

 Jacobs School of Medicine  
and Biomedical Sciences  
University at Buffalo

# Medical Student *Annual* Research Forum

**Wednesday,  
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12pm-3pm**

 Jacobs School of Medicine and Biomedical Sciences  
Office of Student and  
Academic Affairs  
University at Buffalo

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and Biomedical Sciences  
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## Introduction

Progress in medicine is directly related to the research activities of the medical community. The Jacobs School of Medicine and Biomedical Sciences recognizes the importance of research in the task of providing the best medical care to patients. It also recognizes the importance of integrating research experience into the training of future physicians. Whether the ultimate career choice of today's student is primary care, a medical surgical specialty, or a position in academic medicine, there is a need to understand and interpret the results of research as they relate to medical practice. This can best be learned by active participation in research.

To this end, the School maintains formal and informal programs to encourage and support research training for medical students.

Today's Forum presents the results of research projects conducted by students both here and at other institutions. We hope that all participants will enjoy the presentations and that there will be a renewed stimulation to takepart in research.

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**Key:**

\*\* - Dean's Summer Fellow

\*\*\* - Nader Summer Fellow

\*\*\*\* - T35 Summer Research

\*\*\*\*\* - Roswell Cancer Summer Research

# Patient Skin Radiation Dose During Transcatheter Aortic Valve Replacement

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## **Abstract**

### *Purpose*

The patient's skin radiation dose was determined for Transcatheter Aortic Valve Replacement (TAVR) procedures. Skin radiation dose is an important consideration for any intraoperative medical procedure requiring fluoroscopy and/or Digital Subtraction Angiography (DSA). Skin dose is correlated with increased risk of radiation-related stochastic and deterministic effects, which include, but are not limited to, inflammation, erythema, dry and wet desquamation, and even neoplasm. Radiation doses for TAVR procedures have previously been measured in kerma area product (PKA) and cumulative air kerma ( $K_{a,r}$ ), but skin radiation doses have never been measured.

## RISK FACTORS FOR NASOGASTRIC TUBE FEEDING FAILURE FOLLOWING ORAL SQUAMOUS CELL CARCINOMA RESECTION

**Daniel Adelsberg, BA**; Kelvin Anderson, BS; Seth Brand, AB; Jae Gardella, BA; Mary Platek, PhD; William J. Magner, PhD; Ryan P. McSpadden, MD

Oral squamous cell carcinoma (OSCC) is the sixth most common form of cancer and is associated with significant mortality. Surgical resection of OSCC is a pillar of treatment, though it often leads to significant quality of life impairments such as temporary or permanent disruption to integral oral functions such as chewing, swallowing, and speaking. Resection following OSCC frequently requires post-operative enteral feeding methods including nasogastric tubes (NGTs) and percutaneous endoscopic gastrostomy (PEG). Patients who fail to progress from less invasive NGT require PEG placement. The initial choice between NGT and PEG remains subjective due to a lack of established guidelines, necessitating individualized approaches. We aimed to determine predictive factors for failure to progress from NGT following OSCC resection and to develop guidelines that inform surgical decision-making and improve patient outcome. This study employed a retrospective cohort design, analyzing data from OSCC patients who received NGT following OSCC resection between 2014 and 2022. Bivariate frequency analysis and multinomial logistic regression models were used to identify predictive variables for NGT failure. The study was conducted at the Department of Head and Neck Plastic and Reconstructive Surgery, Roswell Park Comprehensive Cancer Center in Buffalo, New York. The study included OSCC patients who received NGT following surgical resection (n=81). Participants were selected consecutively from the institutional database, and their selection was not influenced by subjective criteria. Data were collected on demographics, medical history, tumor characteristics, surgical factors, and pathological findings. Several patient-specific factors, including lower BMI, female gender, current smoking, anxiety or depression, and pre-operative difficulty tolerating oral feed, were associated with higher rates of NGT failure. Conversely, patients with type 2 diabetes or no comorbidities were less likely to experience NGT failure. Factors such as tumor stage, surgical duration, and tumor volume were also associated with NGT failure. Multinomial logistic regression models were developed, providing guidance for tailored treatment plans. Identified risk factors for NGT failure may be used to guide post-operative enteral feeding planning for patients receiving OSCC resection.

# **ENRICHMENT OF NEUROBLASTOMA CELLS FROM PERIPHERAL BLOOD STEM CELLS OF HIGH-RISK PATIENTS**

**Christina Andreou;** Rebekah Kennedy; Shahab Asgharzadeh, MD

USC/CHLA Summer Oncology Research Fellowship Program supported by the National Cancer Institute

Neuroblastoma (NB) accounts for roughly 8% of all childhood malignancies and is the most common extracranial solid tumor in children. While patients with low-risk disease have an event-free survival rate of 92%, patients with high-risk disease face an event-free survival rate of less than 50%. High risk disease is characterized by chemoresistance and tumor relapse requiring complex therapies. Following aggressive multimodal treatment, 60% of high-risk patients relapse, which further diminishes survival outcomes. Identification of patients with ultra-high-risk disease early during their course of therapy could aid in proposing alternative therapies. Peripheral blood stem cells (PBSCs) are harvested as part of the treatment regimen for high-risk patients after two cycles of chemotherapy. These PBSCs can contain rare populations of NB tumor cells and serve as easily accessible biological samples to study the phenotype of NB cells present post-chemotherapy. In this study, we perform enrichment studies of NB tumor cells in PBSC samples using anti-disialoganglioside antibody (GD2) and anti-neuroblastoma antibody (HSAN). We demonstrate CHLA-255 cells effectively bind to GD2 and HSAN. Enrichment of NB from PBSCs using GD2 was successful in capturing GD2-expressing cells while enrichment using HSAN requires further optimization.

# **COLPECTOMY REDUCES THE INCIDENCE OF URETHRAL FISTULA AND STRICTURE FORMATION IN FEMALE-TO-MALE GENDER AFFIRMING SURGERIES: A META-ANALYSIS**

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**Introduction:** The reported rate of urethral fistulas after female-to-male (FTM) gender-affirming surgeries (GAS) ranges from 10% to 68%. There remains a paucity of evidence addressing the widely accepted hypothesis that colpectomy reduces the risk of fistula and stricture formation. We aimed to use a meta-analysis to describe the correlation between colpectomy and the rate of urethral fistulas and stricture after GAS in transgender men.

**Methods:** A literature search of PubMed, Web of Science, and MEDLINE databases was conducted for studies reporting urethral complications of GAS. Inclusion criteria were specific for studies reporting postoperative incidents of urethral fistula and stricture. For those that met the criteria, surgical technique, urethral complications, and outcomes were collected and analyzed using the random-effects model due to the heterogeneity of included study populations. Review Manager (Version 6.3.0) was used to perform subgroup analysis between GAS with prior or concurrent colpectomy/vaginectomy and those without.

**Results:** 50 full-text articles met inclusion criteria with a total of 6404 patients. 3458 (46%) underwent metoidioplasty and 2946 (54%) underwent phalloplasty. The rate of urethral fistula formation in all GAS was 16.3% in those who underwent colpectomy compared to 68.2% in individuals who did not undergo adjunctive colpectomy. Fistula rates were lower if colpectomy was performed in both phalloplasty (21.9% vs. 52.0%) and metoidioplasty (11.1% vs. 43.9%). Similarly, rates of urethral stricture were lower in individuals who received adjunctive colpectomy compared to those who did not in both phalloplasty (23.8% vs. 60.6%) and metoidioplasty (4.8% vs. 11.1%).

**Conclusions:** GAS in transgender men done with colpectomy is associated with decreased rates of urethral fistula and stricture compared to GAS without colpectomy. Urologists and plastic surgeons proceeding with either phalloplasty or metoidioplasty procedures should strongly consider an adjunctive colpectomy to reduce postoperative complications.

## PERCEPTION OF SUNSCREEN NEED AND AFFORDABILITY IN THE BUFFALO AREA

Victoria Hoffman, MS, Mehr Nasir-Moin, BA, Sarah Ghadersohi, BS, Malaika de Weever, BA, **Michael Augustin, BS**, Isaac Swartzman, MD, Lori Ullman, MD

Skin cancer is a significant public health concern, ranking as the most prevalent cancer in the United States. This Buffalo-based study delves into sunscreen utilization disparities, emphasizing perceived need and affordability across diverse demographic groups—specifically, socioeconomic status, ethnicity, and skin types. With approximately one in five Americans expected to develop skin cancer during their lifetime, understanding factors influencing sunscreen behaviors in a specific community context is imperative.

The study used a comprehensive survey distributed at two university family medicine clinical sites in Buffalo. Of 405 participants aged 18 years or older, 206 surveys were analyzed after excluding incomplete responses. Participants self-reported demographic information, including age, gender, household income, and racial/ethnic group. Sunscreen behaviors, affordability, and access were assessed using a combination of multiple-choice and yes/no questions.

Sunscreen products at six retail stores in two zip codes representing lower and middle-to-upper-income areas in Buffalo were cataloged, and price per ounce was calculated for comparison. Survey and cataloging results underwent statistical analysis, utilizing Pearson Chi-Square Analysis, Fisher's Exact Tests, and the Mann-Whitney U Test.

Results indicate a correlation between lower socioeconomic status and perceived sunscreen unaffordability, with 12.84% of lower income respondents regarding sunscreen as unaffordable compared to 1.03% in the middle-to-upper income group ( $p=0.0009$ ). Furthermore, 43.12% of lower income participants reported cost as a significant barrier to sunscreen purchase, compared with 28.87% in the middle-to-upper income group ( $p=0.0338$ ). Notably, the average price per ounce of sunscreen in retail stores was higher in lower income urban neighborhoods in Buffalo (\$4.54) compared to middle-to-upper income suburban areas (\$2.62), highlighting cost disparities in urban vs suburban stores.

This study reveals nuanced dynamics in sunscreen use, underscoring disparities in perceived need and affordability within Buffalo's diverse community. By illuminating these gaps, it emphasizes the imperative to tailor public health interventions to Buffalo's socio-economic landscape. Addressing these varied health perceptions and behaviors related to skin cancer is paramount, as these insights offer direction for shaping targeted educational campaigns and policy recommendations, recognizing the need to mitigate sunscreen use health inequities.

## UNIVERSITY AT BUFFALO DOCTHERS (AMWA): FEMALE MENTORSHIP PILOT PROGRAM

Shefalika Prasad BA, **Beatrice R. Bacon BS**, Elissa J. Goorman BA, Lauren D. Todoro BS, Melissa Rayhill MD, Lauren Kuwik MD

While the number of female physicians is constantly rising, mentorship for female medical students facing a predominantly male work environment continues to be a coveted resource. The University at Buffalo DoctHERS (AMWA) chapter created a female mentorship program to address the unique challenges faced by women in medicine.

In total, 130 female medical students, M1-M4, and 64 female physicians expressed interest. Email was the primary mode of communication. The search for physicians started with direct nominations; 46 physicians were recommended by students, 26 agreed to be mentors. Eighteen physicians responded to a general interest email. Students and mentors completed a questionnaire on their top 3 specialty interests or current specialty, respectively, as well as their desired meeting frequency, interests, and hobbies. Mentorship families were constructed with an emphasis on inter-class diversity and maintaining small groups. Fifty mentorship families were created spanning 30 subspecialties, consisting of all 130 students and 52 physicians. Once the families were constructed, they were emailed the goals of the program, and informed that the program would run April-November. Each family was instructed to meet 2-3 times. The students also received the following additional expectations: shadowing is not a guaranteed aspect of this program, mentors' time should be respected and prioritized, and inter-class mentorship is encouraged. Students who had not met with their mentor by September were reassigned to a different group.

Mentorship programs require a significant time commitment from both mentors and mentees. Notably, almost all groups that failed to initiate meetings within the first month required mentor reassignment. Future programs would benefit from reassigning groups within the first 3 months. Running this program during a normal school year instead of April-November would allow for more schedule alignment between various medical school classes and physicians. Interestingly, the physicians who are highly involved in their residency programs and can share valuable application knowledge tend to be the most restricted in availability. For the 38 families that did manage to meet at least once, this program bridged a gap in mentorship that we hope will continue to close as this program expands.

## BUFFALO FOOD RESOURCES NEEDS ASSESSMENT

**Daniel Baetzhold**  
Stephen Turkovich

Food insecurity is a pervasive issue in the United States, and despite the existence of numerous resources dedicated to the problem, these organizations often display limited cooperation. Buffalo is no exception, with many resources attempting to mitigate this issue with a variety of approaches. This study aimed to identify how these organizations interact and analyze what they need to better serve their patrons. A needs assessment survey was distributed online to individuals with managerial and oversight roles at food insecurity resources, which was broadly defined to include organizations ranging from food pantries to medical clinics. Only programs that operate in the city of Buffalo were included in the study. It included questions about how these organizations interact, what they need, and what barriers they face in serving their target populations. This study (N=25) indicates that cooperation does occur between food insecurity organizations, but the primary resource being exchanged is actually ideas. Interestingly, no respondents reported no interaction with other food insecurity resources. Collaborative events are also a significant way in which these resources interact. Participants indicated that financial resources and increased awareness of their program are the most important things that they need to better serve their patrons. This study found that improving awareness, access, and patient education about food insecurity resources were the major ways that medical professionals can help these programs better serve the community. The most commonly cited barrier to better serving the patrons of food insecurity resources was financial/monetary, while other resources (goods, etc.) was the second most popular answer. Overall, this study reveals that food insecurity resources do communicate, but are often limited in their scope by financial concerns. In the future, not only increased communication, but more cooperative utilization of resources may allow food insecurity organizations better serve the population of Buffalo.

# **SINGLE SURGEON UNILATERAL PEDICLE SCREW TRANSFORAMINAL LUMBAR INTERBODY FUSION: EXPERIENCE OF MORE THAN 100 PATIENTS WITH LONG-TERM FOLLOW-UP**

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Introduced in 1980, the transforaminal lumbar interbody fusion (TLIF) has been transformative. The evolution focused on streamlining implants for minimally invasive techniques. Unilateral pedicle screw fusion (UPSF) becoming a natural by-product. The potential downside being inadequate stability. Meta-analyses comparing the efficacy between bilateral pedicle screw fusion (BPSF) and UPSF are manifold. However, are limited by the small sample size and selection criteria. This study aimed to analyze the clinical, intraoperative, and radiographic outcomes, and costs of more than 100 consecutive patients performed by a single surgeon. Consecutive patients that underwent UPSF-TLIF surgery between 2015 and 2020 and met the inclusion criteria were retrospectively analyzed. Cohort characteristics including age, gender, body mass index (BMI), smoking history, bone quality, and comorbidities, perioperative visual analogue scale, intra-operative information (estimated blood loss [EBL], fluoroscopy time and operative time), fusion, and cost were reviewed. One hundred and four patients are included in the study with female predominance (61.5%) and a mean age of  $57 \pm 13$  years. The mean preoperative VAS score was  $8.12 \pm 1.78$  and postoperative VAS was  $3.16 \pm 3.39$ . There is a significant improvement in the VAS score of 4.96 units ( $p < 0.001$ ). Regarding the intraoperative data, the mean EBL was  $42.9 \pm 22.4$  ml, the mean operative time was  $67 \pm 11$  minutes, and the mean fluoroscopy time was  $4.7 \pm 2.7$  seconds. The mean hospital stay was  $2.03 \pm 1$  days. The UPSF saved \$1,789.00 in terms of costs. All the patients were fused at the final follow-up. UPSF is a safe, effective, and less-invasive alternative for single-level lumbar fusion. In most cases, bilateral pedicle screws are not necessary. Self-evident advantages include low cost, EBL, fluoroscopy time, and short length of stay, without compromising outcomes.

## **Determining the Benefit of Frailty Scoring in Post-Operative Outcomes**

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**Introduction:** Patients undergoing surgery may experience postoperative complications that are influenced by a variety of preoperative health factors. Frail patients carry a higher early postoperative mortality and the occurrence of complications (1). The National Surgical Office (NSO) at Veterans Affairs has implemented a frailty screening tool (Risk Analysis Index-RAI) that assesses a patient's level of frailty using their age, sex, comorbid conditions, cognition, and other determinants. We have used our VA Surgical Quality Improvement database to validate the accuracy of this tool in predicting adverse postoperative outcomes.

**Methods:** The study protocol was reviewed and approved by the Institutional Review Board at the VA Western New York Healthcare System (VAWNYHCS). Approval was requested and obtained from the NSO to access the database for the years 2019 through 2022. Patient clinical information was reviewed, RAI scores were calculated for each individual patient and their survival status was updated at the time of data collection. Patients were grouped according to their RAI score with a cutoff value of 37. Patients were considered "Frail" if their scores were equal to or greater than 37. All others were considered as having "Robust" physical status. All categorical data were analyzed using chi-square analysis and the numerical data were analyzed by Student independent sample analysis for normally distributed variables and by the Mann-Whitney U test if they lacked a normal distribution. Null hypotheses were rejected if the alpha was less than 0.05.

**Results:** Clinical information was accessed from 569 patients who underwent procedures at VAWNYHCS. Average age was 62±13 years. ASA class III comprised 74.2% of the patients with 3.5% whose emergent conditions were operated on. The 30-day death risk was significantly higher in the "Frail" vs. "Robust" group with an odds ratio of 1.06 (1.01-1.39);  $p < .001$ . Postoperative complications occurred in 22 patients and the odds of an adverse event were 3.22 folds higher in the "Frail" vs. "Robust" group (CI:1.21-8.57;  $p = .024$ ). Additionally, 7 patients received perioperative transfusion (6.3% in the Frail vs. 0.6% in the Robust group; OR= 11.37 (2.48-52.03;  $p = .004$ )).

**Conclusion:** This is a preliminary report using the RAI tool to predict the occurrence of adverse outcomes. The collected data at this stage only has enough power to examine the mortality and the occurrence of composite complications following a surgical procedure. The data collection process is ongoing and we estimated to collect medical information from additional 3000 patients which will give us enough power to examine the role of frailty in predicting individual postoperative complications and validate the cutoff value of 37 and determine its sensitivity and specificity.

# HEALTH CARE WORKER EDUCATION FOR PALLIATIVE CARE IN AFRICA

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The demand for palliative care for terminally ill patients is rising globally. This review examines the potential of health worker education to enhance palliative care in Africa. A search of PubMed yielded 32 relevant articles published in English from 2013 to 2023 focused on African countries with WHO-categorized palliative care development and health care worker training. The findings underscore the pivotal role of health care worker education in elevating palliative care standards. Targeted initiatives equip health care workers with vital skills in pain management, symptom control, and communication. The integration of palliative care into public health systems is important for the sustainability of end-of-life care for terminally ill patients in Africa and around the world.

# COMPARATIVE GENOMIC ANALYSIS OF AUTOIMMUNE DISEASES WITH PEMPHIGUS VULGARIS

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The Sinha lab has demonstrated that Pemphigus vulgaris (PV), an autoimmune blistering disease, forms a distinct disease cluster with three other autoimmune diseases: autoimmune thyroid diseases (AITD), rheumatoid arthritis (RA), and type 1 diabetes (T1D) and another cluster involving systemic lupus erythematosus (SLE). PV patients and their 1st, 2nd and 3rd degree relatives were found to more likely have the conditions listed above than would be expected by chance, supporting the concept of the “common gene hypothesis” of autoimmune development. The purpose of this study is to identify top canonical pathways amongst these two clusters to further explore common areas of dysregulation amongst these diseases. The NHGRI-EBI GWAS Catalog was used to create lists of mapped genes for all diseases found to cluster with PV. The overlapping mapped genes were inputted into the KEGG Mapper Pathway Analysis and g:Profiler to obtain related canonical pathways with p-values to assess the levels of significance. Similarly, a literature search for microarray transcriptional studies with differentially expressed genes (DEGs) derived from blood samples in AITD, RA, T1D and SLE was also performed. For PV DEG’s, data from our lab’s microarray study on PV was included. Overlapping DEGs were then also inputted into the KEGG Mapper Pathway Analysis and g:Profiler to obtain related canonical pathways with levels of significance. 378 overlapping mapped genes were found from the GWAS search and 450 overlapping DEG’s. Within each disease cluster for GWAS mapped genes, there were over 25 significant top canonical pathways. The top five significant pathways in both clusters were inflammatory bowel disease, leishmaniasis, toxoplasmosis, asthma, and allograft rejection, all with  $p < 0.01$ . DEG comparisons between each autoimmune disease (RA, SLE, AITD, T1D) were run with PV individually. SLE and PV DEG’s yielded the most significant pathways, 49. Several pathways were significant amongst all comparisons, including Yersinia infection, TNF signaling pathway, NOD-like receptor pathway, JAK-STAT signaling, and cytokine-cytokine receptor interaction, all with  $p < 0.05$ . These results suggest that PV shares commonly dysregulated pathways with other autoimmune diseases. Understanding these overlapping pathways may prove useful in directing targeted PV therapy.

## Complement Signaling as a T-cell Checkpoint in Ovarian Cancer Microenvironment

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Durable antitumor immunity requires expansion and activation of tumor antigen-specific T cells. However, multiple immunosuppressive pathways are obstacles to T cell-driven antitumor immunity, and novel approaches are required to abrogate suppressive pathways. Prior studies from our lab showed that neutrophils are reprogrammed in the tumor microenvironment (TME) to acquire T cell suppressor function. We used an ex vivo model consisting of neutrophils and T cells from healthy donors or patients with ovarian cancer (OC) and ascites fluid from OC patients or malignant effusions from other cancers as authentic components of the human TME. We observed that neutrophil suppressor phenotype is dependent on neutrophil-T cell contact and several neutrophil functions that include complement signaling and NADPH oxidase. Neutrophil suppressors have broad effects on pathways driving T cell proliferation and activation including inhibition of stimulated T cell proliferation, cytokine responses, metabolic changes and mTOR activation. The TME is heterogeneous with distinct immunologic niches with varying populations of immune cells. We therefore asked what role complement signaling would have on T cells in the TME independent of neutrophils. Though exposure to OC ascites fluid supernatants does not inhibit CD3/CD28-stimulated T cell proliferation, it dramatically reduces cytokine production (e.g., IL-2 and IFN- $\gamma$ ) important for T cell activation. Importantly, stimulated T cell cytokine production was rescued by complement inhibition in TME. While complement C3-inhibitors restored IL-2 production, restoration is not dependent on C3aR and C5aR inhibitors. These results will guide subsequent T cell signaling studies that will delineate mechanisms by which complement signaling is a checkpoint on T cell cytokines responses in the TME.

## **EXPLORING FEASIBILITY AND INTEREST IN INTEGRATED UROLOGY-TRANSPLANT SURGERY TRAINING PROGRAMS IN THE UNITED STATES**

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Transplant surgery training programs in the United States (US) continue to struggle with unfilled fellowship spots. Recent studies suggest that involving urologists more in transplant surgery may be a worthwhile strategy to increase the workforce. Currently, only 1% of practicing urologists in the US are trained in renal transplantation. We aimed to gauge interest in transplant surgery among practicing urologists and urology trainees to determine if recruiting urologists is a viable strategy to address the growing shortage of transplant surgeons in the US. Additionally, we sought to identify factors that attracted or deterred interest within this population. A one-time survey was sent to individuals pursuing urology in the US (attending physicians, fellows, residents, and medical students). Data collected included demographics, education, training, and preferences for additional training opportunities in abdominal transplant surgery. Respondent characteristics were compared based on their interest (yes/no) in the field of transplantation. T-tests were utilized to compare continuous variables and fisher's exact test for categorical variables. A multivariable logistic regression was performed to identify respondent's characteristics associated with interest in transplant surgery, adjusting for covariates. 1,163 individuals were contacted and 100 completed the survey (9%) overall. The majority of respondents were male (67%), white (60%), and non-Hispanic (81%). Among those interested in organ transplantation (42%), the greatest number of responses were from urology attendings (69%). Male respondents were more likely (54% (yes) vs. 46% (no),  $p=0.019$ ) while younger respondents ( $\leq 30$ ) were less likely to be interested in the field of transplant (28% vs. 72%,  $p=0.05$ ). After adjusting for covariates, male respondents were 3.6 times more likely to be interested in the field of transplant than female counterparts ( $p=0.042$ ), while the younger respondents were 19% less likely to be interested in the field of transplant ( $p=0.012$ ). Overall, younger, and female urologists were less inclined to pursue a career in transplant surgery, likely due to concerns about diversity, equity, and inclusion as well as the poor lifestyle, including unpredictable working hours, associated with a career in transplant surgery.

## PERCEPTIONS AND UNDERSTANDING OF PARENTAL LEAVE DURING ORTHOPEDIC SURGERY RESIDENCY

**Jamie Bousleiman, BA**, Ellen Lutnick, MD, Jeremy Wells, BS, Robert Ablove, MD, Nader D. Nader, MD, PhD, FCCP, FACC, FAHA

**Objective:** The challenges associated with parental leave during surgical residencies have been extensively documented, often highlighting impacts on resident well-being and training progress. Amongst different guidelines across specialties, the ones provided by the American Board of Surgery (ABOS) are notably stringent. The aim of this study is to evaluate orthopedic surgery residents' opinions on parental leave, their understanding of current policies, and their perception of the effect that parental leave has on their training.

**Methods:** This is a prospective survey study disseminated to all US-based orthopedic residency programs to be distributed to their residents.

**Results:** 48 orthopedic surgery residents across the country responded with a range of gender, age, race/ethnicity, and family status. 54.2% of residents were not familiar with the Accreditation Council for Graduate Medical Education (ACGME) and ABOS's policies regarding parental leave. While a majority (52%) of participants report no discouragement from the program regarding taking full leave, a majority (62.5%) report the expectation is to take less than the full time allotted. 38% of respondents viewed parental leave as having a positive impact on the training of the resident, while 26% viewed the impact as negative. However, 42% believed that parental leave negatively impacted their co-residents. A majority (60.4%) of residents altered their family planning based on residency.-

**Conclusion:** Residency governing bodies must disclose the time allowed for parental leave, which varies greatly between specialties. There exists a persistent belief among orthopedic residents that parental leave negatively affects their co-residents, highlighting a need for more departmental support. Our analysis provides a collective understanding of the current landscape of parental leave during orthopedic surgical residency programs. With this detailed outline, Orthopedic Surgery residency programs and governing bodies can better support their residents.

## **Identifying Cell Processes Involved in Corneal Endothelial Cell Injury from Phacoemulsification**

**Brayan Calle Gonzalez , Varinda Nayyar, Umair Syed, Sangita Patel**

Cataracts is clouding of the natural lens within the eye and the leading cause of blindness worldwide. Cataracts are treated by surgery with phacoemulsification cataract surgery, and it is the most widely performed surgery globally. The phacoemulsification technique uses ultrasonic power to emulsify and aspirate the cloudy lens followed by replacement with an artificial intraocular lens implant. The dissipated energy from phacoemulsification is clinically known to cause damage to the human corneal endothelium (HCEncs), but little data exists on how this injury occurs. The primary aim of this study was to investigate the cellular processes involved with this collateral damage to HCEncs from phacoemulsification. We hypothesized that phacoemulsification would increase apoptotic and necrotic cell death, disrupt the actin cytoskeleton, and cause mitochondrial and cellular morphologic changes in HCEncs.

Using human eyes within 24 hours post-mortem, we applied continual phacoemulsification energy exposure to the anterior chamber of the eye until 50 units of cumulative dissipated energy (CDE) was achieved using the Infinity Vision Phacoemulsification System. 50 CDE units was chosen because it generated endothelial cell death by Trypan Blue stain that was minimal but consistently distinguished from control eyes. The control eye was subjected to the procedure with continual aspiration and flow of irrigation solution, but no ultrasonic power. The corneas were immediately excised from the eye and subjected to trypan blue stain to assess cell death, MitoTracker Red CMXRos to determine mitochondrial activity, TUNEL assay for apoptosis detection, and Alexa Fluor 488-Phalloidin staining of the actin cytoskeleton.

We observed mildly increased Trypan blue in HCEncs exposed to ultrasonic power, relative to control (N=5). We did not observe apoptosis at t=0 nor any changes in mitochondrial morphology between conditions (N=5). Phalloidin staining demonstrated specific ring-shaped actin disruption around damaged cells, greater in phaco than control (N=2).

Necrotic cell death (trypan blue) and cytoskeletal damage are the initial markers of damage in phacoemulsification injury. We did not expect changes to the mitochondria or an increase in apoptosis at time-zero. In future experiments, we will assess these changes longitudinally following culture of the corneas to identify pathways to minimize cell loss from phacoemulsification.

## **SEIZURE FOLLOWING IN-OFFICE LIDOCAINE ADMINISTRATION: A CASE REPORT AND LITERATURE REVIEW**

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Local anesthetics have a broad application for minor and major surgeries, in outpatient and inpatient settings. Drug dosing, frequency, duration of action, and coadministration with other drugs, are one of many factors that must be considered for each patient, before drug administration. Like other medical treatment, use of local anesthetics has potential complications, such as local anesthetic systemic toxicity (LAST). LAST primarily affects the cardiac and central nervous systems (CNS), seizures and cardiac arrest being some of the more time-sensitive symptoms requiring immediate treatment. Patients should be briefed on potential symptoms if LAST occurs and physicians should be aware of the warning signs, treatment, and prevention. In our case study, a 40-year-old woman was administered an excess lidocaine dosage in an outpatient setting. She presented to the emergency department with diffuse tremors, paresthesias of the mouth and face, spasticity, irritability, and a single generalized tonic clonic seizure. The patient was successfully treated with ativan along with lipid emulsion. We review this case and perform a literature review to identify key points in the use of local anesthetics. Healthcare providers should be trained in LAST treatment and prevention. Our case study therefore serves to reduce the frequency of LAST and other adverse outcomes associated with local anesthetic administration.

## **CARDIAC ARREST PEARLS FOR SURVIVAL (CAPS): A Quality Improvement Initiative to Enhance Resident Education**

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In-hospital cardiac arrests (IHCA) are intense experiences for healthcare workers requiring swift intervention. The fast-paced and high-stress environment is often not conducive to teaching residents how to effectively lead these emergencies. IHCA require expert teamwork with multiple disciplines to ensure optimal outcomes. This project sought to identify problems observed during cardiac arrests at Buffalo General Hospital (BGH) and implement education initiatives for interdisciplinary team members. One of most significant problems identified through resuscitation observation and physician reports was a delay in rhythm analysis and defibrillation. This project sought to improve patient care during IHCA by increasing education and simulations for internal medicine (IM) interns, nurses, and pharmacists. The primary goal was to educate residents on how to effectively lead a code, identify shockable rhythms and increase comfortability with the equipment. We conducted a three-hour education session during the IM interns' academic half day in March 2023 consisting of a lecture identifying greatest areas for improvement, staff roles in cardiac arrest resuscitation, and rhythm review followed by simulation stations targeting equipment familiarization, rhythm management, practice running a code, and a debrief discussion. Pre- and post-education surveys were administered, and pre- and post-education values were compared. We also conducted interdisciplinary resuscitation simulations with residents, pharmacists, nurses, and associated students. The analysis included responses to six survey questions from 30 participants for a total of 50 responses. Prior to this training the mean number of IHCA experiences among participants was 6-10. Significant improvements were measured in participants' confidence running a code (5.2/10 to 6.9/10,  $p=0.003$ ), identifying a rhythm (6.4/10 to 7.5/10,  $p=0.04$ ), operating the defibrillator (5.6/10 to 7.8/10,  $p<0.0001$ ), and code cart equipment familiarization (4.1/10 to 7.4/10,  $p<0.0001$ ). Overall satisfaction with the education session was rated at 9.2/10 (SD: 1.02). Further research is needed to evaluate the interdisciplinary simulations. There is also a need to expand upon this research by measuring patient outcomes including rates of time to defibrillation and survival rate after the implementation of this education initiative.

## **YOUTUBE'S ROLE IN EMPTY NOSE SYNDROME EDUCATION**

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Many patients rely on online and social media platforms for healthcare information. Medical content quality and accuracy differs among creator types. This study aimed to assess the quality and content of YouTube videos providing information about Empty Nose Syndrome (ENS). A YouTube search was conducted for “empty nose syndrome” and the first 49 results meeting the search criteria were analyzed. Two independent reviewers analyzed videos for creator type, metrics, and learning objectives. Modified DISCERN criteria were utilized to assess video quality based on aims, sources, content, sources for further reading, and areas of uncertainty. Learning objectives included defining ENS and explaining symptoms, diagnosis, treatments, and pathogenesis. Videos were created by 4 unique sources: 11 (22.4%) United States (US) otolaryngologists, 13 (26.5%) non-US physicians, 20 (40.8%) patients/families, and 5 (10.2%) news sources. Videos made by US otolaryngologists had significantly higher mean modified DISCERN scores (3.5) than non-US physicians (1.5,  $p=.008$ ), patients/their families (0.5,  $p<.001$ ), and news sources (1.0,  $p=.012$ ). US otolaryngologists significantly outperformed patients/their families in meeting learning objectives (3.5 vs. 1.4,  $p=.024$ ). Diagnostic information accuracy analyses revealed that US otolaryngologists’ videos were the most likely to discuss ENS diagnostic tests (e.g., cotton ball test, 45.5%) and diagnostic criteria (ENS6Q, 27.3%). US otolaryngologists offered the most ENS treatment information, recommending techniques such as inferior meatus augmentation procedures (IMAP, N=6) and injections (N=5). In conclusion, YouTube is useful for ENS education, but information quality varies by creator type. US otolaryngologist-created videos offer the highest quality ENS educational content, but they constitute a minority among all ENS videos available on YouTube. Therefore, future ENS educational videos made by US otolaryngologists should provide more information about diagnostic methods, the ENS6Q, and treatment options.

## BARRIERS TO LONGITUDINAL COMMUNITY SERVICE IN MEDICAL EDUCATION

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### **Abstract:**

A pervasive power differential exists between physicians and patients which impacts healthcare outcomes. In response, medical education has increasingly integrated health advocacy into curricula, focusing on bias and social determinants of health. However, translating advocacy principles into applied, practical action remains challenging due, in part, to time and resource constraints. While community service may provide an opportunity to put theory into practice, its implementation and impact remain poorly documented. Recognizing the need for healthcare trainees to engage with communities beyond clinical settings, we explored the impact of a longitudinal mentoring program in the public school system, bridging medical students, general surgery residents, and children in Buffalo, NY. In contrast to traditional episodic community engagement, our approach emphasized sustained weekly interactions throughout 8-months of the academic school year, fostering consistency and trust in relationships. The opportunity was voluntary, and medical students signed up for an hour per week based on interest and availability, while residents were given a protected weekly hour during their educational day to participate. We utilized attendance sheets and surveys to assess the feasibility and identify barriers to participation. Initial interest was higher in surgical residents (77%; 40/52) than in preclinical medical students (15%; 56/372). No clinical medical students were able to participate. Sustained commitment was higher in medical students with an 88% attendance vs. 41% residents over the first month. Both groups exhibited a gradual decline in attendance over three months. Preliminary findings indicate a higher percentage of resident participation compared to medical students, with an additional notable difference between preclinical and clinical year medical students. Survey responses highlighted scheduling conflicts as the most prominent barrier to attending mentoring for both medical students and general surgery residents. This was followed by assignment completion/exams, time or day of mentoring sessions, and distance to the mentoring site in a distinctive order for medical students and general surgery residents. Ultimately, this study provides insight into the challenges of integrating longitudinal community engagement into medical training and establishes a foundation for refining curriculum structures, encouraging long-term commitment, and fostering connections between healthcare professionals and the communities they serve.

## **Supraclavicular Artery Island Flap for Head and Neck Reconstruction: Our Experience and Factors Predictive of Complications**

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**Objective:** Prior studies show the supraclavicular island flap has similar complication rates to free flaps. Our study seeks to describe our experience with the supraclavicular flap for head and neck oncologic reconstruction and identify comorbidities associated with major postoperative complications.

**Methods:** Retrospective review of twenty-three patients who underwent supraclavicular flap reconstruction of oncologic resection related head and neck defects between 2015-2023 among 4 plastic surgeons. Patient demographics, comorbidities, surgical parameters, and postoperative outcomes and complications were assessed.

**Results:** The mean age of patients in the study was 70.17 (range 44-92), with 16 males and 7 females. Six patients (26.09%) died during the course of postoperative follow up, but none within 1 year post operation. Average BMI was 28.74 (range 15-52.5), and average length of admission was 7.43 days (range 2-37). The average length of follow up across all patients was 823 days. Average defect size was 75.98 cm<sup>2</sup> and average supraclavicular flap area was 80.32 cm<sup>2</sup> (range of 20-180 cm<sup>2</sup>). Average total operative time including oncologic resection was 8.89 hrs (range 1.15-18.08 hrs).

Six (26.09%) patients suffered from partial flap necrosis, with 1 (4.35%) suffering total flap necrosis requiring return to the OR for intervention. Two (8.70%) suffered from shoulder contracture or excess bulk postoperatively. Five suffered from partial flap dehiscence (21.74%), and 4 suffered from flap site infection (17.39%). Three (13.04%) required donor site wound revision. No patients suffered from salivary leak or fistula postoperatively. No patients suffered from hematoma of donor or flap site.

Adjuvant radiation was associated with greater postoperative complications overall. Larger oncologic defect area was associated with higher systemic complications postoperatively such as MI, stroke, DVT, or PE. Patient history of type 2 diabetes and vascular disease (DVT, PE) was significantly associated with delayed wound healing at the flap site. Longer case lengths were associated with partial flap dehiscence. Patient history of autoimmune disorder such as rheumatoid arthritis or psoriasis was associated with donor site complications.

**Conclusion:** Supraclavicular artery island flap is reliable and safe for complex head and neck reconstruction.

## AN INTERPROFESSIONAL EDUCATION MODEL TO PROVIDE FREE SCHOOL SPORTS PHYSICALS TO UNDERSERVED COMMUNITIES

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School-based athletics create a prosocial environment for youth and promote a physically active lifestyle. However, young people's ability to participate in school sports may be limited by barriers, including access to required physical exams. In trying to mitigate these gaps, the Lighthouse Free Medical Clinic (LFMC), a student-run clinic providing free medical care to the uninsured and underinsured Buffalo community, held interprofessional school sports physical events in August of 2022 and 2023. The purpose of these events was two-fold: (1) to increase access to sports physicals for youth in underserved areas of Buffalo; (2) to provide a hands-on interprofessional experience for UB health profession students. Following the sports physical, youth were asked to complete an exit survey that included home zip-code, grade in school, school district, sports they intend to participate in, access to physical exams outside of the event, and satisfaction with the event on a 5-point Likert scale (n=72). The most common survey respondent zip codes included 14215 (n=17), 14207 (n=6), and 14211 (n=11). Two of the most represented zip codes, 14215 and 14207, correspond to the highest percentage of people of color and the highest poverty rate zip codes in the city of Buffalo, respectively. Over half (58%) of participants surveyed were planning to play sports for Buffalo Public Schools. Of those who were seen, more than half (57%) indicated that they would not have been able to receive a physical exam without the pop-up event and nearly all survey respondents (96%) indicated being satisfied or very satisfied with their experience. Health profession students similarly completed an exit survey that used a civic engagement scale and the interprofessional collaborative competencies attainment survey (ICCAS) to assess six domains prior to and following the event. Thematic analysis was performed on the qualitative free text responses. After the event, 85% of UB student volunteers stated that compared to the time before the event their ability to collaborate with other health professions was somewhat better or much better. The event highlighted an unmet need for accessible sports physicals in the Buffalo community and provided an opportunity for interprofessional collaboration.

# **NOT ALL FRAILTY IS EQUIVALENT: COMPARING FRAILTY INDEX SCALES IN THEIR CAPACITY TO PREDICT MORTALITY IN OLDER ADULTS WITH TRAUMATIC BRAIN INJURIES**

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Over 30% of older adults experiencing mild-moderate traumatic brain injuries (TBIs) die within one-year of injury. While frailty scores predict poor outcomes in all-age TBI patients, we lack clarity in which scale is best suited for the high-risk older adult population. The primary objective of this study was to compare three frailty indices for their capacity to predict one-year mortality. This retrospective study included patients presenting to a Level I trauma center with isolated mild-moderate TBIs between 2013-2018. Injury characteristics, patient demographics, and frailty variables were obtained from electronic medical records. Date of death was obtained through public records. Differences were considered significant if  $p \leq 0.05$  with univariable analysis. Of the 977 older adults with mild-moderate TBIs, 365 (37.4%) died after hospital discharge, and within one-year of index trauma. There was a significant age difference between those who survived ( $80.43 \pm 0.52$ ) and died ( $84.69 \pm 0.74$ ) at one-year ( $p < 0.001$ ). The two groups demonstrated no difference in Glasgow Coma Scale scores ( $p = 0.128$ ). When comparing frailty index scales, there were significant differences between the survival and deceased groups when using Risk Analysis Index (RAI;  $16.73 \pm 0.535$  versus  $20.59 \pm 0.813$ ;  $p < 0.001$ ) and Modified Frailty Index-11 (mFi-11;  $0.248 \pm 0.013$  versus  $0.289 \pm 0.016$ ;  $p = 0.022$ ), but not the Collaborative European Neurotrauma Effectiveness Research in Traumatic Brain Injury frailty index (CENTER-TBI frailty index;  $0.293 \pm 0.010$  versus  $0.314 \pm 0.013$ ;  $p = 0.125$ ). In older adults with mild-moderate TBIs, the RAI and mFi-11 frailty scores, but not the CENTER-TBI frailty index, differ when comparing patients that survive and die at one-year. Further work is needed to understand how frailty scores may guide interventions to mitigate mortality in this high-risk population.

## MODULATION OF THE CHEMOKINE PRODUCTION IN COLORECTAL CANCER TUMOR MICRO-ENVIRONMENT

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**Abstract:** Presence of cytotoxic CD8<sup>+</sup> T cells (CTLs) in tumor microenvironments (TME) is critical for the effectiveness of immune therapies and patients' outcomes, while regulatory T(reg) cells promote cancer progression. Multiple immune adjuvants, including double-stranded (ds)RNAs, which signal via Toll-like receptor-3 (TLR3) and helicase (RIG-I/MDA5) pathways, induce both the production of CTL-attractants, but also Treg attractants and suppressive factors, raising the question of whether the induction of these opposing groups of immune mediators can be separated.

Previously, we have shown that, multiple immune activators, including the Sendai Virus (RNA virus), poly-I:C and rintatolimod (poly-I:C<sub>12</sub>U) all activate the TLR3 pathway, and induce type-1 interferons (IFNs) and multiple CTL-attracting chemokines (such as CCL5, CCL9, CXCL10, CXCL11) in the *ex vivo*-treated human tumors and myeloid cells. In contrast, only the Sendai virus and poly I:C, but not rintatolimod, activate the helicase pathway, involving NFκB- and TNFα-dependent COX-2 induction, and COX-2/PGE<sub>2</sub>-dependent induction of additional suppressive factors, IDO, IL-10, CCL22 and CXCL12, enhancing Treg attraction to ovarian cancer tissues. The induction of CTL-attractants by either poly I:C or rintatolimod was enhanced by exogenous IFNα (enhancer of TLR3 expression), which also suppresses the PGE<sub>2</sub> receptor, EP4, while only the response to poly-I:C benefits from COX-2 inhibition. Rintatolimod and IFNα were combined to create a Chemokine-Modulating (CKM) Regimen that is used to promote CTL infiltration into solid tumors.

In the current project, we will use human colorectal tumor explant culture system to compare the impact of celecoxib (COX-2 specific inhibitor) versus Indomethacin (COX-2 non-selective inhibitor) on the induction of CTL-attracting chemokines (CCL5 and CXCL10) in *ex vivo*-treated tumors and the induction of Treg attracting chemokines, CCL22 and CXCL12, when used in combination with the CKM regimen previously developed. The results of the project will help us to better understand the factors limiting the effectiveness of cancer immunotherapies and to develop better treatments.

## **EFFECTS OF SOS-INHIBITING COMPOUNDS ON PROTEIN AND NUCLEIC ACID RELEASE IN GRAM-NEGATIVE BACTERIA**

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The SOS response is a stress response observed in some bacteria primarily after DNA damage. This response includes a mechanism of DNA repair that concurrently introduces new mutations into the bacterial genome. The SOS response occurs upon exposure to some antibiotics and provides plausible means for the development of antibiotic resistance. Despite its relevance in resistance development and antibiotic stewardship, the SOS response is poorly characterized. Previous work in our laboratory has demonstrated that triggering the SOS response resulted in a release of large amounts of dsDNA from some Enterobacteriaceae. Drugs used as triggers belonged to classes including antibiotics, antivirals, chemotherapeutics, and antidepressants. The goal of this work was to further characterize the SOS response by determining which bacterial species possess this ability and the macromolecular changes that occur during the response, as well as to identify what drugs act as either inducers or inhibitors of this process. In our research, colonies of *Enterobacter*, *Klebsiella*, *Escherichia*, *Pseudomonas*, and *Shigella* were grown and incubated in the presence of SOS inducers including mitomycin C, bleomycin, zidovudine, and ciprofloxacin. Experimental groups also contained various SOS response inhibitors, including zinc salts, nitric oxide donors, and dequalinium. Macromolecular analysis of supernatant was performed using a qubit fluorometer, which was used to measure dsDNA, ssDNA, and RNA, and the Bradford assay to measure protein content. Of the studied species, *Enterobacter*, *Shigella*, and *Escherichia* displayed the most robust DNA release during the SOS response, while *Klebsiella* displayed very little in response to the studied triggers. Bleomycin and mitomycin C were the strongest inducers of the SOS response across all species. Zinc salts, nitric oxide donors, and dequalinium all showed a concentration-dependent reduction in the amounts of dsDNA, ssDNA, RNA, and protein that was released. The findings reported here provide means which could blunt the SOS-induced introduction of new mutations. A deeper understanding of the SOS response will provide further insight into microbial pathogenesis and bring potential benefits to clinical research.

## IS CORONAL ALIGNMENT OVERCORRECTION A RISK FACTOR FOR REVISION IN TKA?

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**INTRODUCTION:** Total knee arthroplasty (TKA) is a successful surgery; however, revisions may be required within two years post-operation. Malalignment and instability can eccentrically load the tibia resulting in sclerotic bone and subsidence of the tibial component ultimately leading to revision. This study aims to evaluate whether there is a correlation between overcorrection of coronal alignment (past neutral into varus from valgus or vice versa) in TKA and subsequent revision surgery.

**METHODS:** This was a retrospective chart review on cases done by four high-volume joint replacement surgeons between 1/1/2005-12/31/2015. Only revisions due to tibial loosening and instability were included. A minimum of 1-year follow-up, complete x-rays, clinical records, and an initial diagnosis of osteoarthritis were required. Mechanical alignment was measured on weight bearing, long-standing lower-extremity x-rays. Revision cases were 1:1 matched to control cases of primary TKAs by sex, age, BMI, number of co-morbidities, and cemented or uncemented implants. The change in value from pre- and post-operative alignment was calculated and compared between the two groups. Statistical analysis included Chi-squared and Mann-Whitney. A p-value  $\leq 0.05$  and a 95% CI were used.

**RESULTS:** Of the 566 revisions analyzed, only 74 of them met the study criteria. Refer to Table 1 for demographics of the study and control groups. The average age for groups differed as BMIs were matched closely. Most cases in both groups had 3-6 comorbidities. Average time to revision was 77.8 months; range was 3-267 months. The average pre-operative mechanical alignment of the revision group was 1.488° and the control group was 5.616°. The average post-operative alignment was -0.467° for the revision group and 0.813° for the control group (Table 1). Both pre- and post-operative mechanical alignments and change in alignment between the 2 groups were statistically significant, p=0.022, p=0.005, and p=0.013, respectively.

**DISCUSSION:** Alignment after revision for loose and unstable tibia components showed similar post-operative alignment to the control group. There was statistical significance for these pre- and post-operative coronal alignment between the study and control groups but not clinical significance. The data did not support the hypothesis that overcorrection can cause revision TKA.

**Table 1**

	Study Group	Control Gorup	p value
<b>Sex</b>	82% F	81% F	0.894
<b>Race</b>	87% Caucasian	94% Caucasian	0.075
<b>Age Avg, years</b>	61.1	67.4	<b>&lt;0.001</b>
<b>BMI Avg</b>	36.14	35.77	0.79
<b>Pre Alignment Avg, degrees</b>	1.488 +/- 10.198	5.616 +/- 7.97	<b>0.022</b>
<b>Range, degrees</b>	-21 to 24	-13 to 21	
<b>Post-Op Alignment Avg, degrees</b>	0.467 +/- 4.532	0.813 +/- 2.528	<b>0.005</b>
<b>Range, degrees</b>	-20 to 13	-6 to 9	

\*negative values are valgus measurements

**A QUALITATIVE STUDY OF PATIENT TREATMENT PREFERENCES AND WILLINGNESS TO ENROLL IN A RANDOMIZED CONTROLLED TRIAL AMONG PRIMARILY AFRICAN AMERICAN PATIENTS WITH KNEE OSTEOARTHRITIS**

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Sponsor: Health For Erie County, Inc grant (PI: Bisson), “Building the Infrastructure to Increase Diversity in Degenerative Knee Clinical Trials”

Current treatments for knee osteoarthritis (OA) include physical therapy, injections, and/or surgery. Many patients have tried these treatments in the past and developed preferences on what treatment works best for them. Patient preferences for treatment may impact their decision to enroll in a randomized clinical trial (RCT). This study aimed to: 1) describe patient attitudes about conservative knee osteoarthritis (OA) treatments, specifically physical therapy (PT) and injection and 2) assess the likelihood that a patient will enroll in an RCT for conservative care of OA. Patients aged 45-85 presenting to an orthopedic clinic with knee pain were interviewed for 15-20 minutes. We asked patients about experiences with research, their willingness to participate in a hypothetical RCT, and experiences with injection, PT, and surgery. Team members wrote summaries of observations about each participant. Of 20 people interviewed, 80% (n=16) had a history of PT. Of those, 81% (n=13) would get PT again. Of the 20 people interviewed, 88% (n=17) had a history of injection. Of those, 88% (n=15) would get an injection again. Seventy-three percent (n=14) were willing to receive an injection in a randomized study and 89.5% (n=17) were willing to receive physical therapy in a randomized study. Patients were primarily female (70%), African American (75%), and had a mean age of 63. Most (65%) had a high school education level or less and 15% were currently working (most were retired or on disability). While patient openness to injection and PT treatment was high, and 70% of patients said they would enroll in an RCT of PT and/or injection, only 36% of willing patients were believed to be good candidates based on verbal and nonverbal information gathered and assessed by the research team. Reasons for not being a good candidate included a lack of reliable transportation, being content with their current treatment regimen, or too busy with work or childcare. Improvement of orthopedic care relies on the ability to enroll patients in clinical trials to identify the most beneficial treatments for certain conditions. Future research is needed to identify and address barriers to enrolling OA patients in a RCT.

# A QUALITATIVE ANALYSIS OF NORTH AMERICAN MEDICAL STUDENTS' PERSPECTIVES ON THE IMPACT TO MEDICAL EDUCATION OF DOBBS v. JACKSON WOMEN'S HEALTH ORGANIZATION

**Authors:** Paige Carson BS, Mackenzie Cronin BS MEd, Malaika de Weever BA, **Katelyn Donnelly BS MPH**, Kathryn Hobika BS, Hannah Lane BS, Clayton Shanahan BS, Victoria Lazarov MD, Tova Ablove MD

*Introduction:* On June 24, 2022, the Supreme Court ruled in *Dobbs v. Jackson Women's Health Organization* overturning two cases previously upholding a constitutional right to abortion and perpetuating differential standards of care based on state jurisdiction.

*Methods:* This qualitative study used focus groups to elicit the thoughts and feelings of medical students about the *Dobbs* decision's impact on (1) geographic preferences for residency, (2) equitable alternatives for family planning training in residency, (3) if/how educators should address *Dobbs* in undergraduate medical education, and (4) additional positive/negative impacts on medical education. Students from accredited U.S. medical schools who completed an anonymous REDCAP survey December 23, 2022 to May 9, 2023 could elect to enroll in a secondary, 25-minute focus group session. Focus groups were conducted on Zoom in May 2023 and consisted of 1-4 students, 1 facilitator, and 1-2 scribes. Avatars were used to protect anonymity and participants were not required to share any personal demographic descriptors unless they chose to self-identify. Responses were transcribed in real-time. Audio was not recorded. Transcripts were analyzed in Excel v.16.8, using a relational content analysis approach.

*Results:* The primary survey was sent to 68 medical schools representing approximately 39,393 medical students of which 2,384 completed the survey (6.05% response rate). 64 students representing 25 states further volunteered to participate in a focus group session (2.68% response rate). Of those, 32 students representing 14 states with a wide variety of abortion policies completed a focus group session. The top 3 most frequently expressed themes were access to abortion training (n=18), negative impact on medical education (n=17), and humanism (n=16). Participants who saw *Dobbs* having predominantly positive outcomes demonstrated thematic co-occurrences of personal freedoms and liberties, and states' rights to legislate policies setting moral standards. Participants who saw *Dobbs* having predominantly negative outcomes demonstrated thematic co-occurrences of healthcare disparities or inequities for patients and personal fears of prosecution.

*Conclusions:* Medical students' perceptions of the *Dobbs* decision offer insight into new motivations for student career choice and residency selection, and opportunities for improving medical jurisprudence curricula in medical education.

## **Identifying Factors that Contribute to Delays in Stroke Treatment: An analysis on Atypical stroke symptoms.**

**Sabrina Dunn, Nicole Haymes R.N. , Russ Santucci Amit Kandel MD**

Buffalo General Medical Center receives the highest number of strokes in all of New York states, including New York city hospitals. BGH services Western New York and several Pennsylvania counties. However, Western New York also has some of the highest stroke mortality rates in the state. Post stroke outcomes are a function of multiple variables, but most notably time of arrival. Studies have consistently shown faster arrival times translate to improved outcomes because of retention of healthy brain tissue and more health interventional options within 4.5 hours of symptoms onset. This study was done as part of a larger comprehensive stroke survey and community outreach initiative to identifying factors that contribute to delays in stroke treatment and subsequently provide targeted opportunities for community outreach. Demographic data was abstracted from individual patient charts along with, mode of arrival, primary language, Primary care status and chief complaint. By using the National Stroke “Get With the Guidelines” Registry , we pulled stroke data for months January-September of 2023. A chart review of was performed to assess the presenting symptom or chief complaint of stroke patients who arrived outside of window to received IV thrombolytics (>4.5 hours of symptoms). Analysis determined that patients with atypical stroke symptoms were associated with late arrival. With this information, we can create targeted community outreach to improve stroke outcomes.

## DETERMINANTS OF BREASTFEEDING AMONG EX-SMOKING MOTHERS

**Tara A. Edwards BA, Xiaozhong Wen MD, PhD**

Previous studies have demonstrated longer breastfeeding duration is associated with mothers remaining abstinent from smoking.<sup>1,2</sup> Education, income, marriage status, intention to breastfeed, and alcohol have an impact on breastfeeding duration.<sup>3,4,5,6</sup> We aim to explore the determinants that impact breastfeeding duration in ex-smoker mothers, a subpopulation with high risk of insufficient breastfeeding. We conducted a cohort study on 74 adult ex-smoker pregnant mothers from the Greater Buffalo area, NY. Participants completed a lab screening, pre-test, 3 weekly intervention, and post-test visits monthly for the first year postpartum and trimonthly up to two years postpartum. Our intervention consisted of breastfeeding education and financial incentives. Questionnaires were used to measure breastfeeding duration and intention, newborn feeding knowledge, maternal health and substance use. Survival analysis was used to examine the termination of breastfeeding and stratified by co-variables to examine the determinants of breastfeeding duration. Married mothers breastfeed longer than single/divorced mothers ( $p=0.018$ ). Mothers with family yearly incomes from \$34,999-99,999 breastfed longer than mothers with family incomes  $< \$34,998$  or  $> \$100,000$  ( $< p=0.001$ ). Mothers who received more education breastfed longer ( $p=0.01$ ). Intention to breastfeed was associated with longer breastfeeding ( $p=0.014$ ). Intention to exclusively breastfeed was associated with longer breastfeeding duration during the first year ( $p=0.037$ ). Mothers who planned to introduce food and stop breastfeeding at an older age breastfed longer ( $p=0.020$ ,  $p=0.007$ ). Mothers with previous breastfeeding education breastfed longer ( $p=0.016$ ). More specifically, mothers who received their breastfeeding education from a lactation counselor breastfed longer than mothers who received breastfeeding education from health professionals, family/friends, or had not been educated ( $p=0.005$ ). Mothers who smoked in the first month postpartum breastfed for a shorter duration ( $p=0.004$ ). Mothers who consumed alcohol within the first month postpartum breastfed longer than mothers who did not consume alcohol ( $p=0.018$ ). Mothers who were married, educated, and intended to breastfeed breastfed longer. Mothers with a family income of  $< \$34,998$  or  $> \$100,000$  had a shorter breastfeeding duration. Our study demonstrates the importance of breastfeeding education by a lactation professional for successful breastfeeding. Smoking cessation was correlated with a longer breastfeeding duration. The relationship between alcohol consumption and breastfeeding needs to be explored further.

## EGG CONSUMPTION DURING PREGNANCY AND RISK OF DIABETES

**Jade Edwards BA**, Sara Nieto BS, MS, Xiaozhong Wen, MD, PhD

Gestational diabetes mellitus (GDM) is characterized by abnormal glucose metabolism during pregnancy. Our study aims to examine the relationship between various egg food consumption and GDM risk. We analyzed data from 1,397 mothers from the Infant Feeding Practices Study II (2005-2012), a US national cohort study from pregnancy to 1 year postpartum. Mothers reported diet including egg consumption in the past month using a food frequency question. We focused on maternal egg consumption with different forms of preparation during pregnancy, including total eggs, whole eggs, egg whites, egg substitutes, eggs with fat, and egg salad. The status of GDM was self-reported in late pregnancy. We assessed the association between egg consumption and the risk for GDM using a multivariable logistic regression model, adjusting for socio-demographic and pregnancy-related characteristics. On average, total egg consumption was 2.88 cups/week, egg consumption was 0.07 cups/week, egg white consumption was 0.18 cups/week, whole egg consumption was 2.59 cups/week, egg with fat consumption was 1.73 cups/week, and egg salad consumption was 0.24 cups/week. Used as continuous variables, a higher consumption of total egg, whole egg, egg with fat, or egg salad was associated with a significantly increased risk for GDM. Pregnant individuals who consumed eggs 3 times per week or more had a higher risk of GDM (14.2% vs 4.3%; confounder-adjusted OR, 4.80 [95% CI [2.02-11.41]; P-value<0.001), compared to those who never consumed. Pregnant individuals who consumed whole eggs 2+ times per week had a higher risk of GDM (10.9% vs 4.5%; 3.04 [1.48-6.27]; P-value<0.001), compared to those who never consumed. Pregnant individuals who consumed eggs with fat 2+ times per week had a significantly higher risk of GDM (10.8% vs 5.4%; 2.46 [1.41-4.28]; P-value<0.001), compared to those who never consumed. However, used as either continuous or categorical variables, the consumption of egg substitutes or egg whites was not associated with the risk of GDM. High-frequency consumption of whole eggs, eggs with fat, or egg salad was a risk factor for GDM, but consumption of egg substitutes or egg whites was not a significant contributor to the risk of GDM.

## ASSESSING THE INFLUENCE OF THERAPY DOGS ON MENTAL HEALTH AND WELL-BEING AMONG MEDICAL STUDENTS

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Existing research indicates that the prevalence of anxiety and depression among medical students is higher compared to their age-matched peers.<sup>1</sup> Additional studies have noted significant decreases in self-reported levels of stress and anxiety following Animal-Assisted Therapy (AAT), including a randomized control study that assessed nursing students participating in animal therapy before examinations.<sup>2,3</sup> To the best of our knowledge, there is no literature investigating the relationship between medical students' mental health and participation in animal therapy. This study aims to understand the impact of therapy dogs on medical student wellness at the Jacobs School of Medicine and Biomedical Sciences. We surveyed medical student participants at therapy dog events organized by the Animal Advocacy and Assisted Therapies Club. Participants gave verbal consent for their involvement. Demographic questions included gender, class year, and pet ownership status. Subsequent questions, rated on a Likert scale from 1 ("strongly disagree") to 5 ("strongly agree"), assessed perceived mental health post-interaction with the therapy dog. 99 medical students responded, with 63 (63.6%) identifying as female, 35 (35.4%) as male, and 1 (1.0%) as nonbinary. Among the respondents, 42 (42.3%) were first-years, 51 (51.5%) were second-years, and 6 (6.1%) were third-years. Additionally, 56 (56.6%) of the students reported owning a pet. Pets listed included dogs, cats, and a snake. 95 (96.0%) students reported looking forward to attending therapy dog events. Most students (76.7%) spent 5-10 minutes interacting with the therapy dog. Following these interactions, 96 (97.0%) students noted an improvement in their mental health, 94 (95.0%) perceived a reduction in their stress and anxiety, and 96 (97.0%) reported being in a better mood. Furthermore, 85 (86.0%) students reported increased productivity in their studying after meeting the therapy dog. These results support previous research indicating enhanced mental health and reduced stress and anxiety following interactions with therapy dogs. Overall, our results indicate that brief interactions of less than 10 minutes with a therapy animal can have a positive impact on well-being, supporting the integration of regularly scheduled animal therapy events into the medical curriculum.

## **THE EFFECT OF TEPROTUMUMAB INFUSION ON OCULAR ALIGNMENT IN PATIENTS WITH SYMPTOMATIC THYROID EYE DISEASE**

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Thyroid eye disease (TED) is a debilitating inflammatory autoimmune disorder that results in proptosis and ocular misalignment in the orbit leading to symptoms of eye pain, diplopia and vision loss. Teprotumumab, a humanized antibody against insulin-like growth factor 1 receptor, was approved in 2020 for the treatment of TED; however, studies have primarily focused on the effects of Teprotumumab on proptosis, and there is a scarcity of data on the impact of this drug on ocular misalignment. A total of 19 patients undergoing treatment with teprotumumab were evaluated. 11 of these patients had strabismus and symptomatic diplopia. Sensorimotor examination was performed at each visit to assess primary ocular alignment using simultaneous prism-cover testing. Demographic information as well as previous history of radioactive iodine, steroids, strabismus surgery and smoking were obtained. No significant difference between baseline characteristics of patients with and without strabismus was found. The initial absolute horizontal misalignment was  $6.0 \pm 1.5$  prism diopters ( $\Delta$ ), vertical strabismus was  $7.7 \pm 2.4\Delta$  and total strabismus was  $11.5 \pm 2.0\Delta$ . After completion of therapy these values decreased to  $4.0 \pm 1.9\Delta$ ,  $5.5 \pm 2.2\Delta$  and  $8.4 \pm 2.5\Delta$ , respectively. When calculated as percentage of the initial strabismus, treatment resulted in a significant decrease in ocular misalignment (100% vs  $59 \pm 16\%$ ,  $p = 0.009$ ). Regression analysis was performed and found no relationship between response to therapy and any demographic or prior medical history variables. At the final visit, only 6 (54%) patients continued to report diplopia in any gaze. A total of 3 patients underwent additional surgical correction, 2 (18.2%) had no improvement in their alignment and 1 (9.1%) had improvement in strabismus, but not enough to resolve their diplopia. Overall, Teprotumumab significantly reduces the magnitude of strabismus during the active phase of TED.

## **RELATIONSHIP BETWEEN SLEEP DISTURBANCES AND NEURODEGENERATIVE MARKERS IN OLDER VETERANS**

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Sponsored by NIA 1K99AG079117-01 PI: Weiss

Sleep disturbances in older adults may be linked to cognitive decline and neurodegeneration in older adults due to impacts of sleep on glymphatic function. Veterans are likely more susceptible to sleep disturbances such as insomnia and obstructive sleep apnea and may be at higher risk for cognitive impairment. We conducted a pilot cross-sectional study to explore the relationship between sleep and neurodegenerative biomarkers in older Veterans. Participants aged 65-85 years enrolled in a 12-week exercise program for the parent study. Here, we evaluated sleep patterns with the Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index, and Morningness versus Eveningness Questionnaire. Participants also used a Fitbit to assess sleep patterns. The Saint Louis University Mental Status Exam (VA-SLUMS) assessed cognitive function. We also used Cognivue Clarity, an automated FDA-approved device for cognitive assessment with components such as visual motor, perceptual, and memory processing. The test is performed in approximately 10 minutes and validated in adults aged 55 to 85. Lastly, we examined the following biomarkers: NfL, BDNF, TREM2, and D-Dimer. There was no association between D-dimer, TREM2, and poor sleepers, based on the PSQI global score. NfL showed a potential association with decreased sleep efficiency and duration. Further studies are warranted to understand the intricate relationship between neurodegenerative biomarkers and sleep quality in older Veterans, exploring other factors such as Post-Traumatic Stress Disorder and medical history that may affect the selected biomarkers.

**Title:** Mandibular Reconstruction of Hemifacial Microsomia in Goldenhar Syndrome: A Case Report and Review.

**Introduction:** Goldenhar Syndrome, also known as oculo-auriculo-vertebral spectrum, is a rare variant of hemifacial microsomia that stems from abnormal development of the first and second branchial arches. The aim of this report is to demonstrate the clinical course and the management of this rare congenital anomaly.

**Case Description:** A 10-year-old male with history of Goldenhar Syndrome presented initially to the Craniofacial Clinic in July 2022 for surgical discussion regarding his left hemifacial microsomia. His major craniofacial anomalies that were surgically corrected prior to consultation included cleft lip repair, excision of lipodermoids of left eye and auricular skin tags, and a superficial keratectomy. CT Chest with IV contrast demonstrated no abnormalities. Non-contrast Craniofacial CT demonstrated dysmorphic left mandible with severe hypoplasia of the left mandibular ramus and flattening of the condylar fossa. On clinical examination, the patient demonstrated class III malocclusion, multiple missing teeth with delayed eruption of permanent teeth, and facial asymmetry Pruzansky-Kaban class III. After discussion with multidisciplinary craniofacial team, the patient was planned for a left costochondral rib harvest, autogenous graft of left rib to left mandible, and application of custom KLS reconstructive plate to the left mandible. Initial follow up was at weekly intervals for the first month followed by 3-month intervals. At 9-month follow up, panoramic imaging and clinical evaluation showed reduced left facial asymmetry and stable occlusion. A review of literature demonstrates Goldenhar syndrome is the most severe form of hemifacial microsomia and abnormalities are unilateral in 60%-80% of cases [2]. Goldenhar syndrome is characterized by an association of maxillomandibular hypoplasia, deformity of the ear, and ocular, dermoid, and vertebral anomalies. Treatment modalities for reconstruction of craniofacial microsomia varies on severity of Pruzansky-Kaban classification. In our case, the patient was staged Kaban class III, rendering initial treatment with distraction osteogenesis null as there was insufficient bone to fix the device. Costochondral grafts (CCG) have been considered a gold standard in the mandibular reconstruction of pediatric patients because of their viability and stability although fibular free flap is another feasible option [6]. However, long-term prognosis is dependent on the symmetrical side and the constructed ramus-condyle unit [6].

**Discussion:** We have encountered a case of Goldenhar syndrome demonstrating with severe hemifacial microsomia. Costochondral graft reconstruction should be considered first-line treatment in patients with Goldenhar syndrome due to severity of malformation and relatively minimal complications.

## **Title:** SAGITTAL DEFORMITY CORRECTION WITH SCHWAB 4 OSTEOTOMY AND PATIENT REPORTED OUTCOMES

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### **Abstract**

#### Introduction:

Sagittal plane deformities can impact quality of life and patient-reported outcomes. Despite the existence of techniques like total column resection, intradiscal osteotomies, and pedicle subtraction osteotomies, they are sometimes underutilized due to reported high morbidity and a lack of data regarding patient-reported outcomes. This study aims to present our experience with the Schwab 4 osteotomy and explore the associated radiographic and patient outcomes.

#### Materials and Methods:

We conducted a retrospective review of consecutive patients who underwent corrective surgery for severe adult spinal deformities. Patients were included if they underwent a Schwab Type IV osteotomy, and the addition of a lordotic cage with a large footprint at the osteotomy site. We recorded patient demographics, surgical variables, preoperative and postoperative radiographic parameters, and patient outcomes.

#### Results:

Retrospective analysis included data from 26 patients with severe spinal deformities who underwent a Schwab 4 osteotomy and had a follow-up of at least 6 months' post-op. The patient mean age was 65.2±7.8 years, with 80% of patients classified as ASA grade 3. The average Charlson comorbidity index was 3.5±1.6, and average BMI was 31.3 ± 5.4. Three patients underwent an additional anterior approach; the average intraoperative bleeding was 1684 ± 625 ml. Surgical duration averaged 532 ± 72 minutes, and the mean number of fused levels was 10.26±3.35. Ten patients (38%) experienced postoperative complications, with surgical site infections being the most common (40%), followed by deep vein thrombosis and delirium (20% each). Radiographic parameters showed significant improvement after surgery: sagittal vertical axis mean change was 6.7 ± 0.7 cm (p < 0.001) and lumbar mismatch change was 25±14° (p < 0.001).

Patient-reported outcomes also improved significantly, with the Oswestry disability index decreasing from 35 ± 8 to 22 ± 9 (p < 0.001), and the SRS-22r demonstrating increased satisfaction in pain (0.99±1.3, p < 0.001), self-image (1.03±0.86, p<0.001) activity (0.31, p < 0.001), function (0.84±0.7, p<0.001), and satisfaction with management (1.38±1.29 p<0.001).

#### Conclusion:

The Schwab 4 osteotomy, demonstrated significant improvements in patient-reported outcomes and radiographic parameters. This technique can positively impact the quality of life for patients with severe sagittal misalignment who have previously undergone multiple surgical procedures.

# MATERNAL AND NEONATAL HEALTH OUTCOMES OF AN INTEGRATED OBSTETRIC CARE MODEL IN A MULTICULTURAL, UNDERSERVED POPULATION

**Gabriela Funez-dePagnier, BS<sup>1</sup>, Nitya Murali, BS<sup>1</sup>, Allana Krolkowski, MD<sup>2,3</sup>**

*Background:* Jericho Road Community Health Center (JRCHC) is a federally-qualified health center (FQHC) that provides family health including maternal child medical care in Buffalo, New York. JRCHC established the Priscilla Project (PP) in 2005 to improve birth outcomes among socially isolated, at-risk women during pregnancy, childbirth, and postpartum. It relies on a support network composed of employed community health workers, employed doulas, and volunteer mentors. While existing literature on community-based doulas primarily focuses on qualitative research, there is scarce quantitative research evaluating the impact of these programs on health outcomes, particularly for vulnerable populations <sup>1,2,3</sup>.

*Research Question(s):*

1. To evaluate maternal and neonatal health outcomes for patients who opted into any PP services as compared to those who declined.
2. To assess the community-based doula model in JRCHC's multicultural and underserved patient population, with >70% on Medicaid and >50% of whom are refugees, immigrants, or asylum seekers.

*Methods:* Preliminary descriptive analyses were conducted on maternal subjects (n=1629) meeting eligibility criteria via Fisher's exact test.

*Preliminary Results:* On average, patients were 32 years old, identified as non-Hispanic (89.0%), Black (34.9%) or Asian (41.9%), and were residents of zip code 14213 (20.5%). When communicating with their provider, patients preferred a language other than English (62.9%). Patients with doulas present during labor and/or delivery had a lower cesarean delivery rate (24.9% vs. 32.9%, p=0.01), higher successful VBAC rate (69.2% vs. 58.3%, p=0.5), and a reduced risk of preterm birth (3.8% vs. 8.2%, p=0.03) as compared to those who did not.

*Conclusion:* The PP doula program demonstrated improved health outcomes when compared to patients not enrolled, and when compared to NYS and Erie county cesarean delivery rates (33.7%, 34.9%)<sup>4</sup> and preterm birth rates (9.3%, 10.0%)<sup>5</sup>. Understanding these outcomes for the JRCHC population is crucial because it may inform the expansion of healthcare coverage for doula services, further advancing maternal health equity.

## EFFECTS OF AN OPTIMAL DEFAULT GROCERY SHOPPING INTERVENTION ON DIETARY INTAKE: EXPLORING THE ROLE OF FOOD SOURCE

**Karlie Gambino, BS**, Mackenzie J. Ferrante, PhD, RDN, MacKenzie Swanson, BS, Lily McGovern, BS, Leonard Epstein, PhD, Lucia Leone, PhD, Stephanie Anzman-Frasca, PhD

The prevalence of type 2 diabetes is increasing worldwide and while dietary changes are a pivotal part of treatment, adherence to a healthful diet remains an issue. Pre-filled, online grocery carts (i.e., default carts) have provided an effective intervention to increase nutritional quality of grocery purchases among adults with or at risk for type 2 diabetes but had minimal effects on intake. In this secondary analysis, we examine the frequency of food acquired from sources other than grocery stores (“non-grocery food shopping”) as a potential moderator of the default cart intervention’s effects on intake patterns. Participants were randomly assigned to 1 of 3 groups: Control, Online shopping, or Default cart. All groups received diabetes-friendly recipes (3 recipes/week in Weeks 2-4). Recipe ingredients were loaded into the Default group’s online grocery carts. Participants shopped in-person in Week 1, as assigned in Weeks 2-4, and as preferred in Week 5, submitting grocery receipts weekly. At the end of each week, participants were asked to recall food shopping from non-grocery sources. Reported restaurant and convenience store purchasing frequencies were aggregated from Weeks 2-5 to create a non-grocery food shopping variable. Participants completed one Food Frequency Questionnaire (FFQ) post-intervention, assessing intake patterns over Weeks 2-5. Nutritional quality scores were created from FFQ responses by scoring nutritional quality indicators and summing them. Mixed model results showed that non-grocery food shopping did not moderate the effect of study group on nutritional quality of intake ( $p=0.97$ ). Findings also indicate that non-grocery food shopping did not significantly moderate the default intervention’s effects on nutritional quality of dietary intake. These results may be due to decreased precision of the FFQ as a measure of intake patterns, or that intervention recipes (3 per week) represent only a small proportion of monthly intake. Objective measures, such as digital food photography, may bolster future work and help researchers further examine the role of intervention recipe quantity.

## **CURRENT DIAGNOSIS AND MANAGEMENT OF CERVICAL NON-TUBERCULOUS MYCOBACTERIAL INFECTIONS IN CHILDREN**

**Erin M. Gawel, BS, Eunice Im, BA, Michele M. Carr, DDS, MD, PhD**

Non-tuberculous mycobacterial (NTM) infections are a cause of cervicofacial lymphadenitis, particularly in immune competent children between the ages of 1 and 5 years. NTM infections are relatively rare but are increasing in prevalence and are important to consider in the differential diagnosis of a child with non-tender unilateral lymphadenopathy. The mass is typically situated in the superior anterior cervical or submandibular lymph nodes. Constitutional symptoms are normally absent. The diagnosis of NTM lymphadenitis is predominately clinical, based on history and physical examination, but can be definitively established based on a positive mycobacterial culture and polymerase chain reaction test of the purulent discharge, aspirate, or excised node. Neck ultrasound, CT scan, and chest x-ray may also be used to rule out other diagnoses. Optimal management of the condition remains controversial. Complete surgical excision is commonly performed and has low recurrence rates. Medical management using antimicrobial therapies or a “wait-and-see” method has also been shown to be adequate in some studies. However, if the infection is left untreated, patients are at risk of developing a longstanding cutaneous fistula with purulent drainage, which can cause significant morbidity. Overall, the differential diagnosis for neck masses in children is broad, and front-line healthcare providers must recognize the symptoms and signs that suggest cervical NTM in children. This narrative review serves as a guide for clinicians to identify and treat NTM infections in children.

## **Juvenile Idiopathic Arthritis Genetic Risk Haplotypes: Relevance to Children of African Ancestry**

**Sabrina M. George, Hannah C. Ainsworth, Kaiyu Jiang, Gilad Barshad, Adam He, Edward Rice, Marc Sudman, Susan D. Thompson, Carl D. Langefeld, Charles G. Danko, James N. Jarvis**

Numerous juvenile idiopathic arthritis (JIA) risk loci have been identified, overwhelmingly from cohorts of children of European ancestry (EA). The extent to which these regions confer risk in individuals of non-European ancestry is unknown. We posit that the functional mechanism of the actual risk variant should generally span ancestries. Thus, identifying the causal variants on risk haplotypes in EA will facilitate assessment of risk in non-European populations, minimizing the effects of linkage disequilibrium.

Using published regions from EA cohorts (3,939 children with JIA and 14,412 healthy controls), we selected regions containing single nucleotide polymorphisms (SNPs) that met FDR  $P < 0.05$ . In these regions, we identified those SNP residing in open chromatin in multiple immune cell types (neutrophils, CD4+ T cells) using ATACseq and regulatory regions identified using H3K4me1 and H3K27ac marks. We further filtered these SNPs for those located in regions of bi-directional transcription initiation characteristic of non-coding regulatory regions detected using dREG to analyze GROseq data in resting human CD4+ T cells. We examined the allele frequencies of these SNPs in multiple ancestries using NIH Ldlink/Ldhap.

There were 846 SNPs meeting FDR  $P < 0.05$  spanning 24 regions and within regions of open chromatin in neutrophils or CD4+\_T cells. Of these SNPs, 138 SNPs were within regions of bi-directional transcription initiation characteristic of non-coding regulatory regions. These SNPs are therefore strong candidates. We found that 86% of these SNPs could be identified in individuals of African ancestry identified in Ldlink. In individuals of African ancestry, 18 flipped major/minor allele frequency compared to EA and 49 had increased allele frequency of 0.05 in AA. Implementing precision medicine approaches requires examining the tagging SNPs (e.g., those in LD with causal variant) for specific SNPs that biologically contribute to disease. Our functional prioritization pipeline of JIA-associated SNPs identified 138 high priority candidate SNPs for investigation across ancestral groups. Coupled with the knowledge of allele frequencies, analyzing *a priori* functionally-SNPs greatly increases the statistical power to detect associations in other ancestries. Current work is focused on exploring these associations in the UK Biobank data, emphasizing SNPs where allele frequency and sample size provides sufficient statistical power.

## DIVERSITY AMONG EMS FELLOWS

**Jason Gershgorn, BS**, Johanna C. Innes, MD NRP, Lydia Hyla, MA, Susan J. Burnett, MS, EMT-P, Brian Clemency, DO

Emergency Medical Services (EMS) personnel, including EMS physicians, should represent the diversity of the patients they serve. Traditionally, EMS medical directors have been predominantly White and male. Recruiting and training a diverse cadre of EMS fellows is key to improving diversity among EMS medical directors. The goal of this study was to describe demographic trends among EMS fellows since the start of EMS fellowship accreditation. Publicly available data were extracted from the Accreditation Council for Graduate Medical Education (ACGME) Databook for the academic years 2012-2013 through 2021-2022. Data regarding residents' and fellows' self-identified gender and race/ethnicity were analyzed for EMS fellowships, emergency medicine (EM) residencies, and all residencies/fellowships. Data was compared between groups and across time periods. Data for 585 EMS fellows during the 10-year period were reviewed. EMS fellows per year ranged from 8 (2013) to 104 (2022). Gender was not reported for 1% of EMS fellows. Among EMS fellows whose gender was reported, 33% were female and 67% were male. The percent EMS fellows that were female ranged from 22% in 2014 to 45% in 2017. The proportion of female trainees in EMS fellowships was not different from that of females in EM residencies (36%,  $p=0.07$ ), but less than that of females in all residencies/fellowships (45%,  $p<0.01$ ). Race/ethnicity was unknown for 6% of the EMS fellows. Among EMS fellows whose race/ethnicity was known, 80% were non-Hispanic White, 8% were Asian, 4% were Hispanic, 4% were non-Hispanic Black, <1% were Native American/Alaskan, <1% were multiple races/ethnicities and 3% were other. The percentage of non-Hispanic White EMS fellows ranged from 69% in 2019 to 100% in 2013. The proportion of non-Hispanic White trainees in EMS fellowships was greater than in EM residencies (69%,  $p<0.01$ ) and in all residencies/fellowships (55%,  $p<0.01$ ). Over the past decade, one third of EMS fellows were female and three quarters of EMS fellows were non-Hispanic white. EMS leaders, including fellowship directors, should work to strengthen the recruitment of women and underrepresented racial and ethnic minority groups in EMS medical direction.

## COMPARISON OF PERCUTANEOUS CRYOABLATION VS MICROWAVE ABLATION OF SMALL RENAL MASSES IN A LARGE COMMUNITY HOSPITAL SETTING

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Percutaneous needle ablation of small renal masses has become widely accepted in the treatment of confirmed or presumed renal cell carcinoma. Few studies have compared the efficacy of microwave needle ablation (MA) to more widely accepted cryoablation (CA), regarding long-term oncologic outcomes. The primary aim of our study was to compare MA and CA regarding technique-specific odds of residual tumor after primary treatment, delayed in field recurrence after treatment and risk of developing post treatment metastases. The secondary aim of our study was to compare outcome variables such as complications and the impact of tumor size, polar location, and endophytic/exophytic status on the primary outcome measures noted above. We conducted a retrospective cohort study comparing the above-mentioned outcome measures for CA vs MA. Patient demographics and tumor characteristics for both treatment groups were analyzed for significant differences utilizing T-tests,  $\chi^2$  analyses and proportion testing. Logistic regression modeling of procedure type against outcomes of interest was performed to calculate odds-ratios for each outcome. Follow up time was a known bias prior to analysis; thus, a time-to-event analysis was conducted using a Kaplan-Meier curve as well as a log-rank test. The two treatment groups were similar with respect to patient demographics, tumor size, laterality, location and endophytic/exophytic status. Median follow up time for CA was 54.3 months. 119 patients underwent CA of which 13 had residual tumor(s), 18 developed recurrent tumor(s) and 9 developed distant metastases. Median follow up time for MA was 28.2 months. 71 patients underwent MA, of which 2 had residual tumor(s), 7 developed recurrent tumor(s), and 3 developed distant metastases. Using logistic models, we found no difference in odds of disease recurrence [95% CI (-2.17,0.15), p=0.27], odds of residual tumor [CI (-3.67,0.05), p=-0.22], or odds of developing metastatic disease [CI (-1.54,0.73), p=2.11], with respect to both treatment modalities. Follow-up time did not impact the odds of disease recurrence, as a time-to-event analysis resulted in no significant findings (p=0.3). CA and MA offer similar cancer-specific outcomes in terms of risk of residual, recurrent, and metastatic disease in the management of small renal masses.

# **Aurora Surgiscope for Minimally Invasive Evacuation of Intracranial Hemorrhages – A Preliminary Institutional Experience**

## **Authors**

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Mentor: Dr. Adnan Siddiqui

## **ABSTRACT**

### **Introduction**

The field of minimally invasive neurosurgery (MIN) has witnessed significant growth, especially regarding intracranial hemorrhage outcomes. The Aurora Surgiscope System plays a pivotal role in this context, aligning with recent studies highlighting the advantages of MIN techniques. The efficacy of neuroendoscopic surgery has been emphasized in reducing tissue damage, complications, and incision size; the Aurora Surgiscope further refines neurosurgical interventions, aiming to enhance patient outcomes.

### **Methods**

A retrospective review of electronic medical records from July 2019 to September 2023 identified 18 cases using the Aurora Surgiscope for intracranial hematoma evacuation. Patient demographics, comorbidities, symptoms, procedural details, and outcomes were analyzed. The 3D Slicer application facilitated accurate pre- and post-evacuation hematoma volume measurements. Statistical analyses assessed changes in hematoma volumes, procedural outcomes, and patient characteristics.

### **Results**

Among 18 patients, the Surgiscope demonstrated efficacy in hematoma evacuation with a mean reduction of 76.2% in volume. In-hospital complications occurred in 11.1% of cases, predominantly infective in origin. Three deaths were observed, one related to the hemorrhage and procedure. Follow-up revealed improved neurological functioning and a median mRS score of 4. No significant differences were observed in mRS scores at 3, 6, 12 months, and last follow-up.

### **Conclusion**

The Aurora Surgiscope System, employed in minimally invasive neurosurgery, showcases promising outcomes in intracranial hematoma evacuation. This study contributes to the evolving landscape of MIN techniques, emphasizing their potential for improving precision, safety, and patient outcomes.

## ASSOCIATION BETWEEN PSORIASIS WITH DEPRESSION IN US ADULTS: DATA FROM THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY 2005-2014

**Victoria Hoffman, MS**, Terrence Vance, PhD, Ingrid Lazaridou, PhD, Abrar Qureshi, MD, MPH

Psoriasis, characterized as an inflammatory, immune-mediated disorder, has inconsistently been linked with the risk of depression, despite its association with psychological comorbidities. This study employs data from the National Health and Nutrition Examination Survey (NHANES) to investigate the relationship between psoriasis and major depression in a nationally representative cohort, considering epidemiological features and various risk factors. Analyzing NHANES data from 2005 to 2014, we assessed the prevalence and demographic trends of psoriasis. Statistical analyses, including T-tests and Chi-Square analyses, explored associations with factors such as sex, age, race, BMI, socioeconomic status, marital status, smoking, substance use, suicidal ideation, and comorbidities (Hypertension, Hyperlipidemia, Type 2 Diabetes). Based on the PHQ-9 sum score, depression levels were stratified into low (<14) and high (>15) categories based on the distribution of data.

The final dataset comprised 22,164 patients, revealing 576 cases (2.6%) of psoriasis and 622 cases (2.8%) of high depression (PHQ-9 score  $\geq 15$ ). The proportion of individuals with low or high depression scores was significantly higher among patients with a history of psoriasis compared to those without psoriasis (Low: 6.1% vs 3.2%,  $P < .001$ ; High: 6.9% vs 2.8%,  $P < .001$ ). Compared to those without psoriasis, patients with psoriasis were older, more likely to be Caucasian, had higher rates of smoking and substance use, suicidal ideation, and comorbid conditions. The association between psoriasis and depression persisted in the multivariable model after adjusting for confounding variables, including age, race/ethnicity, gender, hypertension, hypercholesterolemia, diabetes, and BMI ( $P = 0.0317$ ). Thirteen percent of patients with psoriasis met criteria for major depression when controlling for confounding variables.

This study adds to the growing body of literature supporting the association between psoriasis and depression, emphasizing the importance of considering comorbidities in understanding this relationship. In exploring the adjusted association between psoriasis and depression in a nationally representative cohort, this study underscores the need for routine depression screening in all psoriasis patients. More research is needed to explore the underlying mechanisms and potential therapeutic implications of this association.

## THE ROLE OF THE MICROBIOME IN CHEMOTHERAPY-ASSOCIATED ORAL MUCOSITIS

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**Introduction:** Oral mucositis is a common complication following the administration of chemotherapy; however, pathophysiology is poorly understood. Preliminary experiments using a 5-fluorouracil (5-FU) mouse model revealed p53-mediated cell cycle arrest is an early event in the response but also showed the oral mucosa transcriptional response at a later stage includes differential regulation of several genes with antimicrobial function and downregulation of cell adhesion molecules. This study aims to evaluate whether suppression of the microbiome ameliorates the phenotype and gene signature of oral mucositis.

**Methods:** 6–8-week-old mice were subjected to intraperitoneal 5-fluorouracil treatment at a dose of 100 mg/kg for 2 days and 50 mg/kg for additional 5 days. Mice were sacrificed at days 2, 4, 6 and 8. Oral swabs were obtained at baseline and sacrifice days then bacteria plated on blood agar. Mice were weighted daily. Tongue, intestinal, and fecal samples were collected on days 4 and 6. Tongues were stained with toluidine blue to visualize lesions and photographed. Images were uploaded into ImageJ processing software and total area of lesions was measured. RNA was extracted from tongues and used for RT-qPCR.

**Results:** Mice that received chemotherapy lost significantly more weight with and without receipt of antibiotic (PBS vs 5-FU,  $p < 0.001$ ), (PBS+Abx vs 5-FU+Abx,  $p < 0.001$ ). Aerobic and anerobic bacterial loads were significantly lower at day of sacrifice in mice that received antibiotic (PBS vs PBS+Abx,  $p < 0.001$ ), (D4 5-FU vs D4 5-FU+Abx,  $p < 0.05$ ), (D6 5-FU vs D6 5-FU+Abx,  $p < 0.05$ ). Administration of 5-FU induced oral mucositis lesions that occupied significantly smaller areas of the tongue in mice who received antibiotic (D4 5-FU vs D4 5-FU+Abx,  $p < 0.05$ ), (D6 5-FU vs D6 5-FU+Abx,  $p < 0.05$ ). Pro-apoptotic genes (PMAIP1, fas, bax) regulated by p53 were not significantly influenced by administration of antibiotic. Genes involved in necroptotic pathways (RIPK3) are upregulated earlier in mice that received antibiotic. Pro-inflammatory genes have altered expression with use of antibiotic with upregulation at day 4 for CD36 and IL33, but decreased upregulation at day 6 for IL33.

**Conclusion:** Gene regulation is impacted by antibiotics and genes that regulate necroptotic and inflammatory response are most affected.

## **ADDRESSING DISPARITIES IN KIDNEY TRANSPLANT OUTCOMES: INSIGHTS FROM LUPUS NEPHRITIS PATIENTS ON RACE, GENDER, AND DONOR SOURCES**

**Nathaniel Iskhakov, Daniel J Baetzhold, Gaganjot Parmar, Olivia Sorci, Naoru Koizumi, Jorge A. Ortiz**

Lupus nephritis (LN) occurs almost twice as frequently in Blacks as in non-Hispanic whites (NHW) and the prognosis in Black patients is significantly worse. Progression to end-stage renal disease (ESRD) in the Black population is almost nine times greater than in NHW. ESRD is appropriately treated with renal transplantation and despite higher rates of ESRD, Black individuals spend longer times on the waiting list and have a higher incidence of diabetes after transplant. We aimed to investigate the factors contributing to the disproportionate outcomes of LN among minority populations. We conducted a retrospective analysis from the United Network for Organ Sharing database containing 6,317 participants with LN to examine transplant outcomes among racial, ethnic and sex groups. Demographic characteristics were collected. Kaplan-Meier Product Limit analysis and multivariate Cox regression analyses were performed. Black lupus patients had the highest graft failure rate while Asian lupus patients had the lowest graft failure rate ( $p < 0.001$ ). White transplant recipients were more likely to be male (22.66%,  $p < 0.001$ ), re-transplant (10%,  $p = 0.001$ ), or live donor transplant (51%,  $p < 0.001$ ) recipients, and were less likely to be on dialysis at the time of transplant (66%,  $p < 0.001$ ). Black patients waited the longest on the waitlist (688 days,  $p < 0.001$ ), were more likely to receive kidneys from donors who were diabetic (5%,  $p = 0.006$ ), hypertensive (18%,  $p < 0.001$ ), after cardiac death (16%,  $p = 0.001$ ), and with high-BMI (28,  $p < 0.001$ ). The findings of this study further support that numerous racial disparities exist in transplant medicine, with Black individuals often receiving poorer quality kidneys and experience the highest rate of graft failure when compared to non-Black patients. Research in this topic should be used to guide clinical practice, as physicians should be aware of these discrepancies in order to identify patients in higher risk groups for transplant rejection. Further exploration is necessary to identify additional gaps in care and identify processes to improve the equity of kidney transplantation across racial and ethnic groups.

# PRELIMINARY EVALUATION OF TWO PATIENT-CENTERED EDUCATIONAL VIDEOS ABOUT KIDNEY TRANSPLANT COMPLICATIONS

**Sydney Johnson**; Anne Solbu, PhD; Renee Cadzow, PhD; Thomas H. Feeley, PhD; Maria Keller, MS; Liise K. Kayler MD, MS

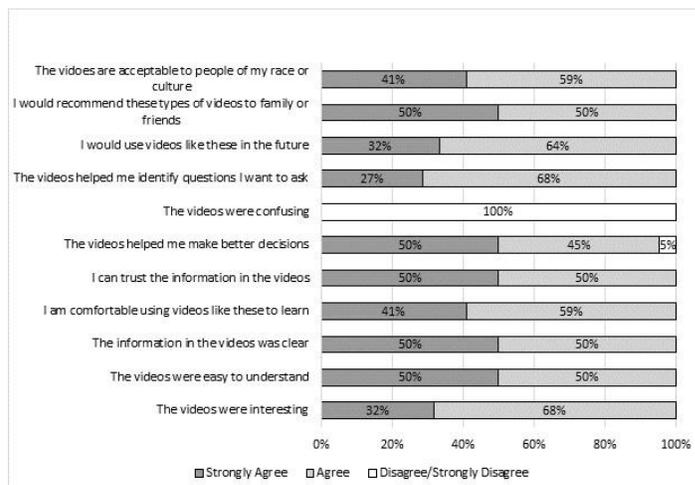
**Background.** Fear of kidney transplant (KTX) complications and incomplete information can weaken transplant acceptance and preparedness. Our group developed 2 patient-centered educational animated videos on common KTX complications to complement a previously developed video-based curriculum intended to promote KTX access.

**Methods.** We evaluated the educational video pair preliminarily using mixed methods. We conducted a pre-post single group study with 22 post-KTX patients to measure the videos’ acceptability and feasibility to improve KTX complication knowledge, understanding, and concerns. Concurrently, we individually interviewed 12 pre-KTX patients about their perceptions of the 2 videos and analyzed the data thematically.

**Results:** Knowledge of KTX complications increased 10% (7.82→8.59, p=0.002) from pre-post video viewing. Large knowledge effect size increases were observed for different levels of age, race, and health literacy. The mean total score for perceived understanding of KTX complications increased post-exposure by 7% (mean 2.48→2.66, p=0.184). There was no change in mean concerns scores pre-post video viewing (mean 1.70→1.70, p=1.00). After viewing the animation, 100% indicated positive ratings on comfort watching, understanding, and engaging (Figure). Three themes of patient perceptions emerged: (1) messages received as intended, (2) felt informed, and (3) scared but not deterred.

**Conclusion:** Two animated educational videos about KTX complications were well-received and promise to positively impact individuals’ knowledge and understanding, without raising excessive concerns.

Figure 1: Acceptability



## **Creation of and preliminary analysis of mutants in two low molecular weight penicillin binding proteins, 5/6 and 6b in the XDR *Acinetobacter baumannii* clinical isolate Ab834**

**Authors: Koulako Kaba, Dr. Thomas Russo, Ulrike Carlino-Macdonald, Zachary Drayer**

**Background:** *Acinetobacter baumannii* is a bacterium that can cause hospital acquired pneumonia, urinary tract infections, soft-tissue infections, and other infectious syndromes. *A. baumannii* infections can have a mortality rate from 19%- 54%. Over the years, the incidence of *A. baumannii* infection has increased due to increased multidrug antibiotic resistance and the ability of the strain to survive on surfaces. It has been shown that PBP 7/8, a low molecular weight penicillin binding protein, is essential for the survival of the bacterium in human ascites *ex vivo* or *in vivo* in mouse or rat infection models. This is due, in part to increased sensitivity to complement and antimicrobial peptide mediated bactericidal activity, which may be a consequence of an alteration in cell membrane integrity in the absence of PBP 7/8. The loss/inactivation of other low molecular weight proteins, like PBP 6b and PBP 5/6 have been hypothesized to result in a similar phenotype.

**Hypothesis:** The loss/inactivation of PBP 6b or PBP 5/6 will decrease the ability of *A. baumannii* to survive in clinically relevant environments.

**Objective(s):** Investigate the role of PBP 6b and PBP 5/6 in the survival of *A. baumannii* *in vitro* and *in vivo* to determine if these proteins are essential in clinically relevant environments.

## **AURICULAR ERYTHROMELALGIA: A SURVEY OF PATIENT EXPERIENCES**

**Alaina Kenny BA BS**, Alyssa Reese BA BS, Victoria Hoffman MS, Brianna Friend BS, Mark Burke MD

Auricular erythromelalgia and red ear syndrome (RES) are both characterized by recurrent episodes of erythema, warmth, and burning pain of the external ear. Despite the similarities in clinical presentation, the relationship between these two conditions remains unclear. The purpose of this study was to gain a better understanding of adult and pediatric experiences with auricular erythromelalgia and RES. A cross-sectional survey was shared to Facebook groups and Reddit communities for individuals with auricular erythromelalgia and/or RES. The survey consisted of questions about demographics, clinical features, medical history, and quality of life. Inclusion criteria were a diagnosis of auricular erythromelalgia or RES, either by a healthcare professional or self-diagnosis, and 18 years of age or above. Adult respondents could answer on their own or on behalf of a child under 18. Participants (N=60) were predominantly female (N=41, 68.3%), Caucasian (N=53, 88.3%) and aged between 4 and 76 with a mean age of 37.9 years. Most participants were adults with auricular erythromelalgia or RES (N=54, 90.0%), while 6 responses described pediatric cases (10.0%). Diagnosis of RES or auricular erythromelalgia was received by a medical professional in 51.7% of respondents (N=31). 38.3% waited 1 year or more for diagnosis after onset of symptoms (N=23). Most participants experience erythromelalgia in other areas of the body beyond the ears (N=37, 61.7%). 38.3% report coexisting autoimmune disease (N=23). Both auricular erythromelalgia and RES present with a wide range of clinical features, including age, severity, and comorbidities. This may explain the observed difficulties in diagnosis and treatment.

Abstract Title: INCIDENCE OF MELANOMA DURING THE COVID-19 PANDEMIC: SEER DATABASE ANALYSIS

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**Abstract:**

The COVID-19 pandemic caused many routine doctor visits to be missed, including those for cancer screening and diagnosis. Among the cutaneous carcinomas whose diagnosis was affected was melanoma, a cancer that is fatal if not recognized and treated early. A delay in melanoma diagnosis with regional spread decreases the 5-year survival rate from 99.5% to 73.8%. This study aims to investigate the impact of the COVID-19 pandemic on the incidence rates of melanoma reported during the pandemic period.

This study aimed to investigate the incidence of melanoma during the COVID-19 pandemic using data from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database. The authors analyzed the November 2022 SEER data submission, including new cancers diagnosed in 2020, the first year of the COVID-19 pandemic. Additionally, the authors investigated the pandemic's effect on the histological characteristics of newly diagnosed melanoma.

Investigation of the SEER database showed a decline in the incidence of most cancers during 2020, including melanoma. From 2005 through 2019, the increase in incidence year-to-year was consistent at 1.1%. In contrast, 2020 demonstrated a 16.3% decrease in reported melanoma incidence compared with the prior year. In addition, melanomas diagnosed in 2020 were noted to have a greater median Breslow thickness at diagnosis compared with those diagnosed in 2019.

The COVID-19 pandemic had a measurable impact on early screening and diagnosis of cutaneous melanoma, evidenced by a reduction in total diagnoses reported in 2020 and an increase in Breslow thickness noted at time of diagnosis. These findings illustrate the importance of prioritizing melanoma screening even in times of public health emergency. Further studies will be needed to fully appreciate the impact the pandemic has had on melanoma incidence, stage at presentation, and length of survival.

## **TIBIAL TUBERCLE AVULSION WITH CONCOMITANT PATELLAR TENDON AVULSION IN THE PEDIATRIC POPULATION: A CASE SERIES**

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Tibial tubercle avulsion fractures are a rare pediatric injury. These fractures typically result from quadriceps muscle contraction (i.e. jumping or landing) in physically active adolescents aged 13-17. Proposed risk factors, including Osgood-Schlatter disease and high body mass index (BMI), remain inconclusive due to limited case studies. Simultaneous tibial tubercle avulsion with patellar tendon avulsion is a rare injury presentation and is a strong indication for expedited surgical repair, making identification crucial. Potential indicative preoperative findings have been recommended, including an increased distance between the distal pole of the patella and the avulsed tibial tubercle fragment with knee flexion, loss of active knee extension, and identification of calcified fragments below the patella. This case series aims to identify demographic and radiographic markers for concomitant patellar tendon rupture, along with describing an effective surgical technique and recovery protocol. Thirteen cases treated by pediatric orthopedic specialists between 3/15/2019 and 6/13/2023 were retrospectively reviewed. Data included patient age ( $14.8 \pm 0.9$  years), race (46% Caucasian, 38% African American and/or Black), BMI ( $26.8 \pm 5.7$  kg/m<sup>2</sup>), laterality (62% right limb), patellar displacement ratio ( $2.0 \pm 0.2$ ), fracture displacement ( $35.5 \pm 14.6$ mm), and fracture classification (Ogden II: 54%, Ogden III: 46%). Fragment rotation differed significantly ( $p=0.005$ ) between Ogden II ( $153.7 \pm 30.9$  degrees) and Ogden III ( $42 \pm 18.0$  degrees) fractures. All patients underwent surgical reduction and patellar tendon repair, followed by controlled weight-bearing, brace use, and physical therapy. Average return to sports was  $20.5 \pm 2.2$  weeks, with no complications reported. This study underscores the importance of early recognition of tibial tubercle avulsion fractures with concomitant patellar tendon rupture in pediatric patients. Radiographic markers, particularly fragment rotation, and a standardized surgical approach have shown promise in optimizing outcomes. Future research should compare these findings to fractures without patellar tendon involvement and expand the patient cohort to enhance diagnostic and treatment strategies. This case series contributes vital insights for clinicians, aiding in the timely identification of this rare injury pattern in pediatric patients. Additionally, our study outlines an effective surgical and postoperative recovery protocol, advancing understanding and treatment options within the medical community.

## THE INFLUENCE OF MUSICAL EXPERIENCE AND IMMERSION ON LAPAROSCOPIC SURGICAL SKILL PERFORMANCE

Eylon J. Arbel, BS, **Katherine Kozlowski, BS**, Alyssa D. Reese, BS, Owen Burns, Julio Arango Lamboy, James C. Rosser, MD

The skills that surgeons must perfect require substantial fine motor and spatial dexterity. Regardless of the initial skill set an individual brings to surgical training, mastering surgical skills requires long hours of practice and improvement. As curricula of surgical residencies evolve, recent studies have focused on identifying potential factors relating to faster and higher-quality skills acquisition, such as experience with video games, sports, and instruments. This study aimed to elucidate the relationship between instrumental musical experience and laparoscopic surgical skill performance. The Top Gun Surgeon team hosted the Top Gun Shootout (TGS) exhibit in the Learning Center at the 2023 Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) annual meeting. All meeting attendees were eligible to participate. Participants first answered several questions regarding their instrumental musical experience. Participants then rotated through three skills stations: Fundamentals of Laparoscopic Surgery (FLS) Peg Transfer, Bean Drop (BD), and Timed Intracorporeal Suturing (TIS). Participants received a score for each station based on performance level. These task scores were used to calculate a Total Top Gun Score (TTGS). Descriptive statistics, non-parametric analyses, and Spearman's correlations were calculated when appropriate to determine associations between musical experience and laparoscopic surgical skill performance. 57 individuals participated in the study. 31 (54.4%) participants indicated they played at least one musical instrument; five of these individuals played more than one instrument. String was the most common class of instrument (N=14), followed by keyboard (N=13). There was a statistically significant positive correlation between number of instruments played and score on the BD task ( $r=0.423$ ,  $P=0.018$ ) but not the FLS and TIS tasks. There was no statistically significant difference or correlation in FLS, BD, TIS, or TTGS scores between individuals that played an instrument and those that did not ( $P>0.05$ ). There was also no statistically significant difference or correlation in scores based on type of instrument played ( $P>0.05$ ). Experience playing musical instruments did not confer an advantage in surgical skills tested in the present study. In future studies, the inclusion of additional skill stations could improve our understanding of how specific instrumental music competencies impact surgical skill performance.

# Accessibility of Lactation Policies and Facilities for 1,847 ACGME-Accredited Surgical Residency Training Programs

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## Abstract

**Introduction:** Despite efforts to recruit female trainees, women pursuing careers in surgical fields face many gender-specific challenges. Breastfeeding following childbirth represents a large concern for female surgical residents. This may be due in part to a lack of transparent, accessible information regarding lactation policies and facilities.

**Objective:** This study aimed to investigate accessibility of lactation policies and facilities among ACGME-accredited surgical residency programs.

**Methods:** From March 2023 to October 2023, websites of surgical residency training programs listed on the ACGME Accreditation System List of Programs by Specialty were reviewed for written department breastfeeding policy, link to institutional graduate medical education (GME) website with a breastfeeding policy, written list of lactation facilities, and link to GME website with a list of lactation facilities. Scatter plots were generated, and Pearson correlation coefficients were calculated to assess relationships of the percent of female residents/fellows and percent of female faculty in each surgical specialty with percent of residency program websites with accessible information.

**Results:** In total, 1,847 websites were reviewed. Seventeen (0.92%) had a written lactation policy, 31 (1.68%) had a list of lactation facilities, 231 (12.51%) had a link to a GME website with a breastfeeding policy, and 295 (15.97%) had a link to a GME website with a list of lactation facilities. Percent of female resident/fellows and percent of female faculty was positively correlated with percent of residency program websites with accessible lactation facility information.

**Conclusion:** Scarce lactation policy and facility information is available to surgical residents desiring to breastfeed following childbirth.

## **CHARACTERIZATION OF NOTCH2 EXPRESSION AND OPIOID-INDUCED MOLECULAR PLASTICITY IN RAT STRIATAL BRAIN REGIONS**

**Charles Lafargue, David Dietz, PhD.**

Substance use disorder, characterized by the compulsive use of psychoactive substances despite negative consequences, affects at least 10 percent of United States adults at some point in their lives, with 75 percent reporting not receiving any form of treatment. This issue is exemplified in opioid addiction, encompassing the misuse of prescription pain relievers and illegal opioids like heroin and synthetic variants such as fentanyl, and has emerged as an enduring mental health concern and a national epidemic. In 2021, opioids contributed to over 80,000 drug overdose deaths, comprising more than half of all reported drug overdose deaths that year. Opioid addiction is a persistent, recurring condition characterized by uncontrollable drug-seeking behaviors and connected to lasting changes in brain plasticity. The persistent nature of this condition can be attributed to sustained alterations in neurostructural and cellular signaling within brain regions linked to natural reinforcement and purposeful behaviors, such as the nucleus accumbens (NAc) and caudate-putamen (CPu). Research exploring opioid addiction's unique neurobiology and cellular signaling changes in addicted brain regions is crucial. The exact intersection and perpetuation of these modifications during addiction states are poorly understood, making these studies essential. Notch Receptor 2 (Notch2) is a cell-surface receptor involved in cell communication, affecting axon guidance and cytokine production. Its activity is dependent on the nuclear concentration of its intracellular domain (NICD), operating independently of second messengers. Once in the nucleus, NICD triggers downstream gene expression, potentially contributing to persistent neuroplasticity and inflammation in the addicted state. This study aims to evaluate Notch2 relative activation in the NAc and CPu by comparing its molecular expression in cytosolic and nuclear fractions. Initial findings from morphine-exposed animal models show decreased cytosolic Notch2 expression in the CPu and increased nuclear Notch2 expression, whereas the NAc exhibits no significant changes. Overall, these results suggest a potentially greater impact of Notch2 activity in the CPu over the NAc. Future work could involve examining temporal changes post-morphine exposure, deciphering Notch2's role in craving and relapse behaviors, and exploring cell-specific expression of Notch2 within the rat striatum.

## **EFFICACY AND EFFICIENCY OF TOURNIQUET APPLICATION IN A HEMORRHAGIC SHOCK STATE**

**Michael LaRock**, Kaori Tanaka DO, Joshua Murphey, David Hostler PhD, Brian M. Clemency DO

Since the inception of the 2015 national Stop the Bleed (STB) campaign, non-military tourniquet (TQ) use has surged, particularly among law enforcement and emergency medical services (EMS). This rapid increase underscores the need for enhanced educational programs. While the STB's "high and tight" pedagogy may be effective in controlled scenarios, its practical application is questionable during self-application. The objective of this study was to assess the ability of trained special weapons and tactics team (SWAT) and/or Medical Response Unit (MRU) members to apply a combat action tourniquet (CAT) appropriately and effectively under simulated shock conditions. Members of SWAT and/or MRU team who self-identified as healthy and TQ-capable volunteer to self-apply a TQ under neutral control and simulated shock conditions. A lower body negative pressure (LBNP) vessel was used as a validated method to simulate blood loss by pulling a portion of the participant's blood volume into their lower extremities. During this time, the subject vitals were monitored for hemodynamic collapse. Once reaching -100 mmHg LBPN, subjects applied the TQ. Doppler ultrasound confirmed arterial occlusion pre and post-LBPN, and a photo assessed TQ application quality. The neutral control followed the same TQ application speed and efficacy assessment. Two subjects have been completed at this time. They showed a respective 1.66 and 10.72 seconds longer TQ application under LBPN, with the latter subject failing arterial occlusion. The strap was not pulled tight enough on inspection. Heart rate (HR) increased significantly under LBPN, while blood pressure (BP) remained stable. Subjects reported feeling "off" like they were in a dream state during the simulated shock trials. This research is currently ongoing to collect data from a total of 20 participants in order to obtain a data set that can be statistically analyzed. So far, simulated hypovolemic shock increases time to application and reduces the efficacy of TQ application by SWAT and/or MRU members.

## **UPDATE ON “CELL THERAPY” CLINICS OFFERING TREATMENTS OF OCULAR CONDITIONS USING DIRECT-TO-CONSUMER MARKETING WEBSITES IN THE UNITED STATES**

**Eric A. Lovett Jr., BS, MBA, Meghana Kalavar, MD, Megan D. Malueg, BS, Ashtah A. Das, BS, Hendrick Francois, BS, Ajay E. Kuriyan, MD**

Stem cell therapy offers the potential to address unmet needs in the treatment of ocular conditions which are often associated with severe morbidity. However, in recent years, many clinics have emerged offering non-Food and Drug Administration (FDA)-approved “cell-based therapies” (“NFACT”) for various conditions, including ocular diseases. A subset of patients receiving NFACTs have experienced poor ocular outcomes and dangerous complications including retinal and vitreous hemorrhages, retinal detachments with proliferative vitreoretinopathy, central retinal artery occlusions, and zonular weakness, with some even experiencing total loss of vision. Concern was initially raised based on findings from a publication in 2017 authored by Nirwan et al. which showed 40 companies offering these potentially dangerous treatments at nearly 80 clinics nationwide. In response to these reported complications the U.S. Department of Justice, on behalf of the FDA, sought a permanent injunction against multiple companies in May 2018 prohibiting them from marketing stem cell products without FDA approval. The objective of this study was to evaluate the potential persistence of these companies following the Government’s intervention. To evaluate this we performed a comprehensive, keyword-based internet search using Google and Bing search engines and social media websites Facebook, YouTube, Twitter, and LinkedIn to identify companies offering NFACTs in 2019 and 2022. We gathered information including the location of each clinic, conditions treated, types of cells advertised, route of administration, cost of care, and whether medical doctors (MDs or DOs) were associated with the companies. Our data shows that in 2019 U.S.-based direct-to-consumer companies marketing NFACTs persisted despite (1) a lack of high-quality clinical evidence supporting the efficacy of these procedures, (2) the association of some of these treatments with severe vision loss, and (3) increasing FDA oversight and legal action. In 2022, the number of clinics and companies decreased dramatically, but their persistence is a reminder that continued vigilance is necessary. The limited scope of current regulation coupled with the ease and rapidity of internet marketing dictates that counseling by well-informed ophthalmologists and optometrists will constitute the primary safeguard against patients undergoing costly, ineffective, and potentially harmful procedures offered by these predatory organizations.

## KAWASAKI DISEASE ANTIBODY PEPTIDE BINDING OBTAINED USING PHAGE DISPLAY

**Madelyn Lux**, Fahmida Aktar, Devin DeCotes, Mark Hicar MD, PhD

Kawasaki Disease (KD) is the leading cause of acquired heart disease among children in the developed world. Its etiology is currently unknown. Criteria for diagnosis of KD include prolonged fever associated with four of five additional symptoms including hand and feet swelling, conjunctivitis, lymphadenitis, rash, and mucous membrane inflammation. Treatment primarily consists of Intravenous Immunoglobulin (IVIG) therapy. Without IVIG, risk of aneurysm development is 1 in 4. Prior findings indicate that KD likely has an infectious origin. Current work is focused towards identifying peptide targets of KD antibodies.

We utilized New England Biolabs Ph.D.<sup>TM</sup> Phage Display Library to identify peptide targets of KD-24 antibodies. A series of panning and amplification procedures were followed to produce plates containing antibody peptide targets. Plaques obtained from those plates were amplified in *E. coli* and utilized to obtain double stranded DNA via MiniPrep. DNA was subsequently sequenced using Sanger sequencing. Additionally, patient serum samples from KD, MIS-C, SARS, febrile controls, and healthy controls were tested against the MTCPI protein using an ELISA protocol. KD 24-67 was previously shown to target MTCPI when tested against an alternate peptide library.

DNA sequences were obtained for each antibody tested: 2F5, 24-29, 24-67, and 24-595. The sequence from 2F5, an HIV antibody with a known binding sequence, corresponded to that identified in previous studies. Therefore, it could be reasonably inferred that the peptide sequences obtained for 24-29, 24-67, and 24-595 correspond to the peptide targets of these antibodies. One way ANOVA showed a significant main effect of serum binding to MTCPI between groups: MIS-C and SARS ( $p < 0.01$ ), MIS-C and Febrile Controls ( $p < 0.0001$ ), and KD and Febrile Controls ( $p < 0.05$ ). On direct testing, KD 24-67 did not show binding to MTCPI.

Phage display provides an effective method for obtaining binding sequences of antibodies. It will be important to confirm the peptide sequences obtained for the KD antibodies and to identify proteins containing these sequences that belong to infectious organisms in order to identify the etiology of KD.

# PREDICTIVE ACCURACY OF RIGHTWARD EXTRAPOLATION OF THE LEFT VENTRICULAR END-DIASTOLIC PRESSURE-VOLUME RELATIONSHIP IN HEALTHY SWINE

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**Objective:** Myocardial stiffness is a primary determinant of left ventricular (LV) diastolic function and can be quantitatively described by the end-diastolic pressure-volume relationship (EDPVR). The EDPVR is traditionally derived by measuring LV end-diastolic pressure (EDP) and volume (EDV) during transient reductions in venous return (preload). However, the accuracy of this approach in predicting changes in LVEDP in response to a rise in LVEDV via rightward extrapolation has not been directly studied. Accordingly, we sought to assess the predictive accuracy of preload reduction-derived EDPVRs in estimating LV diastolic stiffness ( $\Delta\text{LVEDP}/\Delta\text{LVEDV}$ ) in healthy swine.

**Methods:** LVEDP and LVEDV were measured in swine (n=6) at rest and during transient inferior vena cava (IVC) occlusion (reduced preload), transient aortic occlusion (increased afterload), and intravenous phenylephrine (PE; 0.5 mg/kg/hr; increased afterload and preload). Pressure-volume data collected during IVC occlusion were used to generate the EDPVR, the accuracy of which was determined via comparison to measurements of  $\Delta\text{LVEDP}/\Delta\text{LVEDV}$  during aortic occlusion and PE.

**Results:** The LV diastolic stiffness coefficient was greater when derived via aortic occlusion vs. IVC occlusion ( $0.057\pm 0.013$  vs.  $0.022\pm 0.004$ ;  $p=0.03$ ). As a result, IVC occlusion-derived EDPVRs underestimated the rise in LVEDP during aortic occlusion ( $7.6\pm 2.2$  vs.  $13.5\pm 2.1$  mmHg;  $p=0.08$ ). Similarly,  $\Delta\text{LVEDP}/\Delta\text{LVEDV}$  in response to aortic occlusion ( $0.96\pm 0.28$  mmHg/mL) tended to be higher than that predicted from the IVC occlusion-derived EDPVR ( $0.44\pm 0.09$  mmHg/mL;  $p=0.12$ ). Compared with aortic occlusion, PE elicited a greater rise in LVEDV ( $31.5\pm 5.4$  vs.  $18.6\pm 4.2$  mL;  $p=0.08$ ) and LVEDP ( $20.8\pm 1.3$  vs.  $13.5\pm 2.1$  mmHg;  $p=0.01$ ) but  $\Delta\text{LVEDP}/\Delta\text{LVEDV}$  was comparable between each condition ( $0.78\pm 0.16$  mmHg/mL vs.  $0.96\pm 0.28$  mmHg/mL;  $p=0.60$ ). However,  $\Delta\text{LVEDP}/\Delta\text{LVEDV}$  derived from PE tended to be higher than that from IVC occlusion ( $0.78\pm 0.16$  mmHg/mL vs.  $0.44\pm 0.09$  mmHg/mL;  $p=0.10$ ).

**Conclusions:** Rightward extrapolation of the EDPVR derived via IVC occlusion underestimates the rise in LVEDP when LVEDV is increased in the normal heart. This was observed with increased afterload (aortic occlusion) as well as when afterload and preload were simultaneously increased via PE. These findings highlight challenges in quantifying myocardial stiffness and reinforce the importance of assessing the hemodynamic response to increased LV loading directly, rather than extrapolating from EDPVRs created via transient preload reduction.

## Teaching and Applying Motivational Interviewing Strategies within a Primary Care Setting in Caring for Patients with Opioid Use Disorder

Bailey Majtyka M.S., Dr. Frederick Elliott M.D.

Motivational interviewing (MI) is recognized as an effective behavioral intervention in the treatment of patients with addiction. MI techniques currently are applied in both inpatient and outpatient substance use treatment programs, but more research is needed as to the effectiveness of this intervention in primary care settings. This project will attempt to measure the effect of motivation interviewing sessions on the ongoing treatment of patients with an opioid use disorder in a primary care setting. Surveys were designed and distributed to patients within the primary care setting at UBMD in Dr. Elliott's offices at Conventus as a Quality Improvement Project with a mixed quantitative and qualitative survey design. Patients (n=9) were from a wide background, with varying educational backgrounds and wide age range (75 – 30 years old). The survey results were surprising in that most patients had little to say about the suboxone program in their free response and generally had a higher focus on other healthcare related issues. Every patient interviewed was satisfied with their addiction treatment and self-reported feeling comfortable discussing their mental health and physical health situation with the doctor. Most patients treated in the primary care setting seemed stable on their suboxone program with few addiction-themed responses or concerns on our surveys. Most patients reported no other substance use in their survey, but not every urinalysis coincided with the self-reporting. Overall patients felt very comfortable and very satisfied with the current care they are receiving. Patients are very stable while being treated for their OUD while receiving their suboxone regimen. In conclusion, it did not seem as if these patients needed further behavioral intervention for their opioid use disorder beyond their current suboxone regimen. Our next step is to utilize a retrospective study to examine external patient healthcare outcomes in relation to their addiction care visitations.

# Global Congenital Anomalies of the Central Nervous System: A Systematic Review of Literature

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## ABSTRACT

### *Introduction:*

Congenital Central Nervous System (CNS) anomalies exhibit global prevalence, with challenges in accurate estimation due to underreporting and sparse data, particularly in developing nations. Their multifactorial etiology involves embryogenic, environmental, and genetic factors. Limited access to neurosurgical care in middle- and low-income countries contributes to enduring morbidity and mortality.

### *Methods:*

A retrospective systematic review was performed using PRISMA-compliant PubMed and Embase searches. Inclusion criteria encompassed human subjects aged 0-18, original papers, and reporting of congenital CNS anomaly prevalence. Data from 260 eligible studies covered demographics, study design, and anomaly prevalence.

### *Results:*

Among 260 included studies, congenital anomalies were reported in 83.5%. Reported anomalies included neural tube defects (in 68.7% of included studies), spina bifida (50.3%), anencephaly (45.2%), hydrocephalus (41%), and encephalocele (35.5%). Maternal age, paternal age, family history, and folic acid intake were reported in 20%, 2.26%, 9.03%, and 7.1% of studies, respectively. The majority of studies were retrospective (50.6%), with data primarily from hospitals (44.2%) and registries (36.5%).

### *Discussion:*

Geographic variation in CNS anomalies prevalence suggests potential underreporting, particularly considering stillbirths. Environmental and genetic factors remain underexplored. Limited access to neurosurgical care persists, especially in resource-limited settings, hindering global health initiatives.

### *Conclusion:*

This review emphasizes the global burden of congenital CNS anomalies, highlighting the need for targeted interventions and improved neurosurgical care access. Gaps in literature regarding environmental and genetic factors necessitate further research, crucial for developing effective public health strategies and mitigating the impact of CNS anomalies worldwide.

## **THE EFFECT OF CENTRAL CORNEAL THICKNESS AND CORNEAL HYSTERESIS ON INTRAOCULAR PRESSURE MEASUREMENTS USING VARIOUS DEVICES**

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Glaucoma is a disease characterized by damage to the optic nerve, and is a common cause of blindness worldwide. One of the primary risk factors for glaucoma is increased intraocular pressure (IOP). Some physiological characteristics of the eye, such as central corneal thickness (CCT) and corneal hysteresis (CH), are thought to affect the measurement of IOP. However, the degree of impact of CH and CCT on IOP measurement is incompletely understood. This study aimed to elucidate the impact of CH and CCT on IOP in order to more accurately screen for glaucoma. The IOP of 200 eyes of 104 patients aged 19-86 (mean age 63.4 years) was measured via Goldmann Applanation Tonometry (GAT), iCare rebound tonometry, air puff Ocular Response Analyzer (ORA), and a novel Tono-Vera rebound tonometry. Of the 104 patients, 99 had a diagnosed type of glaucoma. Exclusion criteria included those with recent laser procedure or surgery. The ORA was used to measure CH, and CCT was either taken from previous documented measurements or was measured by pachymetry during the study if not previously recorded. IOP measurements were analyzed versus CCT and CH using linear regression analysis and Pearson correlation coefficient. The mean CCT  $\pm$  standard deviation (SD) was  $559.57 \pm 45.11$ , and the mean CH  $\pm$  SD was  $9.51 \pm 2.14$ . The mean IOP  $\pm$  SD were  $14.35 \pm 3.34$ ,  $14.83 \pm 5.11$ ,  $17.28 \pm 5.67$ , and  $17.49 \pm 4.86$  for GAT, iCare, ORA, and Tonovera, respectively. Linear regression analysis did not show a correlation between GAT, iCare, ORA, or Tonovera and either CCT or CH ( $p < 0.01$  for all methods). In conclusion, this study showed no significant correlation between IOP measurements from four different methods and either CCT or CH. The average Tonovera IOP measurement was consistently higher than all other methods tested ( $p < 0.05$ ). Future directions for this project include measuring CCT, CH, and IOP in non-glaucomatous eyes to further evaluate relationships between these parameters and IOP measurements.

**Race, Gender, Healthcare, and Research Perceptions among Orthopedic Patients: A Qualitative Study** Moriah Martindale<sup>1</sup>, Andrea Carland, MPH<sup>1</sup>, Nomi Weiss-Laxer, PhD, MPH, MA<sup>1</sup>, Michael Freitas, MD<sup>1</sup>, Leslie Bisson, MD<sup>1</sup> <sup>1</sup>Jacobs School of Medicine and Biomedical Sciences, University at Buffalo, The State University of New York, Buffalo, NY [moriahma@buffalo.edu](mailto:moriahma@buffalo.edu)

**INTRODUCTION:** Race and gender impact health outcomes in multiple and complex ways. Direct patient experiences as well as patient attitudes and beliefs about race and gender may affect various aspects of healthcare, including patient willingness to participate in healthcare research. Despite numerous research studies on the relationship between sociodemographic factors, discrimination, and healthcare and research participation in other areas of medicine, literature is limited within the orthopedic population. This study aimed to describe 1) patient perceptions of racial and/or gender influences on their healthcare and 2) attitudes and barriers related to orthopedic research participation among primarily Black/African American orthopedic patients.

**METHODS:** Twenty-two patients between the ages of 45 to 85 who presented with knee pain to an orthopedic clinic within a Level 1 county hospital were asked to be interviewed and 20 agreed (response rate = 91%). Patients were primarily female (70.0%), on average 63.6 years old, mostly Black/African American (75.0%), and had an education level attainment of high school or less (65%). Patients were approached during their clinic visit by two or three research team members. One researcher asked the interview questions, which included a series of prompts about perspectives on race, gender and healthcare, and preferences for research participation. The other study team members recorded the patient's verbal and non-verbal responses. Researchers coded and analyzed recorded responses as well as researcher generated memos. The study team met to interpret themes, interpret data and resolve any discrepancies.

**RESULTS:** Half of the patients interviewed (n=10) believed that race or gender impact healthcare. Two patients acknowledged that while they did not experience any discrimination personally, they had heard of experiences with discrimination in healthcare settings. Four patients believed that their race or gender influenced who they selected as their providers, while other patients' provider selections depended on other factors such as proximity to their home or provider reputation. Three of these four patients, who were all female, noted that gender mattered (e.g., "I just feel like a female would understand female problems more than someone else"). Two patients who identified as Black expressed a preference for providers of a similar racial/ethnic background. One patient did express some racial bias regarding provider selection. Of the 20 patients interviewed, seven (35%) had participated in health research studies in the past and five (25%) had friends and/or family who participated in research. The majority of participants expressed positive (45%) or neutral (37%) attitudes about research. Common reasons for participation included the desire to learn more about their medical condition and helping others. Most patients stated they depend on public transportation (15%), medical transportation (35%), or family and friends (25%) to get them to medical appointments while only 25% reported reliable transportation or the ability to drive themselves. Most patients were unemployed (85%) for reasons including disability and retirement. Most patients had smartphones (80%) and reliable internet (75%), but fewer reported access to a computer (25%).

**DISCUSSION:** Half of the interviewed patients in this study perceived race or gender to be factors in their healthcare. The most salient factors included the quality of care received as well as their provider choice. Patients who expressed a preference for a provider desired a shared experience (e.g., concordant gender) with their provider, which is consistent with existing literature<sup>1</sup>. Among the interviewed orthopedic patients, there was a moderate to high level of trust in their provider. The majority of patients had positive attitudes about research and would be likely to participate in studies, if barriers to participation that they enumerated were addressed. Further research is needed to explore provider perspectives on these topics, the existence of institutional bias, and the extent to which the perception of race and gender or direct experiences of discrimination in the healthcare setting impact orthopedic clinical outcomes.

## **IMPROVING COVID-19 DISEASE SEVERITY SURVEILLANCE MEASURES: THE CASE FOR IMPLEMENTING ACCESSIBLE SCREENING TO PROTECT HIGH-RISK POPULATIONS**

**Daniel Maywalt, Secil Ertorer, PhD, Steven E. Lipshultz, MD**

We sought to identify the impact of COVID-19 on low-income, and high diversity areas of Buffalo, New York, to demonstrate how real-time surveillance is achievable and may be used to recognize high-risk populations during a pandemic and allows for targeted availability of effective therapeutics for those with infections. For each of the 17 ZIP Codes in the city of Buffalo, NY, we identified the rates of poverty and diversity, then characterized each of the 17 ZIP codes as high or low ethnic diversity and high or low income. Low-income ZIP Codes were categorized as those with a poverty rate above 26%. High-diversity ZIP Codes were those in which minorities accounted for more than 25% of the residents. The number of positive COVID-19 tests, and the number of COVID-19-related hospitalizations for each ZIP Code were obtained from the New York State Department of Health. Independent sample t-tests were run to compare COVID-19 positive tests and hospitalizations for high- and low-diversity and high- and low-income categories. Of 849,285 tests administered between August 31<sup>st</sup>, 2020 and November 8<sup>th</sup>, 2021, 35,872 (4.2%) were positive. The percentages of positive tests did not differ between the high- and low-diversity ZIP Codes (4.1% and 2.8% respectively; difference between groups, 466 positive tests ( $P=0.22$ )) or between the high- and low-income ZIP Codes (4.3% and 2.8% respectively; difference between groups, 539 tests ( $P=0.14$ )). However, among the 3,161 patients hospitalized for COVID-19 between May 2<sup>nd</sup> and November 19<sup>th</sup>, 2020, the percentage differed between the high- and low-diversity ZIP Codes (1.4% and 0.9% respectively; difference, 154 patients ( $P=0.04$ )) and between the high- and low-income ZIP Codes (1.5% and 0.9% respectively, difference, 1633 patients ( $P=0.01$ )). Data is accessible and should be collected and analyzed in real time to identify high-risk populations for COVID-19 infection. Pediatric cardiology patients represent a high-risk group, like the high diversity and high poverty zip codes analyzed in this study. The results of this study could be used to protect high risk groups, for instance to enhance care of children with heart disease in the face of the COVID-19 pandemic, and future infectious disease outbreaks.

## **Mass Casualty Simulation: Assessment of the Performance of Anesthesia Residents in a Mass Casualty Scenario After Receiving Prior Didactic Training in Hospital Trauma and Triage Care**

**James McKinnon II MA, Sydney Pigott MPH, Jenna Lufty BS, Bryan Velez BS, Stacey Watt MD**

While the role of the anesthesiologist during mass casualty incidents has not yet been clearly defined, previous events around the world have shown that anesthesiologists can be invaluable in providing rapid triage, trauma management, and even on-site resuscitation. Due to the unexpected timing of these events, mass casualty simulations have become an excellent learning opportunity to prepare for these scenarios. We hypothesize that prior didactic training can be an effective educational tool implemented into these simulations to improve triage, management, and decision making skills. In our simulation, we will observe 2 groups of 6 learners attempt to properly triage and stabilize 20 standardized mass casualty scenario patients. One group of learners will receive a pre-simulation didactic lecture discussing proper trauma case management and mass casualty triaging systems. The other group of learners will act as a control group with no didactic training. Our simulation will be run in the JSMBS Simulation Center and designed to represent an emergency room with 4 trauma bays and 4 beds in the hallway. Each standardized patient will have a predetermined triage level, interventions to stabilize, and location for follow up treatment that is unknown to the learners. The learners will then attempt to triage, stabilize, and designate a follow up location for each patient during the simulation. These decisions will be compared to the predetermined values to assess the performance of the learners. Time spent with each encounter will also be recorded. This data will then be compared between our experimental and control groups. We expect our experimental group to perform with more accuracy and shorter encounter times than the control group. We hope that this data will provide some insight into the importance of didactic learning during mass casualty training simulations for anesthesia training.

## **THE VALIDITY OF FRAILTY SCORING IN PREOPERATIVE RISK ASSESSMENT FOR PATIENTS IN THE SURGICAL INTENSIVE CARE UNIT**

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Frailty is a term used to classify patients' physiologic reserve to perform daily activities and overcome external stressors impacting their physical health. The National Surgical Office at the Buffalo Veterans Affairs incorporated a screening tool known as the Risk Analysis Index (RAI) to assess a patient's frailty level. RAI has been used to identify patients at an increased risk of adverse events following surgical procedures. Our study aimed to examine the validity of RAI scores in predicting early perioperative mortality and the occurrence of adverse events in patients admitted to a surgical intensive care unit (SICU). We accessed the list of patients admitted to the SICU and calculated their RAI scores on admission using the VA online tool. This calculator uses age, sex, comorbid conditions, cognition, and the ability of patients to perform their daily activities without help. The primary endpoint used for calculating the RAI cutoff value was 30-day mortality, and the secondary endpoints included overall mortality and the duration of SICU stay. Receiver operator characteristics were used to calculate the cutoff value for RAI, and based on that, patients were categorized as "high" or "low" RAI groups. The frequency of adverse events and survival analyses were examined by chi-square and Kaplan-Meier tests. Null hypotheses were rejected if  $P < 0.05$ . 535 patients' charts were clinically accessed, and each patient received an RAI score. RAI scoring showed to be a strong predictor (AUC  $0.792 \pm 0.012$ ) of 30-day mortality, and with a cutoff value of 33.5, its sensitivity was 87.9%, and specificity was 56.6%. The high-RAI group had greater early and late mortality rates than the low-RAI group (Figure). There was a nine-fold increase in 30-day mortality hazard risk amongst the high-RAI patients ( $P < 0.001$ ). Similarly, the risk of late mortality was a four-fold increase in the high-RAI group ( $P < 0.001$ ). However, we found no association between RAI scores and ICU or hospital length of stay. This study validates using frailty scoring in predicting adverse outcomes in the SICU setting. In future studies, this tool may be compared to other available ICU risk assessment tools, such as APACHE-II and Severity Risk Index tools.

## **RISK OF INFECTION FOLLOWING REVERSE SHOULDER ARTHROPLASTY AFTER FAILED ROTATOR CUFF REPAIR: A RETROSPECTIVE REVIEW**

**Jacob Mogerman B.S., Zachary Tamweber B.S., Lin Feng M.A., M. Nadir Haider M.D., Thomas R. Duquin M.D.**

Rotator cuff repair (RCR) is often considered the most appropriate next step in treatment of patients with rotator cuff tear who have failed non-surgical management. However, patients may still require further intervention given rotator cuff repair failure rates range from 11%, to 57% in some cases. One option for patients who have failed rotator cuff repair is reverse shoulder arthroplasty (RSA). Due to its success, the indications for reverse shoulder arthroplasty have expanded to include patients who have failed rotator cuff repair in the past without significant arthritis. Studies have demonstrated that patients who skip RCR and proceed directly to RSA for treatment of their rotator cuff repair have better overall improvement. With this in mind, we sought to determine if there is an advantage to undergoing RSA as the initial surgical intervention in terms of risk of infection. We hypothesize that patients with rotator cuff tear who undergo rotator cuff repair followed by ipsilateral reverse total arthroplasty have a higher risk of infection compared to patients with rotator cuff tear that undergo reverse total arthroplasty as their primary intervention. To test this hypothesis, a list of patients was generated to include those who have undergone reverse total shoulder arthroplasty with UBMD Orthopedics & Sports Medicine between January of 2015 and May of 2023 following ipsilateral rotator cuff repair with a minimum of 2 years post-surgical follow-up. Of the 92 patients who were found to be eligible for the study, 2 patients met infection criteria following their reverse total shoulder arthroplasty with an additional 5 that had unexpected intra-operative p. Acnes cultures. Infection rate in the study population (2.2%) was compared to previously reported infection rates of both primary repair (2%) as well as reoperation infection rates (6%). The 5.4% of patients that had positive intra-operative cultures were treated with antibiotics and did not require reoperation. Considering intraoperative cultures carry a 15% false-positive rate, future studies should work towards developing a criteria for obtaining intraoperative cultures in patients with previous ipsilateral operations.

# **CYCLOSPORINE IMMUNOSUPPRESSION ENHANCES ONLY EARLY TUMOR GROWTH DURING CHRONIC UV EXPOSURE IN A MOUSE MODEL OF CUTANEOUS SQUAMOUS CELL CARCINOMA**

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Over 1 million cutaneous squamous cell carcinomas (CSCC) are diagnosed in the US annually. Chronic UV radiation and immunosuppression (IS) are well-established risk factors for CSCC in humans. SKH1 mice are an immunocompetent outbred strain that demonstrate photo-carcinogenesis after chronic UV exposure. The effect of immunosuppression in this model has been only partially studied, with conflicting data. Here, we aimed to analyze the impact of cyclosporine IS on skin tumor growth in chronic UV-exposed SKH1 mice.

34 SKH1 mice were subjected to solar-simulated light with 90 mJ/cm<sup>2</sup> UVB exposure five times per week for 13 weeks (n=17) or 18 weeks (n=17) plus control mice (n=18) receiving no UV exposure. At 8 weeks, half the mice were switched to a diet containing cyclosporine; others continued a control diet. Images were taken at 14, 17, and 20 weeks from 3 angles with high-resolution DSLR cameras under standardized lighting. Manual image analysis was performed with VGG Image Annotator to count and measure the size of tumors at all time points. A minimum threshold area for tumor classification was set at 2 mm<sup>2</sup>, or 2,826 pixels.

The average area (p=0.0147) and number (p= 0.0267) of tumors at week 17 were significantly higher in the IS group compared to the control group in the 18-week UV-exposed mice. Following the cessation of UV treatment, the differences between IS and control decreased to become statistically insignificant. No significant differences were seen in the 13-week group. Furthermore, no statistical difference was observed in tumor development between male or female mice in any group. Lastly, no significant difference was found in tumor area or number between mouse groups exposed to 13 or 18 weeks of UV radiation at any time point.

The limited difference in tumor growth between IS and control mice suggests that either SKH1 cyclosporine IS mice inadequately model human IS and CSCC growth, or cyclosporine ineffectively promotes CSCC growth in human IS patients without other immunosuppressive agents or medications. Further studies are needed to elucidate this and identify a sufficient murine model of IS-promoted CSCC.

# DOSE RESPONSE STUDY OF EXTRACELLULAR VESICLES ON ADULT CARDIOMYOCYTE APOPTOSIS

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Cardiovascular disease (CVD) is the leading cause of mortality globally. During a myocardial infarction, healthy heart tissue is transformed into fibrotic tissue, reducing cardiac output. Despite advancements in pharmacotherapy, there is still no targeted cure. Exosomes (exos) are a type of extracellular vesicle (EV) that can carry biological therapeutic cargo. More specifically, cardiosphere-derived cell exosomes (CDC-exos) are derived from a specific cardiac progenitor cell population that have demonstrated anti-fibrotic, anti-inflammatory, and pro-angiogenic properties in models of CVD (Mentekowski et al., 2020). Controlled preparation of CDC-exos with a cardiomyocyte targeting peptide (CMP-exos), have demonstrated greater cardioprotective efficacy of CDC-exos (Mentekowski & Lang, 2019). The aim of this project was to investigate the *in vitro* potency of EVs in inhibiting cardiomyocyte apoptosis. We hypothesized that cardiomyocytes treated with engineered CMP-exos would exhibit a similar amount of apoptosis than unmodified CDC-exos at a lower treatment dose. We treated  $2.56 \times 10^5$  AC-16 adult ventricular cardiomyocyte cells with  $200\mu\text{M}$  hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) for 2.5 hours then exposed them to 1, 10, 100, or 1000 1) CDC-exos/cell, 2) CMP-exos/cell, or media control alone. The effects of each treatment group on cardiomyocyte viability were assessed using a TUNEL apoptosis assay, allowing us to calculate the percentage of cardiomyocytes undergoing apoptosis as a fraction of total cells. Quantitative differences between treatment groups were analyzed using a one-way ANOVA and Tukey's post-hoc analysis with statistical significance set to  $p < 0.05$ . Preliminary results revealed statistically significant findings ( $p < 0.001$ ). Compared to the control, cardiomyocytes treated with CDC-exos showed a statistically significant reduction in apoptosis at all concentrations tested ( $n=3$ ,  $p < 0.05$ ). Additionally, cardiomyocytes treated with 10 or more CMP-exos/cell exhibited significantly less apoptosis compared to the control ( $n=3$ ,  $p < 0.01$ ). Unlike our *in vivo* data, which showed a difference in cardiac function between treatment groups, we found no statistically significant difference in cardiomyocyte cell death between CDC-exos and CMP-exos treatment groups *in vitro* ( $n=3$ ,  $p=0.9$ ). Additional studies are aimed at increasing the power this work with additional biological replicates as well as studying different *in vitro* cardiomyocyte populations and cell stressors to further understand the biodistribution and pharmacological properties of engineered CDC-exos.

## **MACHINE LEARNING-BASED IDENTIFICATION OF HAIR FOLLICLES IN MOUSE SKIN USING REFLECTANCE CONFOCAL MICROSCOPY**

**Mehr Nasir-Moin, BA, Szabolcs Bozsányi, MD, PhD, Kyle Mueller, BA, Wendy J. Huss, PhD, Gyorgy Paragh, MD, PhD**

Reflectance confocal microscopy (RCM) is a noninvasive, real-time imaging technique used to visualize the epidermis and superficial dermis that is comparable to histopathology. RCM enables in vivo study of disease and treatment effects on hair follicle morphology. To expediate this analysis, a machine learning algorithm was established for automatic detection of hair follicles in RCM images. A Vivascope 1500 reflectance confocal microscope was used to image five 4mm x 4mm areas of the back of a SKH1 mouse. For each of the five areas, a sliding window algorithm was applied to one image of the dermis to generate 1,024-pixel x 1,024-pixel patches. The resulting 296 patches were annotated for follicles with the criterion of a black oval with inner pallor and were split into training, validation, and test sets in a 2:1:1 ratio. A YOLOv5 object detection model was trained. The model achieved a mean average precision of 0.964 on the test set, demonstrating high accuracy while capturing a significant proportion of hair follicles and minimizing false negatives. The algorithm was unable to accurately localize and detect follicles when applied to RCM images of non-back regions of a SKH1 mouse. This study demonstrates the ability of a machine learning model to identify hair follicles in SKH1 mice and suggests possible phenotypical differences in hair follicles in different body areas. Our work establishes an automated image analysis of mouse skin hair follicles for future studies on the effects of early cutaneous carcinogenesis on hair follicle characteristics and density.

## EGG CONSUMPTION DURING PREGNANCY AND RISK OF GESTATIONAL DIABETES

Jade Edwards, Sara Nieto, MS, and Xiaozhong Wen, MD, PhD

Gestational diabetes mellitus (GDM) is characterized by abnormal glucose metabolism during pregnancy. Our study aims to examine the relationship between various egg food consumption and GDM risk. We analyzed data from 1,397 mothers from the Infant Feeding Practices Study II (2005-2012), a US national cohort study from pregnancy to 1 year postpartum. Mothers reported diet including egg consumption in the past month using a food frequency question. We focused on maternal egg consumption with different forms of preparation during pregnancy, including total eggs, whole eggs, egg whites, egg substitutes, eggs with fat, and egg salad. The status of GDM was self-reported in late pregnancy. We assessed the association between egg consumption and the risk for GDM using a multivariable logistic regression model, adjusting for socio-demographic and pregnancy-related characteristics. On average, total egg consumption was 2.88 cups/week, egg consumption was 0.07 cups/week, egg white consumption was 0.18 cups/week, whole egg consumption was 2.59 cups/week, egg with fat consumption was 1.73 cups/week, and egg salad consumption was 0.24 cups/week. Used as continuous variables, a higher consumption of total egg, whole egg, egg with fat, or egg salad was associated with a significantly increased risk for GDM. Pregnant individuals who consumed eggs 3 times per week or more had a higher risk of GDM (14.2% vs 4.3%; confounder-adjusted OR, 4.80 [95% CI [2.02-11.41]; P-value<0.001), compared to those who never consumed. Pregnant individuals who consumed whole eggs 2+ times per week had a higher risk of GDM (10.9% vs 4.5%; 3.04 [1.48-6.27]; P-value<0.001), compared to those who never consumed. Pregnant individuals who consumed eggs with fat 2+ times per week had a significantly higher risk of GDM (10.8% vs 5.4%; 2.46 [1.41-4.28]; P-value<0.001), compared to those who never consumed. However, used as either continuous or categorical variables, the consumption of egg substitutes or egg whites was not associated with the risk of GDM. High-frequency consumption of whole eggs, eggs with fat, or egg salad was a risk factor for GDM, but consumption of egg substitutes or egg whites was not a significant contributor to the risk of GDM.

## EFFECTS OF TRANSCRANIAL MAGNETIC STIMULATION FOR TREATMENT RESISTANT DEPRESSION ON PHQ-9 AND COGNIVUE® COGNITIVE ASSESSMENT SCORES

**Dominic Occhino, Jarod Masci, MD**

Transcranial Magnetic Stimulation (TMS) is an FDA-approved treatment for patients with Major Depressive Disorder experiencing treatment resistant depression (TRD). TMS generates small electromagnetic fields to target and stimulate neurons in the left dorsolateral prefrontal cortex (LDPFC). The administration of these magnetic pulses is thought to increase blood flow, oxygen use, and glucose metabolism in an area of the brain associated with cognitive functions including executive functioning and mood regulation. Through the strengthening of neuronal connections and promotion of neuroplasticity, one could predict a concurrent increase in cognitive functioning along with a decrease in symptoms of depression. The purpose of this study is to examine the effects of TMS treatment on self-reported symptoms of depression as well as cognitive function as measured by PHQ-9 health questionnaires and Cognivue computerized assessments, respectively. It is hypothesized that along with a decrease in PHQ-9 scores, patients undergoing this treatment will also see an increase in Cognivue scores. This was measured by collecting and analyzing these scores from patients receiving TMS treatments prior to the first treatment, halfway through treatment, and after the final treatment. We found partial support for our hypothesis as the data showed a statistically significant decrease in depressive symptoms ( $F=26.44$ ,  $P=.000005$ ), but no significant change in Cognivue score ( $F=1.998$ ,  $P=.16$ ). This is a topic that warrants further investigation as the effects of TMS on cognitive function is valuable towards understanding its current and future uses.

## **EARLY BBN-INDUCED PROLIFERATION IN MALE AND FEMALE MICE BLADDERS AND ASSOCIATED TRP53 MUTATIONS**

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Bladder cancer is one of the most common cancers in the US, with an estimated incidence of over 82,000 in 2023 and a higher prevalence in men. Carcinogen exposure is the most significant risk factor for bladder cancer development in men and women. N-butyl-N-(4-hydroxybutyl)nitrosamine (BBN) is a cigarette smoke-mimicking carcinogen that can induce urothelial cell proliferation and invasive bladder cancer in preclinical models. Trp53 is a commonly mutated tumor suppression protein in the context of many cancers, though early mutations found in developing tumors regarding Trp53 have not been highly investigated. C57/BL6Tac mice were exposed to BBN through drinking water for 4 or 12 weeks (wk) to evaluate sex differences in urothelial proliferation and bladder pathologies. Bladder specimens were sectioned and stained for Ki67, indicating proliferation, and for Trp53, indicating Trp53 mutation. Trp53 mutations induced by BBN were determined in invasive bladder tumors. 4-wk male mice demonstrated increased proliferation and progressive pathologies compared to 4-wk female mice, while 12-wk female mice demonstrated increased progression compared to 12-wk male mice, indicated by increased Ki67 staining in a continuous basal layer pattern. A higher percentage of 4-wk and 12-wk male mice bladders had clonal expansions containing Trp53 mutations compared to female mice of the corresponding exposure period. Genetic analysis of mutated Trp53 showed that the most common mutation of Trp53 was a P148S and H176Q mutation in male and female mice, respectively. The similar advanced proliferation pattern found in the 12-wk female mice and the 4-wk male mice demonstrates earlier bladder tumor progression in male mice and suggests that male mice may have intrinsic mechanisms that increase the progression of bladder tumors or a possible suppression in female mice. Additionally, a higher majority of continuous basal staining in 12-wk female mice compared to 12-wk male mice can be explained by a larger portion of the 12-wk male mice having progressed to urothelial carcinoma in situ (UCIS) by that timepoint. With the prevalence of specific amino acid changes in tumors, these early changes could be identified and utilized to screen for changes in normal bladder urothelium to detect early bladder precancer.

## DIALYSIS STAFF PERCEPTIONS OF ANIMATED VIDEO EDUCATION ABOUT KIDNEY TRANSPLANTATION

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**Background.** Video education at dialysis centers could be delivered by any staff member to patients without additional workload burden and accessed by staff to learn themselves; however, usage may depend on perceived value of the content. An online prepost study tested dialysis staff satisfaction with previously developed patient-facing educational animations and feasibility of the program to change unhelpful perceptions about kidney transplantation. **Methods.** Dialysis staff in Western New York, invited via email or self-responding to flyers, viewed 8 sequential videos for 19:36 minutes remotely on their own device. Eight kidney transplant perception questions targeted to the intervention were scored using 4-point likert scales anchored by strongly agree and strongly disagree. The difference in prepost means were compared using p values. Effect sizes were calculated from Z scores. **Results.** A total of 22 dialysis staff participated (8 nurses, 6 social workers, 2 technicians, 3 dieticians and 3 other). Over 90% indicated positive ratings of the videos on anticipated helpfulness to patients, recommending to patients, and using to learn about transplantation themselves (Figure 1). Effect sizes (ranged between 0 and 0.62) suggested potential effectiveness for changing transplant perceptions (Table 1). **Discussion.** This brief animated video education has the potential to improve dialysis staff perception of kidney transplantation and to be used both for patient and staff education. A subsequent implementation study to investigate the impact of health setting on uptake and effectiveness is being prepared.

## **Penile Replantation: A Review of Microsurgical Techniques, Patient Outcomes, and Potential Solutions to Complex Reconstructive Challenges**

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**Background:** Penile amputation, a rare yet critical urological emergency, presents a formidable challenge in urological reconstructive surgery. Historically, the management of this condition has evolved significantly from local amputation site repair to the current gold standard of microsurgical replantation. This study aims to review recent microsurgical techniques employed in penile replantation, patient outcomes, and innovative solutions to the complications inherent to this urological emergency.

**Methods:** The PubMed, EMBASE, and Cochrane databases were queried for papers published between January 1st, 2015, and December 31st, 2023 with the following terms: “penis replantation,” “penile replantation,” “penis replant,” and “penile replant”. Studies that reported postoperative outcomes of at least one case of penile replantation after amputation were included. Extracted case parameters included psychiatric comorbidities, substance use, amputation classification (partial vs. complete), and anastomosed vessels. Outcome parameters investigated included erectile function, sensation, voiding capabilities, and postoperative necrosis. Particular attention was devoted to the discussion of each publication to identify solutions to inadequacies in patient outcomes.

**Results:** Query yielded 98 articles; 37 articles with a total of 46 cases were included. Most of the patients were adults (n=35, 76.1%) and the majority of the cases of pediatric penile amputation occurred during circumcision (9/11, 81.8%). Psychiatric comorbidities included psychotic disorders (n=12), depression (n=6), and substance use/abuse (n=4). Penile necrosis was the most common postoperative complication and occurred in 56.5% (n=26) of cases. Innovative solutions to pre-, intra-, and postoperative challenges were classified based on their purpose, which included alternative urinary drainage, neurovascular management, vascular monitoring, urinary management, cavernosal reconstruction, urethral assessment/stenosis, venous congestion, postoperative necrosis and tissue reconstruction, and erectile dysfunction.

**Conclusion:** Penile replantation presents as a rare and daunting challenge for reconstructive urologists, especially given the lack of standardized guidelines. This study serves as a comprehensive review of a breadth of microsurgical and postoperative therapies that reconstructive urologists and plastic surgeons can utilize to improve patient outcomes.

## COMPARISON OF VOLK AND PHELCOM HAND-HELD PORTABLE FUNDUS CAMERAS FOR THE IDENTIFICATION OF COMMON RETINAL DISEASES

Authors: **Baltaj Sandhur, BS**, Charles Zhang, MD, Cameron McGlone, MD, Robert Finley, MD, Sinan Ersan, BS, Brian Madow, MD, PHD

As the US population ages, there is an increasing demand for accessible retinal care. Tele-retinal imaging has emerged as a potential solution; however, the availability of traditional ophthalmic equipment and dedicated imaging staff is often unavailable in non-ophthalmic provider clinics. We aim to assess the ability of hand-held, cell-phone based fundus cameras made by Volk and Phelcom to determine their effectiveness to diagnose common retinal conditions.

Patients were examined by dilated fundus exam and given a formal diagnosis. Individuals with normal maculas, non-proliferative and proliferative diabetic retinopathy, intermediate and advanced age-related macular degeneration, and retinal vein occlusion were included in the study. A single operator imaged each patient until a satisfactory, fovea centered image was obtained with both cameras. Images were then screened for excessive artifacts by a retinal attending prior to subsequent analysis. All images were then assessed by 3 blinded individuals to determine if any condition was present on the images. Secondary analysis focused on diabetic eyes for staging.

A total of 108 eyes had images obtained using both cameras. The Phelcom camera had a significantly higher proportion of artifact-free images (94% vs 54%,  $p < 0.0001$ ). Looking at overall diagnostic accuracy, there was no significant difference between the two cameras in the combined data (62% for Phelcom vs 54% for Volk,  $p = 0.11$ ); however, the Phelcom showed a notably higher accuracy rate in one individual (51% vs 33%,  $p = 0.03$ ). When assessed by the formal diagnosis made by DFE, only patients with normal maculas were found to have a higher rate of accuracy in the Phelcom images (69% vs 47%,  $p = 0.045$ ). Intra-user consistency was moderate ( $k = 0.512$ ); however, inter-user consistency was poor ( $k = 0.088$  for Volk and  $k = 0.270$  for Phelcom). Secondary analysis staging diabetic retinopathy found that the Phelcom had significantly higher accuracy (59% vs 44%,  $p = 0.03$ ). This was primarily due to overreading in the Volk group (36% vs 19%,  $p = 0.0005$ ).

The overall effectiveness of both cameras in generating images leading to correct diagnoses was poor. Despite lower rates of image rejection by the Phelcom device, it still has an unacceptably low rate of accuracy. Both devices also performed poorly for diabetic screening.

## ROLE OF OXYTOCIN RECEPTOR IN PANCREATIC DUCTAL ADENOCARCINOMA CANCER ASSOCIATED FIBROBLASTS.

**Johann Schwarz**, Aditi Chaubey PhD, Michael Feigin PhD

Pancreatic cancer is the tenth most common diagnosed cancer in the United States with a 5-year survival rate of only 12.5%. The most common form of pancreatic cancer (>90% of cases), Pancreatic Ductal Adenocarcinoma (PDAC), has been unresponsive to many conventional therapeutic techniques, due in part to its dense stroma. This dense stroma has been a recent area of therapeutic interests, it is comprised primarily of cancer associated fibroblasts (CAFs). CAFs have also been subtyped into myofibroblastic (myCAFs), inflammatory (iCAFs), and antigen presenting (apCAFs). These subtypes seemingly cause different tumor phenotypes, although this field is rapidly evolving. The oxytocin receptor gene (OXTR), a GPCR, has been shown to be overexpressed in the myofibroblastic subtype of CAFs (myCAFs). To analyze the effect of OXTR in CAFs and its further effect on pancreatic cancer cells, a proliferation study was conducted where conditioned media from CAF cells, which had been treated with Atosiban (OXTR antagonist), Carbetocin (OXTR agonist confirmed by increased activity of MAPK/ERK pathway on western blot), or OXTR siRNA (confirmed with qPCR), was used to grow PDAC cells. No significant change in PDAC proliferation rate was observed, implying that OXTR expression in CAFs does not play a role in PDAC proliferation. To analyze the effect of OXTR in CAFs on tumor stromal restructuring a collagen gel contraction assay was run using wild type CAFs and OXTR knock down CAFs treated with Atosiban and Carbetocin. The amount of gel contraction was not significantly altered between control and experimental groups. To analyze the effect of OXTR on CAF subtyping, qPCR analysis of RNA extracted from the OXTR knockdown CAFs showed decreased levels of oxytocin receptor and smooth muscle actin, a marker of myCAFs, and an increase in Interleukin-6 and Lysyl oxidase, both markers of iCAFs. This implies that OXTR may have a role in the subtyping of CAF cells. The influence of OXTR on the subtyping of CAF cells is promising, and although a phenotypic change has not yet been observed, future studies are planned to determine if other oncogenic processes are being affected by OXTR expression and activation.

## IMPACT OF RADIOLOGISTS AND PATHOLOGISTS ON THORACIC MULTIDISCIPLINARY CANCER CONFERENCES

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Lung cancer remains the leading cause of cancer death in the U.S and globally; surpassing breast, colon and prostate cancer combined. Despite improvements in lung cancer treatments, survival of patients with advanced stage remains low. Multidisciplinary Cancer Conferences (MCCs), a forum for discussing cancer cases, improves survival. MCCs participants include medical, surgical and radiation oncologists, pathologists, radiologists, and other healthcare professionals that collaborate to formulate diagnostic and treatment plans. Access to accurate, complete, and relevant information is critical to effective participation in case discussion. This study explored the roles and impact of radiologists/pathologists and technology on the work of thoracic MCCs. Understanding their role in MCCs and improving their contribution to case discussion and treatment planning should result in improved quality of care and patient outcomes. We conducted semi-structured interviews and observational study. The subjects included three radiologists/three pathologists who participated in the Thoracic MCCs at Roswell Park Comprehensive Cancer Center. Using narrative analysis of the interview records, we explored their views on Thoracic MCCs. We utilized observational data of thoracic MCCs collected prospectively before and after introduction of NAVIFY<sup>®</sup> Tumor Board Solution using a validated performance assessment tool. A narrative analysis of interview transcripts revealed that pathologists leverage clinical and morphologic/molecular information to provide diagnostic and prognostic insights and to guide treatment decisions. Radiologists help with differential diagnoses, and planning radiation or surgical treatment. Technology can extend the benefits of MCCs to underserved communities. Additionally, AI-driven technology may optimize preparation/presentation of cases at MCCs by accessing digitalized patient records. Overtime, MCCs refine radiologists'/pathologists' insights into clinical care planning. The observational data showed an increase in the quality of presentation by radiologists/pathologists post-NAVIFY (pre vs post mean scores: 3.5 vs 4.8;  $p < .001$  and 3.2 vs 4.4;  $p < .001$ , respectively). Radiologists' participation in case discussions increased (pre vs post: 8.5% vs 19.2%;  $p < .020$ ). In conclusion, radiologists/pathologists provide impactful insights into care planning at MCCs. AI technology can be leveraged to further increase the efficiency of MCCs. Technology can extend the benefits of MCCs to underserved populations.

# Identifying Literature on Long-Term Clinical Outcomes after Shoulder Arthroplasty using Uncemented Humeral Stems

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**Introduction:** . As this shift occurs it remains important to validate the efficiency of these devices; while the short-term and mid-term outcomes have shown promise[1], there also needs to be a comparison in the long-term. Current literature suggests a limited exploration of these long-term outcomes. This paper seeks to explore the presence of studies surrounding long-term outcomes for use of uncemented humeral stems in shoulder arthroplasty.

**Methods:** Studies were stratified given their focus on stem length. “Long-term” outcomes in the literature typically centered around 10 (ten) years, while mid-term centers around 5 years and most studies operate with a minimum 2-year follow-up. Studies were separated regarding inclusion of cemented, uncemented, or both, noting alternative terms such as “press-fit” for uncemented stems. Data noted includes the sample size of patients with full radiologic work-up, revision rates and clinical outcomes including stress shielding. Pub-Med and Web of Science were queried using relevant search terms in June 2023.

**Results:** Results yielded 5 long-term, mostly retrospective studies conducted after use of standard-length humeral stems on populations of 40 and upwards of 1000 cases. While most papers noted favorable long-term clinical outcomes regarding revision rates in humeral stems [2], particularly with an uncemented humeral component, issues still arise regarding presence of radiolucent lines and survivorship of the stem. Another noteworthy finding is that all five of these studies were done in Europe in the last 5 years. Papers surrounding short stem and stemless were found to be only short-to-mid-term studies with discussions suggesting long-term studies are needed. This information would translate clinically to determine whether these rapid changes in design and affixation of stems are necessary across all fields.

**Conclusions:** It is to be noted that while these studies exist, they are not fully comprehensive or representative of the global population. There is a paucity of long-term studies detailing humeral stem survival. Current literature demonstrates survival rates around 75%, but even this figure ranges vastly between papers. Future studies should focus on unveiling a cost benefit analysis of humeral stem affixation and design by identifying survival and revision rates as well as the most common reasons for failure, from scapular notching to stress shielding.

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## Effect Of Ticketing Rates On Pediatric Motor Vehicle Crashes In New York State: A County-based Analysis

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**Background:** From 2010 to 2019, injury has been the leading cause of death for children and teens aged 0-19 in the United States. The most prevalent cause of deaths due to unintentional injury came as a result of motor vehicle crashes (MVCs). Prior studies have found restraint nonuse/misuse, rural roads, vehicle type, and red-light camera policy to be associated with pediatric MVC mortality rates. Our study aims to assess the effect of traffic ticketing rates in New York State on MVCs that include child passengers as a consensus opinion is absent from the literature. **Methods:** Using data from the New York State Traffic Safety Statistical Repository, we identified pediatric-involved crashes by county (age < 16 years). We also collected data on police force size, median household income, and population density. We tabulated the total number of pediatric-involved crashes and calculated the correlation between ticketing rates and pediatric-involved crashes. We then examined yearly ticketing rates by county using a negative binomial regression model, controlling for police force size, median household income, and population density. **Findings:** From 2011 to 2020, there were 84,947 pediatric-involved MVCs in New York State. Overall, pediatric-involved crashes were negatively associated with ticketing rates (Tickets/ 10,000 Population,  $r = -0.24$ ), but positively associated with total tickets issued ( $r = 0.935$ ). According to the multivariate negative binomial model, counties that have a higher ticketing rate also have a slightly lower incidence of crashes involving pediatric passengers ( $p < .001$ ). **Conclusions:** These findings suggest that increased ticketing rates may have a limited but protective effect by decreasing the number of crashes involving a pediatric passenger.

## **ELEVATED LIVER ENZYMES AT THE TIME OF DECEASED DONOR ORGAN DONATION DO NOT AFFECT RECIPIENT OR PANCREAS ALLOGRAFT SURVIVAL FOLLOWING PANCREAS TRANSPLANTATION**

**Evan M. Sood, BS**, Fernando Bomfim, MS, Abigail Delmonte, BS, Kendall DeSantis, BS, Naoru Koizumi, PhD, Rosy James, BS, Robert Plews, MD, Jorge Ortiz, MD

Due to a shortage of suitable pancreata and the underutilization of pancreas allografts, recent efforts have focused on determining whether donor selection criteria should be modified or expanded to accept more marginal donors. While other donor factors have been analyzed previously, there is a lack of data on the association of liver function tests (LFTs) with pancreas transplantation outcomes. Understanding their contribution may help to broaden the currently restricted donor pool. A retrospective analysis was conducted utilizing pancreas transplantation data from the United Network for Organ Sharing (UNOS) database, covering the period between January 2010 - June 2022. The exposure variable, LFTs, included total bilirubin, aspartate aminotransferase (AST), and alanine aminotransferase (ALT) levels. The primary outcomes assessed were graft failure and mortality, measured up to three years post-transplant. To determine whether LFTs were associated with an increased risk of graft failure and mortality, multivariable cox regressions were performed. Overall, 9,391 pancreas transplants were completed during the evaluation period. The breakdown of procedure type was as follows: 7,876 (83.9%) simultaneous pancreas-kidney transplants (SPK), 848 (9.0%) pancreas after kidney transplant (PAK), and 667 (7.1%) pancreas transplant alone (PTA). The median follow-up time was 1,387 days (3.8 years). Multivariate analysis showed no association between donor AST values > 500 U/L and increased rates of graft failure (hazard ratio [HR], 1.06; p = 0.755) or mortality (HR, 0.96; p = 0.886). Similar findings were noted for donor ALT values > 500 U/L (HR, 1.09; p = 0.599 and HR, 0.95; p = 0.831, respectively). There was no correlation with graft failure (HR, 1.13; p = 0.352) or mortality (HR, 0.85; p = 0.410) for total bilirubin levels > 3 mg/dL. In summary, LFTs in the deceased pancreas donor were not associated with increased risk of graft failure or mortality following pancreas transplantation. These findings suggest that elevated LFTs in the pancreas donor should not serve as an absolute contraindication to transplant. We advocate for more widespread utilization of pancreata from these donors with the goal of improving match allocation sequence and shortening time spent on waitlists.

## **Adipofascial Anterolateral Thigh Free Flap in Head and Neck Reconstruction -a Case Series**

### **Abstract**

**Importance:** The adipofascial anterolateral thigh (AF-ALT) free flap is an emerging reconstructive tool in head and neck surgery, but information on its application in salvage laryngectomy, skull base, and maxillectomy reconstructions is limited. This study aims to expand on current knowledge by reporting our experience with these novel applications.

**Objective:** To evaluate the feasibility, outcomes, and donor site morbidity of the AF-ALT free flap in head and neck reconstruction, with a focus on salvage laryngectomy, skull base, and maxillectomy defects.

**Design:** Retrospective review of patients who underwent reconstruction using the AF-ALT free flap.

**Setting:** Roswell Park Comprehensive Cancer Center between July 2019 and January 2023.

**Participants:** Six patients (4 males, 2 females) with a mean age of 54 years (range, 26-79) and mean body mass index of 34.8 (range, 20.4-58.4).

**Interventions/Exposures:** Patients underwent reconstruction with the AF-ALT free flap for onlay flaps following salvage total laryngectomy defects (n=2), maxillectomy (n=2), and anterior skull base defects with orbital exenteration (n=2).

**Main Outcomes and Measures:** Surgical and functional outcomes, free flap outcomes, and donor site morbidity.

**Results:** The average follow-up was 7.8 months. No flap failures, partial flap necrosis, or flap take-backs were observed. Two patients who received the AF-ALT flap for orbital exenteration defects required a small split-thickness skin graft for external cover; one (50%) experienced partial skin graft loss. Postoperative infection occurred in 2 (33%) patients, with one requiring operative washout. No cerebrospinal fluid leaks or salivary leaks were observed. One patient (17%) experienced partial skin loss at the donor site, managed conservatively. No other donor site morbidity was noted.

**Conclusions and Relevance:** This study supports the use of the AF-ALT free flap in head and neck reconstruction, including complex anterior skull base, orbital exenteration, and salvage laryngectomy defects. The flap demonstrates a robust vascular supply, versatility in harvest and inset, and limited donor site morbidity, even in patients with high BMI. Future studies with larger sample sizes and longer follow-up periods will provide further guidance on its utility in these applications.

## **RADIATION SAFETY AMONG FEMALE ORTHOPAEDIC SURGEONS: A SURVEY OF PROVIDER KNOWLEDGE AND PRACTICES**

**Alexandra Spath, BS**; Isabel Wolfe, BS; Isabel Chalem, BS; Michael Alaia, MD; Jaqueline Brady, MD; Mary Mulcahey, MD

As the number of females entering the field of orthopaedics increases, more attention will be paid to the safety of radiation, including those surrounding risks implicit to female surgeons. The purpose of this study was to survey a cross-section of U.S. female orthopedic surgeons evaluating their education and attitudes on radiation safety and adherence to safety recommendations. An online survey was distributed to female orthopaedic surgery faculty. The first component of the survey gathered demographic information including practice setting, US state, and years in practice. The second component was 10 question knowledge assessment. The third component captured personal experiences among respondents including satisfaction with radiation safety training, radiation safety practices, and level of concern regarding exposure risk. Data were collected using REDCap (Research Electronic Data Capture). Sixty-six female orthopaedic surgeons from 21 states completed the survey. Regular dosimeter usage was reported by 24.2% of respondents, and 36.4% of respondents reported always having well-fitted radiation protective equipment provided. The majority (56.1%) stated that they worry about the risks of radiation to their health. Regarding their radiation safety training, 60.6% of respondents rated their training as unsatisfactory or extremely unsatisfactory, and 90.9% of respondents stated that they think training efforts for radiation safety can improve. Female orthopaedic surgeons need advancements in radiation safety training, particularly regarding health and pregnancy risk. Assessment of radiation safety knowledge and personal adherence to guidelines can promote improvements in safety measures and increase confidence of female orthopaedic faculty in their safety and knowledge of radiation exposure.

## “I’M NOT A BAD MOTHER.” PERCEPTIONS OF STIGMA AMONG MOTHERS WITH SUBSTANCE USE DISORDER IN THE CRIMINAL JUSTICE SYSTEM

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**Background:** Between 1980 and 2019 the rate of incarceration among women has increased by 700%, with most being of reproductive age. Justice-involved women are more likely to be the primary caretaker of children compared to men. Women also have higher rates of substance use disorder (SUD) and psychological distress than men. Mothers with SUD in the criminal justice system face a triple stigma: justice involvement, SUD, and negative societal views about their parenting ability.

**Objective:** To explore the experiences of justice-involved pregnant and parenting women with SUD and how they conceptualize their roles as mothers. To uncover contextual factors (barriers and facilitators) affecting social supports, access to care, and resources.

**Methods:** Researchers performed semi-structured qualitative interviews and brief demographic questionnaires with justice-involved mothers with SUD. Participants were recruited from a women’s residential treatment center, outpatient behavioral health clinics, and drug treatment courts. Qualitative analysis entailed inductive thematic content analysis and coded line-by-line in ATLAS-ti. Demographic variables were summarized with descriptive statistics.

**Results:** Twenty women participated in the study. Women’s perceived stigma about being a justice-involved mother with a SUD permeated the interviews and cut across themes. Stigma is defined as a social construction resulting in devaluation of individuals or groups based on particular characteristics. Four themes of stigma were identified corresponding to Bos et al.’s interrelated categories of stigma: self stigma, public stigma, structural stigma, and stigma by association.

**Conclusion:** The perceived stigma felt by these mothers may serve as a barrier to seeking care. Future efforts should investigate ways to minimize these feelings of stigma through provider education and patient empowerment.

## Management And Outcomes of Patients with Ta Low Grade Urothelial Carcinoma of the Bladder with Focal High-Grade Features

### Abstract

**Objectives:** To describe the management and outcomes of patients with Ta predominantly low-grade urothelial carcinoma with focal high-grade features (FHG) (<5%), compared to those with Ta low grade (LG) and Ta high grade (HG).

**Methods:** Retrospective review of all patients who underwent transurethral resection of bladder tumor (TURBT) between 2005 and 2023. Patients with Ta disease were identified and categorized into LG, FHG, and HG. Kaplan Meier method was used to depict high-grade recurrence, T-stage progression, and radical cystectomy-free survival.

**Results:** 449 patients with Ta disease were identified (LG 48%, FHG 12%, and HG 40%). Patients with FHG (32%) had a second-look TURBT more frequently compared to LG (7%) and HG (29%) ( $p<0.01$ ). They received intravesical therapy more frequently compared to LG (36% vs 20%) but lower than HG (55%) ( $p<0.01$ ). They received radical cystectomy less frequently (7% compared to 20% for HG and 11% for LG,  $p=0.01$ ). HG recurrence-free survival at 1, 3, and 5 years was HG (68%, 52%, and 43%), FHG (74%, 53%, and 49%), and LG (87%, 79%, and 73%) (log-rank  $p<0.01$ ). T progression-free survival at 1, 3, and 5 years was HG (84%, 77%, and 70%), FHG (92%, 82%, and 82%), and LG (94%, 89%, and 85%) (log-rank  $p=0.02$ ). Cystectomy-free survival at 1, 3, and 5 years was HG (92%, 84%, and 80%), FHG (96%, 94%, and 94%), and LG (99%, 95%, and 92%) (log-rank  $p<0.01$ )

**Conclusion:** Patients with Ta FHG seem to behave more like Ta HG disease in terms of high-grade recurrences, but they are less likely to experience T stage progression and convert to cystectomy.

# IMMEDIATE EFFECTS OF ACOUSTIC BLAST OVERPRESSURE ON CORNEAL ENDOTHELIAL CELLS

**Umair Syed, Varinda Nayyar, Bryan Calle Gonzalez, Sangita Patel, MD PhD**

The cornea plays a vital role in vision by focusing light rays onto the retina. The corneal endothelial cell layer is a single, non-proliferative cell layer that lines the internal surface of the cornea and regulates corneal hydration allowing for the maintenance of corneal clarity. Damage to this layer can lead to corneal clouding requiring corneal transplantation. Not much is known about how blast exposure affects corneal endothelial cells, however, preliminary data from the Patel lab showed that acoustic blast overpressure trauma (blast without projectile) causes damage to the corneal endothelial filamentous actin cytoskeleton arrangement, tight junctions, and mitochondrial arbor and causes a reduction in corneal endothelial cell density. Clinically, initial blast injury may not be apparent due to the functional reserve of the corneal endothelium, however, subsequent complications from blast exposure (eg traumatic glaucoma, cataracts) can lead to further decline of the corneal endothelium and result in the need for corneal transplantation. The aim of this study was to determine the immediate cellular effects of acoustic blast overpressure on corneal endothelial cells by evaluating necrosis and apoptosis, the actin cytoskeleton, and mitochondrial architecture. We hypothesized that the greatest, immediate changes would be to the corneal endothelial actin cytoskeleton in eyes exposed to acoustic blast overpressure trauma as compared to paired control eyes. Experiments were conducted on human eyes within 24 hours post-mortem. One eye was exposed to a blast exposure from an acoustic blast generator set at 40 psi while the other was prepared in parallel and kept as a control. Immediately upon blast exposure, the corneas were removed and analyzed with trypan blue stain, mitotracker, apoptosis assay, and actin stain. Compared to the prior preliminary data, in our 3 experiments, we found minimal endothelial damage with any of our assays. In follow-up experiments, we have determined that the mechanics of the blast set up (brass vs plastic film) and structure of the eyeball holder significantly influence the outcome of the blast on the corneal endothelium. We are now repeating these experiments with more stringent blast set-up (brass foil only) and eyeball holder specifications (eyeball situated in ballistic gelatin).

## CHARACTERIZATION OF THE MOLECULAR GENETIC MECHANISM OF THE *CHRFAM7A* INVERTED ALLELE

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*CHRFAM7A* is a human-specific fusion gene comprised of a fusion between *CHRNA7* (alpha 7 nicotinic acetylcholine receptor) and *ULK4* (an ULK kinase). This gene is found in 99% of the human population and has robust associations with many neuropsychiatric disorders. The gene can be found in either direct or inverted orientations (both of which are equally prevalent in the population), but only the direct orientation is translated and incorporated into the  $\alpha 7$  nicotinic acetylcholine receptor ( $\alpha 7$ NACHR). The mechanism of the inverted allele, meanwhile, remains uncertain, though it has been shown to be strongly associated with diseases such as schizophrenia. We hypothesized that the inverted allele functions through an RNAi mechanism targeting either *CHRNA7* or *ULK4* (the two genes involved in the fusion gene). We used isogenic iPSC cell lines and neuronal progenitors to compare *CHRNA7* expression in null (UB068) versus inverted *CHRFAM7A* (UB068\_Δ2bp) cell lines. We found that *CHRFAM7A* expression did not affect *CHRNA7* gene expression. We then conducted immunoprecipitation studies with anti-*CHRFAM7A* and anti- $\alpha 7$ NACHR antibodies to detect translation of *CHRFAM7A* and *CHRNA7* in null versus inverted lines. We found that *CHRFAM7A* was not translated in the inverted line, and that translation of *CHRNA7* did not differ between the null and inverted genotypes, suggesting that the inverted allele does not regulate *CHRNA7*. Genome browser bioinformatic analysis of *CHRFAM7A* yet again predicted that the inverted allele is not translated, suggesting an RNA level mechanism of action. A 19bp sequence of the inverted allele was found to align with the *ULK4* gene on chromosome 3, suggesting targeting of *ULK4*. qPCR was used to quantify expression of *ULK4* long and short isoforms in null versus inverted lines. We found that the inverted allele displays skewing of long to short isoform ratio, with the inverted cell line demonstrating a higher expression of the long isoform of *ULK4*. These results are consistent with the hypothesized RNAi regulatory mechanism of the *CHRFAM7A* inverted allele and suggests that the inverted allele regulates *ULK4* expression. Improved understanding of this inverted RNAi mechanism will hopefully provide context for why the inverted allele holds such strong associations with neuropsychiatric disease.

## ACUTE CHANGES IN ERYTHEMA AND EDEMA IN SKH1 MICE AFTER UV IRRADIATION

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After UV exposure in human skin, erythema is considered the best clinical measure of acute effects, and minimal erythema dose is the time-tested measure of photosensitivity. However, in murine models, the validity of erythema as a measure of acute UV response has been questioned. Furthermore, a comprehensive assessment of acute UV changes in SKH1 mice, the most frequently used model, is lacking. Accordingly, our preliminary work aimed to elucidate the timeline of erythema and edema after acute UV irradiation in the SKH1 mouse model.

Four SKH1 mice were irradiated with either a solar-simulated UV or UVB light into seven distinct areas with the following light doses: 0 (control), 50, 100, 200, 300, 400, or 800 mJ/cm<sup>2</sup>. Post-UV cutaneous features were assessed at 4, 6, 8, 10, 24, 48, and 72 hours after UV irradiation. Gross photographs were taken with Canon DSLR cameras. The erythema index was determined with a cutaneous colorimeter (SkinColorCatch, Delfin Technologies). High-frequency ultrasound (HFUS, Dermus SkinScanner, Dermus Ltd.) determined skin thickness as a surrogate measure of edema.

Erythema peaked at 4-8 hours, most prominently in the 400-mJ irradiated area in the UVB group, and less apparently in mice treated with a solar simulator. As a measure of edema, acute skin thickening was detected within 4 hours in some areas treated with UV light exposure and more prominent with Solar Simulator treatment. Crusting and a repeat increase in redness ensued 48 hours after exposure during the subacute phase of UV response, most evident in the solar-simulated areas. These subacute changes paralleled the continued slow increase in skin thickness. Our results suggest that early edema after UV exposure masks epidermal erythema in SKH1 mouse skin, making acute erythema an unreliable measure of UV effects. We showed that skin thickness can be efficiently measured with HFUS in mouse skin and is a more reliable measure of acute UV effects than erythema.

## UNIDOS POR LA SALUD: A PATHWAY TO IMPROVING LATINO HEALTH IN BUFFALO

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Language concordance is associated with improved quality in health care delivery and public health outcomes. Medical providers who can communicate with Spanish-speaking patients are in high demand, particularly in Western New York where there is a significant shortage. Consequently, medical students training in the region represent the ideal target audience for a medical Spanish program. All first year UB medical students were invited to participate in our medical Spanish pilot program. Participants are required to attend eight student-led classes throughout the 2023-2024 academic year. All sessions are structured similarly and encompassed vocabulary review, case presentation, live-demonstrations, and 1:1 practice. Baseline language proficiency was assessed using the interagency language roundtable (ILR-H) modified scale for physicians. Self-reported confidence levels were obtained before and after each class. Overall, 45% of the first-year class (84 students) expressed interest for 40 spots available. Ultimately, thirty-nine were enrolled. Among them, 87% were female and 46% were white 15% were Hispanic or Latino and 82% reported having received formal Spanish training though none spoke Spanish at home. At baseline, 41% rated their Spanish language competency as “Fair” or better on the ILR-H scale. Students in this category reported significantly higher mean confidence scores at the start of the program (5.6 vs 2.0) compared to their less proficient counterparts. Preliminary results at 12 weeks (4 classes) demonstrate improvement among all participants, emphasizing the program's effectiveness in fostering linguistic competence and bolstering confidence among participants. However, participants with higher baseline proficiency tended to benefit more from the intervention. There was notable participation among first-year medical students, indicating a keen interest in enhancing language proficiency among aspiring healthcare professionals in Buffalo. The overall benefits of medical Spanish classes extended to all students but those with higher baseline proficiency appear better positioned to succeed within the limited timeframe available to complete such programs. We look forward to tracking these trends through the remaining four classes throughout the Spring 2024 semester.

# EXAMINATION OF SOCIAL DETERMINANTS OF HEALTH AND THEIR INFLUENCE ON PRESENTATION AND OUTCOMES AMONG PATIENTS UNDERGOING SURGERY FOR ADOLESCENT IDIOPATHIC SCOLIOSIS

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Social determinants of health are nonmedical factors that influence health outcomes among patients. Many studies have demonstrated that prompt recognition of adolescent idiopathic scoliosis and referral to pediatric specialist can mitigate the need for surgical intervention. However, there has been minimal investigation into the influence the SDOH have on the progression of the condition from presentation to surgical intervention. The purpose of this study was to analyze the influence of social determinants of health on the severity of AIS at presentation and prior to surgery, while also examining their influence on outcomes following surgery. A retrospective chart review was performed on 129 patients who underwent posterior spinal fusion for adolescent idiopathic scoliosis between January 2014 to April 2023 at level I pediatric center. Demographics, including race, age at presentation, median income for zip code, and insurance status, were collected for each patient, along with Risser score, Cobb angles, and medical conditions. Additionally, intraoperative, perioperative, and postoperative data was collected for each patient. Student's t-tests, ANOVA, pairwise comparisons, and descriptive statistics were performed utilizing Matlab r2022b. The average age among the 129 patients was 11.7 ( $\pm 0.22$ ) years. 76.0% (n=98/129) were female. Race (p=0.61), type of insurance (p=0.46), and median annual income for zip code (p=0.39) were not significantly associated with age at presentation. Median annual income for significantly associated with greater Cobb angles at presentation (p=0.004) and lower number of follow up appointments (p=0.009). Race was significantly associated with emergency department admission following surgery (p=0.02). Anxiety and depression were significantly associated with longer length of ICU stays (p=0.01). Cobb angle at time of surgery was significantly associated with longer length of intensive care unit stays (p<0.001). Age of presentation was not influenced by SDOH factors, while patients with lower median annual zip code incomes presented with larger Cobb angles and attended fewer follow up visits. Income creates a barrier to attending the physician's office, both prior to and after surgery. Further work should be geared towards removing barriers to allow all patients to present with similar curves and continue follow-up after surgery.

## **PRO-FIBROTIC GENE EXPRESSION IS OBSERVED THROUGHOUT THE LEFT VENTRICLE IN A PORCINE MODEL OF MULTI-VESSEL CORONARY ARTERY DISEASE**

**Alexandra Wadhvani**, Emily R. Hudson, Luke Graser, and Brian R. Weil, PhD

Using implantable telemetry, we recently found that transient elevations in preload are common in swine with multi-vessel coronary artery disease (MV-CAD), presumably from intermittent demand-induced myocardial ischemia. Based on prior evidence that repetitive preload elevation can lead to interstitial fibrosis and myocardial stiffening in the absence of ischemia, the present study was designed to compare pro-fibrotic gene expression in ischemic vs. non-ischemic areas of the left ventricle (LV) in porcine models of single-vessel (SV) and MV-CAD. For this experiment, a total of 12 juvenile swine were instrumented with fixed 1.5 mm constrictors on either the proximal left anterior descending (LAD) and left circumflex (LCx) coronary arteries (MV-CAD; n=6) or the LCx only (SV-CAD; n=6). Expression of lysyl oxidase like-2 (LOXL2), galectin-3, fibronectin, periostin,  $\alpha$ -smooth muscle actin, and collagen-1 was assessed in ischemic (LCx) and non-ischemic (right coronary artery) regions of the LV via quantitative PCR 3-months after instrumentation and compared to normal controls (n=6). Our results showed that several pro-fibrotic genes were significantly upregulated in the ischemic region of the LV in MV-CAD animals compared to controls, including LOXL2, galectin-3, fibronectin, and periostin (all  $p < 0.05$  vs. normal controls). Interestingly, only galectin-3 was also upregulated in the ischemic region of the LV in SV-CAD animals vs. controls ( $p = 0.03$ ), suggesting that repetitive ischemia alone is insufficient to elicit increased expression of additional pro-fibrotic genes. Increased expression of LOXL2, fibronectin,  $\alpha$ -smooth muscle actin, and collagen-1 was also observed in the non-ischemic region of MV-CAD (all  $p < 0.05$ ), providing further evidence that preload elevation, rather than ischemia, is a primary driver of pro-fibrotic gene expression in MV-CAD. In summary, in a porcine model of MV-CAD, increased pro-fibrotic gene expression is observed in both the ischemic and non-ischemic areas of the LV, suggesting that repetitive demand-induced ischemia-mediated preload elevation may contribute to global myocardial fibrosis and LV stiffening in chronic CAD. Ongoing histopathologic analysis will provide quantification of regional collagen deposition in swine with MV-CAD and SV-CAD to determine if the observed pro-fibrotic transcriptional changes result in myocardial fibrosis.

## EXPRESSION AND FUNCTION OF KETOLYTIC ENZYMES IN LUNG CANCER CELL SURVIVAL

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### ABSTRACT

Cancer cells have an altered metabolism that relies primarily on glycolysis, and some studies have shown that carbohydrate reduction or drugs that lower blood glucose levels can reduce tumor volume and cancer growth rate and prolong survival. However, this effect is not uniform in patient cohorts which suggests that certain tumor characteristics might lead to disparate results. The objective of this project was to determine glucose reliance of cancer cells in a panel of lung cancer cells. Cells were subjected to glucose starvation in the presence or absence of ketone bodies (3-Hydroxybutyrate, 3-HBA) to determine the ability of these cells to survive glucose starvation by using ketone bodies as an alternative energy source. Furthermore, the presence and regulation of ketolytic enzymes was analyzed by qRT-PCR. Our results demonstrate that certain lung cancer cells can survive glucose starvation by utilizing ketone bodies as energy source. Furthermore, cells that can utilize ketone bodies have upregulated ketolytic enzymes the expression of which is further induced in the presence of ketone bodies. Taken together, these results suggest that ketolytic enzymes have the potential to be biological markers for the success of carbohydrate reduction treatment in lung cancer patients.

# GEOMETRIC MODELING OF ROD AND CONE PHOTORECEPTOR ARRANGEMENT IN THE HUMAN RETINA

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**Introduction:** The human retina consists of a small, central, cone photoreceptor (PR)-dense region called the fovea and a rod PR-dominant peripheral retina. Therefore, the rod-to-cone PR cell ratio and their packing properties also exhibit a central-peripheral gradient. The disease-induced degeneration of the macula or peripheral retina leads to central or peripheral vision loss, respectively. Current models of foveal PR arrangement suggest hexagonal packing of cone PRs (*i.e.*, each cone PR is surrounded by six cone PRs). However, the geometric properties of cone-rod PR packing in the peripheral retina are unknown. Here, we developed a two-sized disc packing-based geometric model to evaluate the short-range packing of rod and cone PRs from fovea to periphery in normal and diseased retinas.

**Methods:** Human donor eyes ( $n = 3$ ) were enucleated and characterized according to The Utah Protocol. The actin cytoskeleton at the PR cell cortex level was imaged using phalloidin labeling, followed by confocal microscopy. Distribution and size profiles for rod and cone PRs were analyzed using Fiji ImageJ software from different human donor eyes. We generated phantom-regimens of hyperuniform, disordered two-disk packings to study cone-rod packing. Voronoi analysis was then performed on retinal images to model cone-rod PR packing in the peripheral retina

**Results:** Voronoi analysis confirmed hexagonal packing in the fovea. In the perifovea, adding 1-2 rod PRs in the otherwise hexagonal Voronoi arrangement led to a transition to heptagonal PR packing. In the peripheral retina to the ora serrata, non-uniform, disordered octagonal packing was observed in conjunction with increase in rod-density. When cones became completely surrounded by rods, 9-13 rod PRs were typically observed around a cone PR. The rod-cone ratio was approximately 25 at the peripheral retina and 0.5 at the perifovea across all three eyes.

**Conclusion:** This novel geometric model in the human retina may improve our understanding of human retina architecture. In combination with currently available live retinal imaging tools like adaptive optics-scanning laser ophthalmoscopy (AO-SLO), this model may drastically improve diagnostic and prognostic abilities in clinical settings.

# READABILITY OF ORTHOPEDIC TRAUMA PATIENT EDUCATIONAL MATERIALS ON TOP ORTHOPEDIC TRAUMA HOSPITAL WEBSITES

Jeremy Wells, Ellen Lutnick, MD

Introduction: Over half of US adults lack proficiency in literacy, i.e. reading below the equivalent of a sixth-grade level. Various studies have shown that health literacy specifically is an extremely important predictor of patients' health, as patients with poorer health literacy suffer from higher rates of hospitalization, higher healthcare costs, and worse overall health. With the internet becoming increasingly important and more commonly utilized for patients to access information related to their healthcare, it is essential that the online educational materials that patients are accessing are not only accurate, but also easily comprehensible. While patients frequently turn to hospitals' websites for educational materials, to our knowledge no study has investigated the readability of orthopaedic trauma-related educational materials on the websites of top orthopedic hospitals in the U.S.

Methods: We identified 11 top orthopedic trauma hospitals based on a combination of orthopedic clinical and academic volume. We then searched through each entry in the websites' patient educational material databases and selected articles related to orthopaedic trauma conditions and procedures. The readability scores of each article were calculated according to the formulas of seven commonly used readability metrics.

Results: Two of the institutions we identified were excluded altogether due to lack of orthopedic trauma-related patient educational materials or articles that did not fit the specified criteria. A total of 121 articles were analyzed for this study after the exclusion criteria were applied. The average reading level of all of the articles, according to the Flesch-Kincaid Grade Level, was 8.3 (SD=2.64), well above the sixth-grade level recommended by the AMA and NIH. None of the individual institutions had an average reading level below sixth grade. The institution with the lowest average reading level (according to the Flesch-Kincaid Grade Level) was Vanderbilt, with an average score of 6.01 (SD=1.10).

Conclusion: This study demonstrates that orthopaedic trauma-related articles from major hospitals across the US are not at a reading level suitable for the general public. This may negatively impact patient comprehension and health outcomes, and calls for more accessible materials readily available for patient utilization.

# **A PRIVATE FACEBOOK SUPPORT GROUP FOR KIDNEY TRANSPLANT PATIENTS AT A SINGLE CENTER: A QUALITATIVE ANALYSIS OF MEMBER ENGAGEMENT**

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Social networking sites, like Facebook, have potential to enable social support of transplant patients but their engagement activity within such sites remains unclear. Our academic-community partnership previously created a private Facebook support group through the transplant center. The partnership invited 3 groups of local individuals: 1) patients/family, 2) community advocates, and 3) transplant professionals, and implemented an engagement strategy. This study aims to characterize the extent that members of this Facebook group create and engage with group content. We conducted a quantitative content analysis of membership enrollment, posts, comments, and reactions, aimed to determine engagement activity across the 3 member groups during the first 3 years after group inception (May 2019 to May 2023). Over 3 years, 388 unique users were added to the group, which consisted of 95% patients/family (370/388), 2% community advocates (8/388), and 3% transplant professionals (10/388). Almost one-third of members (121/388) were added during the first 6 months after group inception, followed by an average addition of 26 members every 6 months for the remaining study period (Figure 1). Of 536 total posts, 46% (249/536) were made by transplant professionals, 31% (168/536) by patients/family, and 22% (119/536) by community advocates ( $X^2 = 48.25$ ,  $p < .001$ ). All community advocates ( $n = 8$ ) and transplant professionals ( $n = 10$ ) posted at least once, and 21% ( $n = 76$ ) of patients/family posted at least once ( $X^2 = 59.04$ ,  $p < .001$ ). Of patient/family posts, almost half were made by a single person (35/76). The top-three post types with the highest engagement (sum of reactions and comments) were patient/family transplant status updates (Median = 36, IQR = 40), transplant professional posts about monthly transplant volume at the center (Median = 30, IQR = 13), and service announcements about Covid (Median = 27, IQR = 41 (Table 1). This study demonstrates active engagement among patients/family, community advocates, and transplant professionals, and contributes to the knowledge on posting strategies and member activity that may promote social support within Facebook transplant support groups. Areas of future study are to characterize the potential social support received through analysis of member engagement content.

## RE-AIM EVALUATION OF A REGIONAL, SCHOOL-BASED HEALTH PROGRAM

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*Background:* Pediatric obesity and physical inactivity have increased recently and are associated with poorer health outcomes. School-based health programs may improve children's well-being. Qualitative evaluation with evidence-based frameworks can assess human experience and emotion in the context of such programs. Implementation data, like program (in)convenience, provides important information for those who plan to implement similar programming.

*Objective:* We used the RE-AIM framework to assess the effectiveness and implementation of a regional, school-based Fitness for Kids Challenge (FFKC) program. FFKC encourages students to improve their health via completion of a different goal each month (e.g., 0 sugary drinks).

*Methods:* Teachers or coordinators (i.e., participants) of kindergarten through 5<sup>th</sup> grade students participating in the 2022 – 2023 FFKC program provided feedback on the program via an online survey at the end of the school year (n = 57). 31 participants also provided feedback via a semi-structured focus group hosted by the community group administering the program. Frequencies from? close-ended survey questions were run to summarize participant characteristics. Open-ended responses were analyzed qualitatively. Survey responses were used as an indicator of effectiveness (ex: Please share a story about how being involved in the FFKC program has impacted a student). Focus group responses assessed implementation (ex: Barriers or challenges faced during the program).

*Results:* Themes that supported effectiveness of the program included students completing the program's goals, having increased awareness of program messages, and greater focus in school. Themes that supported implementation included that students easily understood the program's goals and enjoyed the curriculum; barriers included difficulties with at-home tracking.

*Discussion/Conclusions:* Participants identified student behavior changes directly related to each month's goal, supporting FFKC is effective to improve student health. Overall responses regarding implementation were positive, with few barriers reported, which should be addressed to provide maximum benefit in future years of this program.

# INVESTIGATING THE EFFECT OF SOS RESPONSE PATHWAY ON BIOFILM FORMATION IN *ENTEROBACTER CLOACAE NIAGARA*

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Our study delves into the SOS response pathway triggered by SOS-inducing drugs in enteric bacteria, *Enterobacter cloacae Niagara*, with a particular emphasis on its role in biofilm formation. The SOS response pathway, well-known for its involvement in DNA repair and mutation introduction, is a key stress response mechanism in bacteria, notably *Escherichia coli*. Coined by Miroslav Radman in 1975, this pathway has been extensively studied, challenging conventional notions by simultaneously repairing DNA and introducing mutations into the genome. Prior research in our lab has expanded the understanding of the SOS response, revealing its activation not only by antibiotics but also by diverse drugs such as anti-cancer agents, antivirals, and antidepressants. Our study focuses on the aftermath of the SOS response induced by specific drugs, unveiling a significant release of nucleic acids – including double-stranded DNA (dsDNA), single-stranded DNA (ssDNA), RNA, and protein. One arm of the study focuses on exploring the pivotal role of the SOS response in biofilm formation. Specifically, SOS-inducing drugs not only trigger bacterial clumping but also initiate the formation of robust biofilms on glass surfaces. These biofilms, found to contain extracellular DNA, underscore a crucial link between the SOS response, biofilm development, and their potential implications for pathogenesis and antibiotic resistance emergence. Furthermore, the research assesses the environment factors, such as the material used for incubation, on SOS response. Overall, the findings highlight the intricate dynamics of the SOS response pathway, with a specific focus on its role in biofilm formation and its implications for antibiotic resistance.