period of time after the operation. However, we anticipate that the lack of ICU utilization amongst a greater majority of patients post-operation will suggest the need to consider admission to the general neurosurgical floor after surgery.

Abstract #: 58
Trainee Rank: Clinical Resident
Theme: Clinical Practice II: Cohort Studies
Cluster: Niche and Innovative Case Studies

Maria Charina Benavidez, MD

Maria Charina Benavidez MD; Stephanie Trautmann MD; Santiago Ceron MD; Sophia Redpath BA; Scott Schimpke MD; Jonathan Myers MD; Philip Omotosho MD; Alfonso Torquati MD; Nicholas Skertich MD

EFFECTS OF NEOADJUVANT GLP-1 RECEPTOR AGONISTS ON WEIGHT LOSS AFTER BARIATRIC SURGERY

INTRODUCTION Glucagon-like peptide -1 receptor agonists (GLP-1RAs) are increasingly prevalent medications used to treat patients with obesity. While bariatric surgery remains the most successful intervention, many patients undergoing surgery have been on a GLP-1RA. This study aims to determine if the neoadjuvant use of GLP-1RA affects surgical weight loss.

METHODS This retrospective cohort study compared outcomes of patients undergoing bariatric surgery (sleeve gastrectomy, Roux-en-Y gastric bypass) who were treated preoperatively with and without GLP-1RAs from July 2022 to June 2023. T-tests and multivariable analysis were utilized to determine significance in weight loss between the groups.

RESULTS 433 patients underwent bariatric surgery, 38 (8.8%) received neoadjuvant GLP-1RAs, 395 (91.2%) did not. 369 (85%) females, 63 (14.5%) males with mean age of 42.3 ± 10.6. Mean pre-operative BMI was 47 for both groups. GLP-1RAs were used for a median time of 12 months (range 3 - 53 months) prior to bariatric surgery but not resumed after. There was a significant difference between patients who received neoadjuvant GLP-RAs vs those who did not at 2 weeks (mean change in BMI of -4.9 vs. -3.8, p=0.006), but not at 3 months (-9 vs -8.4, p=0.25), 6 months (-12.4 vs -11.2, p=0.13), or 1-year (-14.2 vs -12.9, p=0.25) post-operatively.

CONCLUSION Neoadjuvant GLP-1RAs did not significantly impact weight loss at 3, 6, or 12 months after bariatric surgery in this cohort. Further investigation is needed to determine if neoadjuvant GLP-1RA use without post-operative cessation affects weight loss, perioperative morbidity, or safety and quality outcomes.

Abstract #: 59
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice II: Cohort Studies
Cluster: Niche and Innovative Case Studies

Jonathan Day, BA

Jonathan Day, BA, Rush University Medical Center (Presenting Author) Alejandro Espinoza Orias, PhD, Rush University Medical Center Mark Supanich, PhD, Rush University Medical Center Mehmet Kocak, MD, Rush University Medical Center Kerstin Stenson, MD FACS, Rush University Medical Center Vanessa Stubbs, MD, Rush University Medical Center Melih Akyuz, MD, Rush University Medical Center Sean Wrenn, MD, Rush University Medical Center

3D PRINTING AS A NOVEL MEANS OF THYROID VOLUMETRICS AND GOITER VISUALIZATION

INTRODUCTION: Ultrasound (US) imaging is the standard of care for patients with goiters (thyroid enlargements) to measure gland dimensions, determine disease severity and develop treatment plans. US limitations include operator variability, spatial heterogeneity and irregularity, transducer size being smaller than the goiter/nodule, and substernal projection. These can impair goiter visualization and volume calculation. The purpose of this proof-of-concept study is to investigate the efficacy of creating 3D-printed thyroids based on computed tomography (CT) imaging to generate volume calculations.

METHODS: 10 retrospective cases were used: 5 goiters and 5 non-pathological thyroids. CT imaging with reconstructed slice thickness of 1mm or thinner was performed from June-July 2024 and 9 of the patients received intravenous contrast. Neuroradiologists used CT imaging to calculate thyroid volume utilizing the volumetric ellipsoid method (length x width x height x a correction factor of 0.524 for each lobe). The resulting DICOM slices were segmented with commercially available software (Mimics 26.0), yielding virtual 3D models with corresponding calculated volumes. Finally, volumes of printed models were measured using the Archimedes method (water displacement).

RESULTS: Paired t-tests demonstrated there was not a significant difference between radiologist-predicted and Mimics-predicted goiter volumes, nor between radiologist-predicted and Mimics-predicted control volumes (significance defined as $p<0.05$). The same tests showed there was not a significant difference between Mimics-predicted goiter volumes and 3D goiter volumes measured by the Archimedes method, nor between Mimics-predicted control thyroid volumes and 3D control thyroid volumes measured by the Archimedes method (significance defined as $p<0.05$). The mean print time was 6.17 hours (goiters:6.55; normal thyroids:5.8). The mean cost of material used was $5.95 (goiters:$9.44; normal thyroids:$2.47).

CONCLUSIONS: While this pilot study cannot demonstrate technique superiority, the results suggest 3D-printed thyroids provide a similarly accurate estimate of volume compared with traditional radiology estimates. The study may be underpowered to detect volume differences between techniques and additional investigation is required. Future directions for this research group include a prospective, randomized trial that compares 3D printed volumes to both US measures and those of excised thyroid tissue. Additional benefits of 3D printing such as intervention planning and patient education will be explored.

Abstract #: 60
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Clinical Practice II: Cohort Studies
Cluster: Niche and Innovative Case Studies

Anya Forma, BS
Anya Forma (Rush), Marcin Marciniak (Rush),Dr. Sean Setzen (Rush), Dr. Mihir Bhayani (Rush)

RISK OF CONTRALATERAL LYMPH NODE METASTASIS IN ORAL TONGUE SQUAMOUS CELL CARCINOMA

BACKGROUND In lateralized oral tongue squamous cell carcinoma (OTSCC), ipsilateral neck assessment remains the standard of care. The American Society of Clinical Oncology recommends that an elective contralateral neck dissection may be considered for select patients with a clinically negative (cN0) contralateral neck. However, definitive guidelines are lacking regarding specific clinical and tumor factors that predict contralateral neck metastasis. This study aims to determine the incidence of contralateral lymph node metastasis and to identify clinicopathologic factors associated with this risk.

METHODS Utilizing the Leaf database to screen appropriate ICD-10 codes of OTSCC, patient records from a single institution were collected from 2014 to 2024. Clinical and tumor characteristics were gathered to assess potential correlations with contralateral metastatic risk. Associations were analyzed using chi-square and Fisher's exact tests. Fisher's exact tests were applied for both 2x2 and larger contingency tables, with post-hoc pairwise analyses conducted for levels within cell differentiation and pathologic T stage. Relative Risk and Odds Ratios were calculated as well. All statistical analyses were performed using RStudio (Version 2024.04.2+764).

RESULTS Of the 475 patients reviewed with OTSCC, 7.6% had contralateral lymph node metastasis confirmed on surgical pathology. Among these, 80% had a tumor DOI >0.5 cm, 10% had tumors with midline involvement, 80% had a smoking history, and none had WPOI-4 or -5 status. Significant associations were found between contralateral lymph node involvement and perineural invasion ($p = 0.008$), with strong associations for smoking history and perineural invasion (OR and RR = ∞). Tumor depth of invasion showed a moderate association (OR = 1.93, RR = 1.81).

CONCLUSION The incidence of contralateral lymph node metastasis in this population was found to be 7.6%. The clinicopathologic risk factors most highly associated with contralateral metastasis were presence of perineural invasion, poorly differentiated tumors, and more advanced pathologic T stage. Other studied factors, including depth of invasion, midline involvement, and lymphovascular invasion, did not yield statistically significant associations. These findings can provide support for surgeons in treating OTSCC. Further investigation is needed to assess whether any of these factors play a role in regional failure in the contralateral neck.

Abstract #: 61
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice II: Cohort Studies
Cluster: Niche and Innovative Case Studies

Ashley Hong, Bachelor of Science

Ashley Hong (BS) M2 RUSH. Co-Authors: Don O. Kikkawa, MD (UCSD SOM), Marissa K. Shoji, MD (UCSD SOM)

RESETTING THE BROW: A SMALL-INCISION FRONTALIS ADVANCEMENT APPROACH TO BROW PTOSIS

Brow ptosis is a clinical diagnosis based on the descent or drooping of the eyebrows below the supraorbital rim, causing an array of cosmetic concerns or functional deficits such as visual field loss and dermatochalasis. The most common cause of brow ptosis is age-related due to increased skin laxity of the scalp and forehead connective tissues over time, with additional causes including facial nerve weakness, muscle spasms, trauma, or genetics. Current surgical treatments for brow ptosis include the direct brow lift, endoscopic brow lift, pretrichial/trichophytic brow lift, and internal browpexy, each presenting its own set of advantages and limitations. This article presents a new modification of the direct brow lift procedure through a small-incision frontalis advancement approach for the treatment of moderate to severe brow ptosis.

METHODS: This retrospective case review included patients who underwent a small-incision frontalis advancement approach to correcting severe brow ptosis. All patient included had brows resting below the superior orbital rim, visually significant brow ptosis with superior visual field loss, and over a 30-degree improvement with manual elevation of the brow. Pre-operative and post-operative photos of the brow were analyzed using Image J, and brow height was measured vertically at 5 different landmarks of the eye: the medial canthus, medial limbus, mid-pupillary, lateral limbus, and lateral canthus. The main outcome measure was the degree of postoperative change in brow height. A two-tailed T-test was generated and p values <0.05 were considered statistically significant.

RESULTS: 8 patients met inclusion criteria. 3 patients had isolated brow ptosis repair, 4 patients had concomitant blepharoplasty in addition to the brow ptosis repair, and 1 patient had brow ptosis repair in the setting of an underlying medical condition (NF1). Statistical analysis revealed a significant difference between preoperative and postoperative brow height at all 5 landmarks measured, with an average increase of 5mm postoperatively across all sites. All patients had sustained elevation of the brow at least 2 months postoperatively.

CONCLUSIONS: Moderate to severe brow ptosis can be successfully addressed through small-incision advancement of the frontalis muscle. This technique offers patients a minimally invasive approach

Abstract #: 62
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Clinical Practice II: Cohort Studies
Cluster: Niche and Innovative Case Studies

Grant Primer, BA

Rachel Akers (Rush), Grant Primer (Rush), Thomas Cyberski (Rush), Ali Baird (Rush), Peter Filip (Rush), Peter Papagiannopoulos (Rush), Pete Batra (Rush), Bobby Tajudeen (Rush)

THE IMPACT OF RECREATIONAL DRUG USE ON THE HISTOPATHOLOGY OF CHRONIC RHINOSINUSITIS

INTRODUCTION Chronic rhinosinusitis (CRS) is a prevalent condition that afflicts 10-15% of the US population. Though the pathophysiology is not fully understood, mucosal irritants, like allergens and bacteria, can contribute to disease propagation and produce distinct histopathological features. The literature on the impact of illicit drug use on CRS histopathology remains limited. This retrospective study identified CRS patients with history of drug use to further understand unique histopathological features.

METHODS Patients with diagnosis of CRS and documented substance use who underwent endoscopic sinus surgery were included in the study. Demographics, type of substances used, and structured histopathology reports were collected. Data was compared to CRS control groups through Chi-square testing.

RESULTS 13 patients with a history of substance use were identified. Heroin, methamphetamine, cannabis and phencyclidine users were present; some used more than one drug. Most patients were White (69.2%) and male (76.9%). Subepithelial edema (53.8% vs 26.6%, p=0.03) and basement membrane thickening (69.2% vs 30.8%, p=0.006) were both significantly more common amongst the drug user group when compared with non-users. Drug users also had higher prevalence of fibrosis (38.5% vs 17.6%, p=0.06). No significant differences were found between other histopathological features.

CONCLUSION CRS patients with history of substance use had a higher prevalence of subepithelial edema, basement membrane thickening and fibrosis than those with CRS without a history of substance use. These findings suggest a higher level of acute and chronic sinonasal inflammation amongst drug-using patients. Future studies in this population are necessary to establish how these differences may impact management of CRS.

Abstract #: 63
Trainee Rank: Clinical Resident
Theme: Clinical Practice II: Cohort Studies
Cluster: Oncology and Related Conditions

Jaimie Chang, MD

Jaimie Chang MD, Kabeer Masih MD, Bulent Arslan MD, Erik Schadde MD, Sam Pappas MD, Jordan Tasse MD, Matthew Dixon MD

LIVER VENOUS DEPRIVATION PRIOR TO MAJOR HEPATECTOMY: A SINGLE CENTER EXPERIENCE

INTRODUCTION: The limitations of the future liver remnant (FLR) is an obstacle for safe liver resection. Several efforts to augment the FLR prior to hepatectomy including portal vein embolization (PVE) has been well reported in the literature. Liver venous deprivation (LVD) is a more recently developed procedure which consists of the pre-operative simultaneous embolization of the portal and hepatic veins (HVE) of the ipsilateral hemiliver. PVE reduces the blood flow into the hemiliver that is to be resected which signals hypertrophy of the FLR, while HVE reduces collateralization which improves the efficacy of PVE. In this study, we report our center's experience with LVD.

METHODS: Between 2017 and 2024, the patients who underwent LVD prior to planned liver resection at a single institution were identified. CTs or MRIs prior to and after LVD were uploaded in GE AW Server 3.2. The FLR region of interest (ROI) was identified and volumes were computed. The primary outcome of interest was the degree of hypertrophy (DoH) and kinetic growth rate (KGR).

RESULTS: 35 patients were identified and included in the study. The mean age was 59.5 years, and 51.4% were male. The malignancy types included colorectal cancer liver metastases (CRCLM) (54.3%), primary hepatocellular carcinoma (HCC) (17.1%), fibrolamellar HCC (8.6%), cholangiocarcinoma (17.1%), and gallbladder carcinoma (2.9%). The mean DoH was 8.56 ± 6.55% and mean KGR was 4.45 ± 4.19 %/week. Two complications of post embolization syndrome requiring readmission were reported, and two patients had inadequate hypertrophy after the procedure and did not proceed to surgery. 33 (94.3%) of the patients had adequate hypertrophy and underwent subsequent liver resection including 23 right hepatectomies (69.7%), 9 extended right hepatectomies (27.3%), and 1 extended left hepatectomy (3.0%). There were 0 intra-operative complications, 10 (30.3%) post-operative complications (Clavien-Dindo Class II, IIIa, and IIIb). There were 4 (12.1%) post operative mortalities secondary to surgery related complications.

CONCLUSION: Our institutional experience demonstrates that LVD is a safe and effective option to offer patients for augmentation of their FLR prior to undergoing major hepatectomy.

Abstract #: 64
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Clinical Practice II: Cohort Studies
Cluster: Oncology and Related Conditions

Lily Johnsky, BS

Lily Johnsky (Rush); Sarah Herrera Mercedes (Rush); Zoe Post (Rush); Sierra Anderson (Rush), Michael Brown (Rush)

BARRETT'S ESOPHAGUS RISK AND SCREENING DISPARITIES: IMPLICATIONS FOR PRIMARY CARE INTERVENTIONS

INTRODUCTION: Esophageal adenocarcinoma (EAC) incidence has risen dramatically, with an estimated 20,640 new cases diagnosed in 2022. Barrett's esophagus (BE) is a metaplastic change of the distal esophagus associated with Gastroesophageal Reflux Disease (GERD) and is the primary precursor lesion of EAC. Current guidelines recommend a single screening endoscopy for patients with chronic GERD symptoms and 3 or more additional risk factors (RF) for BE. Our study assessed BE screening rates to identify patient populations that national guidelines are omitting.

METHODS: This was a retrospective study approved by Rush University IRB. Inclusion criteria included an initial encounter in a primary care clinic and an ICD diagnosis of GERD. Subsequently, the following BE RF were assessed: age >50 years, smoking status, sex, race, body mass index (BMI) >30, family history of EAC and previous BE. Prior EGD (based on CPT code) and GI referral/visit were documented for each patient as surrogates for screening.

RESULTS: A total of 44,544 GERD patients were included. 37.42% of patients had 3 or more RF for BE. Of those with 3 or more RF, 5.71% were screened and diagnosed with BE and 94.29% did not have a BE diagnosis. Notably, 43.74% of the at-risk patients without documented BE had never received an EGD or been referred to GI for screening. In this missed screening population, 66.31% had 3 RF, 28.50% had 4 RF, and 5.16% had 5 RF. Both screened and unscreened patients displayed similar distributions of sex, age, race/ethnicity, smoking history, BMI, and family history of EAC.

CONCLUSION: Our study highlights that there is a screening gap for patients with RF for BE, with over 100 patients who have a family history of EAC in addition to multiple RF for BE not receiving appropriate screening. Primary care visits are often the first and only point of contact for patients with GERD symptoms, emphasizing the need to improve education for primary care providers and implement electronic prompts for GI referrals. This may significantly improve screening of at-risk patients who would not otherwise see a gastroenterologist.

Abstract #: 65
Trainee Rank: RUSH Matriculated Student
RMC: M4
Theme: Clinical Practice II: Cohort Studies
Cluster: Oncology and Related Conditions

Carlos Medina, Bachelor of Arts

Carlos Medina, BA, MS4 (Rush), Akash Venkataramanan, MD (Cook County Health), Amber Altidor, DNP, APRN, PMHNP-BC (Rush), Rebecca S. Levin, LCSW (Rush), Anastasia Smith, PharmD, BCPS (Rush), Rukan Huq, MD (Rush), Samir Sarda, DO, MPH (Rush), Jonathan Kaplan, MD (Rush)

FACTORS PREDICTING SLEEP DISTURBANCE AND TREATMENT-RESPONSIVENESS IN PATIENTS WITH CANCER

INTRODUCTION: Sleep disturbance is one of the most common complaints of patients receiving treatment for cancer. Demographics associated sleep disturbance include gender, socioeconomic status, marital status, and BMI. We sought to identify if these were predictive of sleep disturbance in our patients and if specific demographics predicted response to treatment.

METHODS: We performed a retrospective chart review of patients in our Collaborative Care Psychiatry Registry to identify patients with sleep disturbance reported during intake. Severity of sleep disturbance was assessed utilizing the Clinical Global Impressions - Severity Scale (CGI-S). Patients were followed for three months. We utilized the Clinical Global Impressions-Improvement scale to measure treatment response. Descriptive statistics of the demographic characteristics of the study population were calculated. Multivariate linear regression was performed to see if there was an association between CGI-I scores and demographic factors including marital status, socioeconomic status and opioid use.

RESULTS: Baseline CGI-S scores ranged from 2 to 7 with the most common score being 4, indicating moderately ill patients. Only opioid use was found to be a predictive risk factor for sleep disturbance, affecting 40% of patients in our cohort. The mean difference in CGI-I score associated with opioid use was 0.55, $p<0.05$. Based on prior studies, it was expected that unmarried patients, female patients, and patients with higher BMI would demonstrate significantly increased severity of sleep disturbance at baseline, however our analysis showed these factors to be statistically insignificant. At 3 months, only male gender predicted CGI-I score reduction. (0.96, $p=0.01$).

CONCLUSIONS: Sleep disturbance is common in patients with cancer and is under-identified and under-treated. Collaborative care can be utilized to identify and treat sleep disturbance with evidence-based treatments aimed at the underlying causes. In our patient population, the greatest baseline predictive factor for sleep disturbance was opioid use. Male patients showed the greatest improvement after intervention. This data provides valuable information regarding the possible underlying predictive factors and severity of sleep disturbances in cancer patients, as well as identifying patients who may be more likely to respond to interventions.

Abstract #: 66
Trainee Rank: Post-Doctoral Research Fellow
Theme: Clinical Practice II: Cohort Studies
Cluster: Orthopedic and Musculoskeletal Interventions

Renato Miyadahira, MD

Renato Miyadahira (RUSH/Instituto Brasil de Tecnologia-IBTS), Jonathan A. Gustafson (RUSH), Felipe F. Gonzalez (RUSH/IBTS), Christopher Knowlton (RUSH), Gregory Nicholson (RUSH), Leonardo Metsavaht (IBTS), Gustavo Leporace (IBTS), Grant E. Garrigues (RUSH)

IS LATERALIZED RTSA THE ANSWER FOR IMPROVED RANGE OF MOTION IN FUTURE SHOULDER?

INTRODUCTION Reverse Total Shoulder Arthroplasty (RTSA) has advanced the management of shoulder arthropathy with rotator cuff dysfunction. The increasing adoption of RTSA has led to innovations in prosthesis design. Conventional RTSA with a medialized glenoid/medialized humerus (MG/MH) prosthesis has been associated with reduced scapulohumeral rhythm ratios compared to healthy shoulders. However, the kinematic effects of lateralized glenosphere/medialized humerus (LG/MH) implants remain underexplored. This study aims to evaluate shoulder kinematics in patients receiving conventional RTSA versus lateralized implants.

METHODS This cross-sectional study included patients who underwent RTSA with LG/MH implants (DJO/Enovis) at least six months prior, without movement limitations or complications. Participants performed three repetitions of abduction in coronal and scapular planes. Motion capture was conducted using a 20-camera OptiTrack system, with markers placed on the upper limb, thorax, and scapula, including a scapula cluster on the acromion. Scapulothoracic and glenohumeral joint angles were analyzed in Visual 3D following ISB guidelines. Scapulohumeral rhythm, defined as the instantaneous change in glenohumeral angle relative to scapulothoracic angle, was assessed for humeral elevation ranges: 0°-30°, 30°-60°, 60°-90°, and 90°-120°. Student's t-test ($P<0.05$) was used to compare scapulothoracic and glenohumeral joint angles and scapulohumeral rhythm between the MG/MH and LG/MH groups.

RESULTS Preliminary analysis included 7 LG/MH patients (mean age: 68.4±7 years) and 12 MG/MH patients (mean age: 69.8±6.7 years), with an average postoperative assessment time of 15.9 months. The LG/MH group demonstrated nearly significant greater scapulothoracic upward rotation during scapular plane abduction (47.5±11.1 vs. 36.4±8.9, $P=0.06$). Scapulohumeral rhythm was significantly lower in the LG/MH group during 60°-90° (1.1±0.6 vs. 2.5±1.5) and 90°-120° (1.5±0.7 vs. 3.5±1.6) humeral elevation ranges compared to the MG/MH group.

CONCLUSION Lateralized RTSA implants may increase scapulothoracic range of motion but reduce scapulohumeral rhythm. Future work will investigate coordination differences between implant types using motion capture and EMG analysis.

ACKNOWLEDGEMENTS Funded by the Rush Research Cohn Fellowship and the IBTS International Research Program.

Abstract #: 67
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice II: Cohort Studies
Cluster: Orthopedic and Musculoskeletal Interventions

Kyle Robertson, B.S.
Kyle Robertson, B.S. (Rush), David Kurlander, M.D. (Rush)

Evaluation of Surgical Intervention for Foot Drop in Patients with Pre-Existing Spinal Radiculopathy

INTRODUCTION Foot Drop (FD) is a condition where neural damage causes inability or difficulty performing foot dorsiflexion and is most caused by L5 radiculopathy. Depending on the cause and severity of symptoms, conservative and surgical treatments exist; however, there is no standardization to care. The purpose of this study was to evaluate the progression of FD and determine when surgical intervention should be implemented for the greatest restoration of functionality.

METHODS This is an IRB approved retrospective study was conducted on FD patients who underwent neurosurgery at Rush University Medical Center between 2018-2023. A total of 33 patients were included in the final analysis. For each patient, anterior tibialis, extensor hallucis longus, dorsiflexion, and plantarflexion strength scores were collected and compared before and after surgical intervention. Demographics, comorbidities, associated symptoms, need for additional surgeries, and complications were also analyzed.

RESULTS Of the 33 patients included in the study, the average age at time of surgery was 61.91 years old. Prior to the surgery, 31 (93.9%) patients had pain, 31 (93.9%) had abnormal gait, 30 (90.9%) experienced numbness, and 9 (27.3%) had urinary abnormalities. Within 2 years of having surgery, 21 (63.6%) patients had an improved dorsiflexion ability. Of the 21 patients who improved, 9 (42.9%) had a complete restoration of foot dorsiflexion. In addition, 5 (15.2%) patients had no change in symptoms, 3 (9.1%) had an improvement of one extremity with either no change or decrease in the other leg's strength, and 4 (12.1%) had a worse outcome after surgery. The average time between symptom onset and surgery for the complete recovery cohort was 0.77 years whereas the average time for the patients with no change, mixed result, or decrease in foot dorsiflexion was 2.16 years.

CONCLUSION This study shows that surgical intervention is an appropriate treatment option for patients who experienced FD because of L5 radiculopathy. It also indicates that earlier surgical intervention yields a greater improvement in symptoms. Limitations of the study include a small sample size and inconsistencies of patient follow up post-surgery.

Abstract #: 68
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice II: Cohort Studies
Cluster: Orthopedic and Musculoskeletal Interventions

Stanley Rozentsvit, BA

Stanley E. Rozentsvit, BA (Rush); Tanner L. Shull, MPH (Rush); Matthew R. Crosse, BS (Rush); Nurudeen Alli, BA (Rush); Ephrem O. Olweny, MD (Rush)

DETERMINANTS OF POSITIVE STONE CULTURES IN PATIENTS UNDERGOING KIDNEY STONE SURGERY

INTRODUCTION Several theories exist on the role of bacteria in kidney stone disease. Current research has focused primarily on their contribution to stone formation, but not their impact on the overall disease course. We investigate how bacteria colonizing stone surfaces interact with patient factors (e.g., demographics, comorbidities) to influence the clinical presentation of stone disease and postoperative outcomes in patients having been treated with percutaneous nephrolithotomy (PCNL) and/or ureteroscopy (URS).

METHODS We retrospectively analyzed data from patients undergoing PCNL and/or URS at our institution (n=175). Preoperative demographic and clinical data, as well as data on stone culture and postoperative outcomes, were collected. Associations between patient demographic and clinical factors and positive stone cultures were evaluated with univariable and multivariable analysis.

RESULTS A total of 39 patients (22%) undergoing PCNL and/or URS had a positive aerobic, anaerobic, or fungal stone culture. Mean (SD) age was 60 (15) years. On univariable analysis, we found female sex ($P<0.01$) and history of arthritis ($P=0.03$) were associated with a positive stone culture. Chronic conditions were summed as a composite variable and found to also be associated with a positive stone culture ($P=0.04$). Clinically, a previous history of urinary tract infection or pyelonephritis ($P<0.01$) and the size of the largest stone found during the procedure ($P<0.01$) were associated with having a positive stone culture. Each significant predictor of a positive stone culture was analyzed in a multivariable model. In multivariable analysis, the size of the largest stone remained significant while controlling for other variables (adjusted OR=1.80, 95% CI 1.01-3.20, $P=0.04$).

CONCLUSIONS Positive aerobic, anaerobic, or fungal stone cultures are present in about one fifth of patients undergoing stone surgery and are primarily predicted by prior infection and chronic illness. Patients with larger stones are also more likely to have positive stone cultures. Elucidating the direct role of microorganisms in stone pathogenesis and pathophysiology requires continued study, and may yield novel approaches to preventing morbidity.

Abstract #: 69
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice II: Cohort Studies
Cluster: Orthopedic and Musculoskeletal Interventions

Andrew Savoia, B.S., M.S.

Presenting Author: Andrew Savoia (Rush) Co-Authors: John Wong (Rush), Victoria Gebert (Rush), Shahood Fazal (Rush), Thomas Shao (Rush), Monica Kogan M.D. (Rush)

EXPLORING PEDIATRIC OFF-HIGHWAY VEHICLE INJURIES: INSIGHTS INTO RISK FACTORS, MECHANISMS, AND OUTCOMES

INTRODUCTION Unintentional injuries are the leading cause of death among children under 19, with motor vehicle accidents-both traffic and non-traffic-related-ranking second. Off-highway vehicle (OHV) injuries, encompassing all-terrain vehicles (ATVs), utility terrain vehicles (UTVs), dirt bikes, golf carts, and snowmobiles, are an underrecognized contributor to pediatric morbidity and mortality. This novel study reviews OHV-related injuries in pediatric populations, analyzing risk factors, geographical patterns, injury mechanisms, and outcomes to provide actionable insights for reducing preventable harm.

METHODS A systematic review of Scopus and PubMed (2014-2024) identified 115 articles on pediatric OHV-related injuries in the U.S. Following independent screening of titles, abstracts, and full-text review, 23 articles were included for analysis.

RESULTS The reviewed studies, spanning an average of 8.9 years, covered 16 states, with some using national databases. Texas was the most frequently mentioned state, followed by Minnesota, Alabama, and Arizona. A total of 346,162 pediatric patients were analyzed, predominantly male (70.9%) and Caucasian (73.5%), with a mean age of 11.8 years. ATVs were the most studied OHV (74.1%), followed by dirt bikes and golf carts (25.9%). Key injury mechanisms include rollovers, ejections, and collisions. Lack of helmet use (41.8%), younger age (12.7%), and lack of protective equipment (10.9%) were the most cited risk factors. Traumatic brain injuries (TBIs) were most common among ATV (45.4%) and golf cart riders (40.4%), while fractures were prevalent among dirt bike (46.3%) and UTV riders (43.3%). Chronic neurological deficits and functional disabilities were the most frequently reported long-term complications.

CONCLUSION OHV-related injuries are a significant yet understudied cause of pediatric morbidity and mortality. Southern and Midwestern states were most represented, suggesting regional OHV usage. The highest-risk OHV riders were male Caucasians who failed to use proper safety equipment. Predominant injury mechanisms include ejections and rollovers, potentially linked to vehicle design. Common injuries included TBI and upper extremity fractures. These findings highlight the need for enhanced public safety initiatives, stricter regulatory guidelines, and further research to reduce preventable OHV-related injuries.

Abstract #: 70
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice II: Cohort Studies
Cluster: Orthopedic and Musculoskeletal Interventions

John Wong, BS

Presenting Author: John Wong (Rush University Medical Center) Co-Authors: Victoria Gebert (Rush University Medical Center), Andrew Savoia (Rush University Medical Center), Jennifer L. Wright (Rush University Medical Center); Julia Hochstatter (Rush University Medical Center); Amy Miller (Rush University Medical Center); Brett R. Levine (Rush University Medical Center); Deborah J. Hall (Rush University Medical Center); Robin Pourzal (Rush University Medical Center)

COMPARATIVE EVALUATION OF CORROSION IN TAPERED AND THREADED MODULAR JUNCTIONS OF REVISION TOTAL KNEE REPLACEMENTS

INTRODUCTION: Fretting, a wear process driven by micromotion between contacting surfaces, is a known cause of corrosion at modular junctions in extension stems of revision total knee replacements (TKRs). While fretting corrosion has been recognized in the literature as a potential contributor to implant failure, its role in influencing TKR longevity and the surrounding tissue environment remains poorly defined. The present study uses radiographic analysis and light microscopy to characterize the severity of fretting corrosion and its clinical implications in two types of modular junctions-threaded and tapered. Tapered junctions are preferred by surgeons for their design, simplifying revisions. We hypothesize that taper modular junctions are more susceptible to fretting corrosion and that severe corrosion correlates with radiographic evidence of loosening and adverse local tissue reactions (ALTR).

METHODS: An IRB-approved retrospective review was conducted on 64 revision TKRs removed between 2018 and 2024. Extension junction types were categorized as either tapered (N=43) or threaded (N=21). Corrosion was assessed using stereo microscopy and scored on a 1-4 scale (1=none, 4=severe) via a modified Goldberg method. Radiographs were analyzed for evidence of prosthetic loosening and ALTR. Statistical analyses included Mann-Whitney tests and Spearman's correlations.

RESULTS: Tapered modular junctions exhibited significantly greater fretting corrosion than threaded designs ($p<0.0001$). Threaded components showed no corrosion (damage score=1), however, tapered systems exhibited median damage scores of 4 in the femoral condyles, 3 in extension stems, and 2 in tibial trays. Time in situ correlated with increased damage scores for femoral condyles ($p=0.044$). Radiographs revealed evidence of tibial and femoral loosening but did not demonstrate associated ALTR.

CONCLUSION: As hypothesized, fretting corrosion is more prevalent amongst tapered modular junctions when compared to threaded designs. There was no evidence of ALTR or implant failure associated with fretting corrosion. Encapsulation with bone cement may mitigate tissue exposure to corrosion products. These findings emphasize the importance of recognizing corrosion as a complication in revision TKR to improve implant longevity and patient outcomes. Further studies and expansion of sample size are warranted to validate these preliminary findings.

Abstract #: 71
Trainee Rank: Clinical Resident
Theme: Clinical Practice II: Cohort Studies
Cluster: Public Health and Demographic Disparities

Caroline Canning, MD, MBI
Caroline Canning (RUSH), Vaisvik Chaudhari (RUSH), Mia Mcclintic (RUSH), Juan C. Rojas (RUSH)

DISCHARGE TO LONG-TERM ACUTE CARE (LTAC) FACILITY WITH MACHINE LEARNING USING ELECTRONIC HEALTH RECORD DATA

INTRODUCTION: Intensive care is a substantial financial burden to the US healthcare system. Increasing costs for ICU services are driven in part by a subgroup of chronically critically ill patients who are typically dependent on long-term life support. Therefore, the transition between ICU and long-term acute care (LTAC) is a critical juncture in the continuum of care. Improving prediction of LTAC facility disposition could have important benefits to improve resource management and promote decreased costs for patients, payors, and hospitals. We aimed to use a machine-learning technique to predict patient's discharge to LTAC based on early clinical indicators in the ICU.

METHODS: We conducted an observational cohort study of all adult patients at a large academic medical center who received at least 48 hours of care in an ICU between January 7, 2019 to September 22, 2024, excluding patients who expired during hospitalization. Patient characteristics, vitals, labs, nursing assessment scales from the first 48 hours of an ICU stay were extracted from the EHR. These variables were aggregated and used as features for the machine learning model. A gradient boosting framework, LightGBM, was utilized to fit the training cohort and predict the outcome of discharge to an LTAC facility at the 48-hour mark for each ICU admission.

RESULTS: A total of 22,436 unique hospitalizations were included, with 15,705 (70%) in the training cohort and 6,731 (30%) in the test cohort. A total of 1,079 hospitalizations (4.81%) resulted in discharge to an LTAC facility. The LightGBM model derived an AUC .90 (CI: [0.891, 0.917]) for predicting discharge to LTAC and a Brier Score of .028. Feature importance analysis indicated the most important predictor values included length of stay in the hospital at the time of prediction, presence of tracheostomy by hour 48, maximum albumin, and mean FiO2 (set).

CONCLUSION: We developed a novel machine learning model to identify patients with a high probability of discharge to LTAC within the first 48 hours of ICU admission. The model's high discrimination suggests reliable forecasting of LTAC facility discharge needs, offering valuable support to clinicians, social workers, patients, and families in planning post-ICU care.

Abstract #: 72
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Clinical Practice II: Cohort Studies
Cluster: Public Health and Demographic Disparities

Houssam Joudi, MPH, BS, BA
Houssam Joudi, MPH; Ihsan Kaadan, MD, MS

DEMOGRAPHIC, COMORBIDITY, AND INSURANCE-BASED DISPARITIES OF PRE-PROCEDURAL COMBINATION MEDICAL THERAPY IN PATIENTS UNDERGOING PERIPHERAL VASCULAR INTERVENTIONS

INTRODUCTION Peripheral artery disease (PAD) is a generalized atherosclerotic condition diagnosed in over 8.5 million individuals in the United States. This disease alters blood flow to the limbs and is associated with increased risk of MI, stroke, and death, and may impair functional status and quality of life. AHA guideline therapy includes lipid-lowering therapy (i.e. statin), antiplatelet and antithrombotic therapy, antihypertensive therapy (as indicated), diabetes management, and lifestyle modifications. Adherence to a combination of medical therapies is associated with improvements in outcomes. We sought to study the association between demographics, comorbidities, and insurance type with pre-procedural Combination Therapy (CT) for PAD (an ASA (aspirin)/ an antiplatelet agent AND a statin) to identify potential disparities in utilization and elucidate directives for quality improvement and policies to improve CT utilization and therefore outcomes.

METHODS This observational study used de-identified data from a Vascular Quality Initiative registry of Peripheral Vascular Interventions conducted within an urban medical center between September 2022 and July 2024.

RESULTS Among the 436 patients, only 72.0% received complete CT prior to intervention. Most patients received partial therapy with 80.5% utilizing solely an ASA/ antiplatelet agent and 83.7% utilizing solely a statin. Males were more likely to be on CT (p=0.046). Hispanic/Latino patients were more likely to be utilizing an ASA/antiplatelet compared to those who were not Hispanic/Latino (p=0.0074). Medicaid was negatively associated with both individual ASA/antiplatelet (p=0.0013) and CT utilization (p=0.015). Comorbidities such as Hypertension (HTN) (p=0.001) and Diabetes (p=0.024) were positively associated with CT compared to a single therapy while CAD (p=<0.001), CHF (p=0.003), and HTN (p=0.016) were positively associated with CT compared to neither therapy. Smoking (p=0.002) was negatively associated with the use of CT compared to neither therapy.

CONCLUSION Our data reflects the underutilization of CT paralleling existing literature. Despite a limited sample size, our findings highlight the importance of addressing potential barriers to CT utilization, such as insurance type, and suggest targeted interventions may be necessary to ensure equitable access to optimal care and underscore the need for quality improvement initiatives and policy changes to increase access and adherence to PAD management through CT.

Abstract #: 73
Trainee Rank: Clinical Fellow
Theme: Clinical Practice II: Cohort Studies
Cluster: Public Health and Demographic Disparities

Jiwon Lee Wang, MD

Jiwon Lee Wang, MD (Rush); Megan Kraemer, DO (Rush); Tricia J. Johnson, PhD (Rush); Katherine Bell, MD (Harvard); Brad Appelhans, PhD (Rush); Aloka Patel, MD (Rush)

SERUM BUN AND BODY COMPOSITION

BACKGROUND: Optimizing nutrition in preterm (PT) infants is crucial for their growth and neurocognitive development. Body composition in PT infants is linked to long-term health outcomes. Nutritional studies often focus on protein adequacy, with serum blood urea nitrogen (BUN) levels serving as a marker. However, there is limited data on the relationship between serum BUN levels and body composition in PT infants.

OBJECTIVE: This study aims to evaluate the association between serum BUN levels and body composition in PT infants. We hypothesize that PT infants with suboptimal BUN levels will have decreased fat-free mass (FFM) compared to those with normal BUN levels.

DESIGN/METHODS: This prospective cohort study included PT infants born at <32 weeks gestational age or with a birth weight <1500 grams. Body composition was measured using bioimpedance analysis (BIA) at NICU discharge. Serum BUN levels, measured as standard care, were abstracted from the electronic medical record, along with demographic, medical, and feeding data. We compared body composition between infants with normal BUN levels (≥10) and those with suboptimal BUN levels. BIA data was analyzed as a continuous variable, with regression analyses to assess differences in BIA between the groups, adjusting for covariates. Data was collected from 65 subjects between January 2022 and October 2024. The study was approved by the Rush University Medical Center IRB, and informed consent was obtained from parents/guardians.

RESULTS: PT infants with abnormal BUN levels were more likely to be born at a younger gestational age and required longer NICU stays. They were also smaller at birth and had lower weight and head circumference at discharge compared to those with normal BUN levels. The abnormal BUN group had more males than females. Interestingly, the discharge FFM was higher in the abnormal BUN group than in the normal BUN group.

Abstract #: 74
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Clinical Practice II: Cohort Studies
Cluster: Public Health and Demographic Disparities

Nhat Nguyen, Bachelor of Biology

Michael Gottlieb, MD (RUMC); Tamara Amponsah, MD (RUMC); Nhat Nguyen (RMC/First author); Ohm Shukla, MS (RMC); Kyle Bernard, MD (MCW); Eric Moyer, MD (RUMC)

EPIDEMIOLOGIC TRENDS IN PEDIATRIC URINARY TRACT INFECTIONS AMONG UNITED STATES EMERGENCY DEPARTMENT FROM 2016-2023

INTRODUCTION Urinary tract infections are a common consideration among pediatric patients with fever. With rising resistance rates and increased focus on antibiotic stewardship, there is a need to better understand the current management. This study reports the incidence and antibiotic distribution among a nationwide cohort of Emergency Department (ED) patients with cystitis and pyelonephritis over an eight-year period.

METHODS We performed a cross-sectional study using the Epic Cosmos research platform from 1/1/2016-12/31/2023. Pediatric (<18 years) ED patients with an ICD-10 code corresponding to cystitis or pyelonephritis were included. Outcomes included the total number of ED presentations, outpatient antibiotic prescriptions, and antibiotics administered in the ED for admitted patients with cystitis or pyelonephritis. Binary logistic regression models were used to measure the relationship between the year and dependent variables (i.e., incidence, antibiotics). Analyses were performed with SPSS. Data were reported as odds ratios (OR) with 95% confidence intervals (CI).

RESULTS Among 46,774,814 total pediatric ED visits, 730,863 (1.5%) were for cystitis and 82,717 (0.18%) were for pyelonephritis. Among those admitted, the most common antibiotics were third-generation cephalosporins (cystitis: 55.6%, pyelonephritis: 62.3%), first-generation cephalosporins (cystitis: 13.8%, pyelonephritis: 13.7%), and ampicillin (cystitis: 10.8%, pyelonephritis: 6.6%). First-generation cephalosporin use rose over time, while ampicillin and ciprofloxacin use declined. Among discharged patients, the most common antibiotics were first-generation cephalosporins (cystitis: 43.1%, pyelonephritis: 33.7%), third-generation cephalosporins (cystitis: 20.8%, pyelonephritis: 25.8%), and trimethoprim-sulfamethoxazole (cystitis: 13.5%, pyelonephritis: 11.8%). First-generation cephalosporin use rose over time, while trimethoprim-sulfamethoxazole and ciprofloxacin use declined.

CONCLUSION Cystitis and pyelonephritis remain common ED presentations, representing nearly 2% of all pediatric ED visits, and there have been notable shifts in the antibiotic selection over time. Understanding the current epidemiology can inform public health planning and antibiotic stewardship in the ED.

Abstract #: 75
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Clinical Practice II: Cohort Studies
Cluster: Public Health and Demographic Disparities

Nicolas Vassiliev, B.S.

Vassiliev, Nicolas (BS) Rush Medical College Sullivan, Emily (BS) Rush Medical College Cohen, William (BA) Rush Medical College McIntosh, Abigail (BS) Rush Medical College Belnap, Ethan (BS) Rush Medical College Khosla, Ishan (BS) Rush Medical College Richter, Camden (BA) Rush Medical College Luger, Daniel (M.D.) Rush Medical College

PHYSICAL ACTIVITY LEVEL ANALYSIS AND ASCVD RISK SCORES WITHIN A FOOD INSECURE POPULATION CHICAGO

INTRODUCTION Cardiorespiratory fitness level is an established predictor of cardiovascular disease (CVD). Growing evidence has shown a correlation between social determinants of health (SDoH) and CVD as well as overall health (Liu Y, et al. Curr Atheroscler Rep. 2021). Sedentary lifestyles exacerbated by various SDoH have been associated with a greater prevalence of CVD, likely due to a lower quality diet and a subsequent increased risk of cardiometabolic risk factors (Brandt EJ, et al. JAMA Cardiology 2022). There is a paucity of data examining the relationship between food insecurity, physical activity level, and risk of atherosclerotic cardiovascular disease (ASCVD).

METHODS The Cardiometabolic Health Initiative (CHI) is a medical student run, community service initiative that provides point-of-care cardiometabolic screening to food insecure individuals at food pantries in West Chicago. The Rapid Assessment of Physical Activity (RAPA) survey was used to assess self-reported physical activity of consenting patients during screening. CVD risk was assessed using a 10-year atherosclerotic cardiovascular disease (ASCVD) risk score. ASCVD risk scores were calculated using patient histories, blood pressure measurements, and fingerstick lipid panel results.

RESULTS One hundred and three patients aged 50 years or older were screened for physical activity level using the RAPA questionnaire. Seventy-nine percent of screened individuals were below the recommended activity level for optimal cardiorespiratory health. Thirty percent of the population was considered sedentary or underactive, while 49% were at the minimum physical activity limit. Mean ASCVD risk score of the underactive group was 17.2% (SD=2.7), and the mean ASCVD risk score for patients meeting or exceeding minimum activity levels was 14.7% (SD=1.4) (p=0.3779).

CONCLUSION results indicate that a large portion of patients with food insecurity do not meet recommended activity level associated with optimal cardiorespiratory health. Our findings suggest ASCVD risk is similar across underactive and minimally active food insecure individuals, with no significant correlation between physical activity level and ASCVD risk score. The presented study indicates that other modifiable risk factors likely contribute to ASCVD risk within food insecure populations. Limitations to this study include a small sample population with further research needed to compare other modifiable risk factors with physical activity and SDoH.

Abstract #: 76
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Broader Education and Training Impacts

Ethan Belnap, B.S.

Ethan Belnap, B.S. (Rush) , Anjali Venkat, B.S. (Rush), Riana Schleicher, B.S. (Rush), Courtney Stefanski (Rush)

GRASS ROOTS IMPLEMENTATION OF LIFESTYLE MEDICINE IN THE PRE-CLINICAL MEDICAL CURRICULUM

INTRODUCTION Lifestyle Medicine (LM) is an emerging specialty which uses evidence-based interventions to prevent, treat, and reverse chronic conditions. Despite myriad studies showing the benefit of LM and the increasing medical student intrigue in learning LM principles, there is minimal integration into US medical schools' curriculum. This study seeks to gauge interest in LM at Rush Medical College and examine a mechanism for grass roots incorporation of LM pillars into the medical school curriculum.

METHODS This is a survey-based prospective study conducted at Rush Medical College in Chicago, IL. First year medical students (M1s) were recruited at a start-of-year club fair and via promotional emails. M1s who participated chose to attend 1-2 LM curriculum sessions focusing on specific LM core competencies. Both antecedent to and following each session, students completed surveys on a scale of 1-10 self-assessing LM familiarity, knowledge of LM scientific principles, technical ability to implement LM, and comfortability utilizing motivational interviewing to improve specific LM facets for patients.

RESULTS Out of 144 first year medical students at Rush Medical College, 25 attended at least 1 LM teaching session. Prior to class, the average familiarity with LM on a scale of 1-10 was 5.06 and comfortability utilizing LM in practice was 5.12. After the class, students showed an average improvement of 60% in concepts of LM. The average self-assessed improvement in LM scientific knowledge, technical ability to teach and implement LM, and comfortability in utilizing LM principles in motivational interviewing was 19.8%, 25.6%, and 49.68%, respectively.

CONCLUSION Our results suggest significant interest from medical students to engage in LM training. Our data also indicates targeted classes on LM core principles leads to improved LM scientific knowledge, LM technical implementation, and LM-specific motivational interviewing skills. these results suggest the importance of LM curriculum integration. Furthermore, targeted classes taught by LM-trained upperclassmen may be a grass roots mechanism used to implement LM into medical schools prior to complete curriculum integration.

Abstract #: 77
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Broader Education and Training Impacts

Michael Chojnacki, BS

Michael Chojnacki, Rush Medical College Corinna Fukushima, MD, Rush University Medical Center
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PROTOCOLIZED MANAGEMENT OF CATASTROPHIC BRAIN INJURY AND IMPACT ON ORGAN PROCUREMENT AFTER BRAIN DEATH

OBJECTIVE: To determine if the Rush University Medical Center Catastrophic Brain Injury (CBI) protocol improved organ viability from donation after brain death (DBD) patients. BACKGROUND: Most organ donations in the US are provided by brain dead patients. It is essential these patients are optimally managed in the intensive care unit (ICU) to ensure their organs remain viable for donation in the event of DBD. A growing area of research stems from the need to clearly define how these patients should be managed to optimize organ viability. The CBI protocol, implemented in 2014, aimed to standardize the management of hemodynamic instability from central diabetes insipidus in catastrophic brain injury patients, many of whom progress to brain death. In this retrospective study, we evaluate the effect of the CBI protocol on organ procurement in DBD patients.

DESIGN/METHODS: We reviewed the electronic medical records of all patients declared brain dead from a single center neuroscience ICU from 2011 - 2023. We collected data including vasopressor use, urine output, and electrolyte derangements. In collaboration with the organ donation agency which receives the donated organs, data was collected concerning types of organs (heart, kidney, liver, lung, pancreas) and numbers of organs procured. Data was compared pre- and post- CBI protocol initiation using chi-squared test and unpaired t-test.

RESULTS: There was a 14% increase in use of vasopressin alone (p=0.02) post-protocol compared to pre-protocol. There were no differences in urine output (p=0.06), serum sodium (p=0.08), or total number of organs donated per patient (p=0.17).

CONCLUSIONS: The clinical management of impending DBD patients is challenging. The implementation of the CBI protocol standardized management of DI and provided more hemodynamic stability in brain death declaration. Future studies are needed to evaluate the impact of the CBI protocol on long term organ viability.

Abstract #: 78
Trainee Rank: RUSH Matriculated Student
CHS: Clinical Doctorate
Theme: Clinical Practice III: Education
Cluster: Broader Education and Training Impacts

Annika Knuth, BS

Annika Knuth (RU); Julia Huber (RU); Graci Leineberg (RU); Sophia Wilkes (RU); and Rebecca Ozelie, DHS, OTR/L, FAOTA (RU)

ANATOMY OF SUCCESS: UNVEILING KEY RESOURCES FOR A STAND-ALONE OCCUPATIONAL THERAPY ANATOMY COURSE

INTRODUCTION The field of occupational therapy (OT) demands a comprehensive understanding of human anatomy to effectively address clients' diverse needs. Educational institutions strive to equip OT students with the necessary knowledge for academic excellence and professional competence; however, many academic programs do not have a stand-alone anatomy course within their curriculum (Giles et al., 2021). Veazet & Roberson (2023) surveyed 65 OT programs and identified a theme of "Impact on Students," that detailed the negative effects of OT anatomy courses including rigor and stress, labor required, student preparedness and lack of retention. Conversely, Veazet & Robertson (2023) identified that an anatomy course at the graduate level is important to clinical success. Anatomy teaches students foundational skills that will be implemented throughout their career. While anatomy is crucial to OT curriculum, it is important to acknowledge the rigor associated with the course. Most OT programs implement anatomy into the curriculum within the first year, adding a challenging course onto an already difficult transition period (Kumar & Jejurkar, 2005). The intensity of the program, including didactic learning and clinical experience, can be demanding for students (Lewis-Kipkulei et al., 2021).

METHODS This study aimed to investigate occupational therapy (OT) students perceived usefulness of resources offered in a stand-alone anatomy course within their program. A survey was administered to 284 OT students enrolled in accredited programs who had completed a stand-alone anatomy course. The survey assessed the resources available, their usage, and the perceived benefit to students' learning.

RESULTS results indicated that open labs and teaching assistants were the most valuable resources for student success, while print/electronic textbooks and office hours were rated as the least beneficial.

CONCLUSION These findings suggest that OT programs should prioritize hands-on learning opportunities and personalized support to enhance students' comprehension of anatomy. By allocating resources effectively, OT programs can improve educational outcomes and better prepare students for clinical practice.

Abstract #: 79
Trainee Rank: RUSH Matriculated Student
CHS: Clinical Doctorate
Theme: Clinical Practice III: Education
Cluster: Broader Education and Training Impacts

Katherine Prejzner, Bachelors of Health Science

Katherine Prejzner, OTD/S (RUSH) Steven Taylor, PhD., OTD., OTR/L (RUSH) Erin Emery-Tiburcio, PhD., ABPP (RUSH) Laurin Mack, PhD. (RUSH) Franco Sambataro (RUSH) Molly Jenkins (RUSH)

SUPPORTING OLDER ADULTS WITH SELF-CARE: A PRACTICAL GUIDE FOR DIRECT CARE WORKERS

INTRODUCTION: Direct-care workers play a crucial role in providing quality home-based care to older adults. One of the most common activities a direct-care worker assists an older adult with is personal hygiene care. Given the sensitive nature of personal hygiene care, effective training is crucial to ensure that direct-care workers possess the necessary knowledge, skills, and sensitivity to provide this care with dignity, respect, and cultural competence. This quality improvement project aims to enhance an educational training resource for Rush direct-care workers by evaluating its effectiveness through pre- and post-test quizzes and focus group feedback.

METHODS: This project design will utilize a mixed-methods approach. Participants in this project will include volunteers from the Center of Excellence and Aging (CEA) network at Rush University Medical Center. These participants will complete pre- and post-assessment quizzes to assess quantitative knowledge gain, and a focus group will be conducted to gather qualitative feedback on the resource's clarity, relevance, and effectiveness.

ANTICIPATED RESULTS: This quality improvement project anticipates several positive outcomes. First, participants are expected to demonstrate significant improvement in their knowledge of hygiene care for older adults as measured by pre- and post-assessment quizzes. Second, the focus group discussions are anticipated to reveal positive feedback on the educational resource's clarity, relevance, and effectiveness. Participants may report that the resource is easy to understand, provides valuable information, and is applicable to their work, while also suggesting specific improvements to enhance its usability and impact. Based on this feedback, the educational resource will be revised and refined to clarify confusing concepts, add or modify content to improve relevance and applicability, enhance its visual appeal and user-friendliness, and potentially incorporate interactive elements to increase engagement.

CONCLUSION: The insights gained from this project can serve as a valuable foundation for developing and implementing more effective training programs for direct-care workers, improving the quality of life and care for older adults receiving home-based care. The findings of this project will contribute to the improvement of direct-care workers' knowledge and skills, ultimately enhancing the quality of care provided to older adults.

Abstract #: 80
Trainee Rank: Clinical Resident
Theme: Clinical Practice III: Education
Cluster: Broader Education and Training Impacts

Leah Yuan, MD
Leah Yuan (Rush); Robert Vargas (Rush); Carol Burke (Rush); Michelle Sweet (Rush)

THE PASS/FAIL USMLE STEP 1 EXAM AND ITS IMPACT ON STEP 2 STUDYING TRENDS

NTRODUCTION In January 2022, the USMLE Step 1 Examination transitioned to a pass/fail format. However, this transition unintentionally increased the significance of Step 2 CK. Our study explores this transition's impact on preparation time for fourth-year medical students.

METHODS This study is a single institution comparative observational study that evaluates how the transition from Step 1 numerical scoring to pass/fail scoring affected medical student study habits for Step 2. A mandatory survey was distributed to fourth-year medical students in the fall of 2016, 2018, 2019, 2022, 2023, and 2024. Simple student t-test analysis was performed to determine if there was a true difference in time studied before and after the Step 1 pass/fail transition. Further analyses used one-way ANOVA to evaluate annual trends in Step 2 study habits.

RESULTS There were 751 survey responses collected from 2016 to 2024. The average number of responses per graduating year was 125 students (SD 23). The responses were then categorized into cohorts before and after the Step 1 pass/fail transition (314 and 437, respectively). The mean number of weeks that students studied for Step 2 before and after the Step 1 pass/fail transition was 4.1 weeks and 4.9 weeks, respectively (95% CI [0.63, 1.02], $p < 0.001$). There was no significant difference in average weeks studied in years prior to the Step 1 pass/fail transition (2016 = 4.0 weeks, 2018 = 4.2 weeks, 2019 = 4.1 weeks; $p = 0.16$). However, there was a significant increase in average weeks studied after the transition (2022 = 4.1 weeks, 2023 = 5.0 weeks, 2024 = 5.6 weeks; $p < 0.001$).

CONCLUSIONS Medical students at our institution are dedicating more time for Step 2 exam preparation now compared to when Step 1 still had numerical scoring. Not only is there a difference in study time before and after the transition, but also there is a steady and significant annual increase in study time after the pass/fail transition. Data is limited because this is a single institution study, but it provides preliminary insight into how these changes have impacted the time required for USMLE Step 2 exam preparation.

Abstract #: 81
Trainee Rank: Clinical Resident
Theme: Clinical Practice III: Education
Cluster: Ethical and Advocacy Training

Tamara Amponsah, MD

Tamara Amponsah, MD (Rush); Vinodinee Dissanayake, MD MPH FACEP (Rush); Princess Currence, DSW MSW (Rush)

REFLECTIONS ON A TORTURE JUSTICE DIDACTIC SESSION PROMOTING PHYSICIAN ADVOCACY FOR FOURTH-YEAR MEDICAL STUDENTS

INTRODUCTION Although torture is prohibited under international and domestic law, from 1980 to 2018, more than 30,000 people died from police violence in the U.S. Further, about 25% of innocent people are coerced into making false confessions or incriminating statements while in police custody due to torture. Physicians have a unique opportunity to detect, document and aid torture survivors, however there is no widespread framework within the profession, and many physicians remain unaware and ill-equipped to provide appropriate care to this population. We developed a didactic session on torture justice for final year medical students and evaluated the effectiveness of the session.

METHODS About 150 fourth-year medical students attended a session on torture justice as part of their core curriculum. Prior to the start of the session, students were asked to voluntarily respond to survey questions to assess baseline knowledge and assumed relevance to their future practice. After an interactive educational seminar reviewing case studies, students were asked to complete a voluntary survey to better understand how the session impacted their knowledge and attitudes associated with torture justice.

RESULTS Sixty participants completed the pre-survey and 56 participants completed the post-survey. At baseline, respondents rated their understanding of the definition of torture justice at 2.12 on a 1-5 Likert scale (1: no knowledge, 5: significant knowledge). There was no statistically significant difference in how participants rated relevance to the physician role pre- and post-session. The majority agreed in the importance of physician involvement ($X2(1, N = 109) = 0.5258$, $p = .47$). Post-session reflections carried common themes, such as an appreciation for improving awareness and comfortability in caring for patients, for establishing skill-building in documentation, and promoting a proactive, vigilant and empowered clinical practice when protecting patient's rights and confidentiality in police presence.

CONCLUSION This educational session for fourth-year medical students on torture justice demonstrated that there was a deficit in baseline knowledge, however students expressed that the session improved knowledge, comfortability and skills needed in clinical practice. Future directions include a more in-depth assessment on knowledge and skills, simulation-based didactics and the inclusion of torture survivors in didactic sessions.

Abstract #: 82
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Clinical Practice III: Education
Cluster: Ethical and Advocacy Training

Regan Curtis, B.A.

Wadi Eghterafi (RUSH), Regan Curtis (RUSH), Ryan Welsh (RUSH), Antoniya K Zheleva (RUSH)

THE OHANA PROJECT: EVALUATING KĀNAKA MAOLI-INSPIRED, EVIDENCE-BASED EMOTIONAL SUPPORT METHODOLOGIES IN ADDRESSING LONELINESS IN THE EMERGENCY DEPARTMENT SETTING

INTRODUCTION For the past six years, Ohana-a RUSH Community Service Initiative Program (RCSIP)-has provided structured social support to patients in the MICU-10E and AICU-10W units. This pilot study aimed to evaluate the feasibility of expanding the Ohana program to the RUSH Emergency Department (ED), standardizing the role of Ohana volunteers, and systematically assessing patient perceptions of the program. Additionally, this study incorporates a detailed examination of the origins of the Ohana program and its foundational connection to Kānaka Maoli cultural principles, emphasizing the importance of familial bonds and communal care.

METHODS Volunteers received standardized training in five evidence-based communication frameworks to enhance their ability to provide emotional support. Patients' self-reported mood and loneliness were recorded on a 10-point scale both before and after the intervention. The sample for this checkpoint evaluation consisted of 12 patients, with an equal male-to-female ratio (1:1).

RESULTS AND CONCLUSION Post-intervention data indicated that 91% of participants experienced a reduction in loneliness and an improvement in mood. Qualitative feedback highlighted the perceived value of engaging with medical students, with some participants expressing that the interactions provided them with a sense of purpose and fulfillment in addition to emotional support. Notable comments included: "I found it refreshing," "I wish you came sooner," and "It's a good idea." These findings suggest that extending the Ohana program to the ED is both feasible and impactful, offering patients meaningful interactions that positively influence their emotional well-being and overall experience of care.

Abstract #: 83
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Ethical and Advocacy Training

Wadi Eghterafi, B.S.
Wadi Eghterafi (RUSH)

UTILIZING ARCHETYPAL REFORMULATIONISM AND HEGELIAN DIALECTICS TO SYNTHESIZE TRADITIONAL PERSIAN MYSTICAL POETRY, BÁBÍ-BAHÁ'Í COSMOLOGY, AND THE KANTIAN CATEGORICAL IMPERATIVE INTO ROBUST HEURISTICAL AND METAPHYSICAL FRAMEWORKS FOR NAVIGATING MEDICAL CLERK

INTRODUCTION Student cynicism and sociopathogenesis are interrelated, potent forces that may drive burnout in clerkship learners. Previous literature highlights the value of system-based approaches in combating medical student burnout, yet individual-level interventions are less explored. Drawing upon lesser-known but potentially relevant frameworks-such as Heptavallicism and Sigmordianism (two philosophical perspectives originating in Persia)-in tandem with an archetypal storytelling model (see Campbell, 1949; Jung, 1969) could offer novel heuristics for bolstering resilience to pessimism and cynicism. Additionally, insights from Bábí-Bahá'í cosmology provide a unique reinterpretation of the Kantian categorical imperative, particularly in light of Hannah Arendt's "banality of evil" thesis. Taken together, these approaches, when combined with reflective writings and mantra formation, may inform new strategies to improve moral clarity, empathy, and resilience among medical trainees.

METHODS The methodology in this paper is twofold. The first aspect of the paper is the use of a Hegelian model to synthesize two pivotal mystical Persian poems, Attar's Conference of the Birds (Sigmordianism) and Bahá'u'lláh's Seven Valleys (Heptavallicism), into a unique, powerful archetypal storytelling framework, reflective writing, and mantra creation for combating burnout in clerkship education. The second aspect of this study employs a comparative analysis of Bahá'í-Bábí cosmology and the "banality of evil" thesis to reinterpret Kantian morality in a way that is more compatible with the sociopathogenesis students encounter in clerkship education.

RESULTS AND CONCLUSION The Hegelian synthesis of Sigmordianism and Heptavallicism can form a compelling archetypal storytelling model as a basis for reflective writing and mantra creation to combat burnout on an individual level. Additionally, reinterpreting Kantian categorical imperatives through a comparative lens, integrating Bahá'í-Bábí cosmology and Hannah Arendt's "banality of evil" thesis, offers an important mindset for students to cope with sociopathogenesis in clerkship education.

Abstract #: 84
Trainee Rank: Clinical Fellow
Theme: Clinical Practice III: Education
Cluster: Ethical and Advocacy Training

Allison Salk, MD
Sloane York Sadia Haider Cristina Barkowski

ASSESSMENT OF MORAL INJURY AMONG VISITING RESIDENTS RETURNING TO A RESTRICTED ABORTION ENVIRONMENT POST-DOBBS

INTRODUCTION: Abortion is an essential component of comprehensive, evidence-based reproductive healthcare. Of the over 4400 OBGYN residents in the United States, 44% are training in states that have restrictive abortion laws and will require away rotations at institutions outside the state of their residency for abortion training. Research regarding away rotation clinical experiences is already underway, and it is undoubtedly important to understand the clinical competencies necessary for appropriate and often abbreviated training. However, there is no research to date on the emotional experiences of these residents- specifically related to moral injury upon returning to their restrictive states.

METHODS: In this study, we aim to understand the experiences of residents who must obtain abortion training in unrestrictive environments following their return to a restrictive environment. We will include residents training at Ryan residency programs in restrictive abortion environments post-Dobbs. The Ryan program is a national initiative created to structure dedicated family planning rotations in select obstetrics and gynecology residency programs in the United States. Thus, the residents at these programs are more likely to be residents interested in providing abortion counseling and services to patients.

RESULTS: We hypothesize that Ryan program trainees who travel for abortion training may experience moral injury, and we aim to understand the experience of residents returning to a restricted environment after practicing in an unrestricted state. The Moral Injury Symptoms Scale-Healthcare Professionals (MISS-HP) was created and previously validated in the setting of the COVID-19 pandemic, but has not yet been applied to abortion providers. This scale will be included in the survey as well as a question related to self-reported moral injury.

CONCLUSION: We will base our conclusions on our results which are currently being analyzed and will be available by the presentation date.

Abstract #: 85
Trainee Rank: Clinical Fellow
Theme: Clinical Practice III: Education
Cluster: Innovative Educational Interventions in Clinical Settings

Shagun Berry, DO

Shagun Berry (Rush University); Samantha Schneider (Rush University); and Elyse Fults (Rush University)

ED SPAR: A NOVEL SIMULATED PRIORITIZATION ASSESSMENT FOR EMERGENCY MEDICINE RESIDENTS

INTRODUCTION: Prioritization is a key skill for emergency physicians, as recognized by the American Board of Emergency Medicine (ABEM) with its inclusion in the new certifying examination. Though prioritization is a skill residents use frequently while working clinically, few simulation based resources exist to assess prioritization for residents. We hypothesized that learners may experience an increase in confidence in their ability to prioritize and anticipate critical tasks through participation in an activity highlighting their existing skills in these areas.

METHODS: We created a hybrid multi-patient 25 minute simulation intended to require residents to recognize and prioritize treatment of critical patients. This simulated experience involved five patient encounters requiring frequent reprioritization, task switching and reassessment upon the addition of new information. Residents were assessed using a rubric on their completion of the tasks unprompted, and also with a prompt. Learners completed a survey prior to and after the simulation allowing reflection on their use of prioritization in the clinical care setting, confidence in their ability to do so, and tools they may use to accomplish this.

RESULTS: Twelve senior residents participated in our pilot study, seven of which were third year residents and 5 second year residents. Critical task completion was 75% without a prompt, and 20% with a relevant prompt. After completion of the simulation and debriefing, residents had an increase in the estimated number of prioritization events they perceived per shift by 31.8%. Confidence in ability to prioritize increased by 9%, while their perception of their ability to anticipate tasks in the ED increased by 17.6%.

CONCLUSION: This pilot study of a simulated assessment of resident prioritization provided an opportunity for residents to practice this frequently used and essential clinical skill in an examination type setting. Residents performed overall quite well on the assessment, and their recognition of prioritization events, ability to anticipate tasks and confidence level in these skills increased.

Abstract #: 86
Trainee Rank: Clinical Resident
Theme: Clinical Practice III: Education
Cluster: Innovative Educational Interventions in Clinical Settings

Manas Deolankar, MD

Manas Deolankar, MD (Rush University Medical Center); Cody Williams, MD (Rush University Medical Center); Devon Buddan, MD (Rush University Medical Center); Monika Pitzele, MD, PhD (Rush University Medical Center); Vinoo Dissanayake MD, (Rush University Medical Center)

ENHANCING TRAUMA-INFORMED CARE IN THE EMERGENCY DEPARTMENT: EVALUATING THE IMPACT OF AN INTERACTIVE EDUCATIONAL INTERVENTION FOR RESIDENT PHYSICIANS

INTRODUCTION Trauma-informed care (TIC) is quintessential in the emergency department (ED), where the high prevalence of trauma among patients profoundly impacts health outcomes. Traumatic experiences may lead to behaviors that complicate patient-provider interactions, making TIC a critical framework for minimizing re-traumatization and promoting healing. Despite its benefits, implementing TIC in EDs is challenging due to time constraints, high patient volumes, and a lack of provider training. In addition, implicit bias may further complicate the capacity for providers to provide TIC to patients. Many resident physicians in emergency medicine (EM) feel underprepared to apply TIC practices, highlighting the need for targeted education. To address this, we conducted an educational intervention for resident physicians to evaluate the impact of structured TIC training on their knowledge, confidence, and ability to improve patient care.

METHODS Participants completed a pre-survey to assess baseline knowledge, experience, and comfort with TIC. The intervention included a lecture on TIC principles, a small group activity analyzing real-life case scenarios, and a summary of key lessons. Case scenarios involved patients with diverse social identities. A post-survey evaluated the effectiveness of this session.

RESULTS Sixteen EM physicians completed a pre-survey and eleven completed the post-survey. Participants included residents at every level of training and one attending physician, with 62.5% reporting prior TIC training. Post-intervention analysis using a Student's t-test revealed statistically significant improvements in general knowledge of TIC and TIC principles. Participants also reported increased confidence in providing TIC to patients of different genders, races, and abilities. Improvements in skills for same-gender, same-race, and older patients were not statistically significant. No significant differences were observed in attitudes toward TIC resources, clinical importance, or universal application. No significant differences were noted in knowledge of the neurobiological impact of trauma.

CONCLUSION Although our study had limited participants, it demonstrates that an interactive educational intervention may enhance EM physicians' knowledge and confidence in TIC, particularly when caring for patients with different social identities. Future investigations may include simulated patients who provide direct feedback on TIC practices, mandatory resident participation, and further study on any variations occurring across clinician training levels and practice settings.

Abstract #: 87
Trainee Rank: RUSH Matriculated Student
CON: DNP
Theme: Clinical Practice III: Education
Cluster: Innovative Educational Interventions in Clinical Settings

Michael Hulburt, DNP

Michael Hulburt (Rush University; Rush University Medical Center); Amanda Van Jacobs (Rush University Medical Center); and Barbara Hinch (Rush University, College of Nursing)

EVALUATION OF THE FRAILTY ASSESSMENT PROGRAM IN A KIDNEY TRANSPLANT CENTER

INTRODUCTION Frailty is a physiologic state with increased prevalence in adults with ESRD that predicts many adverse health outcomes. Frailty poses a potential problem for kidney transplant (KT) outcomes as pre-KT frailty is associated with increased graft loss and death. This kidney center performs frailty assessments using the physical frailty phenotype during candidate evaluation and waitlist management. No prior evaluation of this frailty program had been performed. This program evaluation used the Donabedian framework to examine structure, process, and outcomes. The structure objective was to describe all program activities. Process objectives were to assess staff understanding of the program and impact of frailty on waitlist management. Outcomes objectives were to assess KT impact on frailty and frailty impact on 1-year post-KT outcomes.

METHODS Mixed methods were used. Interviews were completed with lead pre-transplant coordinator and dietician to develop a thorough description of program activities. Focus groups were conducted with pre- and post-transplant nurse coordinators to assess understanding and perceptions of the program. Chart reports were used to describe frailty prevalence in cohorts of evaluated and transplanted patients. Frailty was reassessed in a sample of patients 3-4 months post-KT for comparison to pre-KT scores.

RESULTS Analysis of interviews generated a comprehensive outline of program activities. Focus groups described a lack of knowledge regarding the frailty assessment. Both groups identified that frail patients require more time and attention from caregivers and center staff. Frailty contributed to 1-year graft loss proportionally (1 of 6, 16.6%) to its pre-KT prevalence (17.29%) in 276 transplants. In the reassessment sample (n = 30), there was no significant difference between pre- and post-KT frailty scores using a paired t-test. Despite this, 70% (21) of patients remained non-frail or improved their frailty category post-KT, and only 20% (6) had a worse frailty category.

CONCLUSIONS Frail patients can do well post-KT when well-supported by caregivers and staff. The proportional-to-prevalence impact of frailty on graft loss validates the coordinators' perception that they provide effective post-KT care for frail patients. Frailty should not prevent patients from being referred for transplant.

Abstract #: 88
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Innovative Educational Interventions in Clinical Settings

Benjamin Muller, Bachelor of Arts
Benjamin Muller, RMC M2 Ilyass Majji, RMC M2 Nicholas Cozzi, MD, RUMC

URBAN LATE ADOLESCENT EMERGENCY PREPAREDNESS: MEDICAL STUDENT-LED LIFE SAVING SKILL TRAINING IN CHICAGO'S WEST SIDE

INTRODUCTION: Sudden cardiac arrests and traumatic injuries claim countless lives worldwide each year. The incidence of out-of-hospital cardiac arrests is rising, and its effect is felt especially among minority populations who are less likely to receive bystander Cardiopulmonary Resuscitation (CPR). Teachable skills such as bystander CPR and bleeding control can help preserve life until an ambulance arrives. RUSH 911, a student group from RUSH University Medical College in Chicago, Illinois, is dedicated to improving bystander CPR and Stop-The-Bleed education in Chicago's most vulnerable neighborhoods. This study aimed to teach critical bystander medical skills, including CPR, Automated External Defibrillator usage, choking prevention, Narcan/EpiPen administration, and bleeding control to adolescents in Chicago's West Side. Additionally, it sought to evaluate the effectiveness of the training by assessing participants' confidence and knowledge before and after the class through pre- and post-class surveys.

METHODS: Pre- and post-class surveys utilized Likert-based questions, which assessed participants' confidence and knowledge levels before and after participating in the RUSH 911 training class.

RESULTS: The study involved 31 participants, with an average age of 23 years. Nine participants identified as male (29.03%), 19 as female (61.29%), and three as non-binary (9.68%). Participants reported a significant increase in confidence in their ability to perform all the taught skills post-training ($p<0.00001$). Knowledge levels also showed a statistically significant improvement between pre- and post-class surveys ($p<0.05$).

CONCLUSIONS: This study showed that the training effectively enhanced participants' confidence and knowledge in performing life-saving skills, which will empower the participants to assist should they witness a medical emergency. Future research will assess the sustainability of these improvements over time.

Abstract #: 89
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Innovative Educational Interventions in Clinical Settings

Samantha Schneider, MS

Samantha Schneider, MS (RUMC); Carolyn Clayton, MD (RUMC); Marsha Yellen, MSN,RN (RUMC), Sarah Hock, MD (RUMC)

SIMULATED PATIENT EXPERIENCE WORKSHOP FOR ATTENDING PHYSICIAN FEEDBACK AND CONTINUOUS IMPROVEMENT

INTRODUCTION Patient-physician communication is critical in the emergency department (ED) and can be challenging in its fast-paced environment. Healthcare systems recognize that positive patient experiences lead to better outcomes and have increased emphasis on this aspect of care. To measure this, hospitals use patient satisfaction surveys to evaluate physician communication skills and improve outcomes. Simulation has proven effective in enhancing communication skills and is commonly used in medical student and resident education.

METHODS We developed a 120 minute case-based simulation workshop for emergency medicine (EM) attending physicians consisting of a pre-brief, an individual patient scenario with components typically correlated with positive patient experience, a group debriefing, and then a second individual patient scenario. These events were facilitated by simulation expert educators. Physicians were surveyed before and after the course. The simulated patients completed evaluation checklists as well as patient experience surveys for each of the physician participants.

RESULTS Nine EM physicians participated in the course. Patient experience ratings increased from 76% to 90% between the pre-debrief and post-debrief cases, and 100% of participants would recommend this course to a colleague. A moderate correlation was found between the prior year's average patient satisfaction scores for each physician and the initial SP satisfaction ratings ($r(6) = 0.52$). However, this correlation was not statistically significant ($p = 0.18$). The course was highly rated by all participating physicians. The course received high ratings from all participants, who valued the SPs' feedback and the individualized 1:1 sessions. Group debriefing was also highly appreciated.

CONCLUSIONS The simulated patient-based workshop is a feasible and valued method for providing feedback to physicians on patient experience. Improved simulated patient (SP) ratings from the first to the second scenario suggest that personalized feedback promotes recognition of areas for growth. A moderate correlation between ED patient satisfaction and SP scores indicates that the SP experience mirrors the general patient experience. This approach could identify physicians struggling with patient interactions and guide remediation efforts, ultimately leading to improved patient care and communication skills over time.

Abstract #: 90
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Clinical Practice III: Education
Cluster: Innovative Educational Interventions in Clinical Settings

Emma Theisen, B.S.

Emma Theisen B.S, Dayashree Baskaran B.S, Praewpailin Rich B.S, Aashna Farishta B.A, Alicia Wang B.S, Karaj Singh B.S, Chloie Flores B.S, Artemis MA, EmmaRose F. Brennan, MD, Jaclyn Rodriguez, RN, SANE-A, SANE-P, Neeral K. Sheth, DO, Nupur Shah, DO

HUMAN TRAFFICKING AWARENESS AND TRAUMA-INFORMED CARE: A CURRICULUM INTERVENTION FOR PHYSICIAN ASSOCIATE PROGRAMS

INTRODUCTION: Human trafficking (HT) is a significant public health concern, and healthcare workers are uniquely positioned to identify and care for survivors. A significant number of HT survivors have been documented receiving care in emergency room and urgent care settings, even having follow-up appointments with their primary care physician during their exploitation. Given the high proportion of newly graduated Physician Associate (PA) students entering emergency and primary care fields, it is imperative to incorporate trauma-informed care (TIC) principles and HT training into PA program curricula. Despite this need, such training remains limited. To address this gap, we developed a targeted training session to educate PA students on recognizing HT warning signs and providing TIC to survivors.

METHODS: A total of 31 PA students from Rush University participated in a two-hour training session that included HT and TIC didactic lectures and small and large group discussions based on multiple clinical scenarios. The students completed anonymous surveys before and after the session to assess their comfort levels with identifying HT indicators and implementing TIC. A paired t-test was utilized to analyze the changes between the pre- and post-session survey responses.

RESULTS: Of the original participants, 23 pairs of pre- and post-session surveys were successfully matched and included in the analysis, which revealed a statistically significant improvement in HT knowledge and usage of TIC.

CONCLUSION: This training effectively enhanced PA students' knowledge in using TIC to identify and care for HT survivors, addressing a critical gap in current curricula within PA programs. This training can be implemented at other institutions nationwide to improve recognition of HT survivors further and connect them to longitudinal care across healthcare settings.

Abstract #: 91
Trainee Rank: Clinical Fellow
Theme: Clinical Practice III: Education
Cluster: Neonatal and Pediatric Focus

Sasha Amiri, MD, MS

Sasha Amiri (RU); Laura Seske (RU); Esther Lee (RU); Elizabeth Lerner Papautsky (UIC); Andrew Berenz (RU)

PROVIDER AND PATIENT FACTORS INFLUENCING ADHERENCE TO A RED BLOOD CELL TRANSFUSION GUIDELINE IN NEONATES

INTRODUCTION: Packed red blood cells (pRBC) are frequently utilized in the neonatal intensive care unit (NICU). Unrestricted transfusion practices may increase adverse events, healthcare costs and waste. Prior studies demonstrated an estimated 20-30% non-adherence rate neonatologists have with their institutional pRBC transfusion guideline, but there is limited research on the factors influencing non-adherence. The goal of this study is to investigate provider and patient factors influencing a neonatologist's adherence to a pRBC transfusion guideline. We hypothesize the neonatologist's years in practice, use of a prior transfusion guideline, and patient history of prior transfusions will influence the adherence.

METHODS: 12 neonatologists were interviewed at a level 3 NICU for baseline characteristics and transfusion practice preferences. Patients with anemia admitted to the NICU from June 2023 to July 2024 were identified using medical records and their data were collected. A transfusion guideline was implemented in February 2024. Neonatologists were scored using vignette questions beforehand to predict how closely their individual transfusion practices coincided with the guideline. After guideline implementation, REDCap surveys were administered to neonatologists following clinical encounters. Qualitative and quantitative data were analyzed using Dedoose and Statistical Package for the Social Sciences softwares, respectively.

RESULTS: Data for 129 pre- and 83 post-guideline patients were evaluated, spanning 804 clinical encounters. The two study populations did not differ in gestational age, birth weight, sex, race/ethnicity, and median hematocrit levels (Table 1). Post-implementation provider adherence rate was 56% and transfusion practices aligned closer to guideline recommendations by 12.4% ($p< 0.001$). There were no significant differences in adherence rates based on prior guideline use, years since guideline use, years in practice, self-reported transfusion style, and pre-guideline adherence scores. Factors associated with higher non-adherence rates included patients without a previous history of transfusions (56.2% vs 47%, $p=0.014$) and transfusion practices in the first week of life (60% vs 36.9%, $p< 0.001$).

CONCLUSION: A pRBC transfusion guideline standardized provider practice, but did not reduce transfusion rates in our center. Higher non-adherence rates existed in the first week of a patient's life, creating a quality improvement opportunity through future guideline iterations. Further research is required regarding the influence of provider human factors on guideline adherence over time.

Abstract #: 92
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Clinical Practice III: Education
Cluster: Neonatal and Pediatric Focus

Hannah Chou, DMA, MM, BM

Hannah Chou, DMA (Rush); Alicia Wang, BS (Rush); Jaehyuk Song, BS (Rush); Tanya R. Sorrell, PhD, PMHNP-BC, FAANP, FAAN (Rush); Sophia Peng, MD, FASAM (Rush)

STANDARDIZING BUPRENORPHINE INDUCTION PROTOCOLS IN EMERGENCY DEPARTMENTS

INTRODUCTION: The prevalence of fentanyl-adulterated opioids in street drugs presents challenges in the treatment of Opioid Use Disorder (OUD) in emergency departments (EDs). Approximately 1 in 20 patients who survive a non-fatal opioid overdose face a one-year mortality risk. Buprenorphine (BUP), an evidence-based Medication for Opioid Use Disorder (MOUD), alleviates withdrawal symptoms, reduces cravings, and supports long-term treatment retention. ED-initiated BUP improves retention in addiction treatment three-fold. However, fentanyl's variable potency complicates BUP induction, leading to inadequate dosing, risk of precipitated withdrawal, and inconsistent implementation across EDs. This study evaluates BUP induction protocols tailored to different patient presentations to standardize ED workflows and improve outcomes.

METHODS: Current BUP protocols and evidence addressing fentanyl-specific challenges in MOUD treatment were examined. Resources from the California Bridge Program and an evidence-based educational script for MOUD initiation created for Chicagoland ED providers were analyzed to identify gaps in current MOUD guidance. Findings were synthesized into guidelines to improve MOUD accessibility and integration nationwide.

RESULTS: Three updated BUP induction protocols were identified to address fentanyl-related OUD. High-dose BUP induction is effective for patients presenting with moderate withdrawal symptoms. For patients with a Clinical Opiate Withdrawal Scale (COWS) >8, an initial BUP dose of 16 mg can be given sublingually. If symptoms persist after 30-60 minutes, an additional 8-16 mg is administered, not exceeding 32 mg in 24 hours. Post-Naloxone induction is used when a patient experiences withdrawal following naloxone reversal of an opioid overdose. Administering 16 mg of BUP over 1-2 hours in a single dose or multiple doses stabilizes the patient without further exacerbating withdrawal symptoms. Low-dose BUP induction introduces small, gradually increasing doses of BUP while continuing full agonist opioids. This helps mitigate risk of precipitated withdrawal and patients do not need to be in withdrawal to begin induction.

CONCLUSIONS: Updated BUP induction protocols, including high-dose, post-naloxone, and low-dose methods, enhance ED MOUD delivery by reducing withdrawal symptoms, minimizing precipitated withdrawal, and improving treatment retention. Standardizing these protocols can improve patient outcomes.

Abstract #: 93
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Neonatal and Pediatric Focus

Charlie Fischer, MPH, BS

Charlie Fischer MPH (Rush Medical College), Jonathan Spaan MS (Rush Medical College), Brian Gulack MD (Rush University Medical Center)

NEONATAL SURGICAL SKIN PREPARATION: EVALUATING THE SAFEST APPROACH BETWEEN CHLORHEXIDINE GLUCONATE AND POVIDONE-IODINE

INTRODUCTION Povidone-iodine (PI) and chlorhexidine gluconate (CHG) are two commonly employed agents for skin antisepsis before surgery. Adult trials have shown CHG's superiority over PI; however, PI remains widely used in neonates due to concerns about skin-related adverse reactions associated with CHG exposure in this vulnerable population(1-7). While recent studies comparing CHG to PI have demonstrated CHG's safety and efficacy in neonatal surgery, they employ conservative guidelines regarding patient age or size(8-10). We aim to report outcomes following surgical preparation with CHG and PI in smaller, younger neonates. Previously, Rush's surgical team utilized PI for preparing neonates for surgery, while the NICU already integrated CHG for neonatal preparation. Rush's surgical team adopted the NICU's guidelines on 9/29/23: >1001 grams birth weight or >14 days of life 2% CHG, 70% Isopropyl Alcohol <1001 grams birth weight or <14 days of life 10% Povidone-Iodine

METHODS We retrospectively chart reviewed all neonatal patients who underwent surgery between 9/29/2022-9/29/2023, the first year of the new guidelines. Inclusion criteria were infants < 3 months of age undergoing surgical treatment with pediatric general surgery, with no pre-existing allergies to CHG or PI.

RESULTS Of 61 neonatal patients identified, 46 met inclusion criteria. The average gestational age was 35 weeks, with an average birth weight of 2.640 kg and an average weight at surgery of 3.612 kg. In this cohort, 8.7% (4) had an adverse skin reaction within 7 days of surgery, 4.3% (2) had a surgical site infection within 30 days of the surgery, and 8.7% (4) had wound dehiscence. Of these patients, 60% (28) were sterilized with CHG and 40% (18) with PI. Among CHG-prepped patients, 10% (3) had adverse skin reactions, compared to 5.6% (1) among PI-prepped patients. The primary outcome between the two groups was not statistically significant (χ^2=0.0049, p-value=0.9443).

CONCLUSIONS This study shows no significant difference in adverse skin reactions between neonatal patients prepped with CHG or PI. A similar evaluation will be conducted for neonatal surgeries from 9/29/2021-9/29/2022, the year prior. Comparing these periods will assess the safety and efficacy of Rush's current guidelines for CHG and PI use in neonatal care.

Abstract #: 94
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Clinical Practice III: Education
Cluster: Neonatal and Pediatric Focus

Dimple Gajjar, Associates of Art and Bachelors of Science

Dimple Gajjar, BS2; Amber Smith, PhD, BCBA3, Brenda Hussay-Gardner, PhD, MPH3, Alison Falck, MD4, Suhgai Kadakia, MD1 Division of Neonatology, Department of Pediatrics, Rush University Medical Center1, Rush School of Medicine2, University of Maryland, School of Medicine3, Department of Pediatrics, University of California San Francisco4

EVALUATION OF SAFE-SLEEP AND TUMMY-TIME BOOK FOR PARENTS OF PREEMIES

INTRODUCTION: Sudden Unexpected Infant Death (SUID) remains a significant public health challenge in the United States, with approximately 3,700 cases annually. Although the implementation of safe sleep guidelines in the early 1990s led to a decline in Sudden Unexpected Infant Unexpected Infant Death Syndrome (SUIDS), the rates of accidental suffocation and strangulation in bed have increased since 1997. Premature infants are particularly vulnerable to SUID and are at heightened risk for neuromotor delays, which can be mitigated by practices like "tummy time." However, there is limited research on effective educational interventions that address both safe sleep and tummy time (SSTT) practices, especially for parents of preterm infants.

OBJECTIVE: The objectives of the study are to: 1) develop an educational children's book about SSTT specifically for parents of premature infants, 2) gather feedback on the book from parents, 3) evaluate the effectiveness of this book compared to standard educational practices on improving SSTT knowledge among parents of VLBW infants.

METHODS: This IRB approved, prospective qualitative study involves creating and evaluating the impact of a SSTT book specifically tailored for families with very low birth weight premature infants (birth weight <1500 grams) in the NICU. Consenting participants are interviewed regarding their knowledge of SSTT then they read the SSTT book to their VLBW infant while in the NICU. The first follow-up interviews is conducted within 24-48 hours of the parent reading the book and a second follow-up interview is conducted post-discharge. The semi-structured interviews are conducted face-to-face, are audio-recorded, and designed to measure changes in understanding, behavior and practices. Interviews are transcribed and coded concurrently with data analysis. Interviews will be conducted until we reach saturation of themes.

RESULTS: To date, we have interviewed 4 families.

CONCLUSION:

Abstract #: 95
Trainee Rank: RUSH Matriculated Student
CON: DNP
Theme: Clinical Practice III: Education
Cluster: Neonatal and Pediatric Focus

Dean Howdeshell, BSN

Dean Howdeshell (first author, RUSH), Colleen Nash MD (Chief, Division of Pediatric Infectious Diseases, RUSH), Denise Kirsten DNP, NNP -BC (Primary Mentor/Advisor, RUSH) and Laura Seske MD (Site Facilitator, Director, Division of Neonatology Quality Improvement & Patient Safety, RUSH)

A Targeted Approach for Optimizing Congenital Cytomegalovirus (cCMV) Testing: A Doctor of Nursing Practice Project

INTRODUCTION: Cytomegalovirus (CMV) is one of the most common congenital infections identified in the neonatal period, however, testing remains inconsistent among healthcare providers and often leads to increased healthcare costs and potential parental stress. This quality improvement (QI) project aimed to standardize testing for congenital CMV (cCMV) in a 60-bed, level III Neonatal Intensive Care Unit (NICU) and General Care Nursery (GCN) at a large, urban-academic medical center using an evidence-based clinical guideline and electronic medical record (EMR)-based best practice advisory (BPA) to optimize resource utilization and reduce over testing.

METHODS: IRB acknowledged this QI study. An interprofessional team created and implemented a standardized cCMV testing guideline in the NICU and GCN. Advanced practice providers and physicians received education in-person as well as via online communications. The guideline was made available to all staff through the hospital intranet's clinical resources website. Weekly audits of the EMR-based BPA which flagged eligible neonates over 12 weeks assessed: intrauterine growth restriction (IUGR) and small for gestational age (SGA) classification, presence of physical signs and additional risk factors, testing and positivity rates, and guideline adherence.

RESULTS: During the study period, 41 neonates triggered the BPA for testing consideration. Nine (21%) had a physical sign, exclusively head circumference less than the 10th percentile. Fifteen (36%) were tested for isolated IUGR and/ or SGA, without physical signs or additional risk factors. Twenty-four (59%) neonates were tested, with zero positive CMV **RESULTS**. Ninety percent of testing adhered to guideline recommendations, while four cases (10%) deviated from guideline recommendations.

CONCLUSION: This cCMV testing guideline improved the appropriateness and consistency of cCMV testing in neonates based on specific clinical parameters and risk factors. the results correlate with previous findings and literature describing a low yield in testing neonates who are asymptomatic. Standardized testing reduces variability, enhances efficiency, lowers costs, improves outcomes, and likely decreases parental stress. This project demonstrates the feasibility and effectiveness of targeted cCMV testing in the NICU and GCN.

Abstract #: 96
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Neonatal and Pediatric Focus

Yasmin Minai, BS
Yasmin Minai (RMC); Kousiki Patra (RMC)

DISPARITIES IN NICU AND NEURODEVELOPMENTAL OUTCOMES IN NEONATES TREATED WITH THERAPEUTIC HYPOTHERMIA FOR HYPOXIC-ISCHEMIC ENCEPHALOPATHY

INTRODUCTION Neonatal hypoxic-ischemic encephalopathy (HIE) is a significant cause of mortality and neurodevelopmental impairment. Therapeutic hypothermia (TH) is the only proven therapy for HIE, but studies demonstrate that Black and/or Hispanic infants are less likely to be offered TH. Little is known about the racial/ethnic disparities that exist with respect to HIE treatment, in-hospital, and neurodevelopmental outcome of survivors. This study examines the relationship between race/ethnicity in HIE infants treated with TH and 1. neonatal outcomes 2. neurodevelopmental outcomes at 20 months corrected age (CA).

METHODS This was a retrospective review of 117 infants born in 2017-2023 treated with TH for HIE at RUSH NICU. Race/ethnicity was categorized as Black, Hispanic White, Non-Hispanic White, and Asian. Due to similarities in sociodemographic factors (maternal age, education level, insurance status), the racial/ethnic groups were combined into groups (Black/Hispanic; n=64) and (White/Asian, n=54) for further comparison. Neurodevelopmental outcome measures included cognitive, language and motor index scores at 20 months CA for 54 survivors. Linear regression analyses adjusted for the impact of racial/ethnic group on NICU and neurodevelopmental outcomes.

RESULTS White-Asian mothers were older (p=.01), had higher education levels (p<.001), more likely to have private health insurance (p<.001) and infants more likely to be out-born (p=.03) compared to Black-Hispanic group. Although there were no differences in obstetric/delivery room practices between the groups, White-Asian infants had lower mean blood gas pH (p=.017) compared to Black-Hispanic infants. There were no differences in TH treatment or NICU care between the two groups. In unadjusted analyses, White-Asian infants had higher mean Cognitive (p=.004), and Language (p=.004) scores compared to Black-Hispanic infants at 20 months CA. In regression analyses there were no significant differences in scores after adjusting for variables.

CONCLUSION Despite White-Asian infants being more likely to be out-born and have worse blood gas pH, in unadjusted analyses they had higher cognitive and language scores at 20 months CA as compared to Black-Hispanic infants. These differences did not persist after regression analyses. We surmise that sociodemographic variables most greatly impact these outcome measures and future research should target post-NICU parent-child interventions to reduce disparities in outcome.

Abstract #: 97
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Neonatal and Pediatric Focus

Akanksha Sancheti, B.S. Biology

Akanksha Sancheti (Rush Medical College) Hannah Becker (Rush Medical College) Benjamin Trisman (Rush Pediatrics Residency)

ENHANCING NEONATAL CARE: IMPROVING ADHERENCE TO AAP PHOTOTHERAPY GUIDELINES

INTRODUCTION: In 2022, the American Academy of Pediatrics (AAP) updated phototherapy guidelines for neonatal hyperbilirubinemia. Our institution participated in the AAP LIGHT review to assess adherence, finding initial compliance at only 50% in the inpatient setting. This prompted an analysis of our phototherapy practices and their effectiveness. The study aims to improve adherence by raising awareness among inpatient providers and ensuring more consistent guideline application. We are using multiple PDSA cycles to identify areas of improvement. The data presented here reflects our 2nd PDSA cycle. Our goal is to increase guideline adherence to over 60% by February 2025, improving care for neonates with hyperbilirubinemia.

METHODS: For our 2nd PDSA cycle, we used a multi-department approach, involving the general care nursery, NICU, and pediatric units, to develop an intervention aimed at improving adherence to the updated phototherapy guidelines. A cause-and-effect diagram and key drivers guided the intervention design. The intervention includes a visually engaging infographic summarizing the new guidelines, serving as a quick reference for medical teams. Additionally, clear directions will be provided on how to use our institution's hyperbilirubinemia phototherapy order set within the Electronic Medical Record (EMR) to ensure proper guideline implementation.

RESULTS: As of submission, our institution has implemented the intervention from our 2nd PDSA cycle, including an infographic to guide the use of the hyperbilirubinemia phototherapy order set. This was designed to raise awareness and ensure consistent adherence to the updated guidelines. Between September 2024 and February 2025, we achieved over 60% adherence to the 2022 hyperbilirubinemia guidelines.

CONCLUSION: Ongoing efforts and future PDSA cycles highlight our commitment to improving neonatal care through evidence-based practices. The results of the 2nd PDSA cycle not only guide future interventions but also provide valuable insights into optimizing phototherapy guidelines for neonatal hyperbilirubinemia. As we continue this iterative process, our goal remains to achieve and exceed the target adherence rate in each cycle, ensuring optimal care for our neonatal population.

Abstract #: 98
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Patient-Centered and Community-Based Training

Paige Adams, B.S.

Paige Adams, BS (Rush Medical College); Elizabeth Kiracofe, MD (Airia Comprehensive Dermatology)

SCRATCHING BELOW THE SURFACE: ADDRESSING SEXUAL HEALTH IN PATIENTS WITH CHRONIC SKIN DISEASE

INTRODUCTION The impact of chronic skin disease (CSD) on sexual health is well-documented in the literature. Although sexual dysfunction is common among patients with chronic skin conditions, sexual health is infrequently addressed by dermatologists. In a Belgian survey study, 73% of psoriasis patients reported never having received information about the possible sexual health consequences of their skin condition. This calls into question whether this practice gap exists because of a lack of awareness of this issue or clinicians feeling ill-equipped to address sexual concerns. Psychometrically validated questionnaires can be used in clinical practice to initiate conversations surrounding sexual health. We sought to evaluate the utility of psychometrically validated instruments to assess sexual health in patients with CSD.

METHODS Relevant articles published in English from 2000 through November 2024 were identified using Medline (via PubMed), Google Scholar, and Cochrane Reviews. Studies that assessed sexual health in patients with CSD using psychometrically validated instruments were included.

RESULTS We identified 60 relevant articles. The Female Sexual Function Index (FSFI) was used to assess sexual health in female patients in 28 (46%) studies while the International Index of Erectile Dysfunction (IIEF) was used for male patients in 20 (33%) studies. The Arizona Sexual Experience Scale (ASEX) and Massachusetts General Hospital Sexual Functioning Questionnaire (MGH-SFQ) were gender-neutral instruments used in 9 (15%) and 4 (6%) studies, respectively. The Dermatology Life Quality Index (DLQI) was used most frequently in 29 (48%) studies.

CONCLUSION Studies on sexual dysfunction in patients with CSD utilize various psychometrically validated instruments to evaluate sexual health. Although there is no gold-standard instrument specifically for CSD patients, the FSFI, IIEF, ASEX, and MGH-SFQ can be useful in dermatology practice. The DLQI is helpful to globally assess the quality of life of patients with CSD and briefly mentions sexual difficulties. These tools can serve as a first step to identify potential sexual concerns in which dermatologists can then initiate deeper conversations and develop targeted treatment interventions for sexual dysfunction. Few studies have developed specific questionnaires to assess the impact of skin conditions on sexual well-being. Further research is warranted to validate these focused questionnaires for dermatology patients.

Abstract #: 99
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Patient-Centered and Community-Based Training

Callan Coghlan, BA

Katarzyna Gore MD (RUSH), Callan Coghlan BA (RUSH), Danielle Raslan MD (RUSH), Aylin Ornelas Loredo MS (RUSH), Dustin Brown MD (RUSH), Galeta Clayton MD (RUSH), Gary Peksa PharmD (RUSH), Michael Gottlieb MD(RUSH)

PHYSICIAN-PATIENT COMMUNICATION IN EMERGENCY MEDICINE RESIDENT VS ATTENDING PHYSICIANS

INTRODUCTION Patients provide feedback on attending physicians through surveys, whereas residents usually do not have the same opportunity. Feedback residents receive is often based on secondhand accounts. We aimed to evaluate resident and attending physicians' communication with patients using the Communication Assessment Tool (CAT). We hypothesized that attending physicians would score higher on individual survey questions.

METHODS We conducted a single center prospective observational study at a tertiary care Emergency Department (ED). After being treated in the ED, patients completed a survey on both resident and attending physicians independently. If no ED resident was caring for the patient, only the attending was evaluated. Off-service residents were excluded. Only English speaking patients were included. A mixed-effects model was used to compare attending and resident data, accounting for participant-level random effects. Open ended questions were graded as positive, negative, or neutral.

RESULTS 36 residents and 49 attendings were eligible for assessment. Between May and July 2024, we gathered responses from 144 participants. In the 90 resident surveys and 144 attending surveys, responses were predominantly positive, with "Very Good" making up 87.2% of responses for residents and 89.5% of responses for attendings. Open-ended feedback was positive or neutral, highlighting physician strengths or focusing on unrelated patient conditions. results comparing residents and attendings on each discrete survey question showed p-values from 0.42 to 0.77, indicating no significant difference between groups.

CONCLUSION The CAT survey administered to ED patients generally reported positive resident and attending assessments. This suggests that current tools may not effectively differentiate between the communication skills of physicians, highlighting the need for a more discerning method to evaluate resident communication.

Abstract #: 100
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Patient-Centered and Community-Based Training

Kira Palazzo, BS Bioengineering

Kira L Palazzo MS3 (Rush), Stephen Baldassari MS3 (Rush), Nicholas Cozzi MD MBA FACEP (Rush)

MEDICAL STUDENT-LED COMMUNITY-BASED TRAINING LEADS TO INCREASED SELF-REPORTED CONFIDENCE IN LIFE-SAVING BYSTANDER INTERVENTIONS

BACKGROUND Bystander administration of cardiopulmonary resuscitation (CPR), hemorrhage control, and other emergency interventions have a positive impact on a patient's likelihood of survival. Many members of the general public have limited experience and low confidence in their ability to perform these interventions. However, traditional classes covering CPR and first aid are often inaccessible to community members due to their cost, geographic location, or language barriers. Outreach from volunteer organizations led by medical students can play an important role by teaching emergency medical skills. This study aims to evaluate the change in participants' self-reported confidence in providing emergency medical care before and after attending a free class taught by a medical student-led organization. OBJECTIVE To prospectively analyze the impact of outreach classes led by a medical student organization on participants' self-reported confidence in applying prehospital skills such as CPR, choking intervention, naloxone and epinephrine administration, and hemorrhage control.

DESIGN/METHODS During an eleven-month period between March 2023 and January 2024, participants completed a pre and post-intervention survey that assessed subjective levels of confidence using the Likert scale in the following skills: CPR, choking intervention, naloxone administration & epinephrine autoinjectors, and hemorrhage control. De-identified evaluation responses were then compiled and compared.

RESULTS Seventy-nine people completed the pre-class survey (n = 79) and eighty-five people completed the post-class survey (n = 85) regarding their confidence in performing these interventions via Likert Scale. Self-reported confidence in hemorrhage control rose from 2.23 to 4.58, with CPR administration rising from 2.69 to 4.55. Choking intervention increased in self-reported confidence from to 2.34 to 4.11 with autoinjectors rising from 2.04 to 4.55.

CONCLUSION Early bystander intervention on the scene of a medical emergency can be life-saving. This unique medical student-led course in bystander emergency intervention training targets financial, geographic, and language-related barriers to prehospital healthcare education among underserved Chicago communities. Early findings from this organization's pre-class and post-class surveys demonstrate increased self-reported confidence in performing CPR, choking intervention, use of autoinjectors, and hemorrhage control. IMPACT Increasing knowledge and confidence in prehospital skills for medical emergencies has the potential to increase bystander action while lessening morbidity and mortality. Implementation of similar programs in other communities across the United States may improve outcomes

Abstract #: 101
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Patient-Centered and Community-Based Training

Alexandra Walker, BSE

Alexandra Walker, B.S.E. (Rush); Nicole Khanna, B.A. (Rush); Brandon Deguzman, B.S. (Rush); Ryan Welsh, B.S. (Rush); and Jaehyuk Song, B.S. (Rush)

TEEN MENTAL HEALTH WORKSHOP: BRIDGING THE GAP IN MENTAL HEALTH EDUCATION

INTRODUCTION: Group-based, adolescent mental health workshops improve mental health literacy, reduce stigma, and enhance peer support. Peer-led education fosters recognition, stigma reduction, and help-seeking (Curtin, 2022), while mental health education improves confidence and attitude via knowledge-sharing (Ng, 2021), especially with discussions, videos, and role-playing (Seedaket, 2023). However, accessibility to professional mental health care is limited (Kangwana, 2024). In Chicago, youth mental health is challenged by underdiagnosis, stigma, low literacy, racial disparities, and the impact of COVID-19 (Ezeoke, 2022; Glasgow, 2019). In response, the RUSH Medical Center Adolescent Psychiatry team developed the Teen Mental Health Workshop (TMHW). This study introduces the structure of TMHW, explores feedback and challenges, and assesses efficacy in providing workshops and facilitating therapy access for Chicago adolescents.

METHODS: Medical students overseen by an attending psychiatrist facilitate weekly one-hour workshops. Sessions cover mental health topics such as substance use, body image, social media, gender, and sexuality. Referred participants from the Rush Adolescent Psychiatry group attend in-person or virtual sessions and complete a topic-understanding pre-survey, grounding exercises, an interactive module led by 3-4 student facilitators, and a post-survey to gauge knowledge improvement. Attendance is documented in patient charts. Anonymous workshop feedback is quantified by averaging survey results and categorizing them as positive or negative.

RESULTS: In the first semester (January-May 2024), 85% of sessions (16/19) received "generally positive" ratings with an average of 4.27 teens per session. In the second semester (August-December 2024), 73% of sessions (11/15) were rated "generally positive" with an average of 3.86 teens per session. A majority of participants were satisfied with the session duration.

CONCLUSION: Anonymous post-session feedback from participants has been overwhelmingly positive with TMHW. Workshops accomodate in-person and virtual mediums, but activities requiring physical supplies are limited to in-person sessions. Biannual quality checks allow adjustment for virtual settings, such as early notification to participants of needed supplies. With teens showing lower engagement in physically active modules, a variety of grounding activities (yoga, breathing, guided visualization) to begin sessions was introduced to improve engagement. The future of TMHW involves optimizing workshop content and analysis of participant knowledge improvement.

Abstract #: 102
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Specialty Practice and Outcomes

Morgan Allen, B.S

Morgan Allen (Rush); Dr. Andrea Madrigrano (Rush); Dr. Sarah S Keshwani (Rush); Dr. Melissa Rangel (Rush)

IMPLEMENTATION OF A WIRELESS LOCALIZATION PROGRAM FOR PATIENTS WITH BIRAD 4C AND 5C LESIONS UNDERGOING IMAGE GUIDED BIOPSIES

INTRODUCTION: Recent advancements in wireless localization systems, such as the SAVI SCOUT localization (SSL), have been shown to be an accurate and reliable way to localize non-palpable breast lesions and offer notable benefits such as reduced re-excision rates, improved lesion-targeting accuracy, and increased patient satisfaction. The goal of this study is to analyze the outcomes of women undergoing SSL at the time of initial image-guided biopsies for high-risk BIRAD 4c and 5 breast lesions.

METHODS: A retrospective review between 2022-2024 was conducted at a single institution. Patients with BI-RADS 4C or 5 lesions were included in the study. Variables including the timing of placement of SSL, time from initial biopsy to treatment, follow-up, and outcomes were collected via chart review.
RESULTS: 389 patient charts were reviewed, with 241 patients undergoing surgery at our institution. 222 patients had an SSL in the breast, of those, 72% of SSL were placed at the time of initial biopsy. Only 3% of SSL placed at initial biopsy were lost to follow-up or resulted in surgery at an outside hospital. Among those with SSL placed at biopsy, 87.3% were diagnosed with cancer, 2.5% had high-risk lesions, and 9.5% were benign. Of these patients, 40% underwent lumpectomy, and 31% had mastectomy. The mean time to treatment was not significantly different for patients with (51 days) and without (52 days) initial SSL placement.

CONCLUSION: The results demonstrate that most patients who underwent an SSL placement, went on to have surgical treatment at our institution, with breast imagers able to successfully predict the need for excision in 89.8% of patients. Although no significant difference in time to treatment was observed, the approach improved operational efficiency, increasing the availability of procedure spots and decreasing wait times for biopsies. Placing the localizer at the time of biopsy minimized the number of procedures required, reducing disruptions and lowering the risk of complications such as infection and hematoma. These results build on previous findings that demonstrated the advantages of SSL for operative efficiency and accuracy, with this new data supporting its benefit when done at the time of initial biopsy.

Abstract #: 103
Trainee Rank: Post-Doctoral Research Fellow
Theme: Clinical Practice III: Education
Cluster: Specialty Practice and Outcomes

Victoria Marino, B.S.

Victoria Marino (Rush, UIC) Francesca De Vecchi (Rush), Takayuki Koya (Rush), Landon Begin (Brown), Douglas C. Moore (Brown), Joseph J. Cricso (Brown), Markus A. Wimmer (Rush, UIC) Department of Orthopedic Surgery, Rush University Medical Center, Chicago, IL, University of Illinois at Chicago, Chicago, IL, Department of Orthopaedics, Warren Alpert Medical School of Brown University, Providence, RI

IN VITRO EVALUATION OF HEMIARTHROPLASTY BEARING MATERIALS: A SCOPING REVIEW

INTRODUCTION Osteoarthritis (OA) affects 32 million individuals in the U.S., with symptomatic knee OA impacting 10% of men and 13% of women over 60, leading to pain, stiffness, mobility loss, and increased risks of co-morbidities. Hemiarthroplasty is a treatment for mild-to-moderate OA. While hemiarthroplasty offers benefits such as reduced surgical times and bone preservation, challenges like accelerated cartilage wear and inconsistent clinical outcomes remain. The interaction between hemiarthroplasty bearing materials (HBMs) and native cartilage critically affects implant performance, necessitating detailed investigation. This scoping review examines HBMs, and specimens use in in-vitro studies, experimental setups, outcomes, and study comparability.

METHODS A systematic search using Covidence included cartilage, HBM, and wear (and synonyms) in PubMed, Scopus, Google Scholar, and the Cochrane Library. Eligible studies that mechanically tested HBMs against cartilage in in vitro models were included. HBM, specimen characteristics, experimental setups, motion types, input parameters, and outcomes were extracted. Descriptive statistics summarized continuous variables (percentages rounded to the nearest whole number).

RESULTS Of 1,798 studies, 72 met inclusion criteria, with 47 classified as in vitro. HBMs tested included metals (41%) and soft polymers (32%), with 45% of studies testing multiple HBMs. Cartilage specimens were primarily bovine (65%), predominantly from the tibial-femoral joint (69%). Setups were tribometers (75%) and simulators (25%). Tribometer motions were mainly linear (62%) or multidirectional (24%). Inputs included contact stress (8.8 kPa-23.3 MPa), velocity (0.5-100 mm/s), duration (0.03-33.8 hours), and distance (5.39 cm-9,000 m). Simulators applied 25 N-1.5 kN loads across 500-500,000 cycles with various flexion-extension profiles. Lubricants included bovine serum (38%) and saline-based solutions (21%). Outcomes included COF, wear debris, and assessments of cartilage and HBM damage. COF generally increased with time, but methodological differences limited cross-study comparisons. CONCLUSION Although experimental setups showed similarities, differences in methods used to outcomes limited definitive

CONCLUSIONS. For example, no clear candidate material for HBM emerged. This highlights the complexity of interpreting findings and the importance of consistent methodologies. Such practices are essential for generating comparable outcomes across studies, setting a framework for further testing in preclinical large animal models, and ultimately informing human applications.

Abstract #: 104
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Specialty Practice and Outcomes

Abigail McIntosh, BS

Abigail G. McIntosh BS (1)*, Artemis Markopoulos MA (1)*, Julio A. Roque Buenrostro MS (1), Katie Holland, MD (2), William B. Cohen BA (1), Mihir K. Bhayani MD (2), Vanessa C. Stubbs MD (2) * Artemis Markopoulos and Abigail G. McIntosh contributed equally to this work. 1. Rush Medical College, Rush University Medical Center, Chicago, Illinois, USA. 2. Department of Otorhinolaryngology-Head and Neck Surgery, Rush University Medical Center, Chicago, Illinois, USA. Presenting Author: Abigail McIntosh BS

DEMOGRAPHIC CONCORDANCE AND PATIENT SATISFACTION IN OTOLARYNGOLOGY

INTRODUCTION The 2010 Affordable Care Act (ACA) propelled the American healthcare system away from fee-for-service reimbursement and towards a value-based care model. While fee-for-service remains the prominent reimbursement system, financial incentives of the ACA shifted the focus of healthcare from volume to quality. This shift made patient satisfaction questionnaires, such as Press Ganey surveys, invaluable, as they provide hospitals with profitable insight into patient satisfaction. Existing literature has investigated factors influencing patient fulfillment, including the impact of demographic concordance amongst patients and their providers. While research into patient satisfaction with respect to demographic concordance exists, the literature is limited, populations investigated lack diversity, and research specifically in otolaryngology is sparse. We aim to address this gap in the literature by investigating the impact of patient and physician demographics on patient satisfaction within a diverse academic medical center's otolaryngology department.

METHODS A retrospective review was completed of Press Ganey surveys from otolaryngology patients across a tertiary care center from July to December 2023. Physician demographics were collected through a department survey. Patients were identified using survey contact serial numbers, and electronic medical record review identified the patient's providing physician and the patient's race, ethnicity, age, and gender. Physician surveys were reviewed and patient - physician demographic concordance or discordance was documented. Statistical analysis was performed using Stata statistical software with an alpha value of 0.05. Student's t-test was used to compare quantitative variables.

RESULTS 190 new otolaryngology patients were included. Findings demonstrated significantly higher patient satisfaction during discussions of treatment options among age concordant patient - physician dyads ($p = 0.035$). No other significant difference in patient satisfaction was seen between race, gender, or age concordant versus discordant pairs. Additionally, the study population lacked diversity when compared to the true patient population of this otolaryngology department.

CONCLUSION Our study demonstrates significantly improved patient satisfaction amongst age concordance patient - physician dyads. Notably, our study population lacked diversity and didn't reflect the true demographics of this institution's patient population. Future research should investigate how patient satisfaction surveys can reflect the opinions of all patients to ensure improvements in otolaryngology care reflect the experiences of diverse patient populations.

Abstract #: 105
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Specialty Surgical and Interventional Education

Shahood F Fazal, Master of Science
Shahood Fazal (RUSH), Tom Shao (RUSH),

THE IMPACT OF SCREEN TIME ON PEDIATRIC DRY EYE AND MEIBOMIAN GLAND DYSFUNCTION

INTRODUCTION Excessive screen time in children has become increasingly prevalent due to widespread access to digital devices for education and entertainment. Recent findings, including two Pediatrics in Review articles, highlight a concerning correlation between prolonged digital media use and pediatric Dry Eye Disease (DED) as well as Meibomian Gland Dysfunction (MGD). Historically considered conditions of older adults, DED and MGD are now appearing at younger ages, potentially attributable to reduced blinking and the ocular surface stress associated with screens. This study aims to synthesize the current literature regarding the pathophysiology, clinical manifestations, diagnosis, and management of pediatric DED and MGD in the context of excessive screen exposure.

METHODS A comprehensive literature review was conducted focusing on peer-reviewed journals and recent review articles that examined pediatric DED and MGD. Searches were performed in major databases (e.g., PubMed, MEDLINE) using keywords such as "pediatric dry eye," "meibomian gland dysfunction," and "screen time." Studies assessing blink rates, tear film osmolarity, meibography findings, and clinical outcomes were included. Particular attention was given to research that investigated correlations between device use and ocular surface health in children. Data were synthesized to determine common pathophysiological mechanisms, clinical presentations, diagnostic approaches, and recommended management strategies.

RESULTS Review of the literature revealed that children with high daily screen time exhibit a significantly lower blink rate, leading to increased tear evaporation and ocular discomfort. Multiple studies reported early signs of meibomian gland dropout, with structural and functional alterations evident via meibography. Clinically, children presented with intermittent blurred vision, eye fatigue, dryness, redness, and burning sensations-all symptoms often misattributed to allergies or behavioral issues. Interventions such as adopting the 20-20-20 rule, optimizing screen ergonomics, and implementing lid hygiene measures (e.g., warm compresses, blink training) demonstrated improvement in tear film stability. Advanced therapies, including anti-inflammatory eye drops and targeted treatments for MGD, were indicated for more severe cases.

CONCLUSION The growing body of evidence underscores the pivotal role of excessive screen time in contributing to pediatric DED and MGD. Early identification and intervention are essential to prevent long-term ocular surface complications. Collaboration among pediatricians, ophthalmologists, educators, and caregivers is crucial to reinforce healthy screen habits, promote blink awareness, and integrate regular visual breaks.

Abstract #: 106
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Specialty Surgical and Interventional Education

Annie Fritsch, BA, BS

Annie Fritsch (RUMC), Fedra Britvic (RUMC), Justin Broyles MD (Brigham and Women's Hospital, Harvard Medical School), George Kokosis MD (RUMC)

DIEP FLAP RECONSTRUCTION: THE IMPACT OF CODE CONDENSATION OF COVERAGE AND REIMBURSEMENT

INTRODUCTION: Autologous breast reconstruction (ABR) is becoming increasingly common in post-mastectomy patients. The Current Procedural Terminology (CPT) codes for ABR are 19364, S2067 and S2068 with S2067/S2068 being associated with higher reimbursement rates. It has recently been announced that the S-codes will be consolidated under 19364 in the near future. Our study aims to assess the potential impact of this code consolidation for insurance and coverage both for patients and providers.

METHODS: Claims data for patients from 2018-2023 was accessed via the PearlDiver dataset. Patients billed with S2068, S2067 and CPT19634 were identified. Additional information included total reimbursement, service location, comorbid conditions, and insurance type. Income information from the 2020 census was accessed to evaluate income in the highest utility area for each code.

RESULTS: There were 3,925 claims for S2068, 229 for S2067 and 5,429 claims for CPT 19364. The median payment per patient given an S2068 code was 91% higher than for CPT19364. Total payments from commercial insurers were 34.9% higher for S2068 than for CPT19364. Highest utility by state for each code was compared against median household income in Table 1.

CONCLUSION: Total insurer and median patient payments differ greatly between codes and plan types with higher payments seen from commercial insurance of S-codes. Coding consolidation would impact patients and providers in Texas and New York where S-codes have the most claims.

Abstract #: 107
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Specialty Surgical and Interventional Education

Ryan Guidi, BS, MS

Ryan Guidi - Rush Medical College, M2 John Toms - Rush Medical College, M4 Stephanie Taiberg - Rosalind Franklin Chicago Medical School - M3 George Kokosis, MD - Assistant Professor of Plastic and Reconstructive Surgery, Rush University Medical Center

SYSTEMATIC REVIEW ON THE IDEAL CANDIDATE FOR HIGH-DEFINITION LIPOSUCTION: A DEMOGRAPHIC PERSPECTIVE

INTRODUCTION: High-Definition Liposuction (HDL) represents a pivotal advancement in the field of aesthetic surgery due to its ability to provide a level of precision to body sculpting and contouring. This precision is accomplished by sculpting the subcutaneous fat to represent the shape of the underlying musculature to create a more athletic appearance. While HDL has been performed since the early 2000s, little research has gone into determining the ideal patient population.

METHODS: In this systematic review, a background search was conducted first to determine what variables may impact the effectiveness of the HDL procedure. This was followed by a comprehensive literature review of all peer-reviewed studies on HDL, including randomized controlled trials, cohort studies, and observational studies that report on patient demographics, outcomes, and complications within last 10 years. The literature search started with 46 studies, pulled in adherence to PRISMA-A guidelines, which were then parsed down to 18 that provided significant demographic and complication data that could be analyzed. Regression analysis was performed for BMI, Age, and Sex data individually to analyze impacts on complication rate.

RESULTS: 18 studies were analyzed including a total of 9582 patients. The most common complications included seromas, hematomas, soft tissue fibrosis, oil cysts, and abscesses at incision sites. No specific risk factors were associated with any of the complications. However, general trends were present that in data that indicated lower complication rates amongst populations with lower BMI, female sex, and increased age.

CONCLUSION: This systematic analysis provides some insight into the ideal patient population for HDL. The data collected indicated that increased complication rates are loosely correlated with increased BMI, young age, and male sex although this does not appear to be statistically significant. Future studies are needed that possess more detailed complication data based on participant information, both quantitative and qualitative, to improve our understanding of the ideal population of patients for HDL.

Abstract #: 108
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Clinical Practice III: Education
Cluster: Specialty Surgical and Interventional Education

Ime Inyang, Bachelor of Arts (BA)

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NIPPLE REINNERVATION IN NIPPLE SPARING MASTECTOMY: A CROSS-SECTIONAL REVIEW OF INSURANCE COVERAGE

INTRODUCTION: Nipple reinnervation (NRI) is a technique utilized during breast reconstruction post nipple-sparing mastectomy (NSM) to help preserve sensation to the nipple-areolar complex (NAC). Many patients experience loss of sensation post NSM which has the potential to impact their satisfaction and quality of life (QOL). Cost of surgery is a major factor for patients choosing whether to have a procedure done. Our study aims to analyze the information regarding coverage for these procedures that is publicly available on insurers' websites.

METHODS: This study analyzes the publicly available insurance coverage policies for American insurers with the largest market state and enrollment by state. We systematically reviewed publicly available coverage policies for current procedural terminology (CPT) codes related to complete mastectomy (19303), nerve grafting (64910), and nerve repair utilizing a nerve tissue graft (64912) available on insurers' websites. Coverage was classified as with/without criteria, case by case, coverage denied, or unknown. Descriptive analysis was used to demonstrate trends in coverage for mastectomy and nipple reinnervation.

RESULTS: Sixty-three insurance company websites were reviewed for policy statements regarding coverage of NSM and reinnervation. For CPT code 19303, 19% had coverage with/without criteria, 33% were case-by-case, and 48% were unknown. For reinnervation codes 64910 and 64912, 6% and 5% of companies were classified as coverage with/without criteria. For CPT code 64910, 13% were classified as case-by-case coverage and 79% were unknown. For code 64912, 14% were classified as case-by-case, and 79% were unknown. One company (1.6%) denied coverage for both CPT codes for intraoperative reinnervation. No coverage information was available on 48%, 79%, and 79% of insurance company websites for codes 19303, 67410, and 64912, respectively.

CONCLUSION: NRI post NSM can significantly impact patient satisfaction and QOL. Knowledge of insurance coverage is important for patients and surgeons to grasp the financial implications of their medical care. Our study elucidates the lack of publicly available information regarding insurance coverage for reinnervation procedures, potentially affecting patient pre-surgical decisions. Lack of transparency in insurance coverage may impact patients' ability to make informed decisions regarding their care.

Abstract #: 109
Trainee Rank: Post-Doctoral Research Fellow
Theme: Clinical Practice III: Education
Cluster: Specialty Surgical and Interventional Education

Golnaz Lotfian, MD

Authors: Golnaz Lotfian MD, Jagadeesh Singh MD, Pokhraj Suthar MD Affiliation: Department of Diagnostic Radiology and Nuclear Medicine, Rush University Medical Center, Chicago, USA. Presenting Author: Golnaz Lotfian

ADVANCES IN TREMOR IMAGING

INTRODUCTION: Tremor is a common movement disorder, often categorized into resting and action tremors. Differentiating the underlying etiology can be challenging and relies on advanced imaging techniques. Structural and functional neuroimaging, including CT, MRI, and molecular imaging, play a critical role in diagnosing and understanding tremors. OBJECTIVE: This presentation provides a comprehensive review of advanced imaging techniques used to diagnose tremors, with a focus on I123 DAT scans. Attendees will learn about the DaTscan protocol, imaging findings, and associated false positives/negatives. Additionally, multimodality imaging correlations (CT, MRI) and the role of post-treatment imaging using MR-guided focused ultrasound (MRgFUS) and deep brain stimulation (DBS) will be discussed.

MATERIAL AND METHOD: We present a case-based, multimodal pictorial review of tremor etiologies, incorporating I123 DAT scans, MRI, CT, and other radiographic

METHODS. The review covers a range of tremor types, including Parkinson's disease, essential tremor, progressive supranuclear palsy, and multiple system atrophy. Each case illustrates how advanced imaging can aid in accurate tremor diagnosis and monitoring. DISCUSSION AND RESULT: DaTscan (123I-ioflupane injection) provides essential insights into the dopaminergic systems associated with tremors. This molecular imaging agent assists in distinguishing Parkinsonian syndromes from essential tremor and other movement disorders. Nonetheless, thorough patient assessment, encompassing a comprehensive symptom history and knowledge of medications that may disrupt tracer binding, is crucial to prevent false positives or negatives. The talk examines the distinctive imaging features identified in essential tremor, progressive supranuclear palsy, and multiple system atrophy and investigates the advancing significance of post-treatment imaging in evaluating the effectiveness of therapies such as MRgFUS and DBS.

CONCLUSION: This educational exhibit serves as a vital resource for radiologists to familiarize themselves with the structural and functional neuroimaging findings in tremors. By examining real-world cases, attendees will gain critical insights into advanced imaging techniques that aid in the recognition and accurate diagnosis of various tremor disorders. This review will equip clinicians with the necessary knowledge to interpret complex imaging findings and enhance their diagnostic approach to tremor-related conditions.

Abstract #: 110
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Specialty Surgical and Interventional Education

Ashwinee Manivannan, BS

Ashwinee Manivannan (Rush), Zachary Butler (Rush), Lesly Honore (Rush), Samuel Alfonsi III (Rush), MD, Steven Gitelis (Rush), MD, Alan T Blank, MD (Rush)

PAIN ATTRIBUTION AND MANAGEMENT IN BENIGN AND NON-AGGRESSIVE BONE TUMORS: A RETROSPECTIVE STUDY OF STEROID INJECTIONS VS. SURGICAL INTERVENTION

INTRODUCTION Benign bone tumors (BBTs) represent approximately 50-60% of all bone tumors. While osteoid osteomas and chondroblastomas are well-documented sources of pain, other benign/non-aggressive bone tumors including osteoblastoma, osteochondroma, enchondroma, chondromyxoid fibroma, and fibrous dysplasia do not have a well defined pain profiles. Understanding the origin of pain in these cases is challenging, particularly when comorbidities are present. This study evaluates the efficacy of corticosteroid injections versus surgical intervention in alleviating pain, aiming to clarify whether pain originates from the BBT themselves or associated comorbidities.

METHODS We performed a retrospective review of 37 patients with BBT diagnoses located in extremities. Diagnosis was confirmed via core needle/excisional biopsy. Patient demographic, BMI, tumor diagnosis/location, cortisone use, orthopedic comorbidities, pain relief following corticosteroid injections, surgery type, and postoperative surgical pain outcomes were assessed.

RESULTS Among the 37 patients diagnosed with BBTs, 7 (19%) received a steroid injection, while 30 (81%) did not. Of the 7 patients who received injections, 5 (71%) claimed improved pain relief, while 2 (29%) denied improvements. Four patients who reported initial improvement of pain following steroid injection, reported the pain returned and ultimately underwent surgery with further pain improvement. Among the original 37 patients, 34 (92%) underwent surgery, while 3 (8%) did not. Of the 34 patients who underwent surgery, 31 (91%) reported pain improvement, while 3 (9%) denied any.

CONCLUSION Corticosteroid injections have provided inconsistent pain relief in patients with benign/non-aggressive bone tumors. In contrast, surgical intervention resulted in a higher rate of pain improvement, suggesting that the primary source of pain is often the tumor itself rather than the comorbidity. These findings highlight the essential role of surgical management in addressing the pain associated with BBTs. This is the first study to specifically address the origin of pain presentation in patients with various BBTs, presenting a foundation for further investigations into optimal treatment strategies.

Abstract #: 111
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Clinical Practice III: Education
Cluster: Specialty Surgical and Interventional Education

Amy Wen, B.A.
Amy Wen (RMC); Ryan Kuhn (RMC); Ashwinee Manivannan (RMC)

EDUCATIONAL HANDOUT FOR POSTOPERATIVE CONSTIPATION REDUCES HEALTHCARE UTILIZATION POST BARIATRIC SURGERY

INTRODUCTION: In our bariatric practice, one of the most common reasons patients call or present to the emergency department after bariatric surgery is for constipation. Therefore, our team developed a handout which contained a constipation treatment algorithm for patients to follow independently to manage their symptoms post-operatively. The primary objective of this study was to evaluate the impact of this handout on postoperative healthcare utilization, specifically, the number of patient-initiated messages and calls related to constipation. Secondarily, we aimed to determine its impact on constipation related emergency department visits.

METHODS: A retrospective analysis was conducted using electronic medical record data for all patients undergoing bariatric surgery over two 6-month periods: October 2022 to March 2023 (no handout) and May 2023 to October 2023 (with handout). The number of messages and phone calls related to constipation were recorded, as well as the secondary data including prior history of constipation, ED visits related to constipation, and surgery type. Statistical analysis was performed using R version 4.3.2. Chi-squared and t-tests were used to compare outcomes between the two groups, using a p-value of <0.05 to assess significance.

RESULTS: Patients who received the handout sent and made significantly fewer messages and calls regarding constipation respectively ($p = 0.008$), with lower mean and standard deviation of communications ($p < 0.001$), compared to those who did not receive the handout. Furthermore, emergency department visits related to constipation were significantly higher in the non-handout group ($p = 0.041$).

CONCLUSION: The implementation of an educational handout for managing constipation was effective in reducing the number of postoperative messages and phone calls and lowered the incidence of ED visits related to constipation. This suggests that providing bariatric surgery patients with targeted information on constipation management improves their ability to independently manage their constipation while reducing healthcare utilization.

Abstract #: 112
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Systematic Reviews and Protocols

Aaron Hendizadeh, MS

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SYSTEMATIC REVIEW OF EXCISIONAL TECHNIQUES FOR THE TREATMENT OF GYNECOMASTIA

Abstract not published per trainee's request.

Abstract #: 113
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Systematic Reviews and Protocols

Solomon Isi, BS

Isi S, Gerhold C, Powells D, Atkins M, Dave U, Madden D, Gómez-Verdejo F, Villarreal-Espinosa JB, Carpenter C, Verma N, Chahla J.

OUTCOMES FOLLOWING TRADITIONAL, COOLED, AND PULSED RADIOFREQUENCY ABLATION OF THE GENICULAR NERVES: A SYSTEMATIC REVIEW

INTRODUCTION Knee osteoarthritis (KOA) is one of the leading causes of disability in the United States. Nearly 35 million people in the United States are 65 and older, and two-thirds of adults are overweight, both predispositions for KOA. Genicular nerve radiofrequency ablation (RFA) is a minimally invasive procedure that is being increasingly utilized by orthopaedic surgeons to treat chronic knee pain, primarily in symptomatic KOA patients who experienced failure of conservative or surgical treatments or are poor candidates for surgery. This systematic review aims to compare and analyze the differences in functional outcomes and complications amongst the variations of genicular RFA.

METHODS A systematic review of Embase, PubMed, and Cochrane Library databases was performed in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Included studies either had a retrospective design or were a prospective randomized control trial (RCT). Data items extracted from each study included the following: (1) demographic information; (2) indication for RFA; (3) OAs grade; (4) duration of knee pain prior to RFA; (5) patient reported outcome scores; and (6) number of patients with relief post-RFA.

RESULTS 512 studies were identified for screening. After screening, a total of 45 studies were included in this study. Several studies reported on more than one type of RFA, with 27 studies reported results of traditional RFA, 17 reporting on cooled RFA, and 5 reporting on pulsed RFA. WOMAC scores revealed a range of 13.2 ± 5.1 to 93.53 ± 1.9 pre-RFA and a range of 7.2±3.25 to 76.0±64.0 at 6 months post-RFA for patients that underwent traditional RFA.

DISCUSSION AND CONCLUSION RFA shows promising results, although more research on larger cohorts will need to be conducted to determine which patient populations are most likely to benefit from this intervention.

Abstract #: 114
Trainee Rank: RUSH Matriculated Student
RMC: M4
Theme: Clinical Practice III: Education
Cluster: Systematic Reviews and Protocols

Omar Nabulsi, BA

Omar Nabulsi (Rush), Othman Ibrahim (Rush), Julio Roque Buenrostro (Rush), Stanley E. Rozentsvit (Rush), Mohammed Almaani (Rush), Fares Eshac (Rush), Gabriele Bigante (Rush), Angelo Orsini (Rush), Francesco Lasorsa (Rush), Ricardo Autorino (Rush), Ephrem Olweny (Rush)

COMPARATIVE EFFICACY of PHYTOTHERAPY FOR THE TREATMENT OF LUTS/BPH: A MULTIPLE TREATMENTS (NETWORK) META-ANALYSIS

INTRODUCTION Phytotherapy is widely utilized for the treatment of lower urinary tract symptoms secondary to benign prostatic hyperplasia (LUTS/BPH). Given the wide variety and heterogeneity in commercialized products however, data on their comparative efficacy are lacking. We performed a network meta-analysis to evaluate this.

METHODS We systematically reviewed 44 RCTs of phytotherapy for LUTS/BPH enrolling 3,957 participants from 1995 to 2023. Relevant studies compared specific phytotherapies to placebo and reported outcomes as change from baseline. Outcomes analyzed were American Urological Association Symptom Score (AUASS), quality of life (QoL), maximum flow rate (Qmax), and post void residual (PVR). Network meta-analysis was performed within a frequentist framework, and for each phytotherapy drug, mean change from baseline (95% CI) for each outcome relative to placebo was reported. Treatments were ranked in order of relative efficacy using the surface under the cumulative ranking (SUCRA) method.

RESULTS A total of 24 different phyotherapy or phyotherapy combinations were assessed (Fig 1); overall 6 demonstrated improvement in AUASS vs. placebo, with no significant difference vs. placebo observed for QOL, Qmax and PVR. Specifically, Quisqualis indica (1000 mg and 2000 mg), sitosterol, selenium-silymarin, sitosterol-enriched saw palmetto, Flowens and Epilobium angustifolium extract improved symptom scores (Fig 2). By SUCRA, Quisqualis indica 1000 mg had the highest probability of providing the best improvement in AUASS vs. placebo.

CONCLUSION Several phytotherapy extracts have efficacy in improving AUASS but not Qmax or PVR in patients with LUTS/BPH, with the greatest efficacy observed for Quisqualis indica 1000 mg. Further studies on mechanism of action, optimal extraction methods and optimal duration of treatment are needed.

Abstract #: 115
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Technology and AI in Education

Seth Adler, BA
Seth Adler, BA (Rush), Fernando Ocampo Gonzalez, MD (Rush)

UNTANGLING THE THREADS: PATHOLOGY PROFILES AND ENGAGEMENT OPPORTUNITIES WITH THE LATEST SOCIAL MEDIA PLATFORM

INTRODUCTION: Social media engagement is one avenue for pathology education and engagement. Prior studies have analyzed pathology content on social media platforms like TikTok and X (formerly known as Twitter), but Threads, the newest social media app, has yet to be an area of focus. We analyzed the top pathology-related profiles on Threads in order to describe opportunities for pathologist engagement.

METHODS: The top 60 Threads profiles that populated after searching "pathology" were retrieved, with account type and follower count recorded. 30 were excluded from analysis due to having a follower count below 10 or not being related to pathology. Profiles were grouped as those run by physicians, assistants, those in-training, non-licensed educational, companies, academic institutions, and academic societies. An independent Kruskal-Wallis test was performed to analyze if follower count differed significantly between groups. A Chi-Square test of equal proportions was performed to analyze distribution across account types. Descriptive statistics were also obtained. All data was analyzed via Excel 2024 and Stats.Blue.

RESULTS: 9 out of the 30 profiles included were run by academic institutions (30%), 8 by physicians (27%), 4 by non-licensed accounts providing educational content (13%), 4 by academic societies (13%), 3 by private practice companies (10%), 1 by physicians-in training (3%), and 1 by assistants (3%). The median follower count of all profiles was 115 ([IQR]: 55 - 855), while the mean follower count was 815 (SD = 1408). Physician-run accounts had the highest average follower count (3,744) and pathologist-assistant-ran account had the fewest (28). Follower count was found to differ significantly across account types ($p = 0.04$) and there was significant difference between observed and expected values ($p = 0.03$).

CONCLUSION: While physician-run accounts made up only 27% of all pathology-related profiles on Threads, they had the highest average follower count. Licensed pathologists with interest in creating educational content appear to have a captive audience on Threads, presenting opportunities for engagement with patients, healthcare workers, and physicians-in-training. Further investigation of content type posted on Threads and longitudinal trends should also be evaluated.

Abstract #: 116
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Technology and AI in Education

Kyle Casey, BS

Kyle W Casey (RMC M2) -- presenting/first author Sean M Wrenn, MD (RUMC)

ASSESSING PROVIDER PERCEPTIONS REGARDING PRACTICE IMPLEMENTATION AND COMPENSATION FOR THYROID NODULE RADIOFREQUENCY ABLATION

INTRODUCTION Thyroid nodule radiofrequency ablation (RFA) remains a new technology that has a diverse array of practice settings and variable insurance reimbursement. There is no dedicated CPT code for thyroid RFA yet, which has complicated the insurance approval process, leading to heterogenous coverage, reimbursement, and overall impact on availability to patients.

METHODS This study utilized a 24-question survey distributed to members of the North American Society of Interventional Thyroidology (NASIT). Survey participation was completely voluntary and without compensation. Responses were recorded without personal identifiers. The survey consisted of Likert scale and free response questions.

RESULTS 45 viable responses were recorded. Of these, 82.2% of respondents were dissatisfied or very dissatisfied with the current landscape of insurance approval for thyroid RFA compared to other thyroid procedures. 68.9% of respondents felt that out-of-pocket cost to the patient is often or always a prohibitive factor in the utilization of thyroid RFA. 33.3% of respondents were dissatisfied or very dissatisfied with their current level of reimbursement for thyroid RFA, 33.3% were neutral, and 33.3% of respondents were satisfied or very satisfied with their reimbursement.

CONCLUSION This study shows that there is dissatisfaction among providers with the current landscape of billing for thyroid RFA procedures. This study also found that out-of-pocket cost to patient is the most common prohibitive factor for patients who would otherwise benefit from this treatment. Overall, more research is necessary into the billing and coverage for this procedure, as the landscape may change with the advent of an RFA-specific CPT code.

Abstract #: 117
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Technology and AI in Education

Pierce Herrmann, Bachelors of Science

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COMPARATIVE ANALYSIS OF AI-GENERATED STUDY GUIDES IN OTOLARYNGOLOGY EDUCATION

INTRODUCTION: Resident physicians training in the field of otolaryngology often utilize traditional textbooks such as "Cummings: Otolaryngology Head and Neck Surgery", which are considered the gold standard for educational content. However, integrating artificial intelligence (AI) into educational methods offers potential enhancements to traditional methods of trainee learning. Large language models (LLMs), such as OpenAI's GPT-4, have revolutionized the opportunity for personalized learning experiences. This study evaluates the efficacy of AI-generated study guides for otolaryngology residents, focusing on accuracy, relevance, and clarity.

METHODS: Study guides for four chapters of "Cummings: Otolaryngology Head and Neck Surgery" were generated using ChatGPT-4. A non-expert in otolaryngology generated the study guides to ensure replicability. Expert reviewers (board-certified rhinologists) evaluated the study guides with a structured assessment form. The guides were rated on accuracy, relevancy, and clarity using a 4-point scale. The item-level content validity index (I-CVI) was calculated for each parameter.

RESULTS: Study guides were successfully generated for the selected chapters and evaluated by eight experts. The mean scores for accuracy, relevancy, and clarity across all chapters were 3.8 (SD = 0.4), 3.7 (SD = 0.3), and 3.9 (SD = 0.2), respectively. I-CVI scores for accuracy, relevancy, and clarity ranged from 0.8 to 1.0, signifying that the content was valid. Reviewers praised the comprehensive nature and clear format of the guides, although they suggested incorporating more detailed explanations and visual aids.

CONCLUSION: The findings demonstrate the potential of LLMs in generating high-quality educational content for medical education. AI-generated study guides can reduce the burden on educators and provide tailored learning resources for residents. However, ensuring content accuracy remains critical. Future research should explore refined AI models and multimodal inputs to enhance educational outcomes. This study highlights the feasibility of integrating AI into medical education, offering a scalable solution for generating educational materials. By leveraging AI, medical educators can improve the quality and efficiency of training for otolaryngology residents.

Abstract #: 118
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Clinical Practice III: Education
Cluster: Technology and AI in Education

Tejas Sekhar, BA

Tejas C. Sekhar (Rush Medical College), Bryce Mashimo (Case Western Reserve University School of Medicine), Hamza Dahshi (Case Western Reserve University School of Medicine), Juwon Park (Northwestern University), Hannah Ma (Northwestern University)

WHEN AI MISSES THE MARK: CONTEXTUALIZING CHALLENGES IN MENTAL HEALTH TEXT MODELING

INTRODUCTION: Increasing use of large language models (LLMs) in medicine necessitates responsible implementation, particularly when leveraging specialized clinical text embedders capable of mediating real-world decision making affecting patients [1]. This study evaluates embeddings generated by a domain-specific model (MentalBERT) and a general-purpose model (all-MiniLM-L6-v2) on mental health-related text from Reddit. Using dimensionality reduction and clustering, we assess which model better captures nuances indicated by subreddit labels, while exploring the implications for clinical application integration.

METHODS: A dataset containing 54,412 Reddit posts labeled by mental health-related subreddits (i.e., r/Depression, r/Anxiety, r/Bipolar, r/SuicideWatch, r/OffMyChest) was utilized in this study. Fixed-length embeddings were generated using MentalBERT [3] and all-MiniLM-L6-v2 and subsequently visualized via t-SNE for clustering. K-means clustering (k=5) was applied to generated t-SNE embeddings, and performance was evaluated using metrics such as Silhouette Score, Normalized Mutual Information (NMI), Adjusted Rand Index (ARI), and Purity Score.

RESULTS: The dataset exhibits significant variability in post lengths, with an average word count of 178 words (SD = 237) and a median of 108. Clustering performance metrics and visualizations both show that all-MiniLM-L6-v2 outperformed MentalBERT across all measures, though both models struggled to align clusters with true subreddit labels as evidenced by low evaluation metrics. While all-MiniLM-L6-v2 demonstrated better generalization, both models faced challenges in representing the nuances of informal, mental health-related text for unsupervised clustering tasks. As a secondary analysis, crowdsourced users via the DiagnosUs iOS platform were tasked with re-labeling the Reddit posts while being blinded to the original labels to determine whether model performance could be improved following reclassification.

CONCLUSION: Although all-MiniLM-L6-v2 marginally outperformed MentalBERT, both models struggled to capture the nuanced and overlapping expressions of mental health conditions in the informal and diverse language of online forums. Label imbalance, variability in post lengths, and the models' focus on short-sentence tasks likely contributed to the underperformance, raising concerns about the use of specialized embedders in fine-tuning LLMs for clinical applications. Future research should prioritize adaptable models, multimodal data incorporation [4], and ethical considerations to improve model reliability and patient safety in clinical settings.

Abstract #: 119
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Clinical Practice III: Education
Cluster: Technology and AI in Education

Kayvon Yazdanbakhsh, MPH

Kayvon Yazdanbakhsh, MPH, Pierce Herrmann, BS, Alex Tegeler, MA, Keyur Parekh, MD, Pokhraj Suthar, MBBS (RUSH)

EVALUATION OF ChatGPT 4.0 IN NUCLEAR MEDICINE IMAGING AND DIAGNOSTICS

INTRODUCTION: Advancements in artificial intelligence (AI), particularly those who use large language models (LLMs), an AI program that is trained on text data. One potential application of LLMs is their use in medical education, particularly radiology. This study aims to evaluate the accuracy of Chat GPT 4.0, a popular LLM, in answering nuclear medicine board questions from Nuclear Medicine: A Core Review.

METHODS: To assess our research question, Chat GPT 4.0 was provided with the text and answer choices for 115 multiple choice board review questions. All 12 chapters of the aforementioned board review book were included and questions that relied solely on imaging were excluded. Chat GPT's responses were compared with the chosen answer key for accuracy after each AI-generated response.

RESULTS: Chat GTP's performance on nuclear medicine multiple choice practice questions was varied based on the subject of the question bank, with its accuracy ranging from as low as 75% to achieving a perfect score. The mean ChatGPT correct score was 86.95%, with a median of 85.55% and a standard deviation of 7.28%. Chat GPT scored a perfect score in the Radiopharmacy and Nuclear Cardiology sections correctly answering all 7 and 6 questions, respectively. These chapters are outliers for Chat GPT as the only sections with a score more than 1 standard deviation from its performance mean. Chat GPT scored the worst on Pediatric Nuclear Medicine, another outlier as the only score beyond 1 standard deviation beneath the mean, at 75% missing 2 out of 8 questions. There was no correlation between the percentage of correct answers and the total number of questions in that section.

CONCLUSION: Chat GPT was able to correctly identify the answer of nuclear medicine board questions from one selected text roughly 86% of the time, with varying performance based on the question topic, but no correlation between number of questions answered and its performance in any given chapter. Further research should seek to evaluate what variables are affecting this LMMs performance such as characteristics of key information, question length, complexity of answers or prevalence of the condition being questioned.

Abstract #: 120
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Health Equity and Community Engagement
Cluster: Food Insecurity and Cardiometabolic Health

Joanna Choe, Bachelor of Science

Authors: Joanna Choe, BS (Rush); Lauryn Tsai, BS (Rush); Ethan Belnap, BS (Rush); Camden Richter, BA (Rush); Daniel Luger, MD (Rush) First authors/presenters: Joanna Choe, BS (Rush); Lauryn Tsai, BS (Rush)

EFFECTS OF PRIMARY CARE PHYSICIAN STATUS ON CARDIOVASCULAR DISEASE RISK IN POPULATIONS EXPERIENCING FOOD INSECURITY IN CHICAGO, ILLINOIS

INTRODUCTION: Cardiovascular disease (CVD) affects nearly half of the American population and is projected to increase in the next 30 years. Notably, food insecure individuals face a disproportionate burden of CVD. Studies suggest that there is an association between food insecurity and higher atherosclerotic cardiovascular disease (ASCVD) risk, but there is a paucity in research about the mechanisms of their relationship. Lack of access to health care, specifically a primary care provider (PCP), may be one contributing factor to CVD burden in these populations. The purpose of this study was to assess the relationship between having a PCP and ASCVD risk in a food insecure population of West Chicago.

METHODS: Patients participated in comprehensive cardiometabolic screenings and health coaching events organized by the Cardiometabolic Health Initiative (CHI) at food pantries on the west side of Chicago. Patients self-reported whether they had a PCP or not. ASCVD risk was determined using medical history, blood pressure, point-of-care lipid and A1C panels, and the American College of Cardiology calculator that estimates the 10-year risk of a major cardiovascular event. Statistical analyses were performed in R version 4.4.2 to calculate linear regression and chi-square p-values.

RESULTS: A total of 347 patients participated in the cardiometabolic screenings of which 249 had sufficient data to assess their ASCVD risk. 139 patients have a PCP and the rest did not. The average ASCVD risk was 8.074% for patients without a PCP and 12.549% for patients with a PCP ($p=0.00305$). About 3.5% of the increased ASCVD risk is attributed to having a PCP (Multiple R-squared = 0.03498).

CONCLUSIONS: Our data suggests patients with PCPs have an increase in ASCVD risk than those without PCPs. However, a low R-squared value suggests that having a PCP is not an independent predictor of ASCVD risk. Patients who have health concerns based on age, family history, exposure to risk factors, or other comorbidities may be more motivated to have a PCP. Our findings necessitate further research about the complex interplay between socioeconomic factors and ASCVD risk in order to inform appropriate community-based interventions.

Abstract #: 121
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Health Equity and Community Engagement
Cluster: Food Insecurity and Cardiometabolic Health

Nil Patel, BS, BA

Nil Atul Patel, BS, BA (RMC) Alex Tegeler, BS (RMC) Mireya Smith, BA (independent) Ethan Belnap, BS (RMC) Camden Richter, BA (RMC) Daniel Luger, MD (Department of Internal Medicine, Rush University Medical Center)

IDENTIFICATION OF POST-PANDEMIC FOOD INSECURITY IN CHICAGO'S MOST VULNERABLE COMMUNITIES THROUGH GEOSPATIAL ANALYSIS

INTRODUCTION Since the COVID-19 pandemic, food insecurity has been exacerbated around major metropolitan cities such as Chicago. Food insecurity is defined as a socioeconomic condition in which members of its population are unable to attain or receive access to adequate food. The dramatic changes of the pandemic necessitate a reexamination of which ZIP Codes in the city face the highest burden of food insecurity. Through geospatial analysis, this study aims to evaluate particularly high-risk communities post-pandemic in order to determine proper resource distribution and community-based interventions in the zip codes identified.

METHODS Cardiometabolic Health Initiative is a community service organization that partners with local food pantries to screen patients for cardiometabolic disease risk. This study is a retrospective analysis of patients of CHI screening events from August 2023-December 2024. The screenings include patient history, lipid panels, A1c measurements, and counseling on health and diet. From self-reported data on zip codes, a geospatial analysis was conducted to create a map outlining various hotspots of food insecurity within the Chicago area.

RESULTS Of the 304 participants who reported their ZIP Codes, 44 patients reside in ZIP Code 60302 (14.5%). Thirty seven patients reside in 60644 (12.17%). Thirty four patients from 60623 (11.2%) and thirty one from 60651 (10.19%). Other notable zip codes include 60607, 60310, 60402, 60612, and 60624, all making up sizable percentages of where we see more food insecure populations.

CONCLUSION Our data suggests that post-pandemic food insecurity drastically impacts certain west-side zip codes. Around 48% of food pantry attendees originated from one of four zip codes, indicating an increased burden of insecurity in these areas. However, we also saw broad diversity in the zip codes of various food pantry attendees, some originating from outside Chicago's boundaries. This highlights the importance of identifying struggling communities and determining the proper allocation of resources. In addition, this analysis can be used by CHI and other Chicago-based organizations to help target their efforts towards populations struggling with food insecurity the most.

Abstract #: 122
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Health Equity and Community Engagement
Cluster: Food Insecurity and Cardiometabolic Health

Camden Richter, BA

Camden Richter (RMC), Ethan Belnap (RMC), William Cohen (RMC), Abigail McIntosh (RMC), Ishan Khosla (RMC), Daniel Luger, MD (RMC)

PREVALENCE OF PREDIABETES AND UNCONTROLLED DIABETES MELLITUS AMONG FOOD INSECURE PATIENTS AT CARDIOMETABOLIC HEALTH INITIATIVE SCREENINGS

INTRODUCTION Food insecurity is a public health issue and a major risk factor for overall worse health outcomes including hypertension, diabetes, coronary heart disease, congestive heart failure, stroke, chronic kidney disease and obesity. Food insecure patients are more likely to have both diagnosed and undiagnosed prediabetes and diabetes. This study examines the prevalence and self-awareness of diabetes and prediabetes in an at-risk, food insecure population.

METHODS The Cardiometabolic Health Initiative (CHI) is a community service organization that provides comprehensive cardiometabolic screenings at food pantries in West Chicago. Between August 2023 and December 2024, 191 patients were screened using point-of-care A1c tests.

RESULTS The average A1c of the population was 6.04%. Ninety-six patients had a normal A1c (<5.7%), 66 had a prediabetic A1c (5.7-6.4) and 29 had a diabetic A1c (>6.4). Forty-two patients self-reported a history of DM. The average A1c for the self-reported DM group was 7.58% and the average A1c for the non-reported group was 5.60%. Among the self-reported DM group, 24 patients had controlled DM (A1c<7%) and 18 had uncontrolled DM (A1c>7%). Among the non-reported group, 56 had a prediabetic A1c and 3 had a diabetic A1c.

CONCLUSION The presented findings suggest a high prevalence of diabetes and prediabetes within a food insecure population in West Chicago. Further, this study suggests that many diabetic patients struggle to control their A1c levels. Our findings reflect many barriers presented to food insecure patients that can hinder diabetes diagnosis, education, and management.

Abstract #: 123
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Health Equity and Community Engagement
Cluster: Food Insecurity and Cardiometabolic Health

Alex Tegeler, MA, BSN

Alex Tegeler (Rush University); Nil Atul Patel (Rush University); Ethan Belnap (Rush University); Camden Richter (Rush University); and Daniel Luger (Rush University)

MINI-EAT SCORES AND ASCVD RISK: INSIGHTS FROM A FOOD-INSECURE POPULATION

BACKGROUND Cardiovascular disease (CVD) is the leading cause of death in the United States, in which around half of disability and death related to CVD can be attributed to limited nutritional intake. Food insecurity is linked to an increased prevalence of cardiometabolic risk factors and higher mortality rates. The Mini-Eating Assessment Tool (Mini-EAT) is a nine-question dietary screening tool designed to assess nutritional intake quickly and efficiently. However, its effectiveness in identifying cardiometabolic risk factors in food-insecure populations remains undetermined. This study seeks to illuminate whether there is an association between the Mini-Eat and atherosclerotic cardiovascular disease (ASCVD) risk in a food-insecure population.

METHODS Cardiometabolic screenings were conducted at Beyond Hunger, a food pantry in Oak Park, IL. Data collected included patient demographics, A1c levels, fingerstick lipid panels, blood pressure measurements, and medical history. Participants completed Mini-EAT questionnaires regarding their dietary intake, resulting in a maximum score of 72. The 38 participants were categorized into ASCVD risk groups using the American College of Cardiology risk calculator. Spearman correlation coefficients were calculated to evaluate the associations between Mini-EAT scores and ASCVD risk.

RESULTS The mean Mini-EAT score among participants was 29.58 (SD = 7.64), with no significant differences across risk categories. The Spearman correlation ($\rho = -0.1215$, $p = 0.4673$) between Mini-EAT scores and continuous ASCVD risk percentages indicated a weak, non-significant negative association. This relationship was slightly weaker when analyzed as categorical groups ($\rho = -0.1014$, $p = 0.5447$).

CONCLUSION our results indicate the limited utility of the Mini-EAT survey in identifying cardiovascular risk factors in food-insecure populations. In food-insecure populations relying on food pantries, variability in dietary intake due to inconsistent access to food may hinder the accuracy of responses to the Mini-EAT questionnaire. Our findings suggest that dietary intake, measured by Mini-EAT, is insufficient to capture the complexity of cardiometabolic risk. These findings emphasize the need for comprehensive strategies that integrate dietary assessments with socioeconomic and behavioral factors to more accurately assess cardiovascular risk in food-insecure populations.

Abstract #: 124
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Health Equity and Community Engagement
Cluster: Food Insecurity and Cardiometabolic Health

Tina Ting, MPH

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EFFECTS OF INSURANCE STATUS ON CARDIOVASCULAR DISEASE RISK IN POPULATIONS EXPERIENCING FOOD INSECURITY IN CHICAGO, ILLINOIS

INTRODUCTION Cardiovascular disease (CVD) remains the leading cause of mortality in the United States and globally. Current literature indicates an association between lack of health insurance and worsened cardiovascular-related outcomes. This is exacerbated in low income and racial minority communities which are more likely to experience food insecurity. Evidence has shown that food insecurity can increase risk of CVD by two-fold. Despite this, few studies analyzed the effect of insurance status on CVD risk within food insecure populations. This study seeks to bridge this gap by examining atherosclerotic cardiovascular disease (ASCVD) risk scores among individuals who attended two food pantries in the West Side of Chicago.

METHODS Cardiometabolic Health Initiative (CHI) is a student-led organization that offers free monthly cardiometabolic screenings at food pantries in Chicago. Screenings include blood pressure measurements, lipid and A1c point of care testing, community health worker counseling, and health coaching. Data collected during the visit were used to calculate ASCVD risk scores. Patient insurance status was self-reported as part of a social determinants of health screener. Mean ASCVD risk scores between insured vs uninsured groups was analyzed using an independent sample t-test using IBM SPSS Statistics.

RESULTS Among 347 patients screened, 112 self-reported their insurance status. 40% (n=45) were uninsured. Of the 112, ASCVD score was calculated for 70% of the clients (n=78): 55% qualified as low risk, 15% as borderline, 21% as intermediate risk, and 9% as high risk. The average ASCVD risk score of the overall population was 10.6% (N=248). The mean ASCVD risk scores in the insured and uninsured cohorts were 9.56% and 5.22%, respectively (p=0.067).

CONCLUSION Findings in the literature suggest communities experiencing food insecurity are at increased risk for cardiac events. However, we found no significant difference in ASCVD risk scores by insurance status. This discrepancy could indicate the presence of potential confounders, such as health literacy, access to care, and cardiometabolic risk factors, to this relationship, highlighting the need for further studies to adequately understand the impact of insurance coverage on ASCVD risk score in food insecure populations.

Abstract #: 125
Trainee Rank: Clinical Resident
Theme: Health Equity and Community Engagement
Cluster: Language, Access, and Digital Inequities

Katarzyna Blair, PharmD
Melissa Kocek, PharmD

IMPACT OF AN INTERNAL MEDICINE CLINICAL PHARMACY SPECIALIST AT AN ACADEMIC MEDICAL CENTER

BACKGROUND: In the past 7 years, inpatient hospital prescription drug spending has increased by 20% in the United States. Pharmacists are trained to optimize medication regimens, identify barriers with certain medication regimens, recommend lower cost alternatives, and reduce cost by error prevention. Pharmacists are responsible for identifying nearly 70% of medication errors. Medication errors are estimated to lead to as much as 50 billion dollars in added healthcare costs per year. This study aims to identify the impact of an internal medicine clinical specialist pharmacist at an academic medical center, specifically evaluating the cost avoidance provided and severity of interventions completed by an internal medicine clinical specialist.

METHODS: This is a prospective, observational study. Patients presenting to the Rush University Medical Center internal medicine unit from January 6- February 2, 2025 were included. Seven internal medicine clinical pharmacy specialists tracked interventions related to adverse drug event prevention, resource utilization, hands-on care, drug information and protocol implementation. Accepted and rejected interventions were documented in the electronic medical record (EPIC) using a monitoring system visible only to the pharmacy team (iVents). The primary outcome of this study is mean number of interventions per internal medicine clinical pharmacy specialist per 8 hour shift. Secondary outcomes include: number of interventions completed, type of intervention completed, severity of intervention, time spent per intervention, average cost avoidance per intervention and mean cost avoidance per internal

RESULTS: Pending

CONCLUSION: Potential implications include evidence of the benefit of an internal medicine clinical pharmacy specialist support suggesting the necessitation of additional pharmacy staff. This study could demonstrate the utility of a clinical pharmacy specialist as a cost savings and patient safety initiative.

Abstract #: 126
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Health Equity and Community Engagement
Cluster: Language, Access, and Digital Inequities

Catherine Chang, B.A in Biology

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PATIENT-CENTERED APPROACH TO PROMOTE MYCHART UTILIZATION AMONG RUSH EMERGENCY DEPARTMENT PATIENTS AND REDUCE DIGITAL HEALTH INEQUITIES

INTRODUCTION Research shows that enhanced utilization of patient portals promotes access to medical services, patient engagement, digital health equity, and stronger patient-provider relationships. Despite these benefits, existing research indicates that only 57% of patients in the U.S.A. utilize electronic patient portals due to barriers such as lower levels of digital health literacy, English proficiency, and socioeconomic status. This inequitable access to digital health resources underscores the need for targeted interventions guided by practical implementation and provider buy-in. Rush Digital Health Equity & Literacy Program (D-HELP) sought to address this gap by providing Epic MyChart training to patients in the RUMC Emergency Department (ED), with the goal of promoting increased patient engagement through improved ability to access and utilize their electronic health records (EHR).

METHODS Medical students underwent standardized training to ensure competency with MyChart and consistency in delivering patient education. Students were also trained to identify ED patients at risk of low EHR utilization and provide tailored MyChart training in both English and Spanish, the latter achieved through interpreter services. After each patient encounter, medical students document their interactions using a standardized questionnaire which includes information regarding the patient's prior experience with MyChart and telehealth services, barriers to providing this service, and the patient's receptiveness to training.

RESULTS Ongoing data collection efforts indicate low patient utilization of MyChart and telehealth services among ED patients. results from the questionnaire have been mixed as patients demonstrated a variable level of experience with MyChart. Some patients demonstrate receptiveness to the training while a few-particularly older patients-have expressed indifference or greater resistance to learning about digital telehealth resources, as they are comfortable scheduling appointments with their current methods. However, data collection is still ongoing, and more data points are needed to make decisive claims.

CONCLUSION Recognizing that digital literacy is a modifiable social determinant of health, D-HELP focuses on the provision of multimodal educational services surrounding patient portal navigation and accessibility. Our preliminary findings highlight the gaps in utilization of EHRs in the ED setting, emphasizing the need for further exploration of strategies to improve digital health resource utilization and ensure equitable access for all patients.

Abstract #: 127
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Health Equity and Community Engagement
Cluster: Language, Access, and Digital Inequities

Matthew Crosse, Bachelor of Science (BS)

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TRANSFORMING ENGAGEMENT AND DELIVERY OF HEALTHCARE THROUGH LANGUAGE

INTRODUCTION: The ability to speak multiple languages offers a unique advantage in communicating with different cultures, increasing cultural awareness, and creating more meaningful interactions. Practicing medicine with multilingualism in the U.S. allows providers to more effectively interact with diverse patient populations with limited English proficiency. Due to the rise of these patient populations, there is an increased need for multilingual physicians. This study focuses on the linguistic capabilities of medical specialists at five academic hospitals in Chicago to demonstrate each department's current language representation.

METHODS: Our study primarily analyzed website data from five chosen academic hospitals. The hospitals included John H. Stroger, Jr. Hospital of Cook County, Loyola University Medical Center, Rush University Medical Center, University of Illinois Hospital, and the University of Chicago Medical Center. We investigated eight medical specialties which included Neurosurgery, Orthopedic Surgery, Ophthalmology, General Surgery, Otorhinolaryngology, Urology, Obstetrics and Gynecology, and Cardiothoracic Surgery. We compared the linguistic distribution across these specialties, and considered both full-time and independent physicians.

RESULTS: A total of 979 physicians were included in the study. Neurosurgery had a higher percentage of physicians that spoke two languages of more (52%) compared to other specialties, and Orthopedic surgery was the specialty with the lowest percentage of physicians that spoke more than one language (23.2%). Ophthalmology and Neurosurgery had the highest number of physicians that spoke three or more languages consisting of 14.35% and 20% respectively.

CONCLUSION: As a whole, this study differentiates the language proficiency abilities across eight surgical specialties. Our data highlights that certain specialties are more advantageous for diverse patient populations, benefiting not only Spanish-speaking communities but other communities that may only speak Arabic, French, Portuguese, among other languages. This data could have temporary limitations due to a lack of physicians self-reporting their language skills. Increasing awareness of the need for more linguistic diversity in surgical specialties is important to the overall health of diverse patient populations. Further initiatives will need to be performed to help foster more linguistic diversity and address the continuously rising amount of patients with limited English proficiency.

Abstract #: 128
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Health Equity and Community Engagement
Cluster: Language, Access, and Digital Inequities

Aisha Zanib, Bachelor of Science (BS)

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DEMAND FOR MORE BILINGUAL SPANISH PROVIDERS TO ACHIEVE MORE EQUITABLE HEALTHCARE

INTRODUCTION: Over recent decades, the U.S. Hispanic population and Spanish language have grown substantially, prompting the need to have more Spanish-speaking providers. Although there are more primary care providers fluent in Spanish, there is a notable difference seen in the Spanish-speaking ability of providers in medical specialties. The aim of our study is to highlight this disparity by investigating the Spanish-speaking ability of physician specialists at the five main academic hospitals in Chicago, the third largest metropolitan area in the nation where approximately 29.6% of the population is Hispanic.

METHODS: Data was collected from five academic hospital websites that included the University of Chicago Medical Center, Rush University Medical Center, University of Illinois Hospital, Loyola University Medical Center, and John H. Stroger, Jr. Hospital of Cook County. The specialties evaluated included Neurosurgery, Orthopaedic Surgery, Ophthalmology, General Surgery, Otorhinolaryngology, Urology, Obstetrics and Gynecology, and Cardiothoracic Surgery. Our study assessed attending physicians who worked full time or independently with hospital privileges. Our study also accounted for additional languages spoken by each provider.

RESULTS: In this study, a total of 979 physicians across the eight specialties and five institutions were collected. 64.9% of the physicians in all specialties spoke only English, 12.7% both English and Spanish, and 16.5% another language other than Spanish. Only 5.7% of all providers can provide care in English, Spanish, and another language. Among the most prevalent languages known other than Spanish were Arabic and Hindi consisting of 3.26% and 3.88% respectively.

CONCLUSION: Our study highlights the existing shortage of Spanish-speaking medical specialists despite the rise in both U.S. Hispanic population and Spanish language. The results indicate the need to address this Spanish language gap between primary care and specific specialties through initiatives dedicated to both train and recruit bilingual providers. Temporary limitations of this study may stem from inconsistent or outdated data on hospital websites. Addressing this important issue of increasing the amount of bilingual physicians will help enhance the clinical outcomes that Spanish speakers experience and ultimately improve culturally competent care.

Abstract #: 129
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Health Equity and Community Engagement
Cluster: Maternal, Pediatric, and Global Health Perspectives

Madison Douglas, BS

Madison Douglas, BS (Rush University Medical Center), Kelly Dressel, DNP, RN, CCRN (Rush University Medical Center), Zoe Kusinitz, MPH (Rush University Medical Center), Supriya D. Mehta, MHS, PhD (Rush University Medical Center), and Stephanie Crane, MD (Rush University Medical Center)

COUNTRY OF ORIGIN DISPARITIES IN SUB-OPTIMAL MENSTRUAL HYGIENE MANAGEMENT AND INTERSECTING REPRODUCTIVE HEALTH CONCERNS: A PILOT STUDY FROM THE DOMINICAN REPUBLIC

INTRODUCTION: Due to long-standing systemic xenophobia in the Dominican Republic (DR), women of Haitian descent are underrepresented in national health data. This study assessed menstrual hygiene management (MHM) and other reproductive health concerns in a migrant-dense community to inform future health studies and interventions.

METHODS: An anonymous cross-sectional survey was offered in a low-income community near Santo Domingo over two, one-week periods from October 2023 to April 2024. Eligible participants were at least 14 years old. Reproductive health-related factors were assessed among participants who had menstruated in the last 12 months. Multivariable adjusted modified Poisson regression was used to identify factors associated with sub-optimal MHM, defined by lack of water and/or soap, privacy, or safe menstrual products.

RESULTS: Among 148 participants who menstruated in the past 12 months, over half (53.0%) reported that menstrual materials were unaffordable sometimes (43.5%) or always (9.5%), and more than one-third (38.1%) reported menses interfering with regular duties. Overall, 21.6% had sub-optimal MHM; although 94% of women reported using disposable pads to manage menses, 14.2% were also using cloth (n=19) or underwear/diapers (n=2). Other factors contributing to sub-optimal MHM were lack of privacy (4.1%) and lack of soap (8.7%). In analyses adjusted for age, educational attainment, employment status, and menstrual product affordability, Haitian-born women were more likely to have sub-optimal MHM (aPR = 7.25; 95% CI 2.85 - 18.4). Compared to women with optimal MHM, women with sub-optimal MHM were more likely to report "Poor" general health (46.9% vs. 19.8%, p=0.004) and menses interfering with regular duties (56.3% vs. 32.8%, p=0.015), and were less likely to report reliable contraceptive use (43.3% vs. 68.5%, p=0.011) and prenatal care at last pregnancy (79.3% vs. 95.3%, p=0.005). Haitian-born women were also more likely to have intersecting sub-optimal MHM and contraceptive gap or lack of prior prenatal care (20.4% vs. 2.2%, p=0.001).

CONCLUSION: Suboptimal MHM was a pervasive issue in this migrant-dense community, with Haitian women being particularly vulnerable to its challenges and intersections with other reproductive health issues. Our findings highlight the pressing need to improve menstrual hygiene and reproductive health resources, especially for migrant populations.

Abstract #: 130
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Health Equity and Community Engagement
Cluster: Maternal, Pediatric, and Global Health Perspectives

Katharine Jeffreys, BA

Katharine Jeffreys, BA (Rush), Kate Palmer, MPH (Rush), Cristina Barkowski, MSW, LSW (Rush), Saida Haider, MD (Rush)

THE RELATIONSHIP BETWEEN POSITIVE MATERNAL SOCIAL FACTORS AND BIRTHING OUTCOMES IN THE RUSH ER PATIENT POPULATION

INTRODUCTION: Data suggests that women living in communities in Chicago with high economic hardship have higher rates of premature birth. Premature birth is associated with various health risks to the infant. Rush's patient population includes low-income communities, such as North Lawndale, and East and West Garfield Park. The Social Determinants of Health (SDOH) framework suggests that an individual's social and economic standing informs their health outcomes. According to the SDOH framework, pregnant women who experience job instability, financial difficulty, interpersonal violence, or lack a primary care provider are likely to have poorer pregnancy outcomes. Our research explores the relationship between SDOH and birthing outcomes, such as low infant birth weight (LBW) and premature birth, in pregnant patients in the Rush Emergency Department.

METHODS: In the Birth Equity Emergency Department Pilot Program, pregnant and postpartum patients were screened by Community Health Workers for SDOH upon their visit to the ER. Those that screened positive were given resources and connected to community-based programs. Through IRB approval, we abstracted chart data from 500 participants from January 2022 to June 2023 to determine if there were differences in gestational age and infant birth weight based on exposure level to various SDOH. Patients were assigned an SDOH exposure score based on how many SDOH they screened positive for during the intake.

RESULTS: Our sample was racially diverse and included Black, White, Hispanic, Asian, and other identities. The median SDOH score was 1.0 (range = 0 to 5). There was no correlation between the number of SDOH reported and low birth weight [$X2$ (5, N = 500) = 1.799, p =.87] or premature births [$X2$ (5, N = 500) = 2.360, p =.80] using a chi square model. However, the black racial group had the highest average SDOH exposure score (1.15) and were more likely to deliver LBW infants than any other racial category.

CONCLUSION: Our current screener may not include all social factors that contribute to poor infant birthing outcomes. We should continue to explore additional social factors such as quality of health care, social inclusion and non-discrimination, and their relationship to birthing outcomes.

Abstract #: 131
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Health Equity and Community Engagement
Cluster: Maternal, Pediatric, and Global Health Perspectives

Isabelle Ricke, BS

: Isabelle Ricke1, Camden Richter2, Mike Mastroianni, MD1, Dr. Ashok Jagasia, MD1

EVACLUATING THE ROLE OF CHILD DEVELOPMENT IN THE PREVALENCE OF SINUSITIS, TONSILITIS, AND ALLERGIC RHINITIS AMONG CHILDREN UNDER 18 IN RURAL HONDURAS

INTRODUCTION: There is a significant gap in public health research regarding pediatric patients and the conditions they experience in rural Honduras. The purpose of this study is to investigate the prevalence of sinusitis, tonsillitis, and allergic rhinitis in children under 18 in rural Honduras, with a focus on how these conditions relate to child development.

METHODS: Action for Education (AcE) is a non-for-profit that operates mobile health clinics in rural Honduras. A retrospective review of 194 patients aged 1-18 years old seen by AcE in March of 2023 was performed. Patents were categorized based on clinical diagnosis of allergic rhinitis, tonsilitis, sinusitis or other. Height-for-age, weight-for-age, and BMI-for-age percentiles from the World Health Organization's growth charts were assessed and statistically analyzed alongside the patient's diagnosis.

RESULTS: Findings indicate that there was a higher prevalence of allergic rhinitis (7.735%) than sinusitis (0.00%) and tonsilitis (1.03%) in this patient population. No statistically significant difference of BMI-for-age (P=0.3175), height-for-age (P=0.3032) or weight-for-age (P=0.8088) were found among patients with allergic rhinitis or tonsilitis.

CONCLUSION: This study shows a high prevalence of allergic rhinitis compared to sinusitis and tonsilitis among the patient population. The sample size serves as a limitation of the study and more research needs to be done to investigate the prevalence of allergic rhinitis, sinusitis, tonsillitis and the disease burden on pediatric patients in rural Honduras.

Abstract #: 132
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Health Equity and Community Engagement
Cluster: Racial, Ethnic, and Community-Level Health Disparities

Yoo Jin Ahn, BAS

Yoo jin Ahn (BAS), Seema Pathak (BAS), Graham Cross (MD), Michael Chen (MD)

SOCIOECONOMIC INFLUENCES ON DISCHARGE DESTINATION AFTER ANEURYSMAL SUBARACHNOID HEMORRHAGE

BACKGROUND: This retrospective cross-sectional study included consecutive aSAH patients discharged from a comprehensive stroke center. Discharge destinations were categorized as SNFs, IRFs/Long-Term Acute Care (LTAC), and home healthcare/direct home discharge. Patient race was self-reported, and insurance status was classified as Medicare, Medicaid, or private/self-pay based on medical records. Disparities were evaluated by analyzing racial and insurance subgroup differences in discharge to higher-intensity care settings (IRF/LTAC, SNF), compared to lower-intensity settings (home), using national benchmarks as a reference point. The national study referenced includes short-term acute care hospitals across four demographically and geographically diverse states (AZ, FL, NJ, WI), with63% of participants resided in large metropolitan areas. OBJECTIVE: This study evaluates how race and insurance status influence discharge destinations after aSAH at a single academic tertiary care stroke center compared to national benchmarks.

METHODS: This retrospective cross-sectional study included aSAH patients discharged from a comprehensive stroke center. Discharge destinations were categorized as SNFs, IRFs/Long-Term Acute Care (LTAC), or home healthcare. Race was self-reported, and insurance status was categorized as Medicare, Medicaid, or private/self-pay. Disparities in discharge patterns were analyzed using national benchmarks, which include data from short-term acute care hospitals across four states (AZ, FL, NJ, WI), where 63% of participants lived in metropolitan areas.

RESULTS: The study cohort (643) includes SAH discharged from 2022 to 2024, including diverse population of African American (266), Caucasian (194), Hispanic (117), and Asian/Pacific Islander (28) patients. Insurance groups comprised Medicare (72), Medicaid (62), and private/self-pay (136). Racial disparities in discharge destinations at Rush was minimal (<7%) compared to national data (<5%), whereas disparities by insurance status were significantly reduced in home discharges (Rush: <27%; National: <48%).

DISCUSSION: Insurance status continues to influence discharge destinations more than race. Medicaid and Medicare patients, often with greater stroke risk, are disproportionately discharged to lower-acuity settings. At Rush, proactive discharge planning (e.g., early Medicaid applications, family-involvement trials) and financial support (e.g., charity care, free ambulatory services) may have narrowed disparities. These strategies demonstrate how institutional efforts can improve equitable access to post-stroke care despite socioeconomic barriers such as insurance.

CONCLUSION: Addressing insurance-related barriers through targeted institutional strategies may make for more equitable post-stroke recovery.

Abstract #: 133
Trainee Rank: Post-Doctoral Research Fellow
Theme: Health Equity and Community Engagement
Cluster: Racial, Ethnic, and Community-Level Health Disparities

Jerenda Bond, Doctor of Philosophy in Health Sciences; Doctor of Physical Therapy; Bachelor of Science in Physical Therapy

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ASSOCIATIONS BETWEEN COMMUNITY-LEVEL SOCIAL VULNERABILITY WITH PARKINSON'S DISEASE AND PHYSICAL FUNCTIONING DECLINE: A PROSPECTIVE BIRACIAL POPULATION-BASED STUDY

OBJECTIVE: To examine the association of social vulnerability with Parkinson's disease (PD) and physical functioning decline in a biracial population-based cohort study.

METHODS: We used data from the Chicago Health and Aging Project (CHAP), a population-based longitudinal study of common health conditions, incident Alzheimer's disease, and cognitive decline in older Black and White adults living in neighborhoods on the south side of Chicago. Logistic regression models examined the relationship between social vulnerability and PD diagnosis, rigidity, and tremors at the first clinical assessment, and linear regression models examined social vulnerability and PD diagnosis, bradykinesia, and gait scores. Mixed effects models investigated the relationship among social vulnerability, chair stand, tandem stand, timed walk, and physical functioning at baseline and longitudinally. All models were adjusted for race, sex, age, and education. A higher social vulnerability index (SVI) score indicates a higher social vulnerability. We divided the SVI into quartiles.

RESULTS: There were 9,469 participants from four southside Chicago communities with 24 census tracts. There were 5,776 (61%) female and 6,098 (64%) Black participants. Eighty-four percent of Black participants primarily were residents of CHAP communities in census tracts above the 50th SVI percentile, while eighty-six percent of White participants resided in census tracts below the 50th SVI percentile. Participants in census tracts above the 75th SVI percentile had the highest composite Parkinsonian score (7 [4,14]) and of PD diagnoses (3.4%). Participants living in more socially vulnerable tracts, i.e., above the 50th SVI percentile, had an odds ratio for PD of 2.03 (95% CI= 1.06, 3.89), and those in communities above the 75th SVI percentile had the fastest annual composite physical functioning decline rate at -0.090 (95% CI= -0.136, -0.043) per year compared to participants living in census tracts below the 25th SVI percentile.

DISCUSSION: We found that Black participants primarily resided in more socially vulnerable communities with census tracts above the 50th SVI percentile and were at a higher risk for developing PD and had a faster decline in physical functioning, thus revealing an inequitable burden for older Black adults.

Abstract #: 134
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Health Equity and Community Engagement
Cluster: Racial, Ethnic, and Community-Level Health Disparities

Marcin Marciniak, BS

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ANALYZING HPV VACCINE DISCOURSE ON REDDIT: SENTIMENT AND THEMES

INTRODUCTION Human papillomavirus (HPV) is a well-established risk factor for various cancers, including head and neck cancers. The HPV vaccine significantly reduces the incidence of these cancers, yet vaccination rates in the United States remain below 60%. Vaccine hesitancy, misinformation, and accessibility barriers contribute to low uptake. The COVID-19 pandemic disrupted healthcare systems and intensified public concerns about vaccines. Social media platforms like Reddit provide a unique opportunity to examine public discourse about the HPV vaccine, offering insight into attitudes, concerns, and barriers that may affect vaccination rates. This study analyzes discussions in the r/HPV subreddit (22,919 members) to explore public perceptions of the HPV vaccine and how the pandemic may have influenced these views.

METHODS Posts and comments mentioning the HPV vaccine were scraped from r/HPV using a Python script between August 12 and October 29, 2024. Metadata such as post date, word count, and search terms were recorded. Entries were manually labeled as "Intentional" (focused on the vaccine) or "Incidental" (brief mentions). Intentional entries were further categorized into subgroups: questions, recommendations/advice, personal experiences, resource sharing, barriers/accessibility, and factual claims. Sentiment analysis was performed on all entries using scores ranging from -1 (negative) to +1 (positive) to capture underlying emotions.

RESULTS Of the 684 entries collected, 281 were classified as Intentional, consisting of 85 posts and 196 comments. Sentiment analysis revealed 65.9% positive, 3.0% neutral, and 31.1% negative sentiments. The most common themes were recommendations/advice (25.0%) and personal experiences (5.3%), both associated with high positive sentiment scores, reflecting strong vaccine support. However, 25.0% of entries focused on barriers, such as insurance and financial constraints, which were linked to negative sentiment. Discussions around accessibility barriers often expressed frustration with healthcare providers or systemic inequities.

CONCLUSION This study reveals largely positive sentiment toward the HPV vaccine in the r/HPV subreddit, driven by recommendations and personal experiences. However, barriers to access, particularly cost and insurance issues, remain significant concerns. These findings provide valuable insights for improving HPV vaccination rates through targeted public health campaigns and addressing accessibility challenges, particularly among underserved populations.

Abstract #: 135
Trainee Rank: RUSH Matriculated Student
CHS: Clinical Doctorate
Theme: Health Equity and Community Engagement
Cluster: Racial, Ethnic, and Community-Level Health Disparities

Rae Peitzmann, Bachelor of Science

Rae Peitzmann Rush University Occupational Therapy Department OTD Student class of 2025 Laura VanPuymbrouck Rush University Occupational Therapy Department

Beyond Survival: Success in Sustained Housing Among Those Who Have Experienced Homelessness

INTRODUCTION: People experiencing homelessness frequently experience extreme poverty, substance use, and are profoundly affected by social determinants of health (Kreider-Letterman and Schmelzer, 2021). This population necessarily prioritizes survival strategies (searching for food, shelter, and resources) over other traditionally valued occupations, resulting in significant occupational deprivation and imbalance (Katz, 2017). While considerable research has been done regarding the needs of the unhoused from an occupational therapy (OT) lens, few have examined the long-term success of OT services for sustained success in housing beyond 18 months. Therefore, the primary objectives of this project was to identify factors supporting and limiting successful sustained housing among previously unhoused adults among different demographics and to increase evidence in support of OT services in this population and setting.

METHODS: Data collection occurred through semi-structured client interviews. Analysis used an Inductive thematic analysis (Braun and Clark, 2006) approach to identify themes from within and across interview data.

RESULTS: This presentation will describe the over-arching themes that emerged from analysis of 5 participant narratives. Categorized primarily into factors supporting and limiting long term sustainment of housing following homelessness these themes will be further refined into recommendations for occupational therapy and allied health team member recommendations for intervention supports.

CONCLUSION: Sustained housing remains difficult to study in sufficient detail to determine the effectiveness of OT or other allied health interventions in the long term. This study presents a unique opportunity to assess the effectiveness of OT services in relation to occupational performance, life satisfaction, and sustained housing among the community of Chicagoans experiencing homelessness.

Abstract #: 136
Trainee Rank: Clinical Resident
Theme: Health Equity and Community Engagement
Cluster: Racial, Ethnic, and Community-Level Health Disparities

Melissa Rangel, MD, BS

Shirlene Paul, Rush University Medical Center, Chelsea McPeek , Rush University Medical Center, Dipti Gupta , Rush University Medical Center, Rosalinda Alvarado, Rush University Medical Center, Lisa Stempel , Rush University Medical Center, Mia Levy, Rush University Medical Center, Lauren Green, Rush University Medical Center

EVALUATING THE GAIL MODEL: RACIAL DISPARITIES IN BREAST CANCER RISK ASSESSMENT

INTRODUCTION: The Gail model is a breast cancer risk calculator that was developed in 1989 from a case control series of white women. Contemporary and racially diverse data have since been used to improve the model. However, authors still warn that for black/African American and Hispanic women risk may be underestimated. Race has been recognized as a poor proxy for biological differences and may perpetuate existing disparities. There is limited data evaluating the Gail model across racial groups.

METHODS: Retrospective data including Gail scores, classification of High-risk (HR) Gail score, age, BMI, age at first birth and menarche, history of biopsy, family history of cancer, race, use of risk-reducing endocrine therapy and breast cancer diagnosis were extracted from the electronic medical record. Patients ages 25-75, undergoing mammogram from 7/2020-7/2023 were included. Chi-squared, logistical regression were used to evaluate differences in outcomes between groups.

RESULTS: Data was collected from 31,256 patients; 1,429 Asian, 11,589 black/African American, 5,872 Hispanic/Latino, 1,358 Other, and 11,008 white patients. High-risk Gail model classification (HR) among each racial group was 6.09% (87/1429) of Asian, 2.86% (331/11589) of black/African American, 0.68% (40/5872) of Hispanic/Latino and 11.4% (1228/11008) of white patients. White patients were significantly more likely to be classified as HR than all other groups ($p<0.001$). This difference persisted even when controlling for Gail model variables. Black patients were less likely to be HR compared to white patients (OR 0.23, 95% CI = 0.20 - 0.28). Rates of cancer diagnosis were similar between black (1.57%) and white patients (1.6%).

CONCLUSION: Our study suggests that a racial disparity exists in the classification of patients as HR with the Gail model. Despite similar rates of cancer diagnosis between black and white patients in our population, black patients are much less likely to be considered HR by the Gail model. We did not identify a specific factor within the Gail model variables that could account for this. These findings underscore the need for individualized cancer screening and the potential limitations of algorithms using race as a variable.

Abstract #: 137
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Health Equity and Community Engagement
Cluster: Racial, Ethnic, and Community-Level Health Disparities

Julio Roque Buenrostro, MS

Julio A. Roque (Presenting Author, Rush), Shane D. Martin (Rush), Omar S. Shalakhti (Rush), Ashok Jagasia (Rush)

COMPARING THE RELATIONSHIP BETWEEN THE AVAILABILITY OF ACADEMIC MEDICAL HIGH SCHOOL PIPELINE PROGRAMS WITH RACE AND AGE IN THE MIDWEST.

INTRODUCTION: High school institutional medical pipeline programs (HMPP), play a pivotal role in increasing representation of healthcare professions in underserved and minority populations. These disparities still exist due to age and race with the numerous opportunities for pathway programs in both rural and urban communities of the Midwest United States. This study's primary objective was to evaluate the relation between HMPP availability and race and age composition in rural and urban areas.

METHODS: Demographic data (percentage of 15-19-year-old, race, and ethnicity) was collected from the 2023 US Census database for Midwest (12 states) counties. Counties were categorized as rural or urban based on their Rural-Urban Continuum Codes (RUCC): RUCC values 1 - 3 were classified as urban/metropolitan and RUCC values 4-9 were defined as rural/non-metropolitan. 78 HMPP programs established by academic medical institutions were found in both Rural Counties (RC) and Urban Counties (UC). The data was analyzed utilizing a chi-square test and t-test to compare both rural and urban programs.

RESULTS: The study included 1055 counties. 32 counties were identified to have an established HMPP, with 28 in UC and 4 in RC. Chi-square analysis revealed a significant difference between UC and RC with an established HMPP (chi-squared statistic=50.86; p-value < 0.01). Additionally, there was a significant difference amongst race composition of RC and UC. White (92%, as compared to 88.7% in Urban) and Native American/American Indian (3.1%, as compared to 2.2% in Urban) were significantly higher ($p<0.001$) in rural areas compared to Urban areas suggesting racial disparities with respect to access to these programs. Similarly, 15-19-year-old percentage in RC (6.49± 1.19%) was significantly lower compared to UC (6.70%±0.92; $p<0.001$).

CONCLUSION: A significant difference was found in the number of counties that have an HMPP in UC compared to RC. Furthermore, analysis of county composition found that UC had a greater percentage of minorities, and younger populations. However, this study shows disparities among HMPP in the Midwest that were not only specific to high schools located in rural areas but also among different races in these communities, e.g., the native American and/or American Indian.

Abstract #: 138
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Health Equity and Community Engagement
Cluster: Racial, Ethnic, and Community-Level Health Disparities

Omar Shalakhti, M.S.

Omar S. Shalakhti (Presenting Author, Rush), Shane D. Martin (Rush), Julio A. Roque (Rush), Ashok Jagasia (Rush)

THE EFFECTS OF COUNTY SOCIOECONOMIC STATUS ON THE ESTABLISHMENT OF ACADEMIC MEDICAL PATHWAY PROGRAMS

INTRODUCTION: County socioeconomic status (SES) has been a known factor contributing to the ability to acquire and access academic resources. High school institutional pipeline programs (HMPP) were established to bridge the disparities and insufficient representation that individuals from lower socioeconomic backgrounds face. However, this study hypothesizes that there will be more pathways programs in higher SES and more urban communities as compared to low SES, rural communities.

METHODS: Socioeconomic data (Mean Household Income (MHI) and Poverty Percentage (PP)) for all counties in the Midwest was collected from the 2023 American Community Survey. Rural counties (RC) and urban counties (UC) were categorized following Rural-Urban Continuum Codes (RUCC): RUCC values 1 - 3 were classified as urban/metropolitan and RUCC values 4-9 were defined as rural/non-metropolitan. HMPPs were identified in both rural and urban settings through a meticulous search in Midwest medical institutions. Programs were then categorized and quantified according to RC or UC status. t-test and chi-analysis were then executed to analyze the statistical significance of the effect of SES on the establishment of HMPP in rural or urban communities.

RESULTS: Of the 1055 counties in the Midwest, 28 had an HMPP in UC and 4 in RC. This study found significant differences ($p < 0.01$) between RC and UC in the PP mean in 0-17-year-old (16.42±5.79 ;10.67±3.5, respectively) and mean household income ($75,478 ±13,727; $63,426±8,858, respectively). These results could account for the significant difference in HMPP presence in UC compared to RC (chi-squared statistic=50.86; p-value < 0.01). Therefore, suggesting disparities in opportunities in RC despite significantly higher poverty percentages among 0-17-year-olds and lower household income.

CONCLUSION: This study found a significant difference between MHI and PP in RC compared to UC. Additionally, the significant difference in presence of HMPP in UC compared to RC further demonstrates the need for innovative ways to bridge the disparities between high schoolers in Rural communities such as providing virtual opportunities, e.g. telemedicine shadowing.

Abstract #: 139
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Health Equity and Community Engagement
Cluster: Racial, Ethnic, and Community-Level Health Disparities

Jessica Toledo, Masters of Science
Jessica D. Toledo, MS Tejas C. Sekhar, BA Matthew R. Crosse, BS Julio A. Roque-Buenrostro, MS

DIABETIC RETINOPATHY INEQUITIES IN HISPANIC COMMUNITIES

INTRODUCTION: Diabetic retinopathy (DR) is a leading cause of blindness that disproportionately affects Hispanic communities due to higher rates of diabetes and barriers to healthcare. Using data from the Vision and Eye Health Surveillance System (VEHSS), this study examines DR prevalence and associated trends across age, gender, racial identity, ethnicity, and risk factors to inform targeted interventions.

METHODS: DR-specific US noninstitutionalized population VEHSS data was only available from 2005-2008-of 10,320 potential studies, only 476 (4.6%) met DR diagnostic criteria (exam-confirmed or self-reported prior physician diagnosis) after excluding studies with sample sizes <30, relative standard errors >30%, or both.

RESULTS: Hispanic-only studies comprised 19.1% of the 476 DR data points, with Non-Hispanic studies distributed as 30.7% all races, 21.2% Black, 28.6% white, and 0.4% other. Among Hispanic-only studies, 34.1% were male, 29.6% female, and 36.3% included both genders. Risk factor-stratified studies consisted of 26.4% diabetes, 23.1% hypertension, 30.7% smoking, and 19.8% no risk factor requirement. Age distribution was 38.2% all ages, 34.8% ages 40-64, and 27.0% ages 65-79. Age cohorts 0-17, 12-17, 18-39, and 80+ had no DR representation (either Hispanic or Non-Hispanic) despite other available VEHSS data among mutually exclusive non-DR ophthalmic criteria. Aggregated DR prevalence was 18.7% (CI: 11.9-27.2%) across Hispanic-only studies, with an average sample size of 253 participants per study. Non-Hispanic studies reported a similar aggregated DR prevalence of 18.6% (CI: 12.7-25.8%) with an average sample size of 487 participants.

CONCLUSION: This analysis reveals underrepresentation of Hispanic populations (19.1%) in DR research as well as gaps in age-specific data for younger (0-39) and older (80+) cohorts that may hinder understanding of DR's progression and late-stage burden in all populations. Despite similar DR prevalence between Hispanic and Non-Hispanic studies, smaller Hispanic sample sizes suggest limited generalizability and further persistent disparities in representation and age coverage. Temporal limitation to 2005-2008 data restricts the scope of findings, emphasizing the need for updated, diverse datasets to capture evolving trends and disparities.

Abstract #: 140
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Health Equity and Community Engagement
Cluster: Racial, Ethnic, and Community-Level Health Disparities

Brett Wagner, BA
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ALLOSTATIC LOAD AND INFLAMMATION IN RACIALLY AND ETHNICALLY DIVERSE PATIENTS WITH METASTATIC COLORECTAL CANCER

INTRODUCTION: Patients with metastatic colorectal cancer (mCRC) are living longer due to treatment advances, but underrepresented groups, such as Hispanics/Latinos (H/L) and Blacks/African Americans (B/AA) continue to experience lower survival rates compared to Whites. Allostatic load (AL), a measure of physiological stress, and neutrophil-to-lymphocyte ratio (NLR), a biomarker of chronic inflammation, are linked to worse cancer outcomes and prognoses. This study examines the relationship between AL and NLR in ethnoracially diverse patients who are often disproportionately burdened with health disparities and chronic stress.

METHODS: A retrospective cross-sectional study of H/L and B/AA patients diagnosed with mCRC between 2008-2023 (n=211) was conducted. AL score (0-9) was calculated using 9 biomarkers (body mass index, systolic blood pressure, diastolic blood pressure, creatinine, blood glucose, albumin, white blood cell count, hemoglobin, heart rate) collected from the electronic medical record within 45 days of diagnosis. Elevated AL was defined as scores ≥3 (median value). NLR was calculated as absolute neutrophil count divided by absolute lymphocyte count. Multivariate analyses including Mann-Whitney, Kruskal Wallis, and Chi square tests assessed relationships of AL with sex, ethnoracial groups, and NLR.

RESULTS: Of 129 participants (38 H/L; 91 B/AA), the mean AL score was 3.02. Elevated AL was observed in 40% of H/L males, 22.2% of H/L females, 36.2% of B/AA males, and 52.3% of B/AA females. Significant differences were not observed for elevated AL prevalence based on sex (male: 34.33%, female: 43.55%, $p = 0.283$) nor ethnoracial distribution (Black/AA: 43.96%, H/L: 26.32%, $p = 0.061$). A weak (medium strength effect size) positive correlation between NLR and AL was observed (Pearson's $r = 0.2942$, $p = 0.0012$; Spearman's rho = 0.3312, $p = 0.0003$). Participants with elevated AL had a higher mean NLR (7.80 ± 7.14) compared to those with low AL (4.80 ± 5.12; $p=0.0019$).

CONCLUSION: This study suggests that AL and inflammation (NLR) are interlinked and may contribute to disparities in mCRC outcomes. Future research will compare AL in mCRC patients to healthy controls from diverse populations and examine how body composition factors like low skeletal muscle, adiposity and myosteatosis influence AL and mCRC outcomes.

Abstract #: 141
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Health Equity and Community Engagement
Cluster: Social Support, Chronic Disease, and Aging Populations

Oluwamuyiwa Adebayo, BS, PhD

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UNEQUAL RECOVERY: A SYSTEMATIC REVIEW OF THE ASSOCIATION BETWEEN SOCIAL SUPPORT AND PATIENT-REPORTED OUTCOMES FOLLOWING CARDIOTHORACIC SURGERY

OBJECTIVE: The disparities that persist in cardiothoracic surgery recovery outcomes highlight the need for further insights into social determinants of health and how they impact patient-reported outcomes (PROs). This systematic review aims to synthesize current evidence on the relationship between social support and PROs post-cardiothoracic surgery, with particular attention to the implications for health equity.

METHODS: The systematic review was conducted using the PRISMA guidelines. The authors developed a comprehensive literature search protocol and performed the search using the following databases: PubMed/MEDLINE, Embase, CINAHL, and the Cochrane CENTRAL Register of Controlled Trials. Two independent blinded reviewers screened and reviewed studies; a third reviewer resolved conflicts.

RESULTS: The analysis included 34 studies with a total of 11,827 patients. Across the studies, 94.1% (32/34) reported gender distribution (n=11,695), and 25.6% were women. Of the 35.2% (12/34) that reported race/ethnicity (n=4,390), 13% were not White. A narrative synthesis revealed that social support consisting of emotional, informational, physical, and tangible support was positively associated with PROs, including physical activity during recovery, improved mental health, and reduced symptom burden. In addition, compared to men, women were less likely to receive social support during their recovery period and experienced higher levels of anxiety, fatigue, and depression post-cardiothoracic surgery. However, racial minorities and women accounted for less than 50% of the studied patients, and no study compared racial/ethnicity subgroups in exploring the associations between social support and PROs.

CONCLUSION: This systematic review suggests that social support is associated with PROs after cardiothoracic surgery. However, women and racial minorities remain understudied. These findings highlight the need for additional research on women and minority populations, as well as targeted interventions to enhance social support and improve PROs after cardiothoracic surgery.

Abstract #: 142
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Health Equity and Community Engagement
Cluster: Social Support, Chronic Disease, and Aging Populations

Hao Chen, BS

Hao Chen (Rush), Ernesto Luna Melendez (Rush), Kevin Truong-Balderas (Rush), Shahood Fazal (Rush), Sameer Ansari (Rush)

LOWER PREVALENCE OR UNDERDIAGNOSIS? CHRONIC DISEASE AND HEALTHCARE ACCESS AMONG FOREIGN-BORN AND U.S.-BORN POPULATIONS

INTRODUCTION The foreign-born population in the United States often exhibits better health outcomes than their native-born counterparts, a phenomenon known as the "healthy immigrant effect." Initially, immigrants tend to have lower rates of chronic diseases and mortality. However, this advantage diminishes over time as their health outcomes converge with or worsen compared to native-born individuals due to acculturation and exposure to U.S. healthcare and lifestyle. This study investigates the prevalence of chronic diseases between these groups, examining whether differences reflect genuine health advantages or disparities driven by structural barriers.

METHODS Data from the 2023 National Health Interview Survey (NHIS) Adult Sample was used to analyze self-reported health conditions among foreign-born and U.S.-born individuals. Key outcomes included diagnoses of cancer, coronary artery disease (CAD), hypertension (HTN), and diabetes mellitus (DM). Healthcare access measures included insurance status, usual place of care, wellness visits, and doctor visits within the past year. Perceived health status as fair or poor was also assessed. The sample was restricted to individuals aged 18 years and older, and sampling weights were applied.

RESULTS Foreign-born individuals exhibited lower prevalence rates for cancer (4.8% vs. 10.9%), CAD (3.6% vs. 5.2%), and HTN (29% vs. 33.2%) compared to U.S.-born individuals. However, DM prevalence was higher among foreign-born individuals (11.4% vs. 9.4%). Foreign-born individuals were less likely to have had a cholesterol check in the past year (21.05% vs. 19.95%), more likely to be uninsured (17.3% vs. 4.5%), less likely to have a usual place of healthcare (83.3% vs. 88.9%) and more of them needed but couldn't afford medical care (8.4% vs. 5.9%). Perceived health as fair or poor was comparable (15.1% foreign-born vs. 15.0% U.S.-born).

CONCLUSION The lower prevalence of cancer, CAD, and HTN among foreign-born individuals may reflect underdiagnosis rather than true health advantages. Higher DM prevalence likely reflects its symptomatic nature. Structural barriers-higher uninsured rates, fewer doctor visits, and lack of usual care-can contribute to delayed diagnoses and hinder preventive care. Addressing these barriers through expanded insurance coverage and culturally tailored services is crucial for equitable health outcomes.

Abstract #: 143
Trainee Rank: RUSH Matriculated Student
CHS: MS
Theme: Health Equity and Community Engagement
Cluster: Social Support, Chronic Disease, and Aging Populations

Victoria Gomez, BS Animal Sciences, MS Animal Sciences

Presenting Author: Gomez, V (Rush U) Co-Authors: Jones O (Rush U), Colombo L (Rush U), Maino D (Illinois College of Optometry/Illinois Eye Institute), Mahar A (Harvard) and Gomez SL (Rush U)

MEDICAL CANNABIS AND CHRONIC PAIN IN OLDER ADULTS - A SCOPING REVIEW

INTRODUCTION As more U.S. states legalize medical cannabis (MC), the interest in alternative pain management also increases. Many studies have investigated the use of MC for chronic pain management in adult populations; however, the extent of the literature that pertains to older populations (≥65) is unknown. Thus, the objective of this scoping review is to examine the extent of evidence on the use, effectiveness and safety of two common forms of MC, cannabidiol (CBD) and Delta-9-tetrahydrocannabinol (THC), in treating chronic pain among older adults and to assess the potential of CBD and THC as alternative treatments of chronic pain management in this population.

METHODS To conduct this scoping review, relevant articles will be identified through a comprehensive search of the AMBASE, PUBMED, SCOPUS, and CINAHL databases. This will include peer-reviewed articles of published studies using various research designs, such as randomized controlled trials, cohort studies, cross-sectional studies, case-control studies, systematic reviews, and systematic reviews with meta-analysis. This scoping review will be conducted using the PRISMA-ScR (Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews). Search terms, key words, MESH terms, and search translations were completed by librarians at Rush University. These search terms were applied to the entire accessible population available on databases. Titles and abstracts to be screened were uploaded to Covidence, an online screening and data extraction application designed to manage the review process.

RESULTS Our scoping review began with 9,653 studies imported for review. Of these studies, 3,920 duplicates were identified, 5,108 were considered irrelevant, and 330 did not meet our inclusion criteria. Currently, 244 studies have been included for data extraction which is still in process.

CONCLUSIONS Even though the results are pending, this scoping review will reveal the existing scientific evidence on the use, effectiveness, and safety of CBD and THC for chronic pain in older adults. Ultimately, the findings of this scoping review will reveal a more comprehensive understanding of what evidence exists in the literature and identify the gaps in knowledge and inform future studies.

Abstract #: 144
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Health Equity and Community Engagement
Cluster: Social Support, Chronic Disease, and Aging Populations

Sean Setzen, MD

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EXPLORING PSYCHOLOGICAL WELL-BEING IN HEAD AND NECK CANCER: A REDDIT-BASED SENTIMENT ANALYSIS

INTRODUCTION Head and neck cancer profoundly impacts patients' physical and mental well-being. Survivorship often includes psychological challenges such as anxiety, depression, fear of recurrence, and social isolation. Limited time during clinic visits often leaves mental health concerns unaddressed. Increasingly, patients turn to social media for advice, support, and connection. Reddit serves as a valuable resource for head and neck cancer patients. Subreddits like r/HeadandNeckCancer and r/HNSCC provide spaces for individuals to share experiences and seek advice. The platform's anonymity fosters openness, revealing psychological struggles often overlooked in clinical settings. This study examines mental health themes within these communities to better understand patients' challenges.

METHODS Posts and comments from r/HeadandNeckCancer and r/HNSCC (December 2018-October 2024) were collected using Python and Reddit's API. Texts were pre-processed, and medical terminology was tagged using SciBERT and a custom medical dictionary. Emotions-Joy, Sadness, Fear, Anger, Disgust, Surprise, and Neutral-were identified using a fine-tuned DistilRoBERTa model. Aggregated emotion data and contextual analysis captured holistic discussions.

RESULTS Analysis of 826 posts and 8,507 comments revealed a complex emotional landscape. Neutral (24.46%), Sadness (23.75%), and Joy (21.60%) were most prevalent. Fear (13.45%) reflected anxieties around treatment and prognosis. Anger and Disgust were less frequent but intense. Posts on treatment challenges, prognosis uncertainty, and post-surgery quality of life were associated with elevated Sadness and Fear, underscoring the psychological burden of cancer. Despite these challenges, Joy emerged frequently, highlighting the supportive role of the community through encouragement and shared positive experiences. User-level analysis identified consistently high levels of Sadness and Fear among some individuals, suggesting persistent distress. Contextual analysis showed that discussions often mirrored the tone of the original post, amplifying both positive and negative emotions. Temporal trends indicated peaks in Sadness and Fear during treatment milestones or significant events.

CONCLUSION This analysis reveals significant mental health challenges among head and neck cancer patients on Reddit. Expressions of Sadness and Fear highlight ongoing anxieties, while Joy underscores the value of community support. Insights from social media can guide healthcare providers in addressing psychological distress, enhancing patient care, and improving quality of life.

Abstract #: 145
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Health Equity and Community Engagement
Cluster: Social Support, Chronic Disease, and Aging Populations

Karaj Singh, BA

Karaj Singh, BA (RMC); Kylie Jungles, MD (RUMC), Susan E. Pacheco, MD (UTHealth Houston), Mahboobeh Mahdavinia, MD PhD (UTHealth Houston)

IMPACT OF AREA OF DEPRIVATION INDEX ON ALLERGEN SENSITIZATION IN CHICAGOLAND

INTRODUCTION Socioeconomic conditions are important determinants of health outcomes. Within the field of allergy, there is concern that disadvantaged neighborhoods are associated with higher levels of atopic disease burden. In this study, we aimed to explore the link between socioeconomic disadvantages and aeroallergen sensitization.

METHODS A retrospective chart review was conducted on patients with allergic rhinitis (AR) tested at a tertiary care center in Chicago. InVitro aeroallergen data and patient demographics were collected. Patient address was used to calculate an Area Deprivation Index (ADI) score to categorize their degree of socioeconomic disadvantage. ADI scores were categorized into quartiles, with Quartile 1 (Q1) being the least disadvantaged and Quartile 4 (Q4) being the most.

RESULTS InVitro aeroallergen testing from 1,052 patients was analyzed. Patients in ADI Q4 experienced significantly more outdoor aeroallergen sensitization than those in less disadvantaged quartiles. Q4 experienced significantly more sensitization to weed pollen; 80.9%inQ4 vs50.6%,52.6%,64.2%in Q3-1). Furthermore, Q4 residents were more sensitized to tree, grass and mold pollens compared to Q1 and Q2; 68.1%vs.45.5%,44.6% for tree, 57.4%vs44.3%,41.0% for mold and 100%vs.44.9%,52.6% for grass. There were no differences among quartiles in terms of dog, cat, or dust mite sensitization.

CONCLUSION We found a significant increased risk of aeroallergen sensitization to outdoor allergens in patients living in more disadvantaged neighborhoods in Chicago. This difference may be attributed to increased environmental exposures to toxins and air pollution, and/or possibly lower exposure to these pollens in early life due to lack of green space in these disadvantaged neighborhoods.

Abstract #: 146
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Health Equity and Community Engagement
Cluster: Social Support, Chronic Disease, and Aging Populations

Jaehyuk Song, BS
Jaehyuk Song (Rush); Eunbee Liu (Rush); Raj C. Shah (Rush); Hyejin Kim (Rush)

BARRIERS TO ADRD CARE: SOCIODEMOGRAPHIC INSIGHTS FROM KOREAN AMERICAN CAREGIVERS

INTRODUCTION Korean American caregivers providing in-home care to individuals with Alzheimer's disease and related dementias (ADRD) face unique challenges as an underrepresented group in the US. Culturally associated sociodemographic factors such as English proficiency and immigration history, significantly impact access to healthcare resources and the quality of support available for ethnic minority caregivers and their care recipients. However, little is known about these dynamics among Korean Americans in the context of ADRD caregiving.

METHODS This cross-sectional, descriptive study analyzed existing data from 29 Korean Americans with ADRD and 25 Korean American caregivers in Chicago and its suburban areas, using self-reported questionnaires. Key caregiver variables were age, gender, country of origin, years in the US, English proficiency, caregiving duration, and perceived general health. Care recipient data, including gender and types of ADRD, were collected from caregivers. We performed descriptive statistics (e.g., mean, standard deviation, frequency, percentage, median, and interquartile range) based on variable levels of measurement.

RESULTS Most caregivers (n=21, 84%) and care recipients (n=21, 72.4%) were female. Caregivers' average age was 64.3 years (standard deviation [SD]=10.1; range 45-84), and over 60% of caregivers (n=16, 64%) reported good, very good, or excellent overall health. The average duration of ADRD caregiving was 5.4 years (SD=5.3, range 0.5-24). Nearly all caregivers (n=24, 96%) were born in South Korea and immigrated to the US. Despite an average of 37.2 years in the US (range 16-60), only two caregivers (8%) reported native-level English proficiency. Most caregivers (n=22, 75.9%) were unsure of the specific types of ADRD affecting their care recipients.

CONCLUSION The study reveals unique sociodemographics of Korean American caregivers and their care recipients with ADRD. While sharing similarities with other ethnic ADRD caregiver populations, Korean American caregivers exhibit distinct cultural aspects. High rates of limited English proficiency may contribute to gaps in knowledge regarding specific types of ADRD, likely due to restricted access to accurate and timely healthcare services, including ADRD diagnoses. Larger-scale research is warranted to further explore factors influencing healthcare access and the diagnosis and management of ADRD within this understudied population.

Abstract #: 147
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Health Equity and Community Engagement
Cluster: Social Support, Chronic Disease, and Aging Populations

Jany Sun, BS

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FACTORS RELATED TO WEARABLE SMART HEALTH DEVICE USE AMONG MINORITY ODLER ADULTS

INTRODUCTION: Wearable smart health devices (SHD) are increasingly used to manage chronic health conditions among older adults. Despite SHD offers a promising solution to improve disease self-management, less than 4% of SHD users are African American and Latinx, even though they have higher morbidity and mortality rate from chronic health conditions. Promoting the use of SHD among minority older adults will likely improve health outcome and reduce health care disparity. We aim to identify mutable factors, including predisposing, enabling, and need factors, that impede the utilization of wearable SHD among minority older adults.

METHODS: An interview study was conducted with 20 English speaking minority older patients (age 60+) who have hypertension and were prescribed a smart blood pressure monitor. Andersen's Expanded Behavioral Model, which is a culturally sensitive framework for examining predisposing, enabling, and need factors in health service utilization, was used to guide the study. Thematic and classical content analysis are used to identify and quantify dimensions and themes within these factors.

RESULTS: The average age of participants was 70.7 (M = 70.7, SD = 10.3). The majority were African American (95%, n = 19) and women (55%, n=11). Among the predisposing factors, level of knowledge of SHD (100%, n=20), social network support (100%, n=20), perceived control (85%, n=17), and positive attitude toward daily health monitoring (80%, n=16) increase participants' engagement with SHD. Accessibility issues (35%, n=7) and affordability (30%, n=6) negatively impact participants' willingness to continue using the device. Among the enabling factors, device benefits and convenience (85%, n=17) enhance the use of SHD, but technical problems (90%, n=18) and stress associated with daily monitoring (20%, n=4) are the barriers. Among the need factors, commitment to health management (85%, n=17) and healthcare provider's recommendation for daily monitoring (55%, n=11) facilitate the use of SHD.

CONCLUSION: This study highlights the complex interplay between predisposing, enabling, and need factors in SHD use among minority older adults. Identifying these factors provides a starting point for healthcare providers to design and implement strategies to enhance utilization of SHD among minority older adults, ensuring equitable access.

Abstract #: 148
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Infectious Diseases and/or Immunology
Cluster: COVID-19 and SARS-CoV-

Jekzaly Arelano, BSc MLS(ASCP)CM

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BRAIN AUTOREACTIVE PLASMA IgGs FROM COVID-19 DONORS ENHANCE PHAGOCYTIC CAPABILITY OF HUMAN iPSC-DERIVED ASTROCYTES

INTRODUCTION: SARS-CoV-2, the etiologic agent of COVID-19, in some patients, causes Post-Acute COVID-19 Syndrome (PACS). PACS is associated with brain fog and cognitive difficulties, known as neuroCOVID. With lack of virus detection in the brain and CSF of COVID-19 patients, the underlying mechanism(s) of neuroCOVID remains elusive. Our group demonstrated that inflammatory IgGs, characterized by reduced glycosylation patterns, were associated with disease severity, albeit this was not investigated in context of neuroCOVID. Also, the presence of CSF antibodies that were autoreactive in the brain in an ex vivo mouse model. Here we assessed the impact of plasma COVID-19 IgGs on resident brain cells and initiated studies to determine the brain antigens recognized by autoreactive antibodies from COVID-19 patients

METHODS: We used a Rush repository biobank of bulk plasma IgGs from COVID-19 donors identified as severe (hospitalized, n=10) or mild (non-hospitalized, n=10). Samples were screened for brain autoreactivity using ex-vivo indirect immunofluorescence on C57BL/6 mice. HMC3 (microglia) and iPSC-derived human astrocytes (iAstros) were treated with positive autoantibodies at 5µg/ml for 6 days and phagocytosis was assessed. Phagocytosis capability of astrocytes was assessed using pHrodo labeled apoptotic neurons and in microglia using pHrodo E. coli bioparticles. Antigen targets of the autoantibodies were defined by immunoprecipitation using iAstros lysate and a severe COVID-19 positive autoantibody patient and was sent for proteomic analysis.

RESULTS: Plasma IgGs from severe and mild COVID-19 patients revealed four positive autoantibody patients out of twenty-two patients screened with three patients identified as severe, and one patient identified as mild. iAstros treated with autoantibodies demonstrated an increase in phagocytosis compared to untreated. Microglia phagocytosis was not altered by treatment or controls. Using immunoprecipitation, autoantibody iAstros antigen targets were recovered.

CONCLUSION: Brain autoreactive antibodies among COVID-19 donors enhance astrocyte phagocytosis of damaged neurons, signaling either induction of protective mechanisms (repair) or pathogenic (excessive phagocytosis). Ongoing studies will assess autoreactivity among neuroCOVID cohort and determine the functional impact of these antibodies, their glycosylation pattern, and identify their target brain antigens. Together, these studies will provide insight into mechanisms of neurologic effects of SARS-CoV-2 and potentially identify markers indicative of heightened susceptibility to neuroCOVID and/or inform novel treatments.

Abstract #: 149
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Infectious Diseases and/or Immunology
Cluster: COVID-19 and SARS-CoV-

Daniel Ma, B.S.

Daniel Ma, Sneha Anand, Haile He, Alan Landay, James Moy All RMC

EFFECT OF SARS-COV2 SPIKE ANTIBODIES ON BREAKTHROUGH INFECTIONS: A 3-YEAR STUDY ON 1,000 CHICAGO AREA HEALTHCARE WORKERS

INTRODUCTION: The global response to COVID-19 included a massive push for vaccinations to reduce the spread of the virus. Since then, it has been established that higher neutralizing antibody levels conferred through vaccination or post-infection offer immune protection from serious infection. However, previous reports have found that neutralizing antibody levels post infection vary substantially, leading to unpredictable protection against infection. Further investigation is needed to understand the clinical implications of neutralizing antibody levels for protection against infection over time.

METHODS: The SARS-Cov-2 spike (S) receptor-binding domain and nucleocapsid (N) immunoglobulin G levels were measured in a longitudinal study of 1000 Chicago healthcare workers who were infection naive or previously infected and then vaccinated. Changes in S and N IgG were followed up through 36 months. Vaccine breakthrough infections were identified by increasing levels of N IgG.

RESULTS: SARS-CoV-2 S IgG antibody levels among previously infected and previously noninfected individuals decreased steadily for 11 months after vaccination. Administration of a boosters increased S IgG levels >2-fold beyond those observed after 2 doses, resulting in S IgG levels that were indistinguishable between previously infected and uninfected individuals. At each time point, participants who remained uninfected had >2-fold S IgG titers vs. those who were infected. Breaking infected participants into asymptomatic and symptomatic groups, it was found asymptomatic participants had >1.5-fold S IgG titers vs. symptomatic participants.

CONCLUSION: Although no absolute threshold of immunity was found, our data indicates that higher S IgG levels and hybrid immunity were found in asymptomatic vs. symptomatic breakthrough infections.

Abstract #: 150
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Infectious Diseases and/or Immunology
Cluster: Emerging Drug Targets and Therapeutics

Natalie Adamczyk, BS

Natalie S. Adamczyk(RUSH), Dongjun Ren (Northwestern), Richard J. Miller (Northwestern), Anne-Marie Malfait (RUSH), Rachel E. Miller(RUSH)

FM1-43 ATTENTUATES COMPLETE FREUND'S ADJUVANT SENSITIZATION AND PAN

INTRODUCTION: It is estimated that 21% of adults in the US live with chronic pain, with no new efficacious treatments available. Recently, it has been suggested FM1-43, a styryl dye, is specific for Piezo2 and can relieve pain in acute inflammation. FM1-43's reported ability to reduce pain and be selective to Piezo2 is of interest given the mechanosensitive nature of joint pain. The goal of this study was to assess the analgesic qualities of FM1-43 in an acute model of inflammatory joint pain.

METHODS: All procedures were approved by an IACUC committee. Twelve-week-old female (n=8) and male (n=8) WT mice were utilized to test FM1-43 efficacy in inflammatory joint pain relief. Following baseline testing for knee hyperalgesia, mice were divided into a CFA injection and a vehicle injection group. Three days post injection mice were measured for knee hyperalgesia then split into vehicle (saline 2.5□L) and FM1-43 (5nmol in 2.5□L) injection groups and assessed again 90 minutes later. To determine the effect of FM1-43 on neuron firing, we conducted an in vivo two photon calcium imaging study. Male and female 14-week old Nav1.8cre;GCaMP6sloxp mice were injected with CFA. Three days post injection, mice underwent two photon microscopy imaging. Neuronal response to 100g force at the knee joint pre and post injection of either saline or FM4-64 (6nM in 3□L) into the inflamed knee was recorded.

RESULTS: Compared to baseline, mice injected with CFA had a significant drop in knee withdrawal threshold by day 3 ($p<0.0001$). CFA mice injected with FM1-43 had a significant increase in knee withdrawal threshold ($p=0.0017$) whereas CFA mice injected with saline displayed a further drop in threshold ($p=0.0759$). Saline mice injected with drug had an increase in knee withdrawal ($p=0.0026$). It was determined CFA mice injected with FM1-43 had fewer cells responding to 100g knee force compared to pre injection ($p=0.0016$). Those injected with saline had a significant increase in cell response to 100g knee force ($p=0.0378$).

CONCLUSION: Through this study we have determined that FM1-43 can reduce inflammatory knee joint pain in both sexes and has consequences on calcium mobilization in the knee-innervating DRG.

Abstract #: 151
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Infectious Diseases and/or Immunology
Cluster: Emerging Drug Targets and Therapeutics

Jala Bogard, BS in Forensic Biology, BS in Cell and Molecular Biology

Jala Bogard (RU), Federica Gabrielle (L'Aquila), Dr. Pavel Petukhov (UIC), Dr. Xian-Ming Chen (RU), Dr. Francesco Angelucci (L'Aquila), Dr. David Williams (RU)

TARGETING APICOPLEXAN PARASITES: STRUCTURAL AND FUNCTIONAL CHARACTERIZATION OF CRYPTOSPORIDIUM THIOREDOXIN REDUCTASE AS A NOVEL DRUG TARGET

INTRODUCTION Cryptosporidiosis is a global human infection that causes watery diarrhea, acute gastroenteritis, abdominal pain, dehydration, and nutritional disorders. Although it is usually self-limited in immunocompetent individuals, cryptosporidiosis has a deep impact on public health due to its strong relation to early childhood mortality and is also a potentially life-threatening complication in individuals with weakened immune systems. Cryptosporidium spp. are the causative agents of cryptosporidiosis, with Cryptosporidium parvum and C. hominis being responsible for ~90% of human infections. There are no fully effective treatments currently available, and the only FDA-approved drug, nitazoxanide, is effective in only immunocompetent patients. New drug development is challenging due to the lack of efficient Cryptosporidium in vitro systems and animal models able to validate in vivo the efficacy of pharmacological treatment. The thioredoxin/thioredoxin reductase (Trx/TrxR) system is the main antioxidant defense for C. parvum, as genomic data indicates a lack of a glutathione reductase gene in this parasite. This suggests that the Trx-based redox system can be considered a choke point. Given the potential central role of CpTrxR in the parasite's redox homeostasis, we focus on its functional and structural characterization using two distinct protein sequences (F102 & S102).

METHODS Functional enzyme characterization. Structural studies of recombinant CpTrxR

RESULTS In this study, we reveal a critical difference in redox metabolism between Cryptosporidium parvum and humans, in which in the absence of glutathione reductase, the parasite's redox system is entirely dependent on its TrxR. Auranofin, a gold-containing compound, is known to kill parasites in culture, and here we demonstrate that CpTrxR is irreversibly inhibited by this compound. This underscores the potential of CpTrxR inhibition as a powerful strategy for therapeutic intervention. Results comparing CpTrxR variants found F102 to be more stable, with stabilized activity over time in the presence of substrate. We also present the crystallographic structures of CpTrxR to provide a visualization of three catalytically competent conformations of the C-terminal tail in "in" conformations, unveiling new aspects of the enzyme's mechanism.

CONCLUSION These findings offer essential structural and biochemical insights for the design of selective inhibitors, highlighting Cryptosporidium TrxR as a prime target for drug development.

Abstract #: 152
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Infectious Diseases and/or Immunology
Cluster: Emerging Drug Targets and Therapeutics

Gabrielle Kooi, BS, MS

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GLYCO-ENGINEERED ANTIBODIES HAVE INCREASED CNS DELIVERY AND TISSUE DISTRIBUTION

INTRODUCTION: The blood brain barrier(BBB) has a low penetration of antibodies (0.1-1%) into the Central Nervous System(CNS), which makes treatments difficult. From the small fraction of antibodies that can pass the BBB, there is a of lack understanding in the biology behind their ability to enter. Our lab sought to understand the antibodies found in the CNS and what potentially allows entry into the CNS. Preliminary data revealed that antibodies in the brain have a distinct glycosylation signature with reduced fucose and sialic acid. We sought to glyco-manipulate antibodies to mimic those found in the CNS and assess their ability to penetrate the BBB.

METHODS: Utilized HEK293T cells for production of antibodies to be WT, reduced fucose or reduced sialic acid with knockdown cell lines. Sialidase was utilized to desialylate pooled human IgG(GAM). Antibodies were Cy5-labeled and intraperitoneally(IP)-injected into either our humanized NSG mice or rats. Live imaging at various timepoints was used for visualization of Cy5-dectection in vivo. 48hrs-post-IP-injection, the animals were necropsied. Tissues harvested were brain, spleen, liver and small intestine for fluorometry. Whole brain hemispheres and two mice underwent delipidation for full tissue visualization of Cy5-signal via Odyssey and Lightsheet microscopy. Penetration of the labeled antibodies were tested using a BBB assay.

RESULTS: Our in vivo studies for both mice and rats showed GAM-desialyated had increased delivery to the brain. Cy5-detection was higher for the GAM-desialylated in all other tissues from fluorometry. Whole mouse imaging conferred visualization of Cy5-labeled GAM via Odyssey and Lightsheet micorscopy. The BBB assay revealed the knockdown antibodies had higher penetration values, with reduced sialic acid being overall more penetrative.

DISCUSSION: Our results highlight that modified antibodies have increased delivery to the brain and other organs as well. The study investigates the role of sialic acid in antibody distribution in vivo. A future study would utilize modified antibodies as a targeted treatment for CNS diseases, like HIV.

Abstract #: 153
Trainee Rank: Post-Doctoral Research Fellow
Theme: Infectious Diseases and/or Immunology
Cluster: HIV and Antiretroviral Therapy

Stacey Cahoon, PhD
Stacey M. Cahoon (RUMC), Itzel Lazcano (RUMC), Ryan Ross (RUMC)

THE ANTIRETROVIRAL BICTEGRAVIR CAUSES MORE JOINT PAIN THAN DOLUTEGRAVIR IN WILD-TYPE FEMALE MICE

INTRODUCTION People living with HIV (PLWH) have an increased lifespan thanks to the success of combination antiretroviral therapies (ARTs). It is estimated that more than 50% of PLWH report having pain1. The extent of ART contribution to joint pain is unknown. This study analyzed the effect of ART on joint pain in female mice from three commonly prescribed formulations: 1) bictegravir (BIC)/tenofovir alafenamide (TAF)/emtricitabine (FTC), 2) dolutegravir (DTG) TAF/FTC, 3) DTG/tenofovir disoproxil (TDF)/FTC.

METHODS Twenty female 12-week old C57BL/6 mice were given either regular mouse chow or ART-induced mouse chow for 13-weeks. All experiments were approved by the Institutional Animal Care and Use Committee (IACUC). The mice were split into four equal groups: vehicle control (VEH), BIC/TAF/FTC, DTG/TAF/FTC, and DTG/TDF/FTC. Mechanical allodynia was assessed on the hind paws as described previously2 at baseline (prior to ART treatment) and again at the end of the study (12-13 weeks after ART treatment). A 2-way ANOVA was conducted in GraphPad Prism 10 to determine statistical significance.

RESULTS The 50% withdrawal thresholds were determined at baseline and end of study to quantify the maximally tolerable mechanical force. The withdrawal threshold decreased for all groups between baseline and end of study indicating less tolerability to higher forces (treatment p=0.0042). Pair-wise comparisons showed a significant difference between the baseline and end of study measures in mice treated with BIC/TAF/FTC (p=0.0067).

CONCLUSION Treatment with BIC/TAF/FTC led to a significant increase in mechanical sensitivity over the duration of the study. The results suggest that BIC/TAF/FTC, commonly prescribed as Biktarvy, may worsen joint pain.

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Abstract #: 154
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Infectious Diseases and/or Immunology
Cluster: HIV and Antiretroviral Therapy

William Howell, BA
William Howell, Rush University; Edward Barker, Rush University

Determining the Predominant NK Cell Subset in the Direct Lysis of HIV-Infected Cells

INTRODUCTION: Although drug treatments for HIV control viral growth and extend the lives of people living with HIV (PLWH), the virus's latent reservoirs contribute to HIV persistence. Adoptive transfers of Natural Killer (NK) cells have been proposed to help clear viral reservoirs in combination with latency reversal agents in a process known as "kick and kill." After adding a latency-reversing agent, we aim to identify the NK cell subset most capable of controlling and lysing HIV-infected targets to enhance the clearance of productively infected T cells.

METHODS: With consent, CD4 T-cells and NK cells were isolated from donors' peripheral blood mononuclear cells. CD4 T cells were stimulated and then infected with HIV. Productively infected CD4-HIV-1 p24+ T cells were isolated and co-cultured with autologous NK cells for four hours before assessing the samples using flow cytometry. Samples were evaluated for degranulation markers, cell death, and the expression of relevant NK cell activation receptors and subset markers.

RESULTS: The degranulation frequency was highest in the CD56dimCD16dim NK cell subset, even though this subset represented a minor population (<3%) among CD56dim NK cells. The killing frequency, which measures specific lysis per cell subset, was highest in the CD56dimCD16dim subset. Within the CD56dimCD16dim subset, the most significant frequency of NK cells degranulating in response to infected cells was found in the subgroup expressing NKp46. In contrast, all NK cell subsets utilized NKG2D to kill HIV-infected cells. Given that CD16's association with CD2 enhances NK cells' ability to target cells, we demonstrated that blocking CD16's ability to bind to CD2 using an anti-CD16 B73.1 antibody clone reduced the degranulation frequency within the CD56dimCD16dim NK cell subset in response to HIV-infected cells.

CONCLUSIONS: The CD56dimCD16dim subset of NK cells is primarily responsible for the killing response against autologous HIV+ T cells. The activation receptor NKp46, on the CD56dimCD16dim, facilitates this increased killing of HIV-infected cells.

Abstract #: 155
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Infectious Diseases and/or Immunology
Cluster: HIV and Antiretroviral Therapy

Sarah Kee, BS

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COMPROMISED INTESTINAL BARRIER RESILIENCE TO EXOGENOUS AND ENDOGENOUS DISRUPTION IN PEOPLE LIVING WITH HIV

INTRODUCTION: The human gut microbiome is a dynamic ecosystem where disruptions to this equilibrium, such as HIV, can lead to microbial translocation which drives inflammation. Previous studies on people living with HIV on antiretroviral therapy (PLWH on ART) have shown that the infection is characterized by persistent immune activation even in phases of viral load decline. This contributes to the development of non-AIDS comorbidities which remain prevalent among PLWH despite ART. Multiple mechanisms regarding the activation and attenuation of cellular pathways are unclear and likely multifactorial. We hypothesize HIV impairs the intestinal barrier, making it susceptible to common exogenous and endogenous injurious agents, such as alcohol and pro-inflammatory cytokines, respectively.

METHODS: We generated 3D ileal and colonic organoids from PLWH patients and control (PLWoH) patients from endoscopic biopsy samples. These organoids were co-cultured with: EtOH and two doses of pro-inflammatory cytokine cocktail (IFNγ/TNFα). Following the treatment, epithelial barrier function was measured through the FITC-dextran (4kd) barrier integrity assay. Transcriptomic analysis and Gene set enrichment analysis (GSEA) were performed to identify biological pathways associated with intestinal permeability.

RESULTS: Organoids from PLWH showed elevated intestinal barrier disruption to EtOH and both doses of cytokine stimulation. There was no difference in baseline permeability. Transcriptomic analysis and GSEA demonstrated specific genes involved in epithelial barrier, support, resilience, and repair were downregulated in organoids from PLWH. Additionally, organoids from PLWH exhibited significant activation of pathways related to cellular stress and metabolic dysfunction, potentially suggesting an overactive, maladaptive response to cellular damage.

CONCLUSION: Our findings show an additional mechanism of compromised resilience to common exogenous and endogenous disruptors of the intestines in PLWH using 3D ileal and colonic organoids. Transcriptomic and gene analysis highlighted parallel pathways involved in impairing intestinal barrier integrity. Recognizing the influence of these mechanisms is important in developing targeted therapies to mitigate the effects of impaired barrier integrity and reduce chronic inflammation. Furthermore, with the prevalence of alcohol misuse in this population, there is a great importance of lifestyle factors in managing intestinal disruptions in PLWH. Illuminating mechanisms involved in decreased intestinal resiliency aim to provide new therapies and investigations for PLWH.

Abstract #: 156
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Infectious Diseases and/or Immunology
Cluster: HIV and Antiretroviral Therapy

Megan Seferian, BS

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EPISODIC VIREMIA IN WOMEN WITH HIV ON cART ALTERS IgG GALACTOSE, IgG3 gp120, AND INFLAMMATORY CYTOKINES

INTRODUCTION People living with HIV often exhibit chronic low-level immune activation with elevated inflammatory biomarkers, contributing to increased susceptibility to chronic comorbidities. This process, called inflammaging, has been linked to certain antibody properties such as IgG glycosylation. Although combination antiretroviral therapy (cART) controls viremia, factors such as illness, drug resistance, and medication nonadherence may contribute to viral rebound. Determining how episodic viral rebound affects IgG glycosylation and other such inflammatory biomarkers could aid in our understanding of disease progression in HIV patients.

METHODS Using repository plasma from ten women with HIV (WWH) from the Chicago site of the Women's Interagency HIV Study(WIHS, now MWCCS) on cART who experienced a single episode of viremia (> 200 copies/mL), we studied IgG galactosylation and inflammatory biomarkers at timepoints before, during and after viremia. Subjects were further stratified (n=5) by viral load (low: <1000 copies/ml vs. high: >5000 copies/ml). Bulk IgG was isolated from plasma and galactose was quantified via ECL (lectin) blot for each participant. Total and IgG3-specific HIV gp120 antibodies in plasma were quantified via ELISA. Inflammatory plasma cytokine profiles (IFN-γ, IL-17a, IL-2, IL-21, IL-4, IL-5, and IL-6) were assessed via Luminex. cART levels were measured by mass spectrometry.

RESULTS Six of ten WWH showed a drop in IgG galactose levels (average 38% reduction) during their episode of viremia. Of those six, four WWH had a continued drop(average 36% reduction) following resolution of their viremia. In the group with high viral loads, IgG3 gp120 levels inversely correlated with IgG galactosylation(p=.0376) Further, at a high viral load, IL-2 levels were found to correlate with IgG galactosylation(p=.0378). Finally, levels of IL-17a were found to correlate with IgG3 gp120 across viral loads(p=0.0323). cART levels were found to be reduced or below detection in 8/10 individuals during viremia.

CONCLUSION IgG galactose levels can drop during single viremic episodes, indicating a pro-inflammatory state and modulation in immune function that occurs during increased viral load. These findings suggest that associated heightened inflammation can contribute to immune system dysregulation and potentially contribute to co-morbidity risk and disease progression, although further studies are needed to better understand the role of IgG glycosylation in inflammaging.

Abstract #: 157
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Infectious Diseases and/or Immunology
Cluster: HIV and Antiretroviral Therapy

Abhayavarshini Sridhar, B.Tech, MS, MS

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IN UTERO AND LACTATION EXPOSURE TO DOLUTEGRAVIR-BASED COMBINATION ANTIRETROVIRAL THERAPY REDUCED TRABECULAR BONE BUT NOT CORTICAL BONE MASS IN RATS

INTRODUCTION: Maternal combination antiretroviral therapy (cART) use has reduced perinatal HIV transmission but increased the number of HIV-exposed but uninfected (HEU) children. HEU children experience higher rates of co-morbidities such as reduced bone mass. Current clinical recommendations include use of dolutegravir (DTG) anchored cART for pregnant women. DTG readily crosses the placenta4 and is detected in breast milk and infant plasma. DTG use is associated with bone mass loss in adults living with HIV, but the long-term effects of DTG-based cART on bone development in HEU is unknown. We hypothesized that in utero exposure to DTG-based cART would lead to reduced bone mass in a rat model of HEU children.

METHODS: Time-mated 10-13-week-old female Harlan Sprague Dawley rats were treated with clinically relevant combination of DTG/ Abacavir (ABC)/ Lamivudine (3TC) or vehicle via oral gavage starting at gestational day 6, continuing until postpartum day 28. Offspring were not directly dosed. At 573 days of age tissues were isolated and femoral length was measured using digital calipers. Femoral trabecular architecture and cortical geometry were evaluated using micro-computed tomography. Bone mechanical properties were measured via three-point bending.

RESULTS: Results were analyzed using two-way ANOVA with treatment and sex as factors. Femoral length was greater in cART treated rats, with a significant 3.4% increase in males and a non-significant 0.7% increase in females. Trabecular bone volume fraction was impaired by cART treatment, with a significant 24% reduction in males and a non-significant 6.5% reduction in females. cART treatment caused a decrease in trabecular number in females and an increase in trabecular spacing in both sexes. Neither cortical bone area nor cortical porosity were affected by treatment. There were no significant treatment effects in the mechanical properties.

CONCLUSION: Our data suggests that exposure to DTG-based cART during early development has long-lasting negative effects on trabecular bone mass and potentially influences bone growth. It is currently unclear whether the loss of trabecular bone mass is due to impaired development or accelerated age-related loss. Importantly, impaired bone mass accrual can increase the risk for osteoporosis later in life, and therefore HEU children may be at an increased risk for osteoporosis.

Abstract #: 158
Trainee Rank: Post-Doctoral Research Fellow
Theme: Infectious Diseases and/or Immunology
Cluster: HIV and Antiretroviral Therapy

Amber Virdi, Ph.D.

Amber K. Virdi (RUMC), Srinivasa Narasipura (RUMC), Leannie Olivares (RUMC), Lena Al-Harthi (RUMC)

FECAL MICROBIOME TRANSFER FROM HIV-INFECTED HUMANIZED MICE MEDIATES GUT DYSBIOSIS THROUGH MODULATION OF COLONIC β-CATENIN

INTRODUCTION: HIV-associated inflammation persists despite robust viral control through antiretroviral therapy. Mechanisms linked to the persistence of HIV-associated inflammation are not entirely clear. A leaky gut can theoretically contribute to inflammation through microbiota shift, microbial products/metabolite alterations, and the leakage of these products into the periphery. β-catenin is a cell pro-survival factor essential for gut stemness/renewal, is a component of the cadherin junction complex, and is implicated in other gastrointestinal diseases. Using a humanized mouse model of HIV (NSG-huPBMCs), we previously demonstrated that HIV infection downregulates colonic epithelial tight-junction proteins and β-catenin, and causes a leaky gut; all of which can be reversed by targeted induction of β-catenin. We evaluated here whether fecal microbiome transfers (FMT) from HIV infected mice can recapitulate colonic tight junction and β-catenin loss and induce gut leakiness in a non-HIV infected mouse.

METHODS: Gut microbiome was measured by 16sRNA analysis. FMT was prepared by filtering donor microbial content from uninfected/infected donors. Recipient mice were given a seven-day oral antibiotic regimen, then FMT was delivered to recipient mice via oral-gavage over two weeks. Upon sacrifice, β-catenin and tight-junction markers were assessed in epithelial cells via western blot, and functional leakage was assessed via FITC-dextran assay.

RESULTS: HIV infected mice demonstrated reduction in bacterial diversity, overgrowth of certain bacterial groups like Bacteroidota (which are commonly associated with inflammatory conditions), and loss of Proteobacteria and Firmicutes which may reflect a compromised gut environment. FMT transfer from HIV infected mice significantly reduced expression of colonic β-catenin and ZO-1 in healthy recipient mice. We observed a trend towards FMT inducing gut leakiness in recipient animals, although it did not reach statistical significance given small animal numbers (n=5-7 per group) in these preliminary studies, which will be expanded to assess statistical significance.

CONCLUSIONS: These data demonstrate that HIV infection mediates a shift in microbiota, associated with disruption of the gut in relation to tight junction and β-catenin expression, that impacts gut leakiness. The findings also support the concept that targeting β-catenin is a viable approach to reverses HIV-mediated persistent inflammation through a leaky gut.

Abstract #: 159
Trainee Rank: RUSH Alumni (graduated on/or after May 2024)
RMC: DTS
Theme: Infectious Diseases and/or Immunology
Cluster: Immune Responses and Autoimmune Disorders

Ariana Alcantar, MS in Biotechnology

Ariana G. Alcantar, Alexis P. Jimenez-Uribe, Yanxia Cao, Ryan Spear, Steve Mangos, Eunsil Hahm Rush University Medical Center, Chicago, IL, United States

ACUTE INFLAMMATION ENHANCES SGLT2+ MYELOID POPULATION IN BONE MARROW

INTRODUCTION Sodium-glucose cotransporter 2 inhibitors (SGLT2i) have exhibited benefits beyond controlling blood sugar levels, including improving cardiac function. Since SGLT2 expression predominantly occurs in kidney proximal tubule cells, understanding SGLT2 expression and its pathophysiological functions outside the kidney remains limited. This study aims to investigate the expression of SGLT2 in immune cells and its implications.

METHODS Leukocytes were isolated from peripheral blood and bone marrow (BM) of BALB/c and C57BL/6 mice under normal conditions and after lipopolysaccharide (LPS)-induced systemic inflammation. CD34+ human hematopoietic cells (HSCs) from healthy donors and the human myelocyte cell line (HL-60) were cultured to study for in vitro myelopoiesis. Staining for SGLT2 and cell markers was performed using multicolor flow cytometry.

RESULTS Under normal conditions, approximately 1.5% of mouse BM contains an SGLT2+ population that expresses myeloid markers (Ly6C and Ly6G) but not lymphoid markers (CD3 and CD19). Interestingly, this SGLT2+ population increases after LPS challenge in bone marrow, not in peripheral blood. Further characterization shows that these cells display an immature phenotype (Sca-1+), arise from the myeloid lineage (CD11b+), and are monocytic in nature (CD14+). Consistent with our in vivo results, in vitro myelopoiesis assays demonstrated that inflammatory signals (TNFa or LPS) increase the SGLT2+ myeloid cells during cell differentiation.

CONCLUSION This study reveals that SGLT2 expression is not limited to the kidney. In both mouse and human immune systems, we identified a myeloid population of SGLT2+ cells in the bone marrow that increases under inflammatory conditions. While further investigation is necessary to understand the role of SGLT2 in BM myeloid cells during inflammation, our results imply a novel role for SGLT2 in immune cells. This points to potential clinical implications of SGLT2 inhibitors on immune regulation.

Abstract #: 160
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Infectious Diseases and/or Immunology
Cluster: Immune Responses and Autoimmune Disorders

Nicole Nowak, BS

Kyle Amber, MD (Rush University Medical Center, Department of Dermatology) Adrian Mansini, PhD (Rush University Medical Center, Department of Dermatology)

EVALUATION OF TOPICAL DIPEPTIDYL-PEPTIDASE 4 INHIBITOR AND ITS IMPACT ON THE EXPRESSION OF LATE CORNIFIED ENVELOPE IN A MODEL OF ATOPIC DERMATITIS

INTRODUCTION: Atopic dermatitis (AD) affects nearly 3% of the global population and significantly impacts patients' quality of life. It is characterized by persistent inflammation, pruritus, erythema, scaling, and serous oozing. While topical corticosteroids (TCS) are commonly used, they carry risks such as skin atrophy, tachyphylaxis, and hypothalamic-pituitary-adrenal axis suppression. Alterations in late cornified envelope (LCE) gene expression are believed to contribute to epidermal barrier dysfunction. Deletions in the LCE3B and LCE3C genes have been associated with barrier dysfunction and eczema. Recent studies in the Amber lab suggest that dipeptidyl peptidase 4 (DPP4) inhibitors, like vildagliptin, enhance epidermal differentiation and upregulate LCE genes without inducing inflammation. This study explores the therapeutic potential of vildagliptin in MC903-induced AD mouse models.

METHODS: C57Bl/6J mice (7-9 weeks old) were used. Mice were divided into groups for each treatment (clobetasol 5mg/mL, and vildagliptin at 10 mg/mL, 5 mg/mL, and 1 mg/mL). MC903 (1 nM) was topically applied to ears three times six days before the first treatment. Vildagliptin applied three times a week for 14 days. Ear thickness was measured, and body weight was recorded daily. Tissues and blood samples were collected for FFPE, RNA, and serum analysis. Epidermal thickening and immune cell infiltration were evaluated using H&E staining.

RESULTS: In the MC903 model, no clear increase in ear thickness was observed in the control group, a key feature of this model. Treatment groups, including vildagliptin (10mg/mL, 5mg/mL, and 1mg/mL) and clobetasol (positive control), showed no significant differences in ear thickness, indicating potential shortcoming in disease induction, possibly due to insufficient dermatitis or variability in measurements. Histopathological analysis revealed inconsistent epidermal thickening and mild immune cell infiltration, but these changes were not significantly associated with treatment groups or expected inflammation. The model's inability to achieve robust disease induction limited the evaluation of vildagliptin's effects.

CONCLUSION: The study highlights challenges in evaluating vildagliptin as a therapeutic option for AD in this model, underscoring the need for better disease induction protocols. DPP4 inhibitors, like vildagliptin, show potential in modulating inflammatory pathways and restoring the epidermal barrier, but further research is necessary to optimize disease induction and dosing for effective therapeutic outcomes.

Abstract #: 161
Trainee Rank: Clinical Resident
Theme: Infectious Diseases and/or Immunology
Cluster: Immune Responses and Autoimmune Disorders

Paul J Pecorin, MD

Paul J Pecorin MD (Rush University), Samantha Mutai MD (Rush University), Pamela Contreras-Chavez MD (Rush University)

ACQUIRED HEMOPHILIA A AFTER SJÖGREN'S FLARE: A POTENTIAL TEMPORAL LINK

INTRODUCTION Acquired hemophilia A (AHA) is a rare autoimmune disorder caused by the development of autoantibodies against factor VIII. Patients typically present with significant bleeding complications such as large subcutaneous hematomas. AHA is idiopathic in 52% of cases but can also be associated with malignancy (11.8%) or autoimmune diseases (11.6%). Management focuses on hemostatic control with bypassing or replacement agents to prevent acute morbidity and immunosuppressive therapy to induce remission. Emerging therapies, such as emicizumab, show promise as future treatment options. This case raises questions about the temporal relationship between autoimmune flares and the development of AHA.

CASE PRESENTATION A 67-year-old female with Sjögren's syndrome complicated by cryoglobulinemia presented to her rheumatologist with worsening inflammatory joint pain, synovitis in her proximal interphalangeal (PIP) joints, and worsening sicca symptoms. A flare of Sjögren's disease was diagnosed, and her treatment included an increased azathioprine dose and prednisone, leading to symptom improvement. Twelve weeks later, she presented with large hematomas on her bilateral arms and neck. Laboratory tests revealed an elevated aPTT of 82.2 seconds and a hemoglobin level of 12.2 g/dL. A mixing study showed incomplete aPTT correction, and her factor VIII activity level was <0.5%, confirming AHA. A factor VIII inhibitor level of 20.0 BU (normal <0.3) corroborated the diagnosis. She was started on prednisone (1 mg/kg/day) and rituximab. Despite initial treatment, her hemoglobin continued to decline, and her ecchymosis enlarged. She received recombinant factor VIIa, resulting in clinical improvement and discharge. Post-discharge, her aPTT normalized, and her factor VIII inhibitor level decreased to 0.6 BU. She has not experienced further significant bleeding and remains on a prolonged prednisone taper.

DISCUSSION This case suggests a potential temporal relationship between autoimmune flares and AHA. The Sjögren's flare preceded the AHA diagnosis by three months, raising the possibility that immune activation during flares may trigger autoantibody production. Further research is warranted to clarify this connection and guide management in patients with autoimmune diseases.

Abstract #: 162
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Infectious Diseases and/or Immunology
Cluster: Immune Responses and Autoimmune Disorders

Ryan Spear, BS - Biochemistry

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ALTERED BONE MARROW CONTRIBUTES TO KIDNEY INJURY

BACKGROUND: Circulating factors secreted by immune cells, particularly those involved in glomerular injury, have been implicated in CKD pathogenesis. Our group recently identified BM-derived myeloid cells as key contributors to glomerular dysfunction in mice, suggesting that a dysregulated BM immune system could be responsible for renal injury through soluble factors such as suPAR. Despite its potential importance in CKD development, the role of the central immune system, specifically the BM, has not been thoroughly interrogated in humans. Furthermore, the triggering cause for elevated suPAR production and myeloid alterations, as well as the existence of human myeloid cell population counterpart with similar features that could cause kidney injury, remain unknown.

METHODS: Human BM aspirate samples were collected from 7 healthy donors and 10 CKD patients. We employed ELISA, multiplex cytokine assays, multicolor flow cytometry, and transcriptome profiling via scRNA-seq. To assess the direct impact of TNFα on myelopoiesis, in vitro differentiation assays were conducted using primary huHSCs. We investigated epigenetic/transcriptomic changes, and metabolic alterations in CD14+ monocytic cells differentiated from HSCs in the presence of TNFα, utilizing ATAC-seq, RNA-seq, and Seahorse assays. Complementary animal experiments included in vivo blockade of TNFα, co-injection of TNFα and IFN, measurement of TNFα levels in three proteinuric animal models and suPAR-deficient mice. Finally, we evaluated the impact of secreted factors from TNFα-driven, functionally altered myeloid cells on renal function through immunofluorescence assays on podocytes and filtration function assays in zebrafish.

RESULTS: We found elevated levels of TNFα and suPAR in the BM of CKD patients, along with transcriptomic changes in BM monocytic cells which gave them inflammatory characteristics. In vitro myelopoiesis assays revealed that TNFα drives the expansion of altered monocytic cells resembling those in CKD patients. These cells are metabolically active, transcriptionally and epigenetically modified, and secrete elevated levels of proinflammatory cytokines and suPAR. These secreted factors caused filtration dysfunction in zebrafish and led to cytoskeletal disarrangement in cultured podocytes. Additionally, TNFα exposure during myelopoiesis resulted in increased suPAR levels and proteinuria in mice.

CONCLUSION: Together, our findings suggest that TNFα-driven alterations in BM myeloid cells contribute to glomerular dysfunction in CKD, highlighting the BM-kidney axis as a promising target.

Abstract #: 163
Trainee Rank: Post-Doctoral Research Fellow
Theme: Infectious Diseases and/or Immunology
Cluster: Immune Responses and Autoimmune Disorders

Itzel Pamela Zavala Guevara, Dr.

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DIFFERENTIAL EXPRESSION OF RENAL AND HEPATIC PCSK9 DURING DEVELOPMENT OF HYPERCHOLESTEROLEMIA IN MINIMAL CHANGE DISEASE (MCD)-RELATED NEPHROTIC SYNDROME

INTRODUCTION: In the US, 85% of chronic kidney disease patients with nephrotic syndrome (NS) have hypercholesterolemia, compared to 31.5% of the general population. Proprotein convertase subtilisin/kexin type 9 (PCSK9) plays an important role in the regulation of LDL-cholesterol in the liver. In the kidney, PCSK9 is expressed in the cortical collecting duct (CCD) where acts as a chaperone for the epithelial sodium channel. We showed that PCSK9 is increased in kidney biopsies of patients with NS and that it is implicated in the initiation of hypercholesterolemia in two animal models of NS, the Buffalo-Mna rat (model of focal and segmental glomerulosclerosis) and the Rrm2b-/- mouse (model of collapsing glomerulopathy) (Molina-Jijon et al, 2020). In this study, we investigated the expression of PCSK9 in the puromycin aminonucleoside (PAN) nephrosis rat model of human Minimal Change Disease (MCD).

METHODS: Sprague-Dawley rats were injected with saline 0.9% (control) or PAN (15 mg/100 g bodyweight). Rats were euthanized daily from day 1 to 7 after injection. Proteinuria, PCSK9 and serum cholesterol levels were assessed. PCSK9 gene and protein expression in liver and kidney were studied by RealTime PCR and Western blot.

RESULTS: Control rats did not develop proteinuria, hypercholesterolemia or high serum levels of PCSK9. PAN rats developed proteinuria (mg/18h) from day 4 after injection (0.82±0.1 day 0; 4.4± 1 day 4; 63±17 day 5; 145±7 day 6 and 128±13 day 7). Serum PCSK9 (ng/mL) significantly increased from day 5 (144±26 day 0; 404±81 day 5; 1635±263 day 6; 1816 ± 191 day 7), and hypercholesterolemia (mg/dL) significantly developed from day 6 to 7 (93±6 day 0; 326.80±37 day 6; 352±10 day 7). In the kidney, PCSK9 protein and gene expression increased from day 3 and 5, respectively, and are not modified in the liver.

CONCLUSION: As rats develop NS, PCSK9 protein levels increase in the kidney and serum and did not change in the liver. PCSK9 from CCD may play a role in the initiation of hypercholesterolemia in MCD-related nephrotic syndrome and could become a new therapeutic target to prevent development of hypercholesterolemia in nephrotic syndrome patients.

Abstract #: 164
Trainee Rank: Clinical Resident
Theme: Infectious Diseases and/or Immunology
Cluster: Microbiome and Infection Control

Katie Holland, MD

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Non-tuberculosis mycobacterium lymphadenitis - does the presence of a fistula increase the chance that a child will need surgery?

INTRODUCTION: Cervicofacial lymphadenitis (CFL) in children is commonly caused by non-tuberculosis mycobacterium (NTM). This presents as a slow growing soft tissue infection with lymphadenopathy which can cause violaceous skin changes, necrosis, fistulas, or invasion of local structures such as salivary glands in later stages. Historically, surgery was considered first-line treatment but in recent years literature has shifted to initial medical therapy. This study aimed to evaluate if the presence of fistulous tracts in patients with NTM CFL increased the need of surgery.

METHODS: Retrospective chart review of patients with presumed NTM at a single-tertiary care urban pediatric hospital between 2004-2023. Demographic, physical examination, treatment, operative, laboratory, and follow up data was collected. Imaging, if available, was blindly reviewed by a radiologist for fistula presence. Patients were excluded if they were over the age of 18 or had presentation/pathology/culture data that wasn't consistent with NTM. A Fisher's exact test was used for statistical analysis.

RESULTS: 40 patients were found to have presumed NTM. 80% (n=32) had primary medical treatment, the majority of which failed (81.3%, n=26). Of those that underwent secondary surgery, 88.5% (n=23) had fistula tracts, 11.5% (n=3) did not have fistulas. In total, 90.6% (n=29) of patients with fistulas underwent surgical treatment at some point [20.1% (n=6) primary, 79.3%% (n=23) secondary]. Of patients without fistulas, 62.3% (n=5) underwent surgery. There was not a statistically significant difference in the number of patients with fistulas compared to those without who required surgery (p=.08), or those who required secondary surgery (p=.06). Most patients who underwent surgery had documented resolution of the disease post-operatively (64.7%, n=22) while 35.3% (n=12) required additional treatment which included surgery and/or antibiotics.

CONCLUSION: Surgery including superficial parotidectomy, modified lymphadenectomy, and submandibular gland excision are efficacious treatments for NTM CFL. In this chart review, most patients with fistula tracts failed initial medical management and required surgery. This conclusion may indicate that patients with fistulous tracts may benefit from first-line surgical treatment combined with antibiotics and can aid in family counseling and expectations. We highlight the experience of a high-volume tertiary care pediatric hospital with surgical management of this disease.

Abstract #: 165
Trainee Rank: Clinical Fellow
Theme: Infectious Diseases and/or Immunology
Cluster: Microbiome and Infection Control

Kylie Jungles, MD

Investigators: Kylie Jungles, MD1, Karaj Singh2, Susan E. Pacheco, MD3, Mahboobeh Mahdavinia, MD PhD1,3 1. Division of Allergy/Immunology, Department of Internal Medicine, Rush University Medical Center, Chicago, IL 2.Rush Medical College, Rush University Medical Center, Chicago, IL 3. Division of Allergy and Immunology, Department of Medicine and Department of Pediatrics, UT Health Houston, Houston, TX

CHANGES IN MOLD SENSITIZATION AND ASTHMA RATES OVER THE PAST DECADE

INTRODUCTION: Climate change is an urgent public health crisis. Fluctuating global temperatures, air pollution, and changes in rainfall and pollination patterns alter patterns of respiratory infections and mold proliferation. The accumulative effect of these changes may be detrimental for patients with allergic asthma. We hypothesized that rates of mold proliferation and active asthma have increased with the changing climate.

METHODS: A large retrospective study of patients with allergic rhinitis (AR) visited/diagnosed at a tertiary care allergy clinic in Chicago from 2014-2024 was performed. Participants were tested with a panel of 28-aeroallergens, including 4 common molds. Invitro aeroallergen, active asthma history, and demographics were collected. Using logistic regression, adjusting for demographics, mold-sensitization and current asthma rates were compared between 2014-2019 (pre-COVID) and 2022-2024 (post-COVID) time periods.

RESULTS: 1,052 patients were included. Mold sensitization increased significantly (76.7% post-COVIDvs.46.5%pre-COVID;p<0.0001). Alternaria specifically increased markedly during this time (69.8%vs.38.9%,p<0.0001). Current asthma rates also increased (54.9%vs.42.7%;p=0.03). Importantly, the current asthma was significantly associated with mold sensitization (adjusted-p=0.013). The rate of sensitization to pet dander and other atopic comorbidities were not significantly different.

CONCLUSION: We found a significant increase in sensitization to molds in patients with AR in Chicago over the past decade, which was associated with current active asthma. Increased mold sensitivity may be linked to the increase in temperature, rainfall, and flooding events that Chicago has experienced in the setting of climate change. Alternaria sensitization, which increased drastically during this time, has previously been associated with worsening asthma and might be linked to this pattern.

Abstract #: 166
Trainee Rank: Clinical Resident
Theme: Infectious Diseases and/or Immunology
Cluster: Microbiome and Infection Control

Neeraja Kadiyala, PharmD

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OPTIMIZING PERIOPERATIVE CEFAZOLIN USE IN PATIENTS WITH PENICILLIN ALLERGIES: THE ROLE OF A HOSPITAL-WIDE GUIDELINE

BACKGROUND Surgical site infections (SSIs) are the most common hospital-acquired infection in the United States and are prevented with the use of perioperative antibiotics. Cefazolin, a first-generation cephalosporin, is the preferred perioperative antibiotic for most procedures due to its efficacy in preventing SSIs compared to alternatives. However, those with penicillin allergies have a 50% increase in the likelihood of acquiring SSIs due to inferior alternative antibiotics that are prescribed for concerns for cross-reactivity. Newer studies that cefazolin to those with a penicillin allergy is safe with a cross-reactivity incidence of <1% due to dissimilarity of side chains. To increase the prescribing of cefazolin for perioperative prophylaxis in penicillin-allergic patients, an updated penicillin allergy guideline was published at RUMC in May 2024. This study was conducted to evaluate the effect of the RUMC penicillin-allergy guidelines on cefazolin perioperative prescribing trends for patients with a documented penicillin allergy across different surgical specialties.

METHODS A single-center, retrospective observational cohort study was performed through chart review of patients with a reported penicillin allergy who received a perioperative antibiotic both prior to (7/1/2022 to 1/31/2023) and after implementation of the guideline (7/1/2024 to 1/31/2025). Adult patients with a documented penicillin or amoxicillin allergy were included who underwent a surgical procedure with preoperative antibiotics ordered through one of the following service line order sets: Orthopedic Surgery, General Surgery (Non-Colon/Non-Small Bowel), Thoracic Surgery, ENT, Neurosurgery, and Plastics. Patients who had a concurrent cephalosporin allergy, history of penicillin-associated severe cutaneous adverse reactions (e.g. Stevens-Johnson Syndrome, toxic epidermal necrolysis, etc.) or organ damage, and history of MRSA colonization were excluded. The primary outcome of this study is to assess the rate of cefazolin prescribing during each study period. Secondary outcomes include incidence of surgical site infections, lengths of hospital stay, and incidence of readmission within 30 days of discharge from the hospital.

RESULTS and CONCLUSION pending

Abstract #: 167
Trainee Rank: Clinical Fellow
Theme: Infectious Diseases and/or Immunology
Cluster: Microbiome and Infection Control

Christine Lucky, MD, MPH

Christine W. Lucky (presenting author, Rush), Lahari Thotapalli (Rush), Laura K. Rusie (Rush), Yoona Rhee (Rush), Michael E. Schoeny (Rush), Nicole A. Kraut (Rush), Alexandra Seguin (Rush), Brian Stein (Rush), Raul I. Rodriguez (Rush), Mary K. Hayden (Rush), and Michael Y. Lin (Rush)

IMPACT OF CLOSTRIDIOIDES DIFFICILE ADMISSION SCREENING ON SUBSEQUENT INFECTIONS AMONG HEMATOLOGY-ONCOLOGY PATIENTS

INTRODUCTION: Clostridioides difficile infection (CDI) disproportionately impacts hematology/oncology patients. In June 2022, we implemented admission screening of asymptomatic patients admitted to our hematology/oncology unit (14E) to reduce CDI rates by early identification and isolation of carriers. We evaluated the impact of admission screening on rates of CDI and compared incidence of diarrhea and subsequent symptomatic testing among patients based on admission screening result.

METHODS: During the intervention period (7/2022-7/2024), asymptomatic patients admitted to 14E were tested for C. difficile (perirectal swab, Cepheid GeneXpert®, Sunnyvale, CA); the symptomatic testing protocol (unformed stool, Cepheid GeneXpert®) did not change between the baseline period (5/2020-5/2022) and intervention period. Monthly CDI rates were calculated for 14E using CDC definitions based on positive C. difficile symptomatic tests (community onset [CO] if positive in the first three hospital days, hospital-onset [HO] if day 4 or later). We performed an adjusted interrupted time-series analysis to compare CO-CDI and HO-CDI rates per 10,000 patient-days during baseline and intervention periods. We analyzed the risk of developing diarrhea through hospital day 14 or receiving subsequent symptomatic testing using a matched cohort of asymptomatic C. difficile carriers and non-carriers in a 1:2 ratio during the intervention's first year (7/2022-6/2023).

RESULTS: The incidence rate ratio for HO-CDI was 0.45 (P=0.10) and for CO-CDI, 0.15 (P=0.049). During the first year of implementation, 25 patients were identified as asymptomatic C. difficile carriers. Using a matched cohort of 50 non-carriers, the relative risk (RR) of carriers developing diarrhea during hospital days 1-3 or hospital days 4-14 was 1.33 (95% confidence interval [CI] 0.24, 7.47) and 1.00 (CI 0.38, 2.61), respectively. The RR was 0 (P=0.03) for likelihood of subsequent symptomatic C. difficile testing.

CONCLUSION: There was no significant change in HO-CDI rates and a statistically significant reduction in CO-CDI rates after admission screening. Patients identified as C. difficile carriers at time of admission were less likely to be retested for CDI than non-carriers during hospitalization despite similar rates of diarrhea. Though admission screening for C. difficile may reduce CO-CDI rates through various mechanisms, one important mechanism is its impact on provider testing behavior for subsequent symptomatic C. difficile testing.

Abstract #: 168
Trainee Rank: Post-Doctoral Research Fellow
Theme: Infectious Diseases and/or Immunology
Cluster: Microbiome and Infection Control

Jun Oike, M.D., Ph.D

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Do Implant Material Properties Influence Bacterial Burden in a Mouse Model of Periprosthetic Joint Infection?

INTRODUCTION: This study investigated the effect of implant materials on bacterial burden in a mouse periprosthetic joint infection (PJI) model. Stainless steel (SS), titanium (Ti), and roughened titanium (Ti-R) K-wires were used as femoral intramedullary implants, with surgical sites inoculated with Staphylococcus aureus (Xen36).

METHODS: Fifteen 12-week-old male C57BL/6 mice were used. Implants (0.6 mm x 7 mm) made of SS, Ti, or Ti-R were placed in the right femur. In Study 1, SS (n=5) and Ti (n=4) were compared with $1x10^4$ CFUs inoculated. In Study 2, Ti (n=4) and Ti-R (n=2) were compared with $1x10^3$ CFUs inoculated. From days 7-14, all mice received subcutaneous vancomycin (110 mg/kg) and intravenous IgG1 control antibody (30 mg/kg). Bacterial burden was assessed at day 28 with CFU analysis.

RESULTS: In Study 1, the SS implant group showed significantly higher bacterial burden in the tissue as compared to the Ti implant group ($1.59 \times 10^5 \pm 1.50 \times 10^5$ vs. $9.95 \times 10^2 \pm 7.21 \times 10^2$, p=0.02). Furthermore, implant CFUs trended higher with SS implants ($5.67 \times 10^3 \pm 5.29 \times 10^3$ vs. $8.35 \times 10^2 \pm 7.70 \times 10^2$). In Study 2, the Ti-R implant group showed higher trends of tissue and implant CFUs compared to the Ti group (tissue: $1.33 \times 10^5 \pm 1.32 \times 10^5$ vs. $3.93 \times 10^3 \pm 1.66 \times 10^3$, implant: $8.50 \times 10^4 \pm 8.50 \times 10^4$ vs. $3.91 \times 10^2 \pm 2.65 \times 10^2$). DISCUSSION: This study demonstrates that SS implants lead to significantly higher bacterial burden as compared to Ti implants, indicating that surface properties may influence bacterial colonization. Furthermore, Ti-R implants exhibited a higher trend of bacterial load than Ti, suggesting that surface roughness may enhance bacterial attachment and infection burden.

CONCLUSION: These findings highlight the significant impact of implant material and surface roughness on bacterial colonization in periprosthetic joint infections. SS implants exhibited a significantly higher bacterial burden than Ti, while Ti-R implants showed a trend toward higher infection risk. Larger studies are needed to confirm these findings.

Abstract #: 169
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Musculoskeletal Research and Orthopedics
Cluster: Bone Biology and Molecular Mechanisms

Delia Alkhatib, M.sc. IBS
Delia O. Alkhatib, Kelsey A. Carpenter, and Ryan D. Ross

ACTIVATING MUTATIONS IN LRP5 DO NOT INCREASE ALVEOLAR BONE MASS AND MINERALIZATION IN THE 6 WEEK AGE HYP MICE MODEL OF XLH

X-linked hypophosphatemia (XLH) is caused by loss of function mutations in the PHEX gene, which leads to decreased bone and teeth mineralization. XLH patients suffer from a high rate of periodontitis due to the defective formation and mineralization of the alveolar bone and surrounding tissues. Our laboratory has previously reported that sclerostin antibody (Scl-Ab) improves the mass and mineralization of alveolar bone using the Hyp mice model of XLH. Scl-Ab treatment activates canonical Wnt signaling by inhibiting the binding of sclerostin with low-density lipoprotein receptor-related protein 5 (LRP5). To confirm the positive effects of Scl-Ab are dependent on LRP5-mediated canonical Wnt signaling, the current study tested the hypothesis that crossing Hyp mice with mice harboring an activating mutation in LRP5, the high bone mass (HBM) mouse, would increase the alveolar bone mass and mineralization. Heterozygous male HBM mice were bred with female heterozygous Hyp mice to obtain male and female wild-type (WT), Hyp, HBM, and HypxHBM littermates. A total of 7, 9, 4, and 3 WT, Hyp, HBM, and HypXHBM male and 4, 5, 4, 6, WT, Hyp, HBM, and HypXHBM female mice were bred. Mice were sacrificed at 6 weeks of age and the right mandibles were collected for micro-computed tomography analyses (Scanco µCT50, 70 kVp, 114 µA, 500 ms, 6.0µm voxels). Alveolar bone was analyzed between the first molar roots. The outcome variables were the alveolar bone volume fraction (BV/TV) and tissue mineral density (TMD, mgHA/cm3). Genotype effects were compared using a one-way analysis of variance followed by post-hoc T-tests. Alveolar BV/TV and TMD were significantly affected by genotype. Both Hyp and HypXHBM mice had significantly decreased BV/TV when compared to both WT and HBM littermates of both sexes. However, the BV/TV of HypxHBM mice did not differ when compared to Hyp mice in either males (p=0.18) or females (p=0.48). Similarly, both male and female Hyp and HypXHBM mice had decreased alveolar TMD when compared to WT and HBM littermates. However, TMD levels did not differ between Hyp and HypXHBM mice in either males (p=0.87) or females (p=0.85). Despite our previous findings with Scl-Ab, the current study failed to detect similar positive effects by genetically

Abstract #: 170
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Musculoskeletal Research and Orthopedics
Cluster: Bone Biology and Molecular Mechanisms

Waddell Holmes, Associates of Science, Bachelors of Science, Masters of Science
Waddell Holmes, Marcus Winogradzki, Shreya Patel, Aubrey Vistal, Jitesh Pratap

Regulation of the Endosomal Pathway in Osteoblasts Differentiation

INTRODUCTION: Osteoblasts (OB) synthesize and secrete bone matrix proteins. Recent studies in transcriptomics and proteomics have revealed that the cluster of proteins most upregulated during OB differentiation is related to the endosomal pathway. Endosomes play a crucial role in regulating signaling output by controlling the fate of cell surface receptors through internalization, recycling, and degradation to the plasma membrane, trans-Golgi network, or the lysosomes. However, change in the early, late and recycling endosomal proteins is still unknown. Here, we examined the levels and subcellular distribution of endosomal proteins during OB differentiation and glucose starvation.

METHODS: We utilized mouse IDG-SW3 and primary calvarial OB to examine the expression levels and subcellular localization of endosomal pathway-related genes. We performed quantitative real-time polymerase chain reaction, western blotting, and confocal microscopy. Subcellular distribution of endosomes was detected via specific antibodies for early (EEA1, Rab5, Clathrin, Syntaxin 6, Appl1), late (Rab7, Rab9), and recycling (Rab11) endosomal marker proteins. As endosomal pathway is upregulated during nutrient stress, we also examined endosomal protein levels during glucose starvation.

RESULTS/CONCLUSION: Our results show a significant upregulation of mRNA and protein levels of for STX6 and Rab5 in differentiating IDG-SW3 osteoblasts while EEA1 and Rab7 showed increase in mRNA levels without changing in protein levels. These results suggest both transcriptional and translational regulation of the endosomal proteins during differentiation. Next, to understand the regulation of expression levels and subcellular distribution, we examined the role of Runx2, a master regulator of OB differentiation. We utilized WT and Runx2 knockout (KO) calvarial OB and found a significant reduction in EEA1 and increased levels of Caveolin-1 and Rab11 in Runx2 KO cells. The distribution of endosomes depends on the stability of microtubules (MTs); therefore, we treated OB with MT-targeting agents and found that stabilizing MTs via docetaxel treatment increases the endosomal protein levels. MT depolymerization via vinblastine or nocodazole resulted in the aggregation of EEA1 puncta in Runx2 KO cells without changing the protein levels. These results indicate that changes in the MT dynamics and Runx2 levels can regulate endosomal distribution. Finally, we found decreased levels of Rab11 and STX6 proteins in glucose starved wild

Abstract #: 171
Trainee Rank: Post-Doctoral Research Fellow
Theme: Musculoskeletal Research and Orthopedics
Cluster: Bone Biology and Molecular Mechanisms

Hoomin Lee, Ph. D
Hoomin Lee (RUSH); D. Rick Sumner (RUSH); Frank C. Ko (RUSH)

EXAMINING ENDOTHELIAL-MESENCHYMAL TRANSITION IN INTRAMEMBRANOUS BONE REGENERATION

INTRODUCTION The importance of blood vessel formation is well-known, such as a conduit for supplying necessary nutrients and growth factors to promote bone regeneration. However, potential de-differentiation or transdifferentiation of endothelial cells, such as Endothelial-mesenchymal transition (EndMT), have not been fully explored. While not been explored in bone previously, EndMT has been observed during embryonic development of the heart, cardiac and renal fibrosis, wound healing and cancer progression, triggered by TGFβ, HIF1α, Notch, or Wnt. The key characteristics of EndMT are the loss of original endothelial cell markers (CD31, endomucin, etc.) and production of mesenchymal-specific proteins, including alpha-smooth muscle actin (αSMA) or collagen I, in endothelial cells. We therefore examined if EndMT is observed during intramembranous bone regeneration in mice.

METHODS We used fluorescent reporter mice (Cdh5-creERT2;tdTomato) that underwent mechanical bone marrow ablation surgery at 28 days old to examine EndMT on intramembranous bone regeneration. tdTomato was used as a marker for endothelial cells, and αSMA was used as a mesenchymal-specific marker. To label Cdh5+ endothelial cells, mice were administered with 10 µg/g of tamoxifen at 7 days old (T7) or 28 days old (T28). The two different tamoxifen induction strategies were used examine EndMT on only Cdh5+ descendants (T7) or both the Cdh5+ cells and their descendants (T28). Femurs were harvested post-operative days 7 (P7) or 10 (P10) and stained for αSMA and osterix.

RESULTS In both tamoxifen induction strategies, we found EndMT to be present based on the number of cells that are positive for both tdTomato and αSMA. At 7 days after surgery, double positive cells in bone marrow were 2.04% (T7) and 3.65% (T28) of all tdTomato positive cells, respectively. Similarly, at 10 days after surgery, the double positive cells were 2.42% (T7) and 3.22% (T28) of all tdTomato-positive cells. However, no tdTomato positive cells were also positively stained for osterix in bone marrow for both 7 and 10 days after surgery.

CONCLUSION This suggests that while a subset of Cdh5 expressing cells acquire mesenchymal-like state, EndMT is likely transient and does not directly lead endothelial cells to bone forming cells. Future studies will further examine the necessity EndMT on intramembranous bone regeneration.

Abstract #: 172
Trainee Rank: Post-Doctoral Research Fellow
Theme: Musculoskeletal Research and Orthopedics
Cluster: Bone Biology and Molecular Mechanisms

Pankaj Shitole, PhD

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EFFECTS OF BISPHOSPHONATE MOLECULAR STRUCTURE ON CORTICAL BONE MICROARCHITECTURE

INTRODUCTION: Atypical femoral fractures (AFFs), though rare, are a serious side effect of long-term bisphosphonate (BP) treatment. Despite their low frequency, increased public awareness has negatively impacted medication adherence. The mechanisms underlying BP-associated AFFs remain unclear, with potential contributors including impaired bone remodeling, altered matrix maturation, and tissue microdamage. A key challenge lies in distinguishing the effects of altered remodeling kinetics. While AFF treatment is primarily surgical and prevention focuses on drug holidays, more immediate strategies are needed. Notably, the impact of BP on cortical bone geometry during remodeling has received little attention. Using a rat model, we investigated the influence of different BPs on cortical bone microarchitecture during the remodeling phases.

METHODS: The study involved female Sprague-Dawley rats, which were placed on a low-calcium diet post-parturition to induce bone resorption for 23 days. After weaning, they were switched to a normal calcium diet for recovery. Dams were assigned to five treatment groups-vehicle, ALN, ZOL, RIS, or IBN- and administered specified doses. At the end of the 28-day recovery phase, right femurs were collected for micro-computed tomography (µCT) analysis (70 kVp, 57 µA, 4W, 750ms integration time and 2 µm voxels) of bone microarchitecture, including parameters like cortical area, total area, medullary area, cortical thickness, and cortical porosity. Data were analyzed using unpaired t-tests and one-way ANOVA, with post-hoc Tukey's test for significant treatment effects ($P<0.05$).

RESULTS: The virgin resorption control group showed a significant increase in Ct.Ar and Ct.Th, along with a decrease in Ma.Ar, compared to the resorption baseline group, while no significant differences were observed in Tt.Ar and Ct.Po. The virgin formation control group exhibited a significant increase in Ct.Ar and Ct.Th, along with a decrease in Ma.Ar, compared to the treatment groups, while no significant differences were observed in Tt.Ar and Ct.Po. Additionally, no significant differences were found across any of the parameters between the treatment groups.

CONCLUSION: This suggests that the treatment groups did not exhibit significant differences in bone structural characteristics, while the control groups showed distinct changes in bone morphology, particularly in cortical bone measures.

Abstract #: 173
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Musculoskeletal Research and Orthopedics
Cluster: Bone Biology and Molecular Mechanisms

Nyla White, Applied Physiology and Kinesiology, B.S.

Nyla White; Marcus Winogradzki, Shreya Patel, Waddell Holmes, Jitesh Pratap

"Runx2 Regulation of Microtubule Dynamics in Osteoblasts: Tubulin Isotypes and Acetylation"

INTRODUCTION: Runx2 is a transcription factor essential for bone development and is aberrantly expressed in the bone-metastatic cell line MDA-MB-231, where it is believed to contribute to bone metastasis. Evidence suggests that Runx2 promotes microtubule stability, as indicated by increased acetylated tubulin; however, its influence on microtubule dynamics in osteoblasts remains unexplored. This study aims to investigate the effects of Runx2 on microtubule stability and dynamics in osteoblasts. A deeper understanding of how Runx2 influences microtubules in osteoblasts may reveal novel therapeutic interventions for osteoporosis and related bone disorders in post-menopausal women.

METHODS: Runx2-null and wild-type calvarial osteoblasts were used to evaluate the role of Runx2. Cells were analyzed by western blot, immunofluorescence (IF), and qPCR. IF images were quantified using CellProfiler. Microtubule stability and dynamics were assessed using three microtubule-targeting agents-nocodazole, vinblastine, and docetaxel. Publicly available ChIP-seq data from differentiating MC3T3 cells were analyzed to determine Runx2 recruitment to tubulin isotype loci. Immunohistochemistry (IHC) was performed on femurs from wild-type and Runx2 conditional knockout (Runx2-cKO) mice.

RESULTS: Our previous studies suggested that Runx2 promotes microtubule (MT) stability in breast cancer cells. In this study, we demonstrate that Runx2 enhances resistance to MT-targeting agents, nocodazole and vinblastine, as evidenced by immunofluorescence (IF) and decreased levels of acetylated tubulin, a marker of MT stability. Runx2-null osteoblasts exhibit significant alterations in key regulators of acetylated tubulin, α-TAT and HDAC6. ChIP-seq analysis of MC3T3 cells revealed Runx2 recruitment to several distinct tubulin isotypes during osteoblast differentiation, with notable enrichment at the TUBB2 locus. Additionally, IHC analysis of femurs from Runx2-cKO mice showed reduced β2-tubulin staining compared to wild-type controls.

CONCLUSION: Our findings highlight the critical role of Runx2 in regulating microtubule dynamics, essential for the trafficking and secretion of bone-related proteins. We suggest Runx2 enhances microtubule stability to promote the high levels of intracellular trafficking required to support bone growth and maintenance. This regulation likely involves both the integration of specific tubulin isotypes and post-translational modifications such as acetylation. Future studies investigating how Runx2 modulates microtubules at multiple levels may uncover novel approaches to enhance bone health and combat osteoporosis.

Abstract #: 174
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Musculoskeletal Research and Orthopedics
Cluster: Bone Biology and Molecular Mechanisms

Marcus Winogradzki, B.S.

Marcus Winogradzki; Shreya Patel; Waddell Holmes: Ryan Ross; Frank Ko; and Jitesh Pratap

TUBULIN B2A: A KEY MICROTUBULE COMPONENT IN OSTEOBLAST DIFFERENTIATION

INTRODUCTION Osteoblasts are essential for bone formation, secreting proteins that drive matrix mineralization. Microtubules play a critical role in this process by facilitating their vesicular trafficking. Comprised of α- and β-tubulin heterodimers, microtubule function is influenced by the specific tubulin isotypes incorporated into its structure, as well as by their post-translational modifications. Our preliminary data suggest that tubulin β2a promotes osteogenic maturation, while β3 may inhibit this process. This study investigates the role of tubulin β2a and β3 in osteoblast differentiation and matrix mineralization. Uncovering the specialized functions of these and other tubulin isotypes could provide new therapeutic avenues for promoting bone growth and treating diseases such as osteoporosis.

METHODS Osteoblast differentiation was modeled using the murine IDG-SW3 cell line, with differentiation induced by treatments with ascorbic acid and β-glycerophosphate. Tubulin β2a and β3 function was evaluated through CRISPR-Cas9-generated knockouts. Differentiation was assessed by alizarin red staining, DMP1-GFP signal, and the expression of key transcription factors, including Runx2 and SP7. Downstream analyses included western blotting, qPCR, and immunofluorescence. Immunohistochemistry (IHC) was performed on femurs following bone marrow ablation.

RESULTS During osteoblast differentiation, IDG-SW3 cells showed a significant increase in tubulin β2a expression and a corresponding decrease in tubulin β3, suggesting a functional shift in microtubule composition to support matrix production. Bone marrow ablation further demonstrated a preference for tubulin β2 over β3 in endosteal osteoblasts. Knockout of tubulin β2a in IDG-SW3 cells impaired matrix formation, as evidenced by reduced alizarin red staining and lower DMP1 signal. Analysis of key matrix-forming proteins revealed no significant changes in their expression levels.

CONCLUSIONS Our findings suggest that tubulin β2a plays an essential and potentially regulatory role in bone formation. While knockout of β2a had minimal effect on the expression of secreted proteins involved in matrix formation, it significantly impaired matrix mineralization, indicating that β2a is critical for facilitating their intracellular trafficking and secretion. Future studies will focus on elucidating the mechanisms underlying this impairment and as well as assessing the in vivo impact of tubulin β2a to further define its role in skeletal development and potential as a therapeutic target.

Abstract #: 175
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Musculoskeletal Research and Orthopedics
Cluster: Bone Growth and Development

Itzel Lazcano, BS, MS

All authors share the same affiliation: Department of Anatomy & Cell Biology, Department of Microbial Pathogens and Immunity, Rush University Medical Center, Chicago, IL Presenting/First author: Itzel Lazcano Co-Authors: Niyati Patel, Declan Finerty, Ryan Ross

ESTABLISHING THE MECHANISMS OF TENOFOVIR DISOPROXIL FUMARATE (TDF) AND TENOFOVIR ALAFENAMIDE (TAF) IN OSTEOGENESIS

INTRODUCTION Antiretroviral therapy (ART) has improved the quality of life for people living with HIV (PLWH). However, a concerning side effect is osteoporosis. Recommended HIV-treatment regimens include nucleoside reverse transcriptase inhibitors (NRTIs) tenofovir disoproxil fumarate (TDF) and tenofovir alafenamide (TAF). Despite their structural similarities and shared antiviral mechanism, they have significant differences in side effects. TDF is associated with bone loss, while TAF is not. This study aims to investigate the effects of TDF and TAF on osteogenesis by examining their impact on osteoblast function and on bone mineral density (BMD) changes in a humanized mouse model of HIV-infection.

METHODS 14 and 21-day differentiated fetal human osteoblasts were chronically treated with vehicle (DMSO), TDF or TAF (30/300 ng/mL). Gene expression of markers of osteoblast matrix production (collagen type 1 (COL1A1), alkaline phosphatase (ALPL), osteocalcin (BGLAP)), remodeling (sclerostin (SOST)), and osteoclast activity (receptor activator of nuclear factor-κB ligand (RANKL)), (housekeeping gene: 18S) were analyzed by qrt-PCR. Hu-PBMC-NBSGW mice were engrafted with human PBMCs at 12 weeks old, then infected with HIV and separated into three treatment groups: vehicle, TDF/dolutegravir (DTG)/emtricitabine (FTC), and TAF/DTG/FTC. Femoral cortical and lumbar spine trabecular BMD were measured pre-cART and 5-weeks post-cART using dual-energy X-ray absorptiometry (DXA). One-way ANOVA with Tukey's tests compared gene expression in vitro. Non-parametric Kruskal-Wallis tests, followed by Mann-Whitney U tests evaluated DXA data.

RESULTS 14 and 21-day differentiated osteoblasts treated with TDF (300 ng/ml) showed an upregulated expression of COL1A1, ALPL, BLGAP, RANKL, and SOST compared to TAF. Male mice treated with TDF-based ART, showed a significant decrease in femoral cortical BMD ($*p < 0.05$). Also, Female mice showed a trend for decreasing femoral cortical and lumbar spine trabecular BMD.

CONCLUSION This study showed that TDF has a greater influence on osteoblast activity, compared to TAF, suggesting that despite their metabolic similarities, TDF and TAF have distinct impacts on osteoblast function. Also, BMD changes in vivo effectively replicate clinical findings, demonstrating the impact of TDF-based ART on bone loss. Future work will evaluate tissue-level mechanisms in vivo and co-culture assays to capture osteoblast-to-osteoclast interactions.

Abstract #: 176
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Musculoskeletal Research and Orthopedics
Cluster: Bone Growth and Development

Adegboyega Thompson, BA Chemistry

Adegboyega E. Thompson1, Brittany M. Wilson2, Dawn Nix3, Autumn Sanderson3, Randal K. Buddington3, and D. Rick Sumner2,4 1BA, University at Buffalo, Rush Medical College, Chicago, IL 2Department of Anatomy & Cell Biology, Rush University Medical Center, Chicago, IL. 3Department of Molecular & Cellular Physiology, Louisiana State University Health Science, Shreveport, LA. 4Department of Orthopedic Surgery, Rush University Medical Center, Chicago, IL.

Assessing Early Postnatal Bone Structure in a Preterm Pig Model

INTRODUCTION During the third trimester of pregnancy, the developing fetus receives high concentrations of calcium, magnesium, and phosphorus through placental transfer. This transfer is essential for the final stages of fetal bone development. Preterm birth disrupts this process, leading to an increased risk of metabolic bone disease of prematurity and recurrent fractures. Due to physiological similarities between porcine models and humans, pigs have been tested as a model for assessing skeletal and other deficits associated with preterm birth. This study assesses the recovery of skeletal deficits through the end of the normal weaning period.

METHODS Preterm pigs were delivered by c-section at 105 days of gestation, placed in incubators, and transitioned from total parenteral nutrition to full enteral nutrition after 48 hours. Term control pigs were vaginally delivered after 115 days gestation from the same lineage. Body mass and femurs were collected from preterm pigs at birth (105 days post-conception; n=9), term-corrected age (115 days post-conception; n=4), and term-corrected weaning age (136 days post-conception; n=2). Term control pigs were euthanized at birth (115 days post-conception; n=8) and at age of weaning (136 days post-conception; n=6). Measurements included femur length, AP and medio-lateral width, and micro-computed tomography to assess cortical bone cross-sectional geometry at the midshaft. Three-point bending was performed to assess whole bone mechanical and inferred material properties. T-tests evaluated differences between preterm and term pigs, and two-way ANOVAs assessed the effects of birth status, time post-conception, and their interaction.

RESULTS At birth (105 days), preterm pigs showed significant deficits compared to those at term-corrected age (115 days; $p < 0.05$). By term-corrected age, differences between preterm and full-term pigs were minimal. However, by weaning (136 days), preterm pigs exhibited significant deficits compared to full-term pigs in body weight (-43%), bone length and width (-22% to -33%), cross-sectional geometric properties (-43% to -85%), mechanical properties (-80%), and inferred material properties (-26% to -32%).

CONCLUSION Preterm pigs initially caught up with full-term pigs by 115 days but exhibited significant deficits afterwards. These findings indicate the value of the porcine model in studying interventions aimed at lessening risks of metabolic bone disease of prematurity.

Abstract #: 177
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Musculoskeletal Research and Orthopedics
Cluster: Clinical Challenges and Patient Outcomes

Lesly Honore, B.A

Lesly Honore BS2; Austin Yu BS1, Gabrielle Unson BS3; Matthew Demetrious MD; Steven Gitelis MD; Jordan Tasse MD; Alan Blank MD (PI)

CLINICAL CHALLENGES AND EVOLVING TREATMENT STRATEGIES IN DESMOID FIBROMATOSIS: A SINGLE INSTITUTION EXPERIENCE

Desmoid tumor, also known as aggressive fibromatosis (AF), is a rare, locally proliferative tumor characterized by an overgrowth of myofibroblastic cells. Incidence is approximately 2-4 per million per year, but may appear more frequently with certain diseases such as familial adenomatous polyposis. In addition, trauma such as surgery and pregnancy may trigger the development of AF.1,2 Although considered benign without risk for metastasis, AF presents a high risk for recurrence and infiltration into surrounding neurovascular structures.3 Despite the varied behavior of AF, have been associated with molecular markers such as WNT, ß-catenin.1 Due to the varied clinical presentation of AF, there are a multitude of treatment options. Depending on the spread and severity of the disease, treatment options include surgery, radiotherapy, thermal ablation, and systemic therapy such as hormone therapy, chemotherapy, and anti-inflammatory drugs.1,2,4 However, the effectiveness of these treatment options have exhibited limited success. In a study of 426 patients treated surgically Salas et al. reported a recurrence rate of 50%.5 Systemic treatment has been proven partially effective but carries significant risk for toxicity.6 Given the risk profiles of these treatment options, new methods involving embolization have been explored. Embolization involves the isolation of blood vessels to the tumor either as a pathway for delivering localized chemotherapeutic agents or sealing of these vessels to prevent tumor growth.7 However, data regarding this method has been limited, requiring a larger cohort study to understand its efficacy. The scientific review of embolization of AF are discussed below.

Abstract #: 178
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Musculoskeletal Research and Orthopedics
Cluster: Clinical Challenges and Patient Outcomes

Asim Khan, B.A

Asim A. Khan, B.A (Rush), Renato Miyadahira, MD (IBTS), Lord J. Hyeamang B.A (Rush), Felipe F. Gonzalez, MD (Rush), Grant E. Garrigues, MD (Rush), Gustavo Leporace, PhD (IBTS), Leonardo Metsavaht, MD, PhD (IBTS), Jorge Chahla, MD, PhD (Rush), Jonathan A. Gustafson, PhD (Rush)

A SYSTEMATIC REVIEW OF SHOULDER BIOKINETIC FINDINGS IN THE PRESENCE OF ROTATOR CUFF TEARS TREATED CONSERVATIVELY AND SURGICALLY

INTRODUCTION: Rotator cuff tears can significantly impact the movement of the shoulder joint; however, it is not fully understood how motion impairments relate to other clinical characteristics. The purpose of this study is to determine if patients with rotator cuff injuries exhibit different biokinetic parameters.

METHODS: This is an ongoing systematic review. A comprehensive literature search was conducted across databases including PubMed, MEDLINE, Embase, Scopus, and the Cochrane Central Register of Controlled Trials following PRISMA guidelines. Selected studies comparing shoulder biokinetic parameters such as scapulothoracic angles and shoulder and scapula strength in both patients with rotator cuff tears and healthy shoulders were included. Studies examining cadaver, animal, and pediatric populations were excluded. Two independent reviewers screened studies and extracted data with disagreements resolved by a third reviewer. The primary outcomes were shoulder kinematics and active and passive shoulder range of motion measured with motion capture systems. Secondary outcomes were muscle coordination, strength, range of motion and patient-reported outcome measures. Study quality will be assessed using the NIH Quality Assessment Tool. A systematic review will be conducted, and if sufficient, comparable data is available, a meta-analysis will be performed.

RESULTS: Our initial search identified 2,819 articles of which 50 were selected for full-text review after title and abstract screening. The full-text screening will be conducted systematically by two reviewers to complete data extraction. We expect to find significant differences in active and passive shoulder range of motion in individuals with rotator cuff tears, with important deficits in the rotator cuff group.

CONCLUSION: A synthesis of the current evidence on shoulder biokinetics in the context of rotator cuff injuries will be completed. We hypothesize that in cases of rotator cuff tears, there is significant movement compensation at the expense of scapulothoracic motion and exacerbated recruitment and activation of the teres minor and deltoid muscles.

Abstract #: 179
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Musculoskeletal Research and Orthopedics
Cluster: Clinical Challenges and Patient Outcomes

Ilyass Majji, B.S

Justin B Castonguay, BA (Rush); Ilyass Majji, BS (Rush); Rajko Vucicevic, BS (Rush); Vincent P. Federico, MD (Rush); Mohammed A. Munim, BS (Rush); Eric C. Gehrke, BS (Rush); Austin Q Nguyen, MD (Rush); Alexander J. Butler, MD (Rush); Michael T. Nolte, MD (Rush); Athan G. Zavras, MD (Rush); Gregory D. Lopez, MD (Rush); Matthew W. Colman, MD (Rush).

COMPARISON OF INTRAOPERATIVE FLUOROSCOPY USE BETWEEN TOTAL DISC ARTHROPLASTY AND ANTERIOR CERVICAL DISCECTOMY AND FUSION

INTRODUCTION: Intraoperative fluoroscopy is essential to ensuring safe and accurate spinal implant placement. Recently, there has been growing awareness to the effects of prolonged radiation exposure to both patients and surgeons. While prior studies have investigated radiation metrics among lumbar procedures, a detailed investigation into the utilization of intraoperative fluoroscopic imaging in cervical surgeries is currently lacking.

METHODS: The authors performed a retrospective chart review of patients who underwent single- or multi-level inpatient TDA or ACDF between 2017 and 2022. TDA and ACDF cohorts were matched according to age, gender, and operative levels. Fluoroscopy time was measured in seconds, and estimated radiation dosage was expressed in milligray (mGy). Patient demographics, surgical characteristics, and fluoroscopy parameters were compared between cohorts via independent t-test and across levels via ANOVA.

RESULTS: 168 patients were included for analysis (N = 84 TDA, N = 84 ACDF). There were no significant differences in demographics between cohorts, outside of TDA requiring significantly longer mean operative duration (96.6 ± 52.9 minutes vs. 76.4 ± 56.7 minutes, P = 0.02). TDA required significantly greater radiation exposure in terms of mean fluoroscopy time, regardless of operative levels (P < 0.001). With regards to radiation dosage, only 3-level TDA required significantly more fluoroscopy than its corresponding ACDF cohort (P = 0.02). Additionally, a greater BMI was associated with greater radiation burden (Spearman r = 0.56, P = 0.02). Level-by-level analysis revealed that fluoroscopic exposure was maximized at more caudal segments (single-level implants: P = 0.02 for time, P < 0.001 for dosage; multi-level implants: P < 0.001 for time, P = 0.04 for dosage).

CONCLUSION: TDA required a significant amount of intraoperative fluoroscopy, with results demonstrating an over 1.5 times greater duration than that required for ACDF. This difference may be related to the increased intraoperative adjustments necessary for accurate TDA placement. Increased awareness of procedure-specific radiation exposure is vital to ensuring the safety of both patients and surgeons.

Abstract #: 180
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Musculoskeletal Research and Orthopedics
Cluster: Clinical Challenges and Patient Outcomes

Michael Murray, BS

Michael J. Murray (Rush); Melissa Carpenter (Rush); Trevor A. Poulson (Rush); Monique Hayes (Rush); Alexander Mamonov (Rush); Luc M. Fortier (Case Western Reserve); Zeeshan A. Khan (Rush); Juan Bernardo Villareal-Espinosa (Rush); Jorge Chahla (Rush); Nikhil Verma (Rush)

THE IMPACT OF MEDICAID PAYER STATUS ON PATIENT OUTCOMES FOLLOWING ROTATOR CUFF REPAIR

INTRODUCTION Rotator cuff tears (RCTs) have an incidence of 87 per 100,000 person-years, with prevalence increasing significantly with age. By 60 years, the prevalence reaches 54%, posing substantial clinical and healthcare challenges. RCTs often cause pain, dysfunction, and impaired quality of life, with surgical intervention frequently required for larger tears or failed conservative treatments. Socioeconomic disparities, particularly in insurance coverage, have been linked to poorer outcomes in orthopedic procedures. Medicaid-insured patients, representing a vulnerable population, face barriers including limited access to specialists and physical therapy (PT). Nationally, fewer PT practices accept Medicaid, which could negatively impact recovery following RCT surgeries. However, limited research has explored the influence of Medicaid coverage on outcomes after arthroscopic rotator cuff repair (RCR). This study aimed to evaluate differences in outcomes, functional metrics, reinjury, and reoperation rates between Medicaid and privately insured patients undergoing primary RCR.

METHODS Medicaid patients undergoing RCR were compared to a matched private insurance cohort by age, sex, and BMI. Patients completed questionnaires including the American Shoulder and Elbow Score (ASES) and Veterans Rand 12-Item Health Survey (VR-12). PT and clinic notes were reviewed for attendance, range of motion, and comorbidities.

RESULTS Sixteen patients from each insurance group were analyzed, with no differences in demographics or comorbidities. Postoperative ASES scores were similar, but Medicaid patients had significantly lower preoperative ASES scores (29.86 vs. 46.28; P = 0.008). Medicaid patients also had significantly lower postoperative VR-12 Mental Scores (38.20 vs. 53.40; P = 0.013), despite no preoperative difference. PT attendance, reinjury, reoperation rates, and range of motion metrics were comparable between the groups.

CONCLUSIONS Socioeconomic disparities may influence outcomes. Although Medicaid patients had lower preoperative ASES scores, their functional outcomes were similar to privately insured patients at follow-up. However, the significantly lower postoperative VR-12 Mental Score in Medicaid patients warrants further investigation.

Abstract #: 181
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Musculoskeletal Research and Orthopedics
Cluster: Clinical Challenges and Patient Outcomes

Trevor Poulson, BS, MS

Trevor Poulson (RUSH), Andrew Bi (RUSH), Melisssa Carpenter (RUSH), Michael Murrray (RUSH), Jared Rubin (RUSH), Cameron Gerhold (RUSH), Brian Cole (RUSH), Nikhil Verma (RUSH), Jorge Chahla (RUSH)

ANGIOTENSIN CONVERTING ENZYME INHIBITORS AND ANGIOTENSIN RECEPTOR BLOCKERS PROVIDES A SMALL EFFECT SIZE AGAINST POSTOPERATIVE ARTHROFIBROSIS IN ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

INTRODUCTION This pilot study aimed to evaluate whether patients on ARB or ACE-I medications for hypertension at the time of primary or single-stage revision ACLR experienced a protective effect against postoperative arthrofibrosis. This was assessed by the necessity of manipulation under anesthesia (MUA) and/or lysis of adhesions (LOA) or by decreased postoperative range of motion (ROM). A secondary objective was to examine the impact of these medications on patient-reported outcome measures (PROMs).

METHODS Skeletally mature patients who underwent primary or single-stage revision ACLR while taking ACE-I or ARB between January 2018 and July 2023, with at least 1-year follow-up, were included. Patients were excluded if they were skeletally immature or had concomitant osteotomy, additional ligament reconstruction/repair, associated fractures, or two-stage revision ACLR. ACE-I/ARB patients were matched 1:2 with ACE-I/ARB-naïve controls based on surgery type (primary or revision). Outcomes included postoperative MUA/LOA rates, ROM, and PROMs such as IKDC, KOOS, VR-12 Mental, VR-12 Physical, and PROMIS surveys. Statistical analyses were conducted using RStudio.

RESULTS Among 3,123 ACLRs performed, 100 patients (70 primary, 30 revision) on ACE-I or ARB were matched to 200 controls. Overall, postoperative arthrofibrosis occurred in 3.0% (9/300). None of the ACE-I/ARB patients required MUA/LOA compared to 4.5% (9/200) of controls ($p=0.07$), with a small effect size (dppc2 = 0.3) favoring the ACE-I/ARB group. The absolute risk reduction was 4.5%, with a number needed to treat (NNT) of 23. Among all cases, 2.1% (3/140) of primary ACLRs and 10.0% (6/60) of revisions required MUA/LOA ($p=0.04$). The ACE-I/ARB group demonstrated significantly greater improvement in VR-12 Physical scores compared to controls (12.2 vs. -0.01, $p<0.001$).

CONCLUSION Perioperative ACE-I or ARB use in primary or revision ACLR was associated with a small protective effect against postoperative arthrofibrosis and significantly greater improvements in VR-12 Physical scores, supporting potential benefits of these medications in improving surgical outcomes.

Abstract #: 182
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Musculoskeletal Research and Orthopedics
Cluster: Clinical Challenges and Patient Outcomes

Jasmin Taylor, BS

Jasmin Taylor (Rush Medical College); Kristin Wipfler (FORWARD, The National Databank for Rheumatic Diseases); Kaleb Michaud (University of Nebraska Medical Center); Didem Saygin (Division of Rheumatology, Rush University Medical Center)

UTILITY OF SHORT FORM 36 (SF-36) HEALTH SURVEY QUESTIONNAIRE IN HEALTH-RELATED QUALITY OF LIFE ASSESSMENT IN PATIENTS WITH MYOSITIS

INTRODUCTION: Myositis is an autoimmune disease marked by symptoms of weakness, fatigue, and pain, which significantly impair patients' quality of life. There are currently no validated questionnaires to assess quality of life in patients with myositis. This study aims to assess the utility of the short form (SF) 36 in quality-of-life evaluation of myositis patients.

METHODS: The FORWARD registry is a U.S.-based research databank collecting patient-reported data on rheumatic diseases. Patients self-report information related to their disease, quality of life, sociodemographic, treatments, and hospitalizations biannually. The SF-36 produces two summary scores: Physical Component Summary (PCS) and Mental Component Summary (MCS), ranging from 0 to100. Higher scores indicate better health. Floor/ceiling effects of SF-36 were calculated as proportion of patients scoring 0-5 and 95-100, respectively. Discriminant and construct validity were assessed using proportion of confirmed a priori hypotheses.

RESULTS: The study included data from 168 patients with myositis (77.3% female and 78.5% White), with an average (±standard deviation [SD]) age of 54.3 (±13.8). Mean SF-36 PCS and MCS were 36.5 (±11.2) and 47.0 (±12.0), respectively. SF-36 did not have any floor or ceiling effect. All a priori hypotheses for discriminant validity were met for both PCS and MCS. The SF-36 PCS was significantly different between patients with low vs high physical function (, disease activity, fatigue and pain levels. The SF-36 MCS was significantly different between patients with depression vs those without, those with anxiety vs not, patients with low vs high fatigue and pain levels ($p<0.0001$). The majority of a priori hypotheses for construct validity were met for both PCS and MCS. SF-36 PCS had moderate correlations with pain and fatigue levels, disease activity, and health satisfaction, and strong correlations with physical function. SF-36 MCS had moderate correlations with pain, fatigue, disease activity, physical function and health satisfaction.

CONCLUSION: SF-36 was able to distinguish patient subgroups and had significant correlations with pain, fatigue, disease activity, physical function and health satisfaction scores in patients with myositis. These findings demonstrate that SF-36 has adequate discriminant and construct validity for health-related quality of life assessment through physical and mental health assessment in patients with myositis.

Abstract #: 183
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Musculoskeletal Research and Orthopedics
Cluster: Clinical Challenges and Patient Outcomes

Kaveh Torabian, MS

Kaveh Torabian (RMC), Troy Amen (HSS), Lina Ibrahim (HSS), Stephen Gillinov (Yale), Micheal Dean (Mayo Clinic), Adriana Liimakka (Harvard), Steve Lee (HSS)

GLP-1 AGONIST AND COMMON HAND PROCEDURES: UNDERSTANDING PERIOPERATIVE AND POSTOPERATIVE RISKS AND COMPLICATIONS

INTRODUCTION Glucagon-like peptide-1 (GLP-1) receptor agonists have become a cornerstone in managing type 2 diabetes mellitus (T2DM) and obesity due to their ability to improve glycemic control and promote weight loss. Beyond their metabolic effects, GLP-1 agonists also exhibit immunomodulatory and anti-inflammatory properties that may influence healing. Despite the high prevalence of hand conditions among patients with T2DM, it remains unknown how GLP-1 receptor agonists, may impact perioperative and postoperative outcomes in these patients. The purpose of this study was to evaluate the effects of preoperative GLP-1 agonists use on postoperative complications, readmission, and reoperation following common hand procedures.

METHODS A retrospective study using the PearlDiver database was performed from 2015-2022. Patients undergoing common hand procedures including open carpal tunnel release (CTR), endoscopic CTR, wrist ganglion cyst excision, trigger finger release (TFR), distal radius open reduction internal fixation, and cubital tunnel release were queried. Individuals taking GLP-1 agonists at the time of surgery were propensity matched to those not taking the medications in a 1:1 fashion controlling for numerous clinical variables and comorbidities. Postoperative complications, 90-day readmission, and 2-year all cause revision rates were calculated for each cohort.

RESULTS Patients taking GLP-1 agonists had equal or lower odds of postoperative infections including lower rates of surgical site infections (Odds ratio [OR] = 0.71, 95% Confidence Interval [CI] = 0.60 to 0.86, $p<0.001$) and equal rates of wound dehiscence (OR = 0.91, CI = 0.71 to 1.20, $p=0.41$). These patients also had lower risk of postoperative pneumonia, acute kidney injury, hematoma, pulmonary embolism, and deep vein thrombosis ($p<0.005$ for all). Risk of all-cause 90-day readmission was significantly lower for patients taking GLP-1 agonists (OR = 0.66, CI = 0.58 to 0.76, $p<0.001$). Rates of 90-day reoperation for infection and 2 year-all cause revision were equal between cohorts ($p<0.005$ for both).

CONCLUSION The present study found that patients taking GLP-1 agonists were at no higher risk for 90-day postoperative complications including surgical site infections (SSIs) and wound dehiscence, compared to their matched controls not taking these medications. Furthermore, these patients demonstrated equal or lower rates of overall perioperative complications, reoperation, and readmission.

Abstract #: 184
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Musculoskeletal Research and Orthopedics
Cluster: Gait, Balance, and Motor Function

Lord Hyeamang, BA

Lord J. Hyeamang (Rush Medical College); Arden C. Shen (Midwest Orthopedics at Rush); Alexander J. Hodakowski (Duke University Medical Center); Brittany Dowling (Midwest Orthopedics at Rush), John T. Streepy (Rush Medical College), Nikhil N. Verma (Midwest Orthopedics at Rush); Grant E. Garrigues (Midwest Orthopedics at Rush)

INFLUENCE OF PERCEIVED EXERTION ON BALL VELOCITY AND ELBOW VARUS TORQUE IN HIGH SCHOOL AND PROFESSIONAL BASEBALL PITCHERS

INTRODUCTION The rate of perceived exertion (RPE) is a subjective measure of effort commonly used by baseball pitchers during interval throwing programs (ITPs) for injury recovery. Prior studies indicate that decreases in ball velocity and elbow varus torque are not directly proportional to perceived effort in high school and college pitchers. However, there is limited data on the loading torque rate and cumulative elbow varus torque at varying RPE levels. This study compared ball velocity, maximum elbow varus torque, loading torque rate, and cumulative elbow varus torque in pitchers throwing fastballs at 50%, 75%, and 100% RPE.

METHODS Data were collected from 24 professional (PRO; 189± 5 cm, 91±7 kg) and 24 high school pitchers (HS; 183± 5 cm, 79±10 kg). Professionals threw 5 fastballs at 100% and 75% RPE, while high school pitchers threw 3 each at 50%, 75%, and 100%. A 3D motion capture system (480 Hz) recorded all throws. A linear mixed effects model was used to evaluate the within player relationship between RPE (100%, 75%, 50%) and ball velocity, maximum elbow varus torque, loading torque rate, and cumulative elbow varus torque. Significance was set at $p<0.01$. This was a retrospective review of pitchers who were previously tested and data were de-identified before distribution, thus qualifying for IRB exemption.

RESULTS At 75% RPE, professional pitchers reduced ball velocity to 89% (35.2 ± 1.0 vs. 39.6 ± 0.7 m/s; $p<0.001$) and elbow varus torque to 78% (71.6 ± 4.0 vs. 92.1 ± 3.7 Nm; $p<0.001$). High school pitchers at 50% RPE reduced velocity to 86% (30.3 ± 1.1 vs. 35.3 ± 0.3 m/s; $p<0.001$) and torque to 74% (52.3 ± 3.6 vs. 70.9 ± 3.3 Nm; $p<0.001$).

CONCLUSION RPE reductions led to decreases in all variables, though not proportionally. Professionals showed more accurate exertion perception, with high school pitchers needing lower RPE to achieve similar reductions. This adds to the growing body of literature supports a need for objective measures to optimize rehabilitation, especially for high school pitchers. The use of healthy pitchers in the original data collection was a limitation as ITPs are utilized during the rehab of injured pitchers.

Abstract #: 185
Trainee Rank: 2024 Summer Research Program Participants (Non-RUSH matriculated students)
Theme: Musculoskeletal Research and Orthopedics
Cluster: Gait, Balance, and Motor Function

Aleksandra Kozicka, Bachelor of Science

Aleksandra Kozicka (Rush), Felipe F. Gonzalez, MD (Rush), Poojan Thakkar (Rush) Rithik Palaniappan (Rush), Leonardo Metsavaht, MD, PhD (IBTS), Jorge Chahla, MD, PhD (Rush), Gustavo Leporace, PhD (IBTS), Jonathan Gustafson, PhD (Rush)

UTILITY OF JUMPING TASKS FOR THE PREDICTION OF CLINICAL OUTCOMES IN ORTHOPEDIC PATHOLOGIES

INTRODUCTION: Movement impairments can increase the risk of orthopedic injuries. Jumping is a common screening task used across different pathologies to assess biomechanical risk factors. However, it is still not clear what are the best parameters to predict injury risk and clinical outcomes. The objective of this study was to investigate what biokinetic characteristics assessed by a jumping task are predictive of clinical outcomes in different orthopedic pathologies.

METHODS: This is an ongoing systematic review that followed PRISMA guidelines and was registered in PROSPERO. Longitudinal human studies using any jumping task as a prognostic tool to assess clinical outcomes in orthopedic pathologies were included. Studies had to compare exposed and control groups in statistical analyses and report clinical outcomes at baseline and follow-up. Any musculoskeletal pathologies were included, while cross-sectional studies, case reports, series, and cadaveric studies were excluded. The search was conducted across PubMed, Embase, Scopus, and Google Scholar. Three authors independently screened, extracted data, and rated the articles using the National Institutes of Health (NIH) Quality Assessment Tool, with a fourth author resolving discrepancies. Qualitative analysis will be performed for studies with common outcomes and methodologies, remaining studies will undergo qualitative analysis. Effect sizes will be calculated as risk ratios and pooled using a random-effects model. The primary outcome measure will be injury prevalence. Secondary outcomes will include injury type and patient-reported outcome measures (PRO) assessing pain, quality of life, and functionality.

RESULTS: 2552 abstracts were screened, and 53 studies were included in this review. We expect that biokinetic parameters in the jumping tasks will be associated with injury prevalence and clinical outcomes.

CONCLUSION: Jumping tasks show potential as useful tools for predicting clinical outcomes in various orthopedic pathologies by identifying key biokinetic risk factors. This method may offer a cost-effective approach for screening individuals at higher risk of developing orthopedic injuries before their onset. However, the evidence must be consistent across studies and pathologies.

Abstract #: 186
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Musculoskeletal Research and Orthopedics
Cluster: Gait, Balance, and Motor Function

Emily Sullivan, B.A.
Emily Sullivan (RUMC), Emily Timm (Rush Department of Anatomy and Cell Biology), Sepehr Sani (Rush Department of Neurosurgery), Nepa Patel (Rush Department of Neuroscience), Joan O'Keefe (Rush Department of Anatomy and Cell Biology),

QUANTITATIVE BALANCE AND GAIT ASSESSMENTS TO DETERMINE THE SAFETY AND EFFICACY OF UNILATERAL STAGED MRI-GUIDED FOCUSED ULTRASOUND THALAMOTOMY FOR THE TREATMENT OF ESSENTIAL TREMOR

INTRODUCTION Essential Tremor (ET) is a neurological disorder characterized by activity-dependent tremors, negatively impacting quality of life, making daily tasks challenging. ET is associated with neuropathological changes in the cerebellum, dentatorubrothalamic tract and the ventral intermediate (VIM) nucleus of the thalamus. Treatment includes MRI-guided focused ultrasound (MRIgFUS) which creates a lesion in the VIM network to disrupt the tremor pathway. Some ET patients have reported balance and gait disturbances following the MRIgFUS procedure; however, no studies have quantified assessed these potential impairments. This study aims to evaluate the safety and efficacy of unilateral MRIgFUS thalamotomy in ET patients.

METHODS Subjects with ET are recruited from the Rush Movement Disorder and Neurosurgical Program when they are scheduled to undergo unilateral MRgFUS thalamotomy. Subjects are assessed for tremor, gait and balance at baseline and at 1, 3, 6, 12, and 24 months postoperatively, using Kinesia OneTM ETsense inertial sensor tremography system and the APDMTM Opal inertial sensor system to examine tremor and balance/gait respectively.

RESULTS Three subjects underwent unilateral MRgFUS thalamotomy with evaluations at baseline, 1 and 3 months to assess tremor, balance, and gait. Sharp reductions in kinetic tremor, rest tremor, and postural tremor were observed on the treated side following MRIgFUS. No differences in double limb support time, gait speed, stride length, or turn velocity were detected under any gait conditions; however, there were slight increases in trunk and lumbar range of motion in the coronal, sagittal, and transverse planes during tandem gait after MRIgFUS compared to baseline. Participants exhibited increased total sway area under the feet together, eyes closed stance under single task, dual task, and foam conditions after MRIgFUS, which was sustained through the 6-month post-procedure time point.

CONCLUSION These preliminary findings in 3 patients align with published research, indicating improvements in tremors following MRgFUS thalamotomy and a slight increase in gait and postural instability, that might represent signs of cerebellar balance and gait ataxia. The study will continue enrolling participants to expand the sample size and collect longitudinal data on unilateral and bilateral staged MRgFUS treatment for ET, which has been minimally investigated.

Abstract #: 187
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Musculoskeletal Research and Orthopedics
Cluster: Gait, Balance, and Motor Function

Emily Timm, BS

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THE NEURAL CORRELATES OF GAIT AND EXECUTIVE FUNCTION DEFICITS IN FRAGILE X-ASSOCIATED TREMOR/ATAXIA SYNDROME (FXTAS): A PRELIMINARY STUDY

INTRODUCTION: Gait and executive function (EF) impairments in FXTAS-a neurodegenerative disorder characterized by cerebellar ataxia, tremor, and cognitive dysfunction-negatively affect mobility, increase fall risk, and reduce quality of life. The neural mechanisms underlying these cognitive-motor relationships are largely undescribed. We aimed to examine the 1) cortical control of gait and EF during simple and complex gait tasks and EF assessments, and 2) grey matter volume (GMV) and white matter integrity (WMI) changes in frontal-cerebellar pathways in FXTAS.

METHODS: 10 FXTAS and 7 control participants performed gait testing under single-task (ST), fast-paced, dual-task, and obstacle-navigation conditions, then completed an extensive EF test battery. Simultaneous functional near-infrared spectroscopy (fNIRS) data was collected from the dorsolateral prefrontal cortex (DLPFC), premotor cortex (PMC), and supplementary motor area (SMA) during all assessments. MRI and DWI scans were collected from all participants. GMV of the DLPFC, combined PMC/SMA, and cerebellum, and DTI measures of the middle cerebellar peduncles (MCP), superior cerebellar peduncles (SCP), and cerebellum were obtained.

RESULTS: A trend of increased DLPFC activation was observed in FXTAS participants versus controls under ST gait ($p=0.091$). Analysis of cortical activation during the first and second halves of each gait task revealed significantly greater DLPFC activation ($p=0.042$) and a trend of increased PMC/SMA activation ($p=0.093$) in FXTAS versus controls during the first half of ST gait. FXTAS participants demonstrated significantly reduced DLPFC activation during an information processing speed test ($p=0.020$) and a trend of reduced activation during a verbal fluency test ($p=0.087$). Interim analysis of 6 FXTAS and 6 control participants revealed abnormally elevated DTI measures in FXTAS participants, including MCP mean and axial diffusivities, SCP mean, axial, and radial diffusivities, and axial diffusivity of the cerebellum ($p=0.004$-0.041).

CONCLUSION: Individuals with FXTAS over-recruit the DLPFC and PMC/SMA during simple gait, particularly during its initiation, perhaps to compensate for decreased gait automaticity. Reduced FXTAS DLPFC activation during EF tasks suggests lower maximum recruitment capabilities due to ceiling effects. Several WMI abnormalities were revealed in the MCP, SCP, and cerebellum in FXTAS. These functional and structural alterations in frontal-cerebellar circuits may underlie gait and EF deficits in FXTAS, identifying potential targets for therapeutic interventions.

Abstract #: 188
Trainee Rank: Post-Doctoral Research Fellow
Theme: Musculoskeletal Research and Orthopedics
Cluster: Gait, Balance, and Motor Function

Matheus Vilela, Doctor of Medicine, Master of Science

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VALIDATION OF A MULTI-SEGMENT FOOT MODEL FOR FOOT MOTION ANALYSIS USING WEIGHT-BEARING COMPUTED TOMOGRAPHY (WBCT)

INTRODUCTION: Foot biomechanics is critical to understanding human movement, particularly in injury prevention, rehabilitation and performance optimization. The complex anatomy of the foot makes accurate motion analysis a challenge. Multi-segment foot models, such as the one developed by Ghent University, offer a promising approach by tracking the motion of individual foot segments using skin markers. However, this model has not been fully validated, especially under weight-bearing conditions that simulate real-life activities and expected soft tissue displacements. The purpose of this study is to evaluate the ability of this multi-segment foot model to capture actual movement between bones based on superficial markers placed on the skin by comparing its results to those obtained from weight-bearing computed tomography (WBCT) scans of cadaver feet.

METHODS: Ten cadaver feet were used in this study to simulate six different foot positions (neutral, eversion, inversion, dorsiflexion, plantarflexion, and hallux extension). Superficial markers were placed on the feet according to the Ghent Foot Model guidelines to track segmental motion. WBCT scans were performed to capture three-dimensional (3D) images of the bones under axial loading in each position. The collected images will be processed to create 3D models of both the bones and the skin markers. Distance measurements between the markers and the underlying bones, as well as the relationship between the markers and the underlying bone centroids, will be evaluated using an Anatomical Reference System (ARS). Statistical analyses, including paired t-tests, will be performed to evaluate the accuracy and reliability of the model, and results will be considered statistically significant if the p-value is less than 0.05.

EXPECTED RESULTS: Marker displacement will vary with foot position, but is expected to be similar across specimens in the same foot position. The relationship between skin markers and segment centroids should remain consistent, with any discrepancies providing insight into the limitations of the model.

CONCLUSION: This study will provide valuable insight into the accuracy and reliability of the multi-segment foot model for capturing foot biomechanics. If validated, the model could significantly enhance foot motion analysis in clinical and research settings, improving the diagnosis and treatment of foot-related conditions.

Abstract #: 189
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Musculoskeletal Research and Orthopedics
Cluster: Joint Arthroplasty and Reconstruction

Luat Le, B.S.

Luat Le, BS (Rush); Alexander J. Acuña, MD (Rush); Enrico M. Forlenza, MD (Rush); Joel C. Williams, MD (Rush)

OUTCOMES FOLLOWING TOTAL HIP ARTHROPLASTY IN PATIENTS WITH PREVIOUS PELVIC OSTEOTOMY: A SYSTEMATIC REVIEW

INTRODUCTION: The impact of previous pelvic osteotomy (PO) on outcomes following conversion to total hip arthroplasty (THA) remains unclear. Our systematic review aimed to compare outcomes of patients undergoing THA following PO to those undergoing primary THA.

METHODS: Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a search of five online databases was performed to identify articles published between January 1st 2000-January 1st 2024 reporting on outcomes of patients with and without previous PO undergoing THA. Articles with a minimum 2-year follow-up were included. Risk of bias was evaluated through the Methodological Index for Non-Randomized Studies (MINORS) tool.

RESULTS: A total of 17 articles reporting on 542 THAs with previous PO were included. All articles were of moderate or high quality. Although the data was mixed for certain outcomes, a majority of included studies demonstrated that patients with a previous PO had similar functional outcomes and survivorship, as well as complication and reoperation rates compared to patients undergoing primary THA. However, a history of PO resulted in consistently longer operative times, higher EBL, and less medialization of the acetabular component.

CONCLUSION: Patients with a previous PO were found to have comparable functional outcomes, complication rates, and survivorship following THA relative to controls without a previous surgical history. The differences in acetabular component positioning and intraoperative outcomes allude to the increased operative complexity of conversion THA. More information is needed to determine how factors such as osteotomy type and timing between osteotomy and THA impact the evaluated outcomes.

Abstract #: 190
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Musculoskeletal Research and Orthopedics
Cluster: Joint Arthroplasty and Reconstruction

Katie McMorrow, B.S.

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NO ASSOCIATION BETWEEN DONOR VARIABLES AND CLINICALLY SIGNIFICANT OUTCOMES, REOPERATIONS, AND FAILURE AFTER MENISCAL ALLOGRAFT TRANSPLANTATION

INTRODUCTION The meniscus is a C-shaped piece of cartilage that acts as a cushion between the femur and tibia that is vital long-term knee joint health. Meniscal injuries are common, and when the meniscus is irreparable or symptomatic despite prior treatment, a meniscal allograft transplant (MAT) can be an effective treatment option. This surgery is considered a salvage procedure of removing the total remaining native meniscus and inserting a donor meniscus. Outcomes of MAT are generally high; however, it is essential to determine indications and patient-related factors that lead to successful outcomes as well as outcomes of sex concordance or mismatch of the donor and the recipient meniscal allograft where current research shows conflicting results. this information has the potential to improve therapeutic outcomes for patients and influence how transplantation companies undergo matching donor specimens to recipients.

METHODS This was conducted as a prospective chart review and survey study of 549 patients who underwent a MAT by Dr. Brian Cole and Dr. Adam Yanke between the dates 01/01/2003 to 12/01/2023. This study was then completed in three phases consisting of chart review/data collection, patient recruitment, and data analysis. The two groups, sex concordant and sex mismatch donors, were analyzed for failure and patient-reported outcome scores. results We are currently in the final data analysis phase and will have results and data soon. We hypothesize that the relationship between the sex of the meniscal allograft donor and recipient has no effect on graft survival or patient reported outcomes.

CONCLUSION The MAT procedure is vital procedure for many patients that needs more conclusive studies on patient characteristics and sex concordance of graft and recipient. If our hypothesis proves true, transplantation companies will not need to match the sex of donor and recipient, resulting in more available grafts. With our patient characteristic **RESULTS**, better candidates can be identified for the procedure, resulting in better outcomes overall. If our hypothesis proves false, patients may have longer wait times for the procedure due to a precise sex concordant graft being needed. This may additionally result in donor grafts going to waste due to no exact, sex-concordant match being present.

Abstract #: 191
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Musculoskeletal Research and Orthopedics
Cluster: Joint Arthroplasty and Reconstruction

Colton Mowers, BS

Presenting author: Colton Mowers, BS; Co-authors: William E. Harkin; MD, Tyler C. Williams, BS; John T. Streepy, BS; Kyleen Jan, MD; Gregory P. Nicholson, MD; Grant E. Garrigues, MD All authors affiliated with Rush University.

THE EFFICACY AND SAFETY OF PROPHYLACTIC TREATMENT METHODS FOR CUTIBACTERIUM ACNES INFECTION IN THE SHOULDER: A SYSTEMATIC REVIEW OF LEVEL OF EVIDENCE I RANDOMIZED CONTROLLED TRIALS

INTRODUCTION: Surgical site infection prevention in shoulder surgery is challenging due to the deep-seated nature of Propionibacterium acnes (C. acnes) in pilosebaceous glands. Standard preoperative protocols, which include chlorhexidine gluconate, isopropyl alcohol, and cefazolin, may be inadequate. This systematic review assesses various prophylactic strategies to mitigate C. acnes infections effectively.

METHODS: Following 2020 PRISMA guidelines, a comprehensive literature search was conducted using PubMed, Scopus, and Embase through June 2024. Level I randomized controlled trials examining skin treatments for C. acnes were identified using Covidence, excluding non-primary research. Data extraction focused on treatment groups, colonization percentages, infection rates, and patient demographics. Quality assessment was performed using the revised Cochrane Risk of Bias 2 tool, categorizing studies into low, unclear, and high-risk of bias.

RESULTS: A total of 1,161 patients (826 males, 335 females) were included across 15 studies, with a mean follow-up of 7.33 months. Of these, 952 were undergoing shoulder surgery, either open or arthroscopic. Analyzed treatments included benzoyl peroxide (46.7%), hydrogen peroxide (33.3%), povidone-iodine with and without plastic drapes, DuraPrep, 2% chlorhexidine gluconate, and Blue Light Therapy. Comparisons were drawn against various controls, including different concentrations of chlorhexidine and standard soap and water. Treatments were classified into at-home and peri-operative categories.

CONCLUSION: The review highlights the lack of consensus on the optimal method for preoperative skin preparation to combat C. acnes. Benzoyl peroxide, while significantly reducing bacterial load when applied pre-surgery, was linked to higher rates of complications and adverse skin reactions. This underscores the need for a balanced approach to its use and further investigation into the most effective and safe prophylactic measures against C. acnes in shoulder surgeries, considering both efficacy and safety profiles.

Abstract #: 192
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Musculoskeletal Research and Orthopedics
Cluster: Joint Arthroplasty and Reconstruction

Harmanjeet Singh, B.A.

Siddhartha Dandamudi, Enrico M Forlenza MD, Ajay S Potluri, Harmanjeet Singh, Jonathan Shaw MD, Brett R Levine MD, MS

ESTABLISHING PREOPERATIVE ALBUMIN LEVELS PREDICTIVE OF POSTOPERATIVE OUTCOMES FOLLOWING TOTAL JOINT ARTHROPLASTY

BACKGROUND Low serum albumin levels have been associated with complications following total joint arthroplasty (TJA) procedures. This study aims to determine a cut-off value of albumin as a continuous variable to predict postoperative complications following primary total hip (THA) and knee (TKA) arthroplasty.

METHODS Patients undergoing primary TJA by multiple surgeons at a single, academic medical center between 2016-2024 were reviewed. Cases of revision or TJA for fracture or malignancy were excluded. Preoperative albumin levels, baseline demographics and postoperative complication rates were recorded. Area Under the Curve (AUC) analysis and multivariate regression modeling was performed to determine the sensitivity and specificity of various albumin levels at predicting any complication, revision surgery and readmission.

RESULTS A total of 1,908 patients were included, of which 1,087 (56.9%) underwent TKA and 821 (43.1%) THA. The mean overall preoperative albumin level was 4.03 ± 0.38 g/dL. The overall complication, readmission and revision rate was 6.7%, 3.1% and 2.3%, respectively. Albumin level < 3.8 g/dL was associated with an increased risk of complications following TJA (OR 1.56 [1.08-2.25]; p=0.018). Albumin level <3.5 g/dL, the current standard for malnutrition, was found to be 91.9% specific for any complication following THA, whereas an albumin level <3.6 g/dL was found to be 85.7% and 85.8% specific for readmission and revision surgery following TKA, respectively. Albumin level <3.1 g/dL was found to be 99% specific in predicting complications, readmissions, and revisions.

CONCLUSION Albumin levels <3.8 g/dL were associated with an increased incidence of overall complications following TJA, with albumin levels < 3.5 g/dL and <3.6 g/dL being highly specific for complications in THA and readmission and revision surgery following TKA, respectively. Patients with preoperative albumin levels below these thresholds should be considered for nutritional optimization to minimize adverse outcomes following TJA.

Abstract #: 193
Trainee Rank: Clinical Fellow
Theme: Musculoskeletal Research and Orthopedics
Cluster: Spine and Gait Studies

Felipe Fernandes Gonzalez, MD, MSc

Felipe F. Gonzalez [1,2,3], Jonathan Gustafson [1,3], Dino Samartzis [1], Talissa Generoso [1], Lord J Adusei-Hyeamang [1], Eliane Celina Guadagnin [3], Jorge Chahla [1,3], Marcus Luzo [2], Gustavo Leporace [2,3], and Leonardo Metsavaht [2,3]. 1. Rush University, Department of Orthopedic Surgery, Chicago, IL, USA. 2. Universidade Federal de São Paulo, Department of Diagnostic Imaging, São Paulo, SP, Brazil. 3. Instituto Brasil de Tecnologias da Saúde (IBTS), Department of Research in Biomechanics, Rio de Janeiro, RJ, Brazil.

IDENTIFYING GAIT SUBGROUPS IN LOW BACK PAIN PATIENTS WITH ARTIFICIAL INTELLIGENCE: IMPLICATIONS FOR INDIVIDUALIZED INTERVENTIONS

INTRODUCTION: Low back pain (LBP) is the world's most disabling condition, with tenuous treatment outcomes necessitating deep phenotyping via artificial intelligence (AI) solutions for more "personalized" management. The objective of this study was to investigate the existence of different gait profiles in patients with LBP and assess their clinical characteristics.

METHODS: This is a cross-sectional retrospective study that included individuals with LBP as their primary complaint who had undergone a clinical motion analysis assessment in a single private motion analysis laboratory. Participants were not restricted based on chronicity, etiology, previous treatment, or socioeconomic status. Three-dimensional gait kinematics were assessed including mean angles, range of motion (ROM), and coordination of the trunk and pelvis across three planes. The AI algorithm leveraged to identify distinct gait profiles consisted of principal component analysis, self-organizing maps, and K-means clustering techniques. Clinical characteristics such as demographics, hip and trunk ROM, and hip strength were compared across profiles using the Kruskal-Wallis test with Bonferroni adjustment, at a 5% significance level.

RESULTS: One hundred and eleven patients were analyzed (Age 44.6; SD: 9.5, 56% females). Five distinct gait profiles were identified (Fig. 1). Profile 1 was mainly characterized by an increased lateral trunk ROM and flexed trunk (4.1o; 5.2o; $p<0.05$). Profile 2, by trunk flexion and posterior pelvic tilt (3.4o; 7.2o; $p<0.05$). Profile 3, by excessive pelvic ROM and maximum angle in the coronal plane (2.9o and 11.1o; $p<0.05$) and pelvic anterior tilt (12.2o; $p<0.05$). Profile 4, by trunk extension, and excessive trunk axial ROM (-3.0o; 7.1o; $p<0.05$). Profile 5, by a prominent pelvis-trunk in-phase component in the coronal and axial planes with pelvic predominance (20.2%; 45.6%; $p<0.00$). Profiles 1 and 2 predominantly consisted of males with higher body mass (>77.3%; >76.8kg; $p<0.00$), while profiles 3 and 4, females with lower body mass (>86.2%; <65kg $p<0.00$). Profile 4 displayed increased hip passive ROM, and profiles 1 and 5 decreased ($p<0.05$). No significant differences were found in age, hip strength and trunk ROM between profiles ($p>0.05$).

CONCLUSION: Each of the five profiles identified reveals distinct kinematic and physical characteristics, providing meaningful insights into clinical implications, associated pathologies, anatomical structures at risk, and management.

Abstract #: 194
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Musculoskeletal Research and Orthopedics
Cluster: Spine and Gait Studies

Sayyida Hasan, BS

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DISTINCT STABILITY PROFILES IN LUMBAR DEGENERATIVE SPONDYLOLISTHESIS: STEEPER L5 SLOPES, HIGHER GRADES, AND MULTILEVEL DISEASE DEFINE INSTABILITY

INTRODUCTION: Lumbar degenerative spondylolisthesis (LDS) is a prevalent condition arising from degenerative changes in the spine. Although surgical intervention is well-supported by the literature, the optimal approach remains challenging due to the lack of a standardized definition of instability. Surgeons must rely on clinical judgement to choose between decompression alone, decompression with posterolateral fusion, or decompression with interbody fixation. Recent advancements in unsupervised artificial intelligence (AI) have shown promise in identifying patterns within orthopaedic literature, though its application in LDS remains limited. Thus, this study aims to define instability in LDS using an unsupervised AI-driven scoring system guide treatment stratification.

METHODS: A cross-sectional analysis was conducted using XRs and MRIs collected from a multicenter referral database between 2006 - 2022. Patient demographics, complications, and revision rates were systematically recorded. Spinal parameters were measured by research assistants under the supervision of an orthopaedic surgeon. Using YOLOv3, ResNet-18, and confident learning (CL), weighted scores were assigned to variables associated with surgical failure. Patients were stratified into three stability groups: stable, moderately unstable, and severely unstable LDS. Principal Component Analysis (PCA) was used for visualization.

RESULTS: Among 714 patients, spectral clustering revealed three LDS stability groups. Cluster 1 (stable) had minimal complications, no reoperations, and improved postoperative pain (VAS) and disability (ODI) scores. Cluster 2 (moderately unstable) had more complications requiring hospital admission, occasional reoperations, and moderate persistent pain and disability. Cluster 3 (severely unstable) had the highest rates of complications and reoperations and longer operative times. Cluster 3 patients had significantly increased use of bone morphogenic protein (BMP) and demineralized bone matrix (DBM), higher spondylolisthesis grades, multiple spondylolisthesis levels, and steeper L5 slopes pre-operatively ($p<0.05$). No significant differences in age or sex were observed across clusters ($p>0.05$).

CONCLUSION: This study introduces a novel LDS classification system based on instability scores. Patients with higher spondylolisthesis severity, multilevel disease, and steeper L5 slopes are associated with increased instability, requiring more invasive surgical procedures. These findings may inform personalized surgical strategies to improve outcomes.

Abstract #: 195
Trainee Rank: RUSH Matriculated Student
RMC: M2
Theme: Musculoskeletal Research and Orthopedics
Cluster: Spine and Gait Studies

Othman Ibrahim, BS

Khaled Aboushaala (RUMC); Othman Ibrahim (RMC); Namra Ahmed (RUMC); Rewa Aboushaala (RUMC); Suliman Garguom (RUMC); Andrew Savoia (RUMC); Jennifer Westrick (RUMC); Lorena Juarez (RUMC); Schuyler Hilton (RUMC); Nicholas Skertich (RUMC); Ana Spagnoli (RUMC); Alfonso Torquati (RUMC); Philip Omotosho (RUMC); John Martin (RUMC)

THE EFFECTS OF BARIATRIC SURGERY ON SPINAL ALIGNMENT, RADIOLOGICAL PARAMETERS, AND CLINICAL OUTCOMES IN MORBIDLY OBESE PATIENTS WITH LOW BACK PAIN: A SYSTEMATIC REVIEW AND META-ANALYSIS

INTRODUCTION: Bariatric surgery (BS) is a procedure widely utilized in the management of obesity. Although, there is limited literature on the impact of the consequent extreme weight loss on spine health. This systematic review aims to investigate the effect of bariatric procedures on spinopelvic sagittal parameters and evaluate clinical outcomes in morbidly obese patients experiencing low back pain (LBP).

METHODS: A comprehensive literature search was conducted across databases such as PubMed/MEDLINE, Scopus, Embase, CINAHL, and the Cochrane CENTRAL Register. Two reviewers independently screened abstracts, analyzed articles, and performed data extraction from the listed databases using Covidence. Meta-analysis was performed using RevMan software to synthesize quantitative data and the Newcastle-Ottawa Scale (NOS) to assess the quality of the observational studies included.

RESULTS: Five longitudinal observational studies and three retrospective studies were included. BS significantly increased intervertebral disc height, reducing the Cobb angle, LBP, and radiculopathy, while improving physical function and quality of life (QOL) within 12 months post-surgery. BS reduces spinal conditions such as lumbar stenosis, herniation, and spondylosis. Meta-analysis confirmed significant improvements in lumbosacral spinal alignment and reductions in LBP-related disability. Over 50% of obese patients with lumbar issues stop seeking treatment within six months following surgery, and more than 90% of these conditions are resolved within two years. However, one study exhibited increased risk for spinal disorders and procedures in BS patients compared to morbidly obese patients who have not undergone BS. The most common diagnoses were spinal stenosis, disk degeneration, spondylolisthesis, and spondylosis.

CONCLUSION: Extreme weight loss achieved through BS reduced LBP/leg pain and alleviated LBP-related functional disability while optimizing overall QOL. Additionally, the procedure increases disc height, ultimately improving lumbar lordosis and enhancing spinal alignment. There are currently no published studies examining the effects of BS on spinal degenerative MRI phenotypes or key spinopelvic sagittal parameters including pelvic tilt, sacral slope, pelvic incidence, and LL-PI mismatch. This gap highlights an exciting area for future investigation. Large-scale, high-quality randomized controlled trials (RCTs) are necessary to validate claims that BS improves spinal alignment, including the evaluation of clinical outcomes and MRI-based degenerative phenotypes in obese individuals with LBP.

Abstract #: 196
Trainee Rank: RUSH Alumni (graduated on/or after May 2024)
RMC: DTS
Theme: Neurodegenerative Diseases and Inflammation
Cluster: Alzheimer's Disease and Related Mechanisms

Hannah Carson, MS

Hannah Carson, MS, Rush University Medical Center Hiu Chen, PhD, University of Illinois at Chicago George Chlipala, PhD, University of Illinois at Chicago Liudmila Romanova, PhD, Rush University Medical Center

ARACHNOID BARRIER IN ALZHEIMER'S DISEASE

INTRODUCTION: Impaired clearance of Aβ protein is an early event in Alzheimer's disease, where Aβ aggregates into plaques that disrupt brain function and cause cognitive decline. This process may be reversible, but the mechanisms of Aβ clearance are poorly understood. It is known that meninges, multi-layered membranes that envelope the brain, play important role in clearance. It is thought that, one of the meningeal layers, arachnoid barrier, which interfaces cerebrospinal fluid (CSF), is critical for this clearance function. We hypothesize that dysfunction of the arachnoid barrier in aging impairs Aβ clearance, leading to its accumulation in the brain neuronal tissue. In this study, we test this hypothesis using proteomic analysis of human arachnoid tissue correlative to age, AD progression, and sex.

METHODS: Ninety-nine fresh human arachnoid samples were obtained from Banner Research Institute, divided into three groups: CN (26 samples, PMI <5 hours, MMSE 27-30), MCI (30 samples, PMI <5 hours, MMSE 16-26), and AD (43 samples, PMI <5 hours, MMSE 0-15). CN samples were from subjects without dementia or major neuropathology; MCI subjects had a clinical diagnosis of mild cognitive impairment at death; AD samples met intermediate or high NIA-Reagan criteria for Alzheimer's disease. Protein concentrations were measured using a Bead Bug Homogenizer and BioTek microplate reader, then provided to the UIC spectrometry core for proteomic profiling of arachnoid and dural cells, analyzing variables like cognitive status, age, sex, disease, and severity.

RESULTS: Shotgun proteomics on all 99 human samples was performed at UIC. Data were analyzed for significance, and heat maps were generated for CN, MCI, and AD groups, as well as by individual bins. Volcano plots and pathway analyses were conducted for each group and overall. Significant findings were further analyzed through regression with age, disease severity (MMSE 0-30), and sex as a biological variable.

CONCLUSION: The most significant differences between cognitively normal and AD arachnoid were in proteins related to transport and mitochondrial function, supporting our hypothesis that aging impairs Aβ clearance mechanisms, especially as they relate to the arachnoid barrier. This increases the accumulation of Aβ and reinforces the link between impaired clearance and disease progression.

Abstract #: 197
Trainee Rank: Post-Doctoral Research Fellow
Theme: Neurodegenerative Diseases and Inflammation
Cluster: Alzheimer's Disease and Related Mechanisms

Tristan Philippe, PhD, MSc

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TRANSCRIPTOMICS OF POST-MORTEM CHOROID PLEXUS REVEALS DYSFUNCTION IN ALZHEIMER'S DISEASE

BACKGROUND: The choroid plexus (ChP) is a physical and immunological barrier that protects the brain and maintains homeostasis. Imaging, biomarker, and animal studies highlight the importance of this structure in Alzheimer's Disease (AD) development and pathogenesis. Understanding ChP molecular dysfunction during AD progression will indicate novel avenues for therapeutic intervention. Recent single-cell RNA sequencing studies have begun to reveal the transcriptional diversity of ChP cells in mouse brains. However, to date there is no comprehensive study that charts the molecular properties of cell types within human ChP and their changes during AD progression.

METHOD: We performed single-nuclei RNA-sequencing (snRNA-Seq) on ChP from 81 ROSMAP participants with no cognitive impairment (NCI), mild cognitive impairment (MCI), or Alzheimer's Dementia (AD(d)). To examine protein expression changes, we also conducted proteomics on a subset of postmortem CSF and ChP tissue samples.

RESULT: We identified 15 major cell types from over a million ChP nuclei, including four types of epithelial cells, four types of fibroblasts, four types of border-associated macrophages (BAMs), one type of T cells, and two types of vascular cells. We mapped the spatial distribution of specific cell types using the CosMx Spatial Molecular Imager and RNAscope. In the Ad(d) but not the MCI group, we observed proportionally elevated BAM_2 cells expressing higher levels of stress response genes. CellChat analysis inferred stronger interactions between BAMs and other cell types via the CD45, SPP1, and VISFATIN pathways in AD(d). Differential gene expression (DEG) analysis of epithelial subtypes revealed decreased expression of genes essential for cilia formation and movement in participants with AD(d) but not MCI. In fibroblasts and epithelial cells, we observed changes in genes and genetic pathways related to cell adhesion, ion transport, cell metabolism, and pro-inflammatory response in AD(d) and MCI. Postmortem CSF and ChP tissue protein changes corroborate DEGs, indicating multifaceted disease ChP pathophysiology in AD.

CONCLUSION: We provide a comprehensive spatial single-cell transcriptomic atlas of the human ChP and chart the differentially expressed genes, pathways, and intercellular communications related to cognitive impairment. Our results indicate a spectrum of cellular and molecular dysfunctions in ChP during AD development, with cilia dysfunction and BAM_2 abundance correlated with the severity.

Abstract #: 198
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Neurodegenerative Diseases and Inflammation
Cluster: Alzheimer's Disease and Related Mechanisms

Ishwarya Venkatesh, MS, BE

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COBALT AND TITANIUM ALLOYS COMMONLY USED IN TJA IMPLANTS INCREASES AMYLOID-β PROTEIN EXPRESSION IN iPSC-DERIVED ASTROCYTES-COULD THIS CONTRIBUTE TO EARLY-ONSET OR EXACERBATE ALZHEIMER'S DISEASE?

INTRODUCTION: Alzheimer's disease (AD), is a common age-related neurodegenerative disorder, characterized by amyloid-β plaques, neurofibrillary tangles (NFTs), neuroinflammation, and synaptic dysfunction. Most cases are late-onset and sporadic, with unclear triggers. Recent findings at Rush Alzheimer's Disease Center (RADC) suggest a connection between AD and metal accumulation from total joint arthroplasty (TJA). In this study TJA patients (N=229) presented elevated levels of Cobalt in the inferior temporal cortex; a region linked to early-onset AD. As metallic wear particles disseminate into brain, they may induce neuroinflammation contributing to AD. Here we investigated the functional integrity of resident brain cells when exposed to cobalt (Co) and titanium (Ti) particles.

METHODS: To evaluate the impact of implant alloys on brain cells, we exposed human iPSC-derived astrocytes, neurons, microglia, and endothelial cells to Co and Ti (10-200 alloy particles/cell) for 24hrs and 6days. We assessed the impact of these metals on cellular toxicity, morphological, and physiological changes through live imaging, immunofluorescence, and gene expression analysis. Primary hallmarks of AD, including amyloid-β accumulation and hyperphosphorylated tau formation, were evaluated in neurons and astrocytes.

RESULTS: MTS assay revealed Co and Ti at 200 particles/cell did not cause toxicity in astrocytes or neurons. Live imaging of Co and Ti-exposed astrocytes showed increased phagocytic activity and morphological changes, including enhanced branching and process outgrowth. After 6days Co-exposed astrocytes exhibited significantly elevated levels of amyloid-β and vimentin expression, while Ti increased amyloid-β and vimentin only in astrocytes that ingested particles. Immunofluorescence indicated that amyloid-β expression in astrocytes began within 24 hours of Co exposure and increased over 12 days. In neurons, exposure to low dose of Co (10 particles/cell) caused axonal and dendritic damage, with reduced PSD95 and MAP2 expression, whereas Ti had no adverse effects.

CONCLUSION: Our findings indicate that Co particles exert more pronounced morphological and physiological effects on neurons and astrocytes compared to Ti. Astrocytes exposed to Co for 6days exhibited morphological changes characteristic of reactive astrogliosis, a defense mechanism activated by environmental stress. Most significantly cobalt induced amyloid-β deposition in astrocytes. Our study suggests that metals can impact neuroinflammation by facilitating early onset or exacerbation of AD.

Abstract #: 199
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Neurodegenerative Diseases and Inflammation
Cluster: Broader Neurological and Immunological Interactions

Stefanie Cassoday, B.S.

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MEDIAL PREFRONTAL CORTEX PYRAMIDAL NEURON ACTIVITY IS ENHANCED BY SARS-COV-2 IGG ANTIBODIES AND COCAINE-SELF-ADMINISTERING NON-TG AND HIV-1 TG RATS

INTRODUCTION: Neurocognition plays a vital role in daily life and is regulated by specific brain regions, particularly the medial prefrontal cortex (mPFC), which works with other brain areas to regulate attention, memory, decision-making, and learning. Neurocognitive impairments are commonly associated with certain brain disorders, including COVID-19 (caused by SARS-CoV-2), HIV-Associated Neurocognitive Disorder (HAND), and substance use disorders such as cocaine use disorder (CUD). Our previous research has revealed that the SARS-CoV-2 spike protein triggers abnormal-increased activity among mPFC pyramidal neurons in both non-transgenic (Tg) and HIV-1 Tg rats that self-administer cocaine. However, the impact of immune responses to SARS-CoV-2 infection on mPFC neuron function in the context of HAND and/or CUD remains unexplored.

METHODS: To address this issue, we used a combined rat model of neuroHIV (HIV-1 Tg) and cocaine self-administration (Coc-SA) to study how immune responses may affect mPFC neuron function. Rats underwent 2 weeks of Coc-SA, followed by a 3-week withdrawal phase, during which drug-seeking behavior was evaluated on days 3 and 21. After the final behavioral assessment, the rats were euthanized, and their brains were analyzed via whole-cell patch-clamping. The firing activity of mPFC neurons was assessed with perfusion of IgG antibodies (2.5 and 5 µg/mL) from patients with severe or mild COVID-19.

RESULTS: We found that both HIV-1 Tg and non-Tg rats displayed similar drug-taking behaviors. Drug-seeking behaviors persisted, suggesting that cocaine-induced neuroplasticity is associated with hyperactivity and altered membrane properties of mPFC neurons. We also found that IgG from severe COVID-19 patients induced a significant increase in firing activity among mPFC neurons in SAL-yoked rats, which worsened neuronal hyperactivity in Coc-SA rats. In contrast, IgG from mild COVID-19 patients had no effect on neuronal firing.

CONCLUSION: These novel findings, combined with our prior research, suggests that while the SARS-CoV-2 spike protein directly enhances mPFC neuron activity, SARS-CoV-2-induced bulk IgG may further heighten this overactivation, causing hyperexcitability-related neuronal damage. This mechanism may contribute to neurocognitive deficits in COVID-19 patients and worsen those in the overlapping epidemics of COVID-19, neuroHIV, and CUD.

Abstract #: 200
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Neurodegenerative Diseases and Inflammation
Cluster: Broader Neurological and Immunological Interactions

Kevin Truong-Balderas, BS,BA

Kevin Truong-Balderas (Rush); Maria Mihailescu (Rush); Grace Tu (UIC-Peoria); Elmer Tu (UIC-Chicago); Kyle T. Amber (Rush)

DEVELOPMENT OF SUPERFICIAL THROMBOPHLEBITIS AND SUBSEQUENT CENTRAL RETINAL VEIN OCCLUSION OCCURRING IN A PATIENT RECEIVING IVIG FOR OCULAR PEMPHIGOID

INTRODUCTION Ocular predominant mucous membrane pemphigoid (oMMP) is a rare, chronic autoimmune subepithelial blistering disease characterized by inflammation and scarring of the conjunctiva, with the potential for permanent vision loss. Immunosuppressive agents and corticosteroids are mainstays of treatment to prevent progression. Biologic therapies, such as intravenous immunoglobulin (IVIg), are frequently utilized in progressive disease. IVIg has, however, been rarely associated with thromboembolic events in other conditions.

CASE PRESENTATION A 43-year-old male with a 3-year history of bilateral entropion and trichiasis presented with progressive cicatrizing conjunctivitis consistent with ocular mucous membrane pemphigoid (oMMP). He reported recurrent bilateral eye soreness, foreign-body sensation, pruritus, and burning, with worsening ocular discomfort despite epilation. Examination revealed trichiasis, symblepharon, and entropion without cutaneous or other mucosal involvement. Conjunctival biopsy showed cicatrization with negative direct immunofluorescence, and serological testing for autoantibodies was also negative. A diagnosis of oMMP was made based on clinical findings. Initial treatment with doxycycline and mycophenolate mofetil failed, leading to IVIg therapy. After the first month, he developed superficial thrombophlebitis (STP) at the infusion site, managed conservatively. Following three months of IVIg, recurrent STP prompted aspirin initiation. Due to persistent symptoms, a tunneled catheter was placed, and ocular disease remained in remission. After five months, he developed non-ischemic central retinal vein occlusion (CRVO), leading to IVIg discontinuation and systemic anticoagulation. Hypercoagulable workup revealed elevated anti-cardiolipin IgM. Rituximab replaced prior therapy, and oMMP remains controlled with adjusted dosing every four months, preventing flares and maintaining remission. Vision stabilized at 20/25, though a paracentral scotoma remains.

CONCLUSION Our case demonstrates recurrent STP during IVIg therapy as a harbinger of VTE manifesting in the form of CRVO. This was presumably precipitated by the patient's anti-cardiolipin IgM antibodies. Early identification and management of hypercoagulability is crucial in preventing serious outcomes, such as CRVO. This case adds valuable insight into the safety profile of IVIg and highlights the importance of careful monitoring in its administration. Moreover, it underscores the necessity for further research into the mechanisms underlying IVIg-related thromboembolic events and the development of strategies to reduce these risks.

Abstract #: 201
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Neurodegenerative Diseases and Inflammation
Cluster: Inflammation in Neurodegenerative Disorders

Daniela Garcia Prada, Neuroscience BS

Daniela Garcia Prada, Dustin Kim, Neal Wrobel, Richard G. Fessler, Brian T. David

3D-PRINTED BIOMATERIAL SCAFFOLDS MODULATE NEUROINFLAMMATION AFTER SPINAL CORD INJURY

INTRODUCTION Spinal cord injury (SCI) affects over 15 million people globally, with 18,000 new cases annually in the United States. Most cases result from trauma, leading to motor and sensory dysfunction and chronic pain. Inflammation plays a key role in SCI, with microglia and macrophages driving secondary complications. In rodent models, macrophage activity peaks at 1 and 8 weeks post-injury (wpi), influencing inflammation and tissue repair. Tumor necrosis factor-alpha (TNF-α), a pro-inflammatory cytokine, is a critical target in SCI therapies. Poly(lactic-co-glycolic acid) (PLG) scaffolds, a biodegradable polymer, have emerged as a promising strategy for promoting axonal regeneration and modulating inflammation. This study explores PLG scaffolds combined with TNF-α antagonists to investigate their immunological effects at 1 and 8 wpi.

METHODS On Day 0, a contusive SCI was induced in three different experiments. In the first, rats received either a myelotomy (n=4) or myelotomy with PLG implantation (n=4), followed by sacrifice at 1 wpi for flow cytometric analysis of myeloid cell infiltration. In the second experiment, rats received no intervention (n=5) or myelotomy with PLG scaffold implantation (n=11). The PLG group received injections of either vehicle (n=5) or etanercept (n=6) into the scaffold at 1wpi, followed by sacrifice at 2wpi to assess myeloid and lymphoid cells. In the third experiment, animals underwent either sham surgery (n=4) or SCI (n=8) (followed by myelotomy (n=4) or PLG scaffold (n=4)), and were sacrificed at 8wpi for flow cytometry.

RESULTS PLG scaffolds shifted macrophage polarization toward an anti-inflammatory (M2) state at 1wpi without affecting macrophage levels. At 2wpi, PLG reduced macrophage levels but did not alter polarization or affect microglia and T cells (etanercept provided no additional benefit). By 8wpi, PLG normalized myeloid and macrophage levels to near-sham levels. Sensory testing showed rapid thermal hypersensitivity post-SCI, with no additional sensory recovery observed in PLG-treated groups.

CONCLUSIONS PLG scaffolds possibly sequester inflammatory macrophages, preserve spinal cord structure, and induce a sub-acute anti-inflammatory shift at 1wpi. Sub-acute reductions in macrophage levels were observed at 2 and 8wpi, highlighting PLG's potential to modulate inflammation and support tissue preservation in SCI.

Abstract #: 202
Trainee Rank: RUSH Matriculated Student
RMC: M3
Theme: Neurodegenerative Diseases and Inflammation
Cluster: Inflammation in Neurodegenerative Disorders

Edena Khoshaba, BS

Edena Khoshaba1, Heather Rasmussen PhD2, Maliha Shaikh, MS1, Ali Keshavarzian MD1, Faraz Bishehsari MD PhD3 1 Rush Center for Integrated Microbiome and Chronobiology, Rush University Medical Center, Chicago, Illinois, USA. 2 Department of Nutrition and Health Sciences, University of Nebraska, Lincoln, NE, USA 3 MD Anderson Cancer Center-UTHealth Houston Graduate School of Biomedical Sciences, Houston, TX, USA

INVESTIGATING THE ROLE OF CIRCADIAN DISRUPTION AND GUT-DERIVED INFLAMMATION IN METABOLIC DYSFUNCTION AMONG OBESE INDIVIDUALS

INTRODUCTION: Metabolic syndrome (MetS) is a growing health concern in the 21st century, strongly linked to chronic systemic inflammation. Gut-derived inflammation, driven by compromised gut barrier integrity, plays a pivotal role in the development and progression of MetS. Disruptions in circadian rhythms can exacerbate gut leakiness and amplify inflammatory pathways. In this secondary analysis, we study the potential role of circadian phenotypes and gut permeability in MetS among an at risk (obese) population .

METHODS: We analyzed data from a randomized, placebo-controlled trial of obese young adults. MetS was defined by waist circumference, triglycerides, HDL, blood pressure, and fasting glucose. Circadian phenotypes were assessed via the Munich Chronotype Questionnaire (central) and Food Timing Screener (peripheral). Late chronotype was defined as a mid-sleep point >3 hours later on free days compared to workdays, and late eating as meals after 8 PM. Intestinal permeability was measured using 5- and 24-hour mannitol, lactulose, and sucralose excretion in urine following ingestion of a sugar mixture.

RESULTS: Data from 87 patients were in analyzed in this study. Late chronotype was significantly associated with two or more features of metabolic syndrome (42, 76.4% vs. 13, 23.6%, p=0.025). This association strengthened when adjusting for demographics, with late chronotype having 4.20 times more likely to have metabolic syndrome (95% CI 1.33 to 13.27, p = 0.014). Intestinal barrier dysfunction showed associations with metabolic syndrome and our circadian phenotypes in multiple instances. Greater features of metabolic syndrome were associated with higher gut permeability to 24-hour lactulose (mean difference of -1.40, 95% CI [-2.53 to -0.27], p=0.016). Five-hour urinary mannitol levels were significantly higher in those who ate after 8 PM (mean difference = 4.24, 95% CI [0.26, 8.22], p = 0.037). At 24 hours, mannitol levels remained significantly elevated (mean difference = 6.39, 95% CI [0.77, 12.02], p = 0.026.

CONCLUSION: Our findings highlight novel associations between features of circadian disruption such as late eating with gut leakiness, and progression of MetS in a well-defined human cohort. Mechanistic role of gut microbiota and gut-derived inflammation needs to be further studied.

Abstract #: 203
Trainee Rank: Post-Doctoral Research Fellow
Theme: Neurodegenerative Diseases and Inflammation
Cluster: Inflammation in Neurodegenerative Disorders

Robin Vroman, PhD

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CLEARING-ENABLED LIGHT SHEET MICROSCOPY IMAGING OF NEURONAL AND NON-NEURONAL CELLS IN MURINE JOINTS

INTRODUCTION Millions of people suffer from chronic pain, creating a major healthcare burden. Recent research highlighted the importance of non-neuronal cell types in musculoskeletal pain sensitization. Despite their importance, the spatial relationships and interactions between non-neuronal cells and pain-sensing neurons are still poorly understood, in part explained by the limitations of two-dimensional histology approaches.

METHODS To address this, we developed a clearing-enabled light sheet microscopy approach for high-resolution 3D visualization and quantification of nerve density in murine tissues. Intact murine knee, ankle, and shoulder joints from neuronal reporter mouse lines (Pirt-GCaMP3, NaV1.8-tdTomato) were decalcified and cleared using a modified DISCO protocol. Antibodies against tdTomato, GFP, or PGP9.5 stained nerves, while endomucin and podoplanin marked endothelial cells and reticular fibroblasts. Secondary antibodies in the red or far-red wavelengths were used to amplify signal.

RESULTS We imaged these samples with a Zeiss Lightsheet 7 microscope and using Imaris software we can visualize positively stained neuronal signal that is distinct from the non-neuronal labeled cells. Using this advanced imaging technique, we visualized the spatial distribution of neurons and non-neuronal cells in murine joint tissues. The 3D reconstruction provided detailed structural relationships between pain-sensing neurons and surrounding non-neuronal cells.

CONCLUSION Our study presents a novel clearing-enabled light sheet microscopy approach for high-resolution, 3D visualization and quantification of nerve density in musculoskeletal tissues. This methodology offers a significant supplemental value to traditional 2D histology techniques, allowing for a more comprehensive understanding of the spatial interactions between pain-sensing neurons and non-neuronal cells. Future work will focus on optimizing and applying these different co-stains on joints in disease models like osteoarthritis, Ehlers Danlos syndromes, or spondyloarthritis.

Abstract #: 204
Trainee Rank: RUSH Matriculated Student
RMC: M1
Theme: Neurodegenerative Diseases and Inflammation
Cluster: Parkinson's Disease

Havish Gattu, Bachelors of Science in Ecology and Evolutionary Biology, UCLA

Nate Pertsch (Rush), Havish Gattu (Rush), Kazuki Sakakura (Rush)

OPTIMIZING MAGNETIC RESONANCE-GUIDED FOCUSED ULTRASOUND FOR PARKINSON'S DISEASE USING TRACTOGRAPHY

INTRODUCTION Magnetic resonance-guided focused ultrasound (MRgFUS) is emerging as a promising, minimally invasive therapy for tremor-dominant Parkinson's disease (TdPD). Through thermal ablation of the thalamus, MRgFUS has shown efficacy in reducing motor symptoms of TdPD. While the VIM nucleus of the thalamus is the standard target, alternative lesion sites such as the ventralis oralis anterior/posterior (VOP/A) are being explored. This study aims to use multi-shell multi-tissue constrained spherical deconvolution (MSMT-CSD) probabilistic tractography to confirm the distributions of the pallidothalamic and dentatorubrothalamic tracts across the VIM and VOP/A targets.

METHODS Six patients with TdPD underwent VIM MRgFUS thalamotomy but had suboptimal improvement in tremor. Then, patients underwent concurrent VOP/A thalamotomy. Tremor improvement was recorded using CRST. The experimental lesion was then reproduced on Human Connectome Project (HCP) Patient data to compare the number of streamlines intersecting each lesion site. To do so, probabilistic tractography was employed to generate patient-specific motor and sensory tracts, including the pallidothalamic tract (PTT), mammillothalamic tract (MTT), medial lemniscus (ML), and dentatorubrothalamic tract (DRTT).

RESULTS Mean age was 71.5 years (SD=2.7); 83.3% were male. Treatments were 66.7% right-sided and 16.7% second-side procedures. Mean VIM lesion coordinates were X=13.9mm, Y=7.5mm, and Z=2.2mm. VOP/A was targeted by moving approximately 3-5mm anterior and 3mm medial to the initial VIM lesion, with final coordinates at X=11.7mm, Y=11.3mm, and Z=2.3mm. Of the 5 patients with resting tremor, all had improved postural/action tremor after VIM thalamotomy (mean CRST-B 8.8 improved to 0.4) but unsatisfactory control of resting tremor. After VOP/A thalamotomy, resting tremor improved in all 5 patients (mean CRST-A hand score 3.6 improved to 0.0). For the patient without resting tremor, postural/action tremor improved after VOP/A thalamotomy (CRST 3 improved to 1).

CONCLUSION Given significant improvements in tremor after VOA/P lesioning, we anticipate that DRTT and PTT fibers overlap in this region in some patients. Integrating tractography into MRgFUS targeting may improve targeting, reduce adverse effects, and optimize outcomes for TdPD patients.

Abstract #: 205
Trainee Rank: RUSH Matriculated Student
RMC: DTS
Theme: Neurodegenerative Diseases and Inflammation
Cluster: Parkinson's Disease

Ameera Shaw, Bachelor of Science, Master of Science

Ameera Shaw (Rush University); Billy Nguyen (Rush University); Bryan Killinger (Rush University); and Vineet Gupta (University of Texas Medical Branch)

DISCERNING THE ROLE OF MYELOID CELLS IN PARKINSON'S DISEASE

INTRODUCTION Pathological characterization of Parkinson's disease (PD) includes overexpression and aggregation of the protein alpha-synuclein (a-syn) in neuronal cell bodies known as Lewy bodies, which leads to increased neuroinflammation and subsequent neurodegeneration. These a-syn aggregates over-activate resident microglia via ligation of toll-like receptors (TLRs) and signaling proteins, thereby stimulating pro-inflammatory NFkB and inflammasome pathways. Subsequently, it results in generation of pro-inflammatory cytokines that recruits peripheral monocytes and other immune cells, causing further damage. Thus, targeting peripheral monocyte recruitment and microglial activation could be therapeutic in PD, although agents that can accomplish both are missing. Here we describe a novel approach that targets these pathways using a common molecular target (CD11b) and a novel small molecule therapeutic (LA1). CD11b is an adhesion receptor that is highly and selectively expressed on monocytes and microglia with roles in cell adhesion, migration, tissue recruitment, and phagocytic clearance of pathogens and aggregates. Previously, we discovered that agonism of CD11b via the Conformation-Locking Allosteric agonist (CLOAK), LA1, also acts as an intracellular brake on TLR-stimulated NF-kB and inflammasome pathways, reducing inflammatory activation of myeloid cells. LA1 binds to CD11b on myeloid cells and increases CD11b-dependent adhesion and reduces cell migration.

METHODS Here, we evaluated the efficacy of LA1 in an a-syn dependent model of PD in mice by stereotaxically injecting an adeno-associated virus (AAV) to overexpress □-syn in the substantia nigra (SN) and subsequently administering either vehicle or LA1 for 4- or 8-weeks. Mice were then anesthetized and euthanized for brain, blood, and spleen collection.

RESULTS We found that agonism of CD11b with LA1, suppressed a-syn mediated pro-inflammatory microglial activation and reduced monocyte infiltration into the brain, thereby reducing neuroinflammation and neurodegeneration.

CONCLUSION Validation of LA1 in this PD model will provide a significant new advance in targeting myeloid cells (inflammatory monocytes and microglia via receptor CD11b) in a novel and safe way in PD. Additionally, if it shows efficacy in the pre-clinical models, it will justify rapid translation into early-stage clinical studies with PD patients in the future (given that the agent is in clinical studies with good safety data)

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