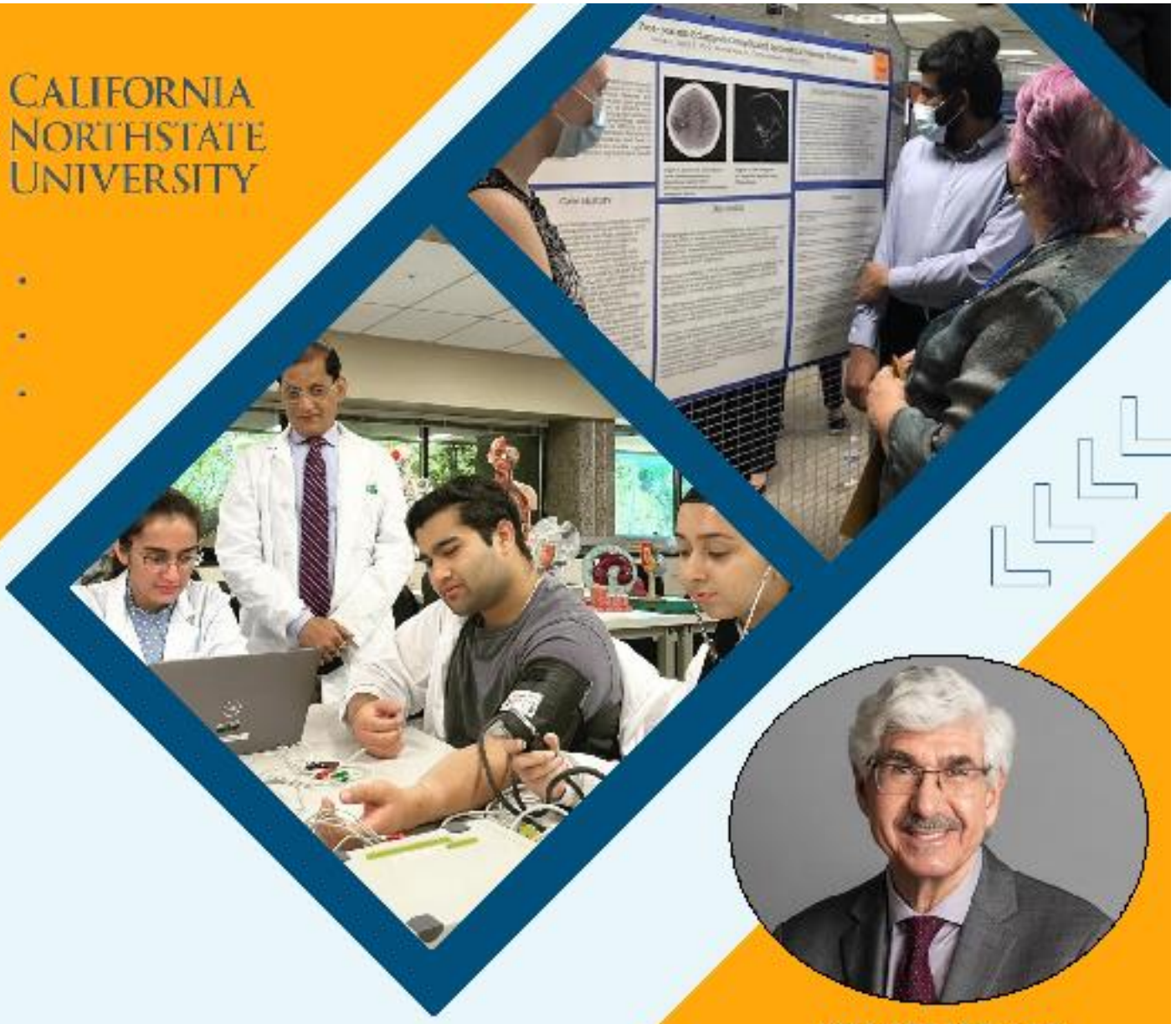
CALIFORNIA NORTHSTATE UNIVERSITY



KEYNOTE SPEAKER

DR. JERRY NADLER, M.D., MACP, FAHA, FACE

VA Northern California Health Care System

"Recent Updates about the Causes and Pathogenesis of Type 1 Diabetes"

CALIFORNIA NORTHSTATE UNIVERSITY

2024 RESEARCH DAY

FEBRUARY 9TH, 2024

8:45 am to 4:00 pm

SUBMIT YOUR ABSTRACT

COLLEGE of MEDICINE | COLLEGE of PSYCHOLOGY | COLLEGE of PHARMACY | COLLEGE of DENTAL MEDICINE | COLLEGE of GRADUATE STUDIES | COLLEGE of HEALTH SCIENCES

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Timeline for CNU Research Day 2024

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Poster Presentations Session **A** in Classroom **2B** and **2C**	8:45-10:00
Poster Presentations Session **B** in Classroom **2B** and **2C**	10:15-11:30
Lunch in COM Classroom 1A/B	11:30-12:00
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Keynote Speaker Presentation	**12:10-1:00**
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JERRY L. NADLER, M.D., MACP, FAHA, FACE

Jerry L. Nadler, M.D., MACP, FAHA, FACE, Prior to joining the VA, he has served as dean of the School of Medicine NYMC since 2019. He remains as adjunct Professor of Pharmacology at NYMC and is a Health Science Professor of Medicine UC Davis School of Medicine

Prior to joining New York Medical College, Dr. Nadler served as professor and chair of internal medicine, the Harry H. Mansbach Endowed chair in internal medicine and vice dean of research and director of the Strelitz Diabetes Center at Eastern Virginia Medical School.

Dr. Nadler previously served as chief of endocrinology and metabolism at the University of Virginia, co-director of the Diabetes and Hormone Center of Excellence and associate director of the school's National Institutes of Health (NIH) funded Diabetes Endocrinology Research Center.

Dr. Nadler's contributions have focused on the causes leading to beta cell failure in diabetes and understanding cardiovascular complications of diabetes and obesity. In particular his efforts have led to the identification of inflammatory pathways leading to pancreatic beta cell damage, insulin resistance and atherosclerosis. Toward this end, his research has led to the development of preventative therapies and the identification and patents of new small molecules blocking 12-Lipoxygenase activity. He also has current work focused on determining whether a virus could be a trigger for Type 1 diabetes as well as examining the link between diabetes, insulin resistance and Alzheimer's disease. He has published more than 240 papers in per-reviewed Journals. His clinical interest is the care of people with diabetes and endocrine disorders. His research has been continuously funded by the NIH and he has received Foundation funding from the ADA and JDRF.

He is excited to mentor investigators and students and grow research opportunities and support our investigators and learners.

2024 CNU Research Day Podium presentations:

CHS:

Abstract ID: Group 1 (Podium Presentation)

Submitter	Nikhila K Reddy
Authors	Nikhila K Reddy; Peter Katz PhD
Title	Pain and Dignity – Should They Be Related?
Abstract	There is great power in intertwining pain and dignity in palliative care, but this is not without a need for reflection and regulation to prevent unintended devastating consequences. The interplay between pain and dignity opens space for empathy within healthcare practices, emphasizing the responsibility to ensure that notions like "dignified suffering" do not overshadow the essentials of pain management. Healthcare professionals' motivation is often rooted in empathy with the goal of promoting well-being and alleviating pain. However, in pain management, societal norms that uphold the dignified tolerance of pain—and condemn ostensibly "undignified" experiences of pain such as opioid dependence—significantly impact healthcare professionals' decision-making, enlarging the existing gap in addressing the needs of those coping with unmanaged pain. The prevailing stigma around potent pain management carries enough of a stigma in it of itself. To think about these complex cases of pain management requires not only reshaping healthcare practices, but also critique of social attitudes that undermine the value of pain management. For instance, a patient experiencing acute pain might hesitate to fully embrace available pain management due to concern of being socially condemned; similarly, a doctor could be reluctant to provide comprehensive pain treatment, fearing it may be perceived as ethically incorrect or detrimental to the patient. When healthcare professionals intertwine pain and dignity, societal norms pervade the decision-making processes of healthcare systems. This podium talk illuminates the need for an environment in which individuals can unapologetically prioritize their well-being. In navigating the intricate interplay of pain and dignity, the imperative lies in fostering a healthcare narrative that seamlessly integrates empathy with evidence-based care, ensuring the preservation of individual dignity while prioritizing timely and effective pain management for people seeking treatment.

Abstract ID: Group 2 (Podium Presentation)

Submitter	Ravi Ranjan PhD
Authors	Matthew Phan; Medina Malik; Zara Adnan; Ravi Ranjan PhD
Title	Time to Climb: Circadian Rhythm Disruption
Abstract	**Study Objective:** Dysregulation of sleep has been associated with numerous negative health consequences. However, the relationship between circadian rhythm and the development of neurodegenerative disorders, such as Alzheimer's and Parkinson's, has yet to be fully explored in the context of life expectancy. Drosophila melanogaster, more commonly known as the fruit fly, were placed into different sleep conditions to determine the effects that circadian rhythm disruption has on locomotion and life expectancy. **Methods:** Various lifespan-altering, circadian rhythm-regulating, or neurodegenerative disorder-causing genetic modifiers were used to assess the extent to which these modifiers could counteract the deleterious effects of sleep dysregulation. Locomotive ability and behavior were observed by placing flies into climbing assays twice a week throughout their development. **Results:** Testing revealed that flies introduced to a normal sleep cycle experienced a slower decline in function and neurodegeneration compared to flies in abnormal sleep conditions, whose locomotive abilities and behavior were severely altered over a shorter period. Additionally, flies with the life-span increasing mth gene declined at a slower rate than wildtype (w1118) flies. **Conclusions:** Although additional time and research are required for flies with neurodegenerative disorders, their observed behaviors suggest an improved function in normal sleep conditions and impaired function in abnormal sleep conditions. These findings indicate that proper sleep and circadian rhythm play a vital role in neuronal development and aging. This study will hopefully aid in the development of medication targeting mth G-protein coupled receptors to improve motor and cognitive function and mitigate the negative effects of sleep deprivation.

COP:

Abstract ID: Group 3 (Podium Presentation)

Submitter	Desiree Ewell
Authors	Desiree Ewell[1]; Nita Vue[1]; Sakib Moinuddin[2]; Tanoy Sarkar[2]; Fakhrul Ahsan[2]; Ruth Vinall[2] Affiliation: [1] CNUCOP Students [2] Department of Pharmaceutical and Biomedical Sciences, College of Pharmacy, California Northstate University, Elk Grove, CA 95757, USA
Title	Development of a bladder cancer-on-a-chip assay to assess the invasive potential of bladder cancer cells
Abstract	**Objectives:** The primary objective of this study was to develop a 3D functional bioassay to assess the relative invasiveness of bladder cancer cells. **Methods:** Our model uses a 3D organ-on-a-chip microfluidics platform to assess bladder cancer cell invasiveness. Four established bladder cancer cell lines and primary cells isolated from a mouse bladder were used to help develop our model. Cells were mixed with 1:1 media and Matrigel and 5,000 cells/ul injected into the center channel. The 2 adjacent side channels were then filled with Matrigel. Invasion of cells into the Matrigel-containing side channels was assessed every 24 hours. Time to invasion and furthest distance moved by cells were assessed. Upon completion of experiments, chips were fixed and stained using FITC-phalloidin and DAPI. **Results:** The J82 and T24 cell lines (human muscle invasive bladder cancer cells lines) and the MB49 cell line (a highly invasive mouse bladder cancer cell line), started invading into the Matrigel side channels within 24 hours. T24, J82, and MB49 cells moved a maximum of 110, 87, and 170 um by 48 hours, respectively. In contrast, RT4 cells (a human non-invasive bladder cancer cell line) took 48 hours to invade into the Matrigel channels and only invaded a maximum of 3um. Primary mouse bladder cells did not invade into the Matrigel side channels but survived within the chips for over 20 days. Staining of chips with DAPI and FITC-phalloidin allowed for clear visualization of cells and the actin cytoskeleton and demonstrated that immunostaining of cells within chips is possible. **Conclusions:** Our chip model allows for invasiveness of bladder cancer cells to be assessed and can be used for future drug testing and development experiments. Our ability to conduct immunostaining will support assessment of the molecular mechanisms which drive invasion and thereby further support drug development.

Abstract ID: Group 4 (Podium Presentation)

Submitter	Justin Lenhard
Authors	Rondelle Jordan[1]; Samar Ahmed[1]; Roopreet Dab[2]; Andy Thoong[1]; Xinyi Zhou[1]; Andy Le[1]; Andy Tran[1]; Tuanh Huynh[1]; Chanchal Kaur[1]; Tarwinder Purewal[1]; Kevin Brandt[1]; Cafrey Feng[1]; Raymond Huang[1]; Alexander Swanberg[1]; Roslyn Isseroff[3]; Justin Lenhard[4] Affiliations: [1] CNUCOP Student [2] California Northstate University College of Medicine [3] UC Davis Health, Sacramento CA [4] Department of Clinical and Administrative Sciences; California Northstate University College of Pharmacy
Title	Potential Synergy of Fluoxetine and Fosfomycin against Drug-Resistant Bacteria
Abstract	**Study Objective:** Study Objectives: Additional options are needed to combat difficult-to-treat pathogens. The aim of the current study was to assess whether fosfomycin achieves synergistic killing against drug-resistant bacteria when paired with the selective serotonin reuptake inhibitor fluoxetine. **Methods:** Two carbapenem-resistant Acinetobacter baumannii isolates, one carbapenem-resistant Klebsiella pneumoniae isolate, and one multidrug-resistant Pseudomonas aeruginosa isolate were investigated via in vitro time-killing experiments. Using a starting inoculum of 10^6 CFU/ml, each isolate was exposed to concentrations representing 0.5x and 1x the minimum inhibitory concentration (MIC) of fosfomycin and fluoxetine each alone, as well as the combination of both agents over 24 hours. At 0, 2, 4, 6, 8, and 24 hours, samples were collected, serially diluted, and plated onto agar for viable cell counting. Synergy was defined as >/= a 2-logCFU/ml reduction of the combination in comparison to the most single agent at any time point, whereas an >/= a 1-logCFU/ml reduction was defined as additivity. **Results:** Synergy was achieved against one A. baumannii isolate and the K. pneumoniae isolate. Against the aforementioned A. baumannii isolate, the combination of fosfomycin and fluoxetine at 0.5x their respective MICs resulted in 2.2 logCFU/ml of additional killing at 6 hours relative to the most active individual agent. Against the K. pneumoniae isolate, the combination of both drugs at 1x their MICs resulted in > 6 logCFU/ml reduction at 24 hours. Additivity was observed against the second A. baumannii isolate, with a maximum additional reduction of 1.7 logCFU/ml, whereas there was no synergy or additivity achieved against the P. aeruginosa isolate (maximum additional reduction = 0.8 logCFU/ml). **Conclusions:** Of the four multidrug-resistant isolates that were evaluated, the combination of fosfomycin and fluoxetine achieved synergy against two isolates and additivity against one isolate. Further experiments evaluating more bacteria are needed to better understand the utility of the combination.

MPS:

Abstract ID: Group 5 (Podium Presentation)

Submitter	Madison Spenser
Authors	Madison Spenser, Ashraf M. Mohieldin
Title	Ciliary proteins as a Biomarker for Sickle Cell Disease
Abstract	Sickle cell disease (SCD) is a genetically inherited disorder where red blood cells (RBCs) are sickled and aggregate in the vasculature, obstructing normal blood flow. Vasculature primary cilia organelles play a vital role in detecting the blood flow in SCD patients. Previous studies revealed that the disrupted shear stress caused by sickle RBCs induces the level of reactive oxygen species (ROS) and results in high cilia detachments. However, the shear stress effect of sickled RBC on cilia and the vasculature ciliary protein profile in SCD is unknown. In this study, we examined ciliary stability under different magnitudes of shear stress on microvasculature endothelial cells (ECs), analyzed ciliary proteomic profiles, and validated potential ciliary biomarkers for SCD. Our results indicated that a shear stress of 5.0 dyn/cm2 led to significant deciliation events in ECs by sickled RBCs. The comparative proteomic analyses of ciliary proteins isolated from whole blood unveiled distinctive protein markers in control and SCD mouse models. A total of 175 ciliary proteins were enriched exclusively in the control group, whereas 45 ciliary proteins were enriched exclusively in SCD. The bioinformatics analyses further revealed the unique and differentially expressed biological processes, molecular functions, cellular components, signaling pathways, and protein classes between control and SCD mouse models. Additional analyses indicated unique post-translational modifications (PTMs) of ciliary proteins in SCD. 9 and 3 PTMs protein fractions were enriched exclusively in control and SCD, respectively. Consistent with animal studies, our translational studies have validated the unique enrichment of Transferrin receptor 1(TfR1), Complement 1 (C1), Glyceraldehyde-3-phosphate dehydrogenase (GAPDH), and ADP-ribosylation factor-like protein 13B (ARL13B) proteins in patients with SCD. This study provides the first evidence that vasculature primary cilia are clinically relevant in SCD. Hence, the identified ciliary protein biomarkers hold promise for their potential use in assessing and monitoring individuals affected by SCD.

Abstract ID: Group 6 (Podium Presentation)

Submitter	Eslam Mohamed
Authors	Shaumik Patil, Eslam Mohamed
Title	Studying core Fucosylation in human macrophages exposed to tumor factors.
Abstract	**Study Objectives**: Fucosylation is a post-translational modification that involves transferring a monosaccharide derivative, fucose, to the N- or O-linked glycans on proteins. Fucosylated proteins are involved in vital processes such as cell adhesion, cell signaling, co-stimulation, angiogenesis, and tumor metastasis. There are 13 fructosyltransferases (FUTs) mediating fucosylation. Of those, FUT8 is the only protein that is responsible for core fucosylation on N-linked glycans, making its biological role unique. In cancer, changes in core fucosylation are associated with tumorigenesis. However, the role of core fucosylation in tumor associated macrophages is completely unknown. This study aims to address this knowledge gap by investigating the process of core fucosylation in macrophages exposed to tumor conditions. **Methods:** THP-1 derived macrophages were exposed to tumor media and Endoplasmic Reticulum (ER) stress inducers (tunicamycin and thapsigargin). Western blot was used to detect FUT8 protein levels. We utilized RT-PCR to measure genes expression. We assessed changes in fucosylation and expression of cell surface markers by flow cytometry **Results**: Mature macrophages showed higher FUT8 expression compared to their monocytic progenitors. Macrophages exposed to tumor media and ER stress showed slightly lower FUT8 expression. Consistent with that, core fucosylation was increased in mature macrophages and decreased in macrophages exposed to tumor media and ER stress. Genes involved in ER stress response, and immunosuppression were upregulated in macrophages exposed to ER stress inducers and tumor media. HLA-DR (MHCII) was decreased in macrophages exposed to tumor media. **Conclusion**: Our work shows a significant alteration of core fucosylation in macrophages exposed to tumor factors and ER stress. Core fucosylation plays a key role in macrophages under different pathological conditions suggesting that the changes we observed in macrophages under tumor conditions can determine their responses in cancer settings. Continuing this work will reveal the role of core fucosylation in tumor associated macrophages."

PSY:

Abstract ID: Group 7 (Podium Presentation)

Submitter	Yuhan Jie
Authors	Jie, Yuhan; Baldwin, Quentin; Lemieux, Madeline
Title	Is Adverse Childhood Experiences (ACEs) Associated with Cannabis Use in Adulthood, Personality as Moderator?
Abstract	**Study Objective:** A. Investigate the association between ACEs and cannabis abuse and dependence symptoms. B. Examine the moderation effects of personality traits on the relationship between ACEs and cannabis use. C. Contribute to the research knowledge on ACEs and substance abuse. **Methods:** This study utilized a secondary data analysis. The data was extracted from the fourth wave of the National Longitudinal Study of Adolescent Health (Add Health), which is a nationally representative sample of adolescents, their social environment, and health factors. SPSS-25 was used for data analysis. The sample size for this study consisted of N=4998 individuals, selected from the Add Health dataset. The primary variables included were the history of ACEs and the symptoms of cannabis abuse and dependence. Personality traits were assessed by standardized scales, focusing particularly on traits like aggressiveness, impulsivity, and angry hostility. **Results:** The analysis revealed statistically significant differences ($F=14.47$; $df=3, 4995$; $p<.001$) in the number of cannabis abuse symptoms among different ACEs categories (None, Low, Medium, High). Participants within higher ACEs categories showed an increased number of cannabis abuse symptoms. A Chi-square test of independence showed a significant association ($X^2 = 82.26$, 2 df, $p<.001$) between ACEs categories and the presence of cannabis dependence symptoms (Yes/No). This finding suggests a link between the extent of adverse childhood experiences and the likelihood of developing cannabis dependence symptoms. Furthermore, Chi-square moderator analyses was used to test personality traits as potential moderators. Specifically, within the group exhibiting low Angry Hostility, ACEs experience was positively associated with having cannabis dependence symptoms ($X^2= 40.49$, 2 df $p<.001$). **Conclusions:** ACEs were positively associated with cannabis abuse and dependence symptoms in adulthood. There is a relationship between the absence of ACEs and no cannabis abuse and dependence symptoms. Angry hostility personality score moderated the relationship between ACEs and cannabis dependence symptoms.

Abstract ID: Group 8 (Podium Presentation)

Submitter	Numfon Vilay
Authors	Vilay, Numfon; Alavynejad, Shayan; Ruder, Steve; Rodriguez, Nicki; Schneider, Andrea
Title	Assessing the Efficacy of the ACCESS Program on Life Satisfaction in Adults with Autism Spectrum Disorder
Abstract	**Study Objective:** A. Compare baseline and post-program data on life satisfaction in adults with ASD to address specific areas the program has helped with improvement in daily life and explore long-term effects of the ACCESS program on positive life outcomes B. Assess potential impacts of improved life satisfaction on social relationships, specifically with their social partners **Methods:** Participants (n=25) aged 18-39 years with a diagnosis of ASD (11 females; 14 males; mean age=24.4 years) were recruited from cohorts of the ACCESS Program in 2020, 2022, and 2023 at the UC Davis Mind Institute. Each adult participant was accompanied by a closely involved adult from their social group, the social partner (21 females; 5 males; total 26). Assessments were conducted at baseline (pre-program) and post-program, including the Social Skills Inventory (SSI), Satisfaction with Life Scale (SWLS), and Meaning of Life Questionnaire (MLQ). The program comprised two parallel intervention groups: one for adults with ASD and another for their social partners. Delivery formats varied, with online-only sessions in 2020 and 2022, and a hybrid version (online and in-person) in 2023. Building on a successful pilot randomized controlled trial (RCT) demonstrating efficacy and acceptability (Oswald et al., 2018), the current ACCESS curriculum underwent minor modifications from the published research. **Results:** In the pre- and post-program assessments, significant improvements were observed for the SSI with an increase of 13 points. SWLS and MLQ scores also indicated positive changes, with presence scores rising by 4.3 and search scores decreasing by 3.3. These findings highlight substantial enhancements in various domains for adults with ASD compared to their baseline scores. Moreover, participants reported improved relationships with their social partners after the program, with reciprocal positive feedback from both adults with ASD and their social partners. **Conclusions:** Adults enrolled in the ACCESS Program appeared to show improvements in life satisfaction and positive life outcomes. Improvement in these aspects of the person's life has also promoted better social skills and relationships with others in their lives including their social partner.

CDM:

Abstract ID: Group 9 (Podium presentation)

Submitter	Aleena Khan
Authors	Aleena Khan; Ariga Sarkissian; Shadi Javadi, DDS, MS; Shymaa Bilasy, PhD.
Title	Unveiling the Role of Stem Cells in Accelerated Orthodontic Tooth Movement: A Comprehensive Review
Abstract	**Study objective:** Orthodontic treatment is essential in addressing teeth and jaw discrepancies. Despite the major benefits, prolonged orthodontic treatment remains a significant drawback. Patient inconvenience, increased risk of tooth decay, root resorption, and gum recession are among the disadvantages. Therefore, accelerating orthodontic tooth movement can reduce these risks by shortening treatment duration. Utilizing stem cells is an innovative recent method in many recent studies. This study aimed to explore the possible uses of stem cells in accelerating orthodontic tooth movement (OTM). **Methods:** A comprehensive search was conducted utilizing PubMed, Cochrane Library, ResearchGate, Google Scholar, Ovid, and ScienceDirect databases. After applying the inclusion and exclusion criteria, a refined selection process yielded 54 articles for a thorough review of stem cells' application in expediting tooth movement. **Results:** The review of existing literature highlights the possibility of using stem cells in expediting OTM by modulating the bone remodeling process in the future. One study emphasized the importance of inflammation and the subsequent acceleration of OTM. Mesenchymal stem cells emerge as key contributors, actively participating in bone remodeling during OTM. Studies demonstrated specific mechanisms underlying stem cells' involvement. Notably, periodontal ligament stem cells were identified as a regulator of osteoclastic activities, thereby influencing bone remodeling during tooth movement. **Conclusions:** The reviewed literature collectively suggests that stem cells, particularly MSCs, play a significant role in expediting OTM by orchestrating inflammation and influencing crucial bone remodeling processes. While further research is imperative to comprehensively understand the underlying mechanisms, the potential application of stem cells in orthodontics holds substantial promise for reducing treatment duration and alleviating associated risks and discomfort.

Abstract ID: Group 10 (Podium presentation)

Submitter	Mariah Sharp
Authors	Mariah Sharp (1); Sumanpreet Kaur (1); Maheen Qureshi (1); Swathi Chitre (2);Nisha Manila (3)
Title	Optimizing the Pediatric X-Ray Experience: A Literature Review on the Effectiveness of Dental Anxiety Reduction Techniques, Sensors, and Imaging Protocols
Abstract	**Objective:** Our literature review analyzed how adjustments in dental environments, patient sensor choice, and radiographic methods can boost comfort and minimize stress/radiation in pediatric X-rays. **Methods:** A comprehensive review of the literature was conducted using Ovid Medline, Google Scholar, and Science Direct to review articles and research papers. The search terms "pediatric", "radiographs", "comfort", and "dentistry" were used. Inclusion factors comprise female and male participants ages 0-13 years, intraoral X-rays, panoramic X-rays, and CBCT. Studies with advanced medical imaging and abstracts were excluded. **Results:** Dental Anxiety Reduction Techniques A comprehensive literature review resulted in 50 articles. 46% of articles recommended non-pharmacological approaches such as colorful lighting, wall projections, recorded maternal voice, virtual cognitive tools, and tell-show-do method to reduce dental anxiety. 6% of the articles recommended pharmacological approaches such as nitrous oxide which have shown anxiety reduction in cooperative children. Patient preferred sensors 22% of the articles examined the effects of using patient preferred sensors. Patients highly favored phosphorus plates over CCD sensors in terms of comfort. Projection techniques can be modified for infants and patients with a gag reflex by using size 0 intraoral periapical films and CBCT to enhance comfort. Education 10% of the articles highlighted the importance of patient/parent education on radiographs. Communicating with and educating parents in regard to the benefits and risks of pediatric dental radiographs was discovered to improve patient comfort in taking radiographs. Overprescription of radiographs 10% of the articles discussed overprescription of radiographs. Dentists are found to more commonly overprescribe radiographs. Following ADA guidelines promotes safe radiation levels. **Conclusion:** Analysis of several sources has supported the use of non-pharmacological and pharmacological dental anxiety reduction approaches, patient preferred sensors including phosphorus plates of the correct size, education of risks and benefits of radiographs, and avoidance of the overprescription of radiographs to enhance pediatric comfort.

COM/non-SDSSP:

Abstract ID: Group 11 (Podium Presentation)

Title: Semaglutide versus other GLP-1 Agonists on Weight Loss in Non-Diabetic Patients: A Systematic Review

Authors: Denise Nadora, BS1; Jimmy Wen, BA1; Christiane How-Volkman, MS1; Alina Truong, BS1; Ethan Bernstein, BS1; Muzammil Akhtar, BS1; Neha Prakash, BS2; Eldo Frezza, MD1

1California Northstate University College of Medicine, Elk Grove, CA, 95757.

2A.T. Still University School of Osteopathic Medicine, Mesa, AZ 85206

Objective: Obesity is clinically defined by a body mass index (BMI) of ≥ 30 kg/m2. In recent years, obesity's prevalence has reached heights towering previous rates, raising concern for the implicated rise of associated comorbidities such as cardiovascular disease. The purpose of this systematic review is to evaluate semaglutide against other available glucagon-like peptide 1 (GLP-1) agonists in facilitating weight loss and possible adverse effects outside of a primarily diabetic population.

Methods: A systematic search following the guidelines established by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was performed in Pubmed, Embase, and Cochrane Library for comparative studies comparing semaglutide and other GLP-1 agonists on weight loss. A narrative synthesis was performed to analyze the differences in weight loss and adverse events between the cohorts.

Results: Five studies met inclusion criteria (3 RCTs; 2 retrospective cohort studies) which contained data from 1,697 patients whose mean age was 50.13 years (47.0 to 55.15) and mean follow-up period was 44.4 weeks (24 to 68). Four of the five studies included a comparison of 0.05 mg to 2.4 mg daily or weekly semaglutide to 3.0 mg daily liraglutide, while one included a comparison against 10.0 mg weekly efinopegdutide. Semaglutide had a significantly greater mean weight loss compared to liraglutide at 13.1% (9.8-15.8%) versus 7.6% (6.4-8.8%). Semaglutide in comparison with efinopegdutide did not produce a significant difference in weight loss at 7.51% versus 8.58%. Common adverse events with semaglutide and comparator GLP-1 agonists included minor and moderate gastrointestinal events.

Conclusion: Semaglutide, liraglutide, and efinopegdutide have demonstrated to provide mean reductions of 12.15 kg, 7.9 kg, and 8.6 kg, respectively in body weight with minimal to moderate observed side effects.

Abstract ID: Group 12 (Podium Presentation)

Title: Nicotinamide Mononucleotide (NMN) effects on Physical Performance: A Systematic Review on Randomized Control Trials

Authors: Solomon Kim, BS[1]; Jimmy Wen, BA[1]; Burhaan Syed, BS[1]; Mouhamad Shehabat, BS[1]; Ubaid Ansari, BS[1]; Muzammil Akhtar, BS[1]; Daniel Razick, BS[1]; Dr. David Pai, MD, FASN[1]

[1]California Northstate University College of Medicine, Elk Grove, CA 95757

Introduction: Nicotinamide adenine dinucleotide (NAD+) is essential in the proper function of many essential cellular processes in the human body. NAD+ levels decrease with increased age and thus NAD+ supplementation has become increasingly investigated as a potential therapeutic agent for many disorders of aging. The purpose of this review is to investigate the effect of Nicotinamide mononucleotide (NMN), a NAD+ precursor, on physical performance and evaluate the safety profile of supplementation.

Methods: A systematic review search criteria following the guidelines from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was performed in two databases for randomized controlled Trials on NMN supplementation. Study variables included title, author, publication date, study year, number of patients, dosage, mean age, mean follow-up time, pre and post intervention reported outcomes, and rates of complications.

Results: Nine studies, including 375 patients with a mean age of 57.6 years (35.6 to 81.1 years) and mean follow-up time of 9.7 weeks (4 to 12 weeks) were included in this study. NMN dosages ranged from 207.5 mg/day to 1200 mg/day. Mean pre-intervention grip strength and skeletal mass index was 29.9 kg (range: 21.4-40.1 kg) and 7.4 kg/m^2 (range: 6.9-7.65 kg/m^2), respectively. Mean post intervention grip strength and skeletal mass index was 30.5 kg (range:21.7-41.9 kg) and 7.4 kg/m^2 (6.8-7.64 kg/m^2), respectively. There were no serious adverse effects observed. Moreover, of the reported side effects, they were determined to be independent of NMN supplementation.

Conclusion: Patients taking NMN supplementation demonstrated improved physical performance parameters and are well tolerated with no serious adverse effects observed.

COM_SDSSP:

Group O1

Authors: Nazanin Ahmadian[1]*, Sabrina Dallas[1]*, Elena N. Dedkova DVM PhD[1,2]
[1]College of Medicine, California Northstate University
[2]Department of Molecular Biosciences, University of California Davis
*Both authors contributed equally

Title: Protective effect of non-feminizing estrogen on mitochondrial metabolism in Friedreich's Ataxia human fibroblasts

Introduction: Friedreich's Ataxia (FA) is an autosomal recessive neurodegenerative disorder caused by a mutation in the gene *frataxin (FXN)* which usually first presents with gait instability that devolves into inability to walk then eventual death due to cardiomyopathy. Our work in mouse models of FA revealed significant sexual dimorphism with earlier cardiac failure and death in males compared to females as well a significant decline in circulating levels of testosterone in FA males but normal estrogen levels in FA females. Therefore, we hypothesized that non-feminizing estrogens (NFE) could slow cardiomyopathy in FA by improving mitochondrial metabolism.

Methods: Patient-derived skin fibroblasts were differentiated into myofibroblasts, and their substrate utilization was compared to myofibroblasts from unaffected carriers with one mutation in *FXN*. Cell differentiation into myofibroblasts was verified by staining with alpha-smooth muscle actin antibodies and cell imaging. Mitochondrial substrate utilization was measured using Biolog Mito Plates preloaded with cytosolic and mitochondrial metabolites. Cells were treated with 100 nM of NFE for 24 hours before experiments.

Results: FA myofibroblasts had reduced mitochondrial volume with decreased utilization of alpha-ketoglutaric, succinic, fumaric, malic, L-glutamic, and D,L-beta-hydroxybutyric acids as well as L-glutamine, L-ornithine, glycine/alanine, and tryptamine. Utilization of alpha-keto-butyric acid was unchanged. Utilization of Acetyl-L-Carnitine and Palmitoyl-D,L-Carnitine was increased in FA myofibroblasts. Cell treatment with NFE increased rates of mitochondrial substrates utilization to the levels observed in unaffected carriers.

Conclusions: Patient-derived myofibroblasts exhibited impaired metabolic capabilities in the TCA cycle and utilization of ketones. Treatment with NFE improved cell metabolism in FA male and female myofibroblasts, suggesting its potential therapeutic relevance for FA treatment.

Group O2

Authors: Cortney Connor[1], Sarah Fung[1], Raymond Ko[1], Anura Ratnasiri PhD, MSc
[1] College of Medicine, California Northstate University, Elk Grove, California
[2] California Department of Public Health

Title: Unveiling Trends and Disparities: A Comprehensive Analysis of Adolescent Births in California - Navigating the Challenges and Prioritizing Adolescent Maternal Health

Background: The adolescent birth rate in the U.S., measured as births per 1,000 females aged 15 to 19 years, has declined since 1991, reaching a low of 16.7 per 1,000 females in 2019. Despite this trend, teenage pregnancy continues to pose social and health challenges, manifesting in heightened rates of maternal high school dropout, birth complications, and chronic childhood medical conditions. This study aims to examine recent trends in teen birth prevalence, identifying associated risk factors and disparities in the state of California.

Methods: Conducted as a retrospective cohort study, we analyzed 372,352 teen births out of the 5,137,376 resident live births (7.25%) documented in the California Birth Statistical Master Files (BSMF) from 2007 to 2016. Age at birth was categorized as 15 to 19 years, with a reference category of 20 to 29 years. The study investigated birth outcomes including low birth weight (LBW), preterm birth (PTB), small-for-gestational-age birth (SGA), large-for-gestational-age birth (LGA), and cesarean delivery (CD). Utilizing descriptive analysis, simple linear regression, and multivariate logistic regression (MLR), we calculated adjusted odds ratios (AORs) with 95% confidence intervals (CIs) to explore associations.

Results: While the teenage pregnancy rate had a linear decline ($p < 0.001$) from 40.1 in 2007 to 15.8 in 2016 (per 1,000 females), certain maternal characteristics increased over time. Adjusted odds ratios revealed that women with less than a high school education and those with a high school diploma had a 9.0-fold and 3.3-fold higher prevalence of teen births, respectively, compared to women with college or an associate degree. Hispanic women were twice as likely to experience teen births compared to White women. Teen mothers were nearly 50% more likely to rely on Medi-Cal and 46% more likely to lack first-trimester prenatal care. Importantly, they were 43% more likely to be underweight.

Conclusion: Our findings emphasize the need to address racial and ethnic disparities and improve birth outcomes among adolescent births. Policymakers should prioritize ensuring pregnant adolescents have access to high-quality maternal health services, encompassing both pre and postnatal care, to safeguard the health of mothers and infants in the years ahead.

Group O3

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Title: Assessing the Use of Active Learning and Hotspot Technology in Medical School Education

Introduction: Educators are looking for novel teaching strategies that cater to today's generation of future healthcare workers. Our purpose was to investigate the effectiveness of two active learning pedagogies: an introductory immunology session using the "Invasion of the Body Snatchers" as a *movie analogy* for the daunting task the immune system faces, and Hotspot technology, which is an audience response system that prompts students to answer questions integrated into lectures by selecting the correct area in an image on their phones or computers.

Methods: For the movie analogy, two Likert scale surveys gauging student perceptions of the presentation were administered to first-year medical students (M1s) with anonymously recorded responses. One survey was given after the presentation and a second was administered just after an examination. Confounding variables were addressed via survey questions on previous student immunology experiences. Student responses were analyzed via paired and unpaired t-tests.

For the Hotspot portion, a Likert scale survey was administered to M1s immediately following a lecture that had practice questions incorporated into the lecture via Hotspot.

Results: For the movie analogy, 27 students enrolled in the first survey and 17 of these participants completed the second survey. For the first survey, participants felt the teaching strategy was engaging (70.3%), strengthened their confidence in learning immunology (70.3%), and was an effective means of introducing basic concepts of immunology (85.1%). There was no significant difference between student responses in the two surveys, which suggests students' positive takeaways from the presentation did not change after examination on the subject. 13 students enrolled in the Hotspot survey, of which 61.5% reported that Hotspot made paying attention to the lecture easier, and 69.2% felt that they learned more with Hotspot than standard multiple choice questions. All participants reported that Hotspot was a good use of class time, and 53.5% of participants indicated they are more likely to attend a session when they know Hotspot will be used.

Conclusion: These results suggest that medical students prefer teaching methods that employ active learning practices, indicating potential future directions in higher education.

Group O4

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Title: Exploiting Mitochondrial Vulnerabilities to Induce Immunogenic Death in Melanoma Cells

Introduction: Tumor cells in the tumor microenvironment (TME) are known to upregulate endoplasmic reticulum (ER) stress as a survival mechanism and ER stress transmission to the mitochondria is associated with tumorigenesis. We studied the mitochondrial unfolded protein response (mt-UPR) associated Lon protease 1 (LONP1) in tumor cells undergoing ER stress. Our hypothesis is LONP1 inhibition during ER stress promotes immunogenic cell death (ICD) in melanoma cells.

Methods: To simulate the TME, we used murine B16 melanoma cells that were treated with thapsigargin, a compound known to induce ER stress. Then, some cells were co-treated with both thapsigargin and CDDO-Me, a pharmacological inhibitor of LONP1. RT-PCR was used to assess potential targets associated with mt-UPR. TIMER is a database we used to assess the clinical significance of LONP1 in skin cutaneous melanoma patients. MitoProbe DIOC assay was used to assess mitochondrial membrane potential. Annexin V/PI assay was used to determine the proportion of apoptotic cells. Calreticulin exposure assay was used to determine the expression level of cell-surface calreticulin. CellTiter-Glo assay was used to determine both the intracellular and extracellular concentrations of ATP.

Results: RT-PCR showed that Lonp1 is expressed in response to ER stress. TIMER showed that expression of LONP1 is negatively correlated with the infiltration of cytotoxic CD8+ T cells, CD4+ T cells and activated NK cells. MitoProbe DIOC assay of co-treated cells showed the lowest mitochondrial membrane potential. Annexin V/PI assay of those cells showed an increase in apoptosis versus all other conditions. Calreticulin exposure assay of co-treated cells showed an increase in cell-surface calreticulin exposure versus all other conditions. CellTiter-Glo assay showed both decreased intracellular ATP and increased extracellular ATP in co-treated cells only.

Conclusions: B16 melanoma cells undergoing ER stress in the absence of LONP1 function showed higher cell-surface calreticulin, higher extracellular ATP release, increased entry into late apoptosis and their mitochondrial membrane potential was significantly reduced. We conclude that inhibition of LONP1 in the presence of ER stress induced ICD in our cells, suggesting LONP1 as a potential target for cancer immunotherapy.

Group O5

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Title: Association Between Diabetic Retinopathy and Self-Reported Diabetes in the National Institutes of Health 'All of Us' Research Program.

Purpose: Understanding of diabetes mellitus (DM) diagnosis is assumed to be essential in an individual's ability to manage their diabetes and self-reported DM has been associated with self-management behavior. This cross-sectional study aims to investigate the association between self-reported DM and diabetic retinopathy (DR) in participants with DM in electronic health records (EHR) in the National Institutes of Health "All of Us" (AoU) Research Program.

Methods: The study population included AoU participants who had a diagnosis of DM Type 1 or Type 2 with EHR data. The exposure was self-reported DM based on responses to a survey and was categorized as "Yes" for those who self-reported DM, "No" for those who did not self-report DM, and "Skipped" for those who did not answer the question. The outcome was DR based on EHR data. Multivariable logistic regression models were used to examine the association between self-reported DM and DR, adjusting for age, sex at birth, race and ethnicity, income, education, difficulty reading health care information, ophthalmoscopy screening, and presence of comorbidities (cardiovascular disease, dyslipidemia, and chronic kidney disease).

Results: Of the 55,304 participants in the study population, 12,448 (22.5%) were in the "Yes" group, 9,152 (16.6%) were in the "No" group, and 33,704 (60.9%) were in the "Skipped" group. The prevalence of DR in the "Yes", "No" and "Skipped" groups was 15.6%, 3.7%, and 13.0% respectively. The proportion of participants who had a Current Procedural Terminology (CPT) code for ophthalmoscopy was 21.7% in the "Yes" group, 17.9% in the "No" group, and 17.3% in the "Skipped" group. Compared to the "Yes" group, those in the "No" group (adjusted odds ratio [aOR]: 0.20; 95% confidence interval [CI]: 0.18-0.23) and "Skipped" group (aOR:0.76; 95% CI: 0.71-0.81) had lower odds of having DR.

Conclusion: A strong association was found between DR diagnosis and DM self-report status. Among beneficiaries with DM diagnosed by EHR in AoU, those who did not self-report DM had a lower likelihood of having DR compared to those who self-reported. These findings may suggest decreased DR screening among individuals who are unaware of their DM diagnosis, suggesting a need to further investigate health literacy regarding DM diagnosis and its systemic complications in individuals with DM.

Group O6

Katherine Arnott[1], Savannah Zemeida[1], Emily Chou[1], Esther Chang[1], Valerie Gerriets[1], John Cusick[1]

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Reinforcing Course and Academic Policies through Gaming

Introduction: In an educational era of advancing technology and decreasing interest in the traditional lecture format, there is a need to find alternative teaching methods that are interesting and effective for millennial university students and subsequent generations. This 2-year study assesses the effectiveness and benefit of review games for the learning and retention of Course, Academic, and Student Progression (CASP) policies taught to California Northstate University medical students during their orientation.

Methods: Two cohorts of first year medical students in 2022 and 2023 were introduced to CASP policies during their orientation, and all students then participated in a Kahoot review game on the first day of instruction. A survey was administered before and after the game with scored questions and Likert style questions to assess their knowledge of the policies and their impression of the review game. Score changes between the surveys were assessed using a Mann-Whitney U test in 2022 and both unpaired and paired t-tests in 2023. Likert-style data was combined for both years.

Results: In 2022, 14 and then 19 students completed the 2 surveys. The Mann-Whitney U showed no significant difference between the scored assessments (p-value = 0.056). In 2023, 82 and then 71 students completed the 2 surveys. Both the unpaired t-test (p-value = 6.34E-14) and paired t-test (p-value = 1.28E-10) showed a significant improvement in scored assessments. The combined Likert-style questions showed that 97% (87/90) found the review games helpful for learning CASP policies, and 92% (83/90) found it a fun way to meet and interact with classmates.

Conclusion: This study strongly suggests that review games provide an effective and fun way to reinforce important policies to matriculating students. It may be beneficial for more universities to introduce review games as a teaching tactic.

Group O7

Authors: Aaron Creswell[1], Saumya Bipin[1], and Han-Rong Weng[1]

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Title: Spinal signaling molecules implicated in the spinal neuroinflammation are regulated by AMPK

Introduction: Millions of patients worldwide suffer from persistent neuropathic pain induced by nerve injury, due to limited effective treatments currently available. Spinal neuroinflammation, characterized by glial activation and over-production of pro-inflammatory cytokines, has recently been critically implicated in excessive neuronal activation in the spinal dorsal horn, an important relay center for the pain signal transmission. In the search of identifying molecular targets for the development of novel analgesics, we focused on understanding signaling molecules regulated by AMPK in the context of spinal neuroinflammation.

Methods: Male Sprague-Dawley rats were administered drugs in vivo, and immunohistochemical signal intensity was compared via students T-test.

Results: Activation of TLR4 in the spinal cord with topical application of lipopolysaccharide onto the spinal dorsal surface induced neuroinflammation in the spinal dorsal horn, featuring activation of microglia and over-production of TNFa. These were temporally associated with suppressed protein expression of phosphorylated AMPK, LANCL2, and cell cycle braker P16INK4a. To determine the role of AMPK in the signaling pathway altered by activation of TLR4, AMPK activity in the spinal dorsal horn was inhibited by topical administration of an AMPK inhibitor, Compound C. We found that spinal dorsal horn treated with Compound C had suppression in AMPK activity, protein expression of LANCL2, and P16INK4a, which were temporally associated with microglial activation and over-production of TNFa.

Conclusions: Activation of TLR4 in the spinal dorsal horn produces strong neuroinflammation in the drug-treated area, which was associated with suppression in AMPK activity, LANCL2, and P16INK4a signaling molecules. These results were recapitulated using an AMPK inhibitor. Therefore, targeting the TLR4 and AMPK mediated signaling pathway could potentially ameliorate neuropathic pain via controlling neuroinflammation.

Group O8

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Title: Birth Outcomes Among African American Women: A Comparative Analysis of Births to US-Born and Foreign-Born Women in California (2007-2016)

Introduction: Foreign-born African American (AA) women typically have more favorable birth outcomes compared to those born in the United States (US). Adverse birth outcomes, particularly preterm (PTB) and low birth weight births (LBW), carry lifelong consequences, heightening the risk of neonatal mortality, respiratory distress syndrome, and neurodevelopmental delays. This study aims to compare birth outcomes among US- and foreign-born AA women in California from 2007 to 2016.

Method: As a retrospective cohort study, we examined 267,588 AA births, constituting 5.2% of the 5,137,376 resident live births in the California Birth Statistical Master Files (BSMF) from 2007 to 2016. Birth nativity was categorized as US-born or foreign-born. Birth outcomes encompassed LBW, very low birth weight (VLBW), PTB, very preterm birth (VPTB), small-for-gestational-age (SGA), large-for-gestational-age (LGA), and cesarean delivery (CD). We applied descriptive analysis, simple linear regression, multivariate logistic regression (MLR), and adjusted odds ratios (AORs). MLR analysis enabled AORs based on nativity to quantify associations while accounting for environmental and reproductive covariates.

Results: Births to foreign-born AA women increased linearly from 8.7 in 2007 to 12.8 in 2016 ($p < 0.001$). US-born AA women were more likely to smoke or have obesity during pregnancy, and have adolescent pregnancies. Births to US-born AA women were also more likely to have LBW (AOR 1.73; 95% CI, 1.63–1.85; $p < 0.001$), VLBW (AOR 1.52; 95% CI, 1.34–1.73; $p < 0.001$), PTB (AOR 1.59; 95% CI, 1.50–1.69; $p < 0.001$), VPTB (AOR 1.48; 95% CI, 1.30–1.68; $p < 0.001$), and SGA births (AOR 1.47; 95% CI, 1.38–1.56; $p < 0.001$) compared with births to foreign-born AA women. However, births to foreign-born AA women were more likely to have LGA (AOR 1.67; 95% CI, 1.57–1.77; $p<0.001$).

Conclusion: Major risk factors for poor birth outcomes, such as smoking or having obesity during pregnancy, and adolescent pregnancy, are more prevalent among US-born than foreign-born AA women. Accordingly, LBW, VLBW, PTB, VPTB, and SGA are more prevalent among births to US-born AA women. Interventions to improve smoking cessation during pregnancy, reduce adolescent pregnancies, and enable healthy weight management are priorities for maternal and infant health.

Group O9

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California Northstate University College of Medicine

Title: What Changed? Factors Influencing the General Surgery Residency Match Over Time

Introduction: General Surgery (GS) Residency Programs (GSRPs) have become increasingly competitive to match in the United States. Between 1994 and 2014, despite an increase in applicants, successful matches into general surgery decreased by 13%. This paper aims to 1) understand the trends in competitiveness for a general surgery residency spot, and to ascertain the effects of 2) geographical distribution and 3) research experiences on matching.

Methods: National Resident Matching Program (NRMP) data from 2013 to 2022 was analyzed for 1) total open positions per year, 2) percentage of students matching annually, 3) USMLE Step 1 and Step 2 scores, and 4) research experiences for matched students. Geographical locations of GSRPs for matched US seniors were obtained; distances between medical schools and respective GSRP matches were used to assess the proportion of students matching within 100 miles, in the same state, in the same region, or in a different geographical region than their medical school.

Results: Of 28,690 applicants between 2013 and 2023, 15,242 (53.12%) successfully matched into a GS residency program. For matched GS applicants, there were significantly higher USMLE Step 1 scores and lower match rates compared to matched Emergency Medicine and Family Medicine applicants ($p < 0.001$). Between 2019 and 2023, more applicants matched into GSRPs within the same state/region as their medical school than within 100 miles of their medical school ($p<0.05$); students graduating from schools with affiliated GSRPs were more likely to match at academic residency programs compared to students without affiliated GSRPs ($p<0.001$).

Conclusion: Higher board exam scores and more research experiences improve the likelihood of matching. Institutions affiliated with GSRPs produce students who are more likely to match into academic programs. Students are more likely to match into GSRPs in the same state/region as their medical school rather than within 100 miles.

Group O10

Authors: Emma McIntyre[1]; Mrinal Prabhakar[2]; Tzu-Ni Sin[2]; Carol Villafuerte-Trisolini[2]; Erin Kinnally[3]; Kevin Choy[4]; Sina Farsiu[4]; Sara M Thomasy[5]; Glenn Yiu[2]

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Title: Retinal nerve fiber layer thinning as a measure of cognitive decline in nonhuman primates

Introduction: The retina shares a common developmental origin with the brain, therefore non-invasive retinal imaging methods such as optical coherence tomography (OCT) may be a promising method to indicate early cognitive decline. Photoreceptor and retinal nerve fiber layer (rNFL) thinning have been found in humans with dementia, but no similar association has been made in humans with preclinical cognitive impairment The aim of this study is to evaluate any associations between rNFL and photoreceptor layer thickness and cognitive performance in rhesus macaques – a large animal model that enables preclinical testing of novel therapies.

Methods: We performed OCT imaging on rhesus macaques that underwent a series of cognitive behavioral tasks to test rational decision-making, working memory, and sequence memory. Macular OCT images were analyzed by image segmentation using DOCTRAP software to measure the average thickness of the rNFL and photoreceptor layers including the inner segment (IS) and outer segment (OS), within the nasal 1-3mm and 3-6 mm sector of the foveal, parafoveal, and perifoveal rings around the central macula. To prevent confounds between visual capacity and cognitive performance, relations among cognitive tests and retinal layers were conducted using multiple stepwise regression, controlling for age, testing condition, and visual acuity scores.

Results: We evaluated 90 left eyes (OS) of 90 rhesus macaques (mean age 19.86 years, standard deviation ± 3.28). Reaction time on a rational decision-making test was slower ($F(1, 88) = 23.659$, $p < .001$, adjusted $R^2 = .340$) and more variable across trials ($F(1, 88) = 14.749$, $p < .001$, adjusted $R^2 = .236$) in individuals who had thinner NFL layers, suggesting poorer decision-making abilities. Older age was associated with photoreceptor IS layer thinning, and animals with thinner macular IS layers showed more variability in decision-making reaction time across multiple trials ($F = 4.699$, $p = .035$, adjusted $R^2 = .07$) when adjusted for age, testing condition, and visual acuity.

Conclusions: Photoreceptor layer and rNFL thinning may be correlated with cognitive decline in rhesus macaques, highlighting the possibility that structural image biomarkers could be an indicator of early cognitive decline.

POSTER SESSION 1 ABSTRACTS

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COM-SDSSP posters

Group A1

Authors: Yavar Abgin[1], Kayla Umemoto[1], Dr. Dinesh Vyas[1]
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Title: **An Elderly Case of a Mesenteric Cyst; Case Report**

Introduction: Mesenteric cysts, a rare occurrence in hospitals, predominantly arise in pediatric patients. These cysts vary in type and size, and are often treated successfully with surgical excision. This report details an unusual case of a mesenteric cyst in an 82-year-old woman, admitted to ICU with respiratory distress and elevated heart rate. The patient's significant medical history included high WBC count and moderate coronary atherosclerotic calcifications. Despite initial minimally invasive attempts, exploratory laparoscopy was necessary. The patient showed improvement post-surgery, but the pathophysiology of mesenteric cysts, especially in the elderly, remains largely unexplored.

Case Presentation: An 82-year-old female presented in ICU with no abdominal pain but elevated heart rate, respiratory distress, and atrial fibrillation. Her history included intra-abdominal abscesses. CT scans showed a small, encapsulated low-density abdominal collection and other complications, such as bilateral pleural effusions. Mesenteric cysts are often symptom-free but can present with abdominal masses, pain, nausea, and fatigue. They are typically discovered incidentally during imaging for other conditions and appear as well-defined, fluid-filled masses in the mesentery.

Discussion: Mesenteric cysts, formed from lymphatic or mesothelial tissue, are rare and benign. Their etiology is linked to lymphatic proliferation and inflammation. Studies have shown elevated inflammatory markers in patients with these cysts. Histopathology often reveals fibrous walls with signs of chronic inflammation. Differential diagnosis should include other cystic abdominal structures. Surgical excision is the preferred treatment. In this case, an 82-year-old patient with a deteriorating condition underwent surgery for a mesenteric cyst, leading to a favorable outcome. The surgery involved laparoscopy, laparotomy, abscess drainage, and fluid aspiration. The pathology confirmed a benign mesenteric lymphatic cyst. Further research is essential for a better understanding of the pathogenesis of mesenteric cysts.

Group A2

Authors: Vince Thomas [1], Meraj Alam[1], Zohaer Muttalib[1], Nalin Ranasinghe[2], Leonard Ranasinghe[2]
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Title: Case Study of Pneumothorax in a 27-year-old Male as a Possible Post COVID 19 Infection Complication

Introduction: Pneumothorax occurs when air enters the pleural spaces, resulting in decreased negative pressure between the pleural membranes. It is usually the result of viral infection or an injury in the vicinity of the lungs and can lead to the collapse of the lungs. Pneumothorax that occurs without an injury is known as spontaneous pneumothorax and is divided into primary and secondary spontaneous pneumothorax based on presence of underlying lung disease. Smokers are at higher risk for pneumothorax, as smoking damages type 1 and type 2 alveolar cells that line the alveolar sacs, resulting in the formation of bullae which can burst and allow air to enter the pleural space. This results in various symptoms which are clinically seen, such as chest pain, dyspnea, and absent breath sounds.

Case Presentation: A 27-year-old male presented to the emergency department (ED) with difficulty breathing, chest pain, and fatigue. On arrival, vital signs were BP: 101/55 mmHg, P: 68 beats/min, Resp: 22 breaths/min, Temp: 36.3°C. Physical examination showed the patient was alert, oriented, had good strength and sensation, had no pulsatile masses, was walking, and talking. The patient was breathing easily throughout the course of the physical exam. History is significant for smoking, marijuana use, and being COVID-19 positive in April 2022 roughly 1 month before the current ED presentation. The following lab tests were ordered: WBC, Hemoglobin, Potassium, glucose, magnesium, lipase, lactic acid, heart failure test, troponin, B-type natriuretic peptide, total creatine kinase, muscle breakdown test, urinalysis, urine toxicology screen, international normalized ration test, influenza test, and COVID-19 test. Oxygen saturation was low at 85% on room air and repeated with 93% on room air. His oxygen saturation increased to 100% oxygen on 2 liters of oxygen with nasal cannula. Potassium levels were low at 2.7 mmol/L. Glucose was elevated at 192 mg/dL and 162 mg/dL with repeat. The plasma lactic acid test was elevated at 3.0 mmol/L. The influenza and COVID-19 tests were negative. An anterior-posterior chest X-ray revealed left-sided pneumothorax showing total lung collapse of the left lung. No pneumothorax was seen in the right lung which was clear. An electrocardiogram detected marked sinus bradycardia at 49 beats per minute.

Discussion: Understanding the link between COVID-19 and pneumothorax is essential to determine effective ways to prevent the progression of COVID so that it does not cause the formation of a spontaneous pneumothorax which can potentially be fatal to the patient.

Group A3

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Title: Leiomyomatosis Peritonealis Disseminata (LPD): Case Report of Malignant Transformation and a Comprehensive Literature Review

Introduction: Leiomyomatosis peritonealis disseminata (LPD) is an entity with uncertain biological behavior. It is characterized by multiple smooth muscle intra-abdominal and pelvic nodules which may recur after apparently complete resection. The disease has been predominantly described in childbearing age females. There are only isolated case reports indicating the malignant potential of the disease. A comprehensive collation of cases is lacking in literature.

Methods: We present a case of malignant transformation of LPD over two decades. This patient was originally diagnosed with uterine atypical smooth muscle tumor but developed frank malignancy during the follow up. An increasingly aggressive disease course resulted in ultimate development of liver and lung metastases almost 23 years after original diagnoses resulting in her demise. A comprehensive review of English literature was performed and an excel database of available cases with pertinent data points was constructed. 213 cases of LPD were described including the present case. The patients were divided into G1 (reportedly benign), G2 (malignant at presentation) and G3 (malignant transformation).

Results: Compared to G1, G2 at presentation were more likely to be symptomatic (73%/88%), larger sized (4.1/8.4 cm), and older aged (38/44). In G1, G2, and G3 respectively, the average age was 38.5, 44.3, and 37.5 years while the disease specific survival was 100%, 71%, and 40%. The mean number of surgeries performed in G1, G2, and G3 respectively was 1.6, 1.8, and 3.8. Hormone receptors were found in 24.4% of cases. The mean reported follow up time was in G1, G2, and G3 respectively was 44.9,13.1, and 70.5 months. This suggests that with longer follow up, even apparently benign tumors may develop malignancy. The transformation time to malignancy in G3 was 77.8 months, which is more than the average reported follow up in G1 (32.9 months).

Conclusions: LPD is a potentially malignant condition with long latency prior to transformation. Lifelong surveillance should be considered even in cases originally presumed to be benign. Loss of hormone receptor expression may serve as a marker for this transformation. Circulating Tumor DNA (ctDNA)levels may be associated with development of hematogenous metastases and may be a useful biomarker.

Group A4

Authors: Garrett Henkle, BS[1], Nam Le, BS[1], Kayvon Solaimanpour, BS[1], Dermet Fong, MD[1]
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Title: A Unique Presentation of Reactivated Tuberculosis In Setting of Active Community Acquired Pneumonia

Introduction: Community acquired pneumonia (CAP) and tuberculosis (TB) are two common lung diseases which present similarly but can be diagnosed individually or jointly based on clinical and imaging criteria[1]. Reactivation TB occurs when a case of latent TB infection is endogenously reactivated, and presents with acute symptoms and is contagious[2]. Acid-fast bacilli smear and PCR testing are the gold standard for diagnosis[3,4], aided by Chest X-Ray (CXR)5, showing characteristic upper lobe lesions, cavitation and fibrosis[6]. CAP has a higher incidence, estimated at 24.8 cases per 10,000 adults in the United States[7]. Clinical presentation can mimic that of TB, however CXR findings of CAP more commonly include lower lobe opacities and infiltrates, but may also affect multiple foci[8].

Case Presentation: The patient is a 76-year-old male with history of diabetes mellitus, hypertension, and hyperlipidemia. He presented to the emergency department with one week of weakness and fever. CXR showed multifocal opacities consistent with multifocal pneumonia (Figure 1a). CAP therapy was initiated. He was placed on airborne precautions due to concerns of TB based on discovered distant history of TB treatment and bilateral upper opacities. TB testing subsequently revealed AFB 2/3 positive along with a positive PCR. The patient was started on RIPE therapy (Rifampin, Isoniazid, Pyrazinamide, Ethambutol), which eventually transitioned to Rifabutin, followed by Ethambutol and Moxifloxacin. Upon discharge, levofloxacin was recommended given fluid-responsive acute kidney injury. The patient tolerated Rifabutinl, and there was minimal treatment-associated nausea, managed with metoclopramide as needed.

Discussion: This case illustrates an unusual presentation of reactivated TB in setting of active CAP, highlighting a unique instance of potential joint diagnosis, which may aid in timely identification of similar patients leading to optimal patient outcome.

Group A5

Authors: Alexandra Eftimie[1], Carolina Rodriguez Orozco[1], Solomon Kim[1], Megan Hsu[1], Sarah Preiss-Farzanegan, MD, FAAPMR[1]
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Title: Alignments and Differences Between Standardized Patients' and Preceptors' Observations of Medical Students in OSCEs: Impacts on Feedback.

Introduction: The Objective Structured Clinical Examination (OSCE) is an essential learning tool that provides medical students with an interactive approach to clinical skills education. Although OSCE sessions generally follow a standard protocol, there are variations in how they are conducted and how feedback is provided to medical students by preceptors and standardized patients (SP). This study aims to explore alignments or differences between the traits SPs and preceptors focus on when evaluating medical students in OSCE and whether this impacts the way feedback is provided.

Methods: Purposive sampling was used to recruit California Northstate University College of Medicine preceptors and SPs to participate in individual semi-structured interviews. The interviews will be recorded and transcribed. The transcript will serve as the basis for analysis and thematizing participant responses using Grounded Theory. Descriptive statistics, including frequencies and central tendency estimates, will be used to summarize demographic data.

Results: Nine SPs (five paid professional and five student volunteers) and five preceptors participated. Preliminary analysis revealed group alignment regarding the importance of empathy, curiosity, and responsiveness. Preceptors emphasized structure and professionalism, while SPs focused on sensitivity and curiosity. Both groups withheld feedback on behaviors they viewed as innate or likely to improve. Preceptors focused on diagnostic algorithm feedback while SPs centered on their emotions and student sincerity.

Conclusion: Preceptors and SPs value empathetic engagement, illustrated through contextual listening, professionalism, and emotional responsiveness. Both groups are likely to omit subtle behaviors that may improve naturally over time in OSCE training. These unrecorded behaviors may still affect the interaction. Further demographic, thematic, and frequency data is expected to elucidate more comprehensive findings.

Group A6

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Title: Case Study: Osteosclerotic Myeloma

Introduction: Osteosclerotic multiple myeloma, a type of multiple myeloma, is a malignant proliferation of plasma cells with a poor prognosis when left untreated. In typical multiple myeloma, excess production of immunoglobulins causes hypercalcaemia, renal insufficiency, anemia, and bone pain (CRAB). Other complications include osteoporosis and lytic bone lesions. In contrast, osteosclerotic multiple myeloma causes bone osteosclerosis, leading to a similar presentation. Treatment of this disease is successful using stem cell transplants in patients who are able to tolerate it.

Case Presentation: A 55-year-old Asian female with a history of hyperlipidemia, degenerative disc disease, an arachnoid cyst, and spinal stenosis presented to the clinic complaining of unilateral ear pain and fullness, vertigo, and lower back pain with movement. An appointment was made for evaluation of possible Ménière's disease, and two weeks later an MRI with and without contrast of the spine was performed which did not reveal abnormalities. Ten months later, the patient returned for increasingly worse lower back pain with new onset neck pain accompanied by bilateral upper extremity tingling sensations, in addition to continued vertigo. Clinical suspicion for spinal stenosis causing cervicalgia and lumbago was noted and an MRI of the cervical and lumbosacral spine was ordered, revealing multilevel compression fractures. X-ray of thoracic and lumbosacral vertebral bodies confirmed compression fractures in both regions and showed diffuse osseous demineralization. Differential diagnoses of osteoporosis or multiple myeloma were considered. The patient received a diagnostic DEXA scan and stem cell transplantation in the United States with successful remission three months later, during which she was diagnosed with osteosclerotic myeloma.

Discussion: Treatment for multiple myeloma includes stem cell transplants, radiation and chemotherapy. Disease recognition, early diagnosis and rapid treatment are crucial for positive prognoses.

Group A7

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Title: Understanding the community needs of harm reduction services of AI/AN people who inject drugs in the Great Plains: A Qualitative Study.

Introduction: Harm-reduction services are associated with a decrease in overdose deaths and increase in healthcare accessibility for people who inject drugs (PWID). Yet, harm reduction services are severely limited in regions that serve American Indian and Alaska Native (AI/AN) populations. Harm-reduction services can be instrumental in reducing the number of opioid overdose deaths in AI/AN populations.

Methods: We conducted a secondary qualitative analysis of semi-structured interviews with 10 AI/AN PWID and 9 health and social service workers. The interviews explore injection drug use practices, access to injection equipment, substance use treatment resources, and health system perception and knowledge of AI/AN injection drug use behaviors in the Great Plains. We employed a synthesized textual interview approach to both code and analyze the data.

Results: This study unveils the complex lived experiences of PWID in the Great Plains. Participants vividly expressed their need for improved communication, accessibility, and humanization in health services. A striking revelation was that PWIDs often feel their health and dignity are overlooked, pointing to a significant gap in acknowledging and addressing their needs. Concurrently, community healthcare workers recognized the pressing need for enhanced harm reduction and substance use treatment program development. A notable metric from the code co-occurrence analysis highlighted the frequent linkage between 'Community Context' and 'Harm reduction options'- indicating the profound impact of community-specific factors on the accessibility of harm reduction services. There's an urgent need for the implementation of evidence-based harm reduction and treatment services, especially in the face of sociopolitical challenges that impede public health initiatives for AI/AN PWIDs in the region.

Group A8

Authors: Carter Chan[1*], Cameron Ward[1*], Jesse Wong[1*], Elaine Cheung[1*], Leonard Ranasinghe[1]
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Title: A Rare Case of Pyogenic Ventriculitis Following Otitis Media Caused by COVID-19 Infection.

Introduction: Pyogenic ventriculitis (PV) is an uncommon complication of intracranial infection in adults characterized by ependymal lining inflammation and suppurative fluid in the brain ventricles[1]. PV is typically a complication of hydrocephalus pressure relief treatment[2], meningitis, brain abscess, trauma, or intrathecal chemotherapy[3,4,5]. Predisposing factors for ventriculitis include immunocompromise, alcoholism, cirrhosis, diabetes, or recent surgery[6]. Symptoms can vary, but often include fever, headache, nausea, vomiting, neck stiffness, photophobia, decreased mental status, and seizures[3,5,7].

Case presentation: We report a rare case of PV with left otitis media as a sequelae of a prior COVID-19 infection in a 58 year old male traveling to the Philippines. PV is a rare complaint to the emergency department, especially in adults, and the occurrence of PV following COVID-19 infection has not been well documented in the literature. While visiting the Philippines, our patient presented to the ER with left ear fullness, decreased hearing, fever, and chills, which progressed to vomiting and disorientation. He had a recent positive PCR COVID test and a COVID infection a few months prior. He had pink palpebral conjunctiva, anicteric sclerae, hyperemic left tympanic membrane, and blood clots on the left external auditory canal. On admission, he was diagnosed with encephalopathy. The patient's disorientation and nuchal rigidity led to a suspected CNS infection of either abscess formation, meningitis, or ventriculitis. He was started on broad spectrum antibiotics. Brain scans depicted ventriculitis and a lumbar puncture (LP) showed elevated opening pressure. Vancomycin was added due to positive S. pneumoniae results, during which he developed communicating hydrocephalus. A final diagnosis of PV and otitis media was made based on clinical symptoms and CSF culture. He was discharged home to the US, where he continued antibiotics and visited the ER as advised. Although asymptomatic, he was admitted for observation and evaluation. Head CT/MRI showed findings compatible with mastoiditis and possible ventricular pus concerning for ventriculitis (fig1). He was recommended to continue vancomycin for 6-8 weeks and was discharged.

Discussion: This case demonstrates a rare case of PV, a condition with few studies, especially in regard to COVID-19.

Group A9

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Title: Evaluating an Alternative Crisis Response Model

Introduction: Alternative crisis response programs aim to provide more effective services than that provided by law enforcement agencies and emergency medical services (EMS). MH First Sacramento is one such organization that has been providing crisis communications and response services within the Sacramento area since 2020. Observations of its operations suggested the hypothesis that MH First's services are cost beneficial, adding to its attractiveness as a long-term alternative in the crisis response realm.

Methods: To be financially advantageous, the benefits gained in averted costs of traditional crisis response services should outweigh the cost of MH First's operations. The average cost for consumers of traditional crisis response services was estimated by analyzing data from EMS response fees for the Sacramento Metro Fire Department as well as data on the average cost of an ED visit related to mental/substance use disorders in the US. Then, I collected data for each of MH First Sacramento's responses (either virtual, in-person, or both) during the period from April 2020 to May 2023, the period for which MH First was provided a grant of from the Justice Team Network. Finally, I calculated cost-benefit analysis of MH First. To do so, I used a range based on estimated minimum and maximum financial costs for each crisis response using traditional services; the minimum cost assumes each crisis response only required EMS assessment of the patient, while the maximum cost assumes each crisis response would require EMS assessment, transport, and emergency department evaluation.

Results: Of 28 logged requests for assistance during the time period during which the grant funding was allocated, 10 were removed from the analysis because they either required police/EMS intervention or involved missed calls to MH First without contact made during a call-back. The remaining 18 requests potentially averted EMS costs ranging from $20,844 to $80,244. Therefore, utilizing a grant of $286,738 for its operations, MH First's responses were associated with net costs ranging from $206,494 to $265,894.

Conclusion: MH First Sacramento currently operates at a net cost to the public health system. Its operations should increase efficiency in order to provide a beneficial alternative to the current crisis response options.

Group A10

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Title: A Unique Case of Infectious Colitis after Influenza B Infection.

Introduction: Influenza is a viral illness characterized by fever, cough, and congestion. Of the three types (A, B, and C), influenza B's presentation is commonly acute. It is rare to display infectious colitis (IC) symptoms (abdominal pain, diarrhea, and hematochezia) following influenza B infection. IC is an inflammation of the colon that bacterial and viral strains can cause. While the association between influenza A and IC has been studied, IC's association to other strains such as B or C still needs to be understood.

Case Presentation: The patient is a 62-year-old female who presented to the emergency department (ED) with nausea, vomiting, diarrhea, and lower abdominal pain for 5 days. On examination, the patient was afebrile with a heart rate of 120 bpm, blood pressure of 208/113 mmHg, respiratory rate of 20 rpm, and O_2 saturation of 98% on RA. She appeared alert and fully oriented with no other physical deficits. The abdominal exam was unremarkable. CBC demonstrated acute inflammatory changes including leukocytosis, lymphopenia, and neutrophilia. The patient was positive for influenza B. A follow-up abdominal/pelvic CT demonstrated inflammatory changes in the RLQ involving the cecum, right colon, and peri appendiceal region. This included mucosal ring enhancement, wall thickening in the cecum and ascending colon, and stranding adjacent to the cecum. These findings were consistent with a diagnosis of acute colitis. The patient began IV fluids, IV zofran, ciprofloxacin, and flagyl. After discharge, tylenol and compazine were recommended.

Discussion: This case presents the rare manifestation of acute IC following infection by influenza B. Currently, reported cases of influenza IC have illustrated links with influenza A in which the patient was diagnosed with hemorrhagic colitis after infection.[1] There have been no reported cases of colitis in relation to influenza B. It is important to evaluate the many complications of type B and its rare but debilitating relation to colitis so physicians can include colitis in their management.

Group A11

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Title: Severe Anemia Secondary to Hypothyroidism

Introduction: Anemia and hypothyroidism share a reciprocal relationship in which anemia may present before or may be a result of thyroid disease, but causality between the two remains to be undefined. Anemia and hypothyroidism commonly present with overlapping symptoms confusing the assessment and management of both conditions.

Case Presentation: The case discussed within this report pertains to a 39-year-old female with a recent history of a 40-lb weight gain within two months and a history of substance abuse with methamphetamine who has experienced a prolonged period of heavy menstrual bleeding. She presents to the Emergency Department with shortness of breath, fatigue, bilateral leg and foot swelling, and accompanying pain in her lower extremities. After subsequent laboratory testing, including a complete cell count (CBC), urinalysis, and computed tomography scan (CT), she was later diagnosed with both hypothyroidism and severe microcytic anemia. Due to the patient's lack of continuity of care with a primary care physician, this case is unique as it reaffirms the relationship between anemia and hypothyroidism. We hypothesize that the history of substance abuse may have altered the hypothalamus-pituitary-thyroid axis, and the long history of severe vaginal bleeding, potentially due to Von Willebrand's disease, exacerbated the evolution of microcytic anemia.

Discussion: With this case report, we hope to explore the connection between hypothyroidism, substance abuse, and the development of severe microcytic anemia to illuminate the potential conditions populations struggling with substance abuse may be more prone to developing.

Group A12

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Title: Critical Hypokalemia: A Complex Clinical Journey

Introduction: Hypokalemia is a condition in which serum potassium levels are low, under 3.4mEq/L, and may have severe consequences. Extreme hypokalemia, although rare, can lead to paralysis, cardiac arrest, and death. Through analyses of a unique case of extreme hypokalemia, we will better understand hypokalemia's presentation and provide a concise framework for managing hypokalemia. Ultimately, recognizing hypokalemia is imperative in the broader field of emergency medicine.

Case Description: The case involves a 71-year-old male with a medical history including hypertension, Stage 3 Chronic Kidney Disease (CKD), monoclonal gammopathy of undetermined significance (MGUS), and hypokalemia. The patient was directed to the Emergency Department (ED) by his physician due to a precipitous drop in potassium levels to 1.8 mmol/L (normal range: 3.4-5.0 mmol/L). Despite this substantial decrease, the patient was asymptomatic.

EKG performed in the ED notably showed peaked T waves and prolonged QTc, with occasional PVCs. The patient reported recently starting the diuretic hydrochlorothiazide (12.5 mg once a day) and had an increased urgency to urinate. Physical exam in the ED indicated no notable findings.

Concern for hypokalemia secondary to hydrochlorothiazide use was suspected, the medication was stopped, and the patient was started on intravenous potassium. He was admitted to telemetry for four nights with potassium supplementation and repeat labs. Once his potassium was stabilized, and the patient was discharged with 20mEq of potassium, four times a day for four weeks.

Discussion: The decisions made in this case highlights the importance of vigilant and proactive medical assessment and interventions. Despite the patient's lack of symptoms, the recognition of such potassium levels prompted immediate action. This case emphasizes the importance of closely monitoring patients for side effects of medications. The recognition of hydrochlorothiazide as a potential cause of hypokalemia and the decision to discontinue the medication exemplifies the necessity to address adverse effects of medication. The patient's lack of symptoms despite a significant drop in potassium levels emphasizes the importance of a comprehensive approach, considering both clinical symptoms and laboratory results in medical decision-making.

Group A13

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Title: Web Creep: A Systematic Review of its Risk Factors, Treatment, and Assessment.

Background: Web creep is the most common postoperative complication of syndactyly surgery with highly variable and poorly understood treatment options. This review hopes to establish a better standard of postoperative care in syndactyly surgery to avoid web creep.

Methods: We conducted a systematic review of six databases according to PRISMA guidelines with the aim of evaluating patient and surgical risk factors for web creep, postoperative strategies to prevent web creep, indications and treatment algorithms for reoperation, and evidence for different outcome measures of web creep.

Results: Our search yielded 1040 publications, of which 64 articles met the inclusion criteria for data analysis. Studies included were largely therapeutic levels of evidence IV. Total number of patients and webs was 2001 and 6157 of which 231 (11.5%) patients and 403 (6.6%) webs developed web creep. There was a significant relationship between use of graft-less technique and diagnosis of web creep ($p<0.001$) and the need for reoperation ($p=0.023$). There was no significant relationship between the use of absorbable vs non-absorbable suture or postop casting/splinting vs soft dressing and the development of web creep. The majority of studies assessed web creep on a subjective basis, but when objective measures were used, the Withey score was the most utilized (88 patients). Many studies defined grade 2 Withey score as “clinically significant” web creep requiring reoperation. However, due to the large variety in web creep assessment, it was not possible to statistically correlate Withey score and the need for reoperation. When reoperation was pursued, it was more often for early web creep rather than late web creep.

Conclusion: Further research is required to establish more consistent treatment algorithms in web creep prevention and treatment, with a focus on standardizing an objective measure of web creep as well as the role that graft vs graft-less techniques play in its development.

Group A14

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Title: CT Use Reduction In Ostensive Ureteral Stone – Hydronephrosis Severity (CURIOUS-HS)

Introduction: CT is performed in > 90% of patients diagnosed with ureteral stones, but only 10% of patients presenting to the emergency department (ED) with acute flank pain are hospitalized for a clinically important stone or non-stone diagnosis. CT is considered the gold standard for diagnosis of ureteral colic but exposes patients to harmful ionizing radiation. Hydronephrosis can be accurately detected using point-of-care ultrasound (POCUS) and is a key predictor of ureteral stone and risk of subsequent complications. A recently published high-sensitivity clinical decision rule (CURIOUS) that utilizes hydronephrosis as a key variable could reduce imaging in patients at low risk for complications from ureteral stones.[4] We seek to further refine this CURIOUS clinical decision rule by including gradations of hydronephrosis (CURIOUS-HS).

Methods: The study used data from a prior retrospective cohort study over a 5-year period from 1/1/2016 to 12/31/2020 that included a random sample of 4000 patients from ages 18 to 64 years, who presented to one of 21 Kaiser Permanente Northern California EDs and underwent a non-contrast CT for suspected ureteral stone. Recursive partition analysis will be used to generate a clinical decision rule predicting the primary outcome of clinically important stones, prompting hospitalization or urological procedure within 60 days. We will estimate the C-statistic, plot the receiver operating characteristic curve for the model, and calculate sensitivity, specificity, and predictive values of the model based on a risk threshold of 2%.

Results: In the CURIOUS study, 4000 patients were enrolled and 354 (8.9%) had a clinically important stone. The rule using hydronephrosis as a binary variable predicted complicated stones with Sn 95.5% (95% CI 92.8%–97.4%), Sp 59.9% (95% CI 58.3%–61.5%), PPV 18.8% (95% CI 18.1%–19.5%), and NPV 99.3% (95% CI 98.8%–99.6%). The additional data collection has been completed and statistical analyses of the CURIOUS-HS rule is pending.

Conclusion: If POCUS could be used to ascertain presence of hydronephrosis, the CURIOUS rule could significantly reduce CT use (by 63% in the parent study). Our revised rule using hydronephrosis as a graded variable could potentially reduce it further.

Group A15

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Title: 3D Printed Diseased Heart Valves for Medical Education: Normal vs. Diseased Cases

Introduction: 3D printing capabilities have become more accessible in recent years, with potential to create effective learning materials. We hypothesize that the use of novel 3D-printed models with modifiability will improve students' learning and confidence in their knowledge.

Methods: 3D-printed heart models with the ability to interchange healthy and stenotic valves were created. Participating students will be assigned to one of two workshop groups about heart valve pathology. Both groups will be given the same information regarding valvular pathology followed by a brief quiz to assess their knowledge. However, the experimental group will also interact with 3D heart models prior to taking the quiz. The control group will have the same opportunity to interact with the models after taking the quiz. Both groups will then take a survey to rate their satisfaction with the workshop and the effectiveness of the models.

Results: The 3D-printed models were successfully created using premade model files in combination with Blender editing software. The novel aspect of having interchangeable mitral and tricuspid valves was also successfully implemented. Participants are currently being recruited and preliminary data is expected in the next several weeks.

Conclusions: Given the relatively easy access by which we were able to create these 3D-printed heart models, we believe that 3D-printed models could easily be incorporated into medical school curricula. Interchangeable pieces increase the modifiability of 3D-printed models and have potential utility in demonstrating differences between physiological and pathological structures.

Group A16

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Title: Ramsay Hunt Syndrome Masquerading as Bell's Palsy: A Case Report

Introduction: This case report outlines an atypical presentation of Ramsay Hunt Syndrome, initially misdiagnosed as Bell's Palsy, in a 28-year-old male with a prior history of Bell's Palsy that presented on the opposite side. The unusual contralateral manifestation underscores the significance of accurate diagnosis and management in recurrent facial palsies.

Case Description: The patient presented with left-sided facial sensory loss progressing to right-sided motor impairment, reminiscent of his episode of Bell's Palsy. However, on further investigation, subsequent workup revealed varicella-zoster virus (VZV) positive cerebrospinal fluid in the context of auricular symptoms and his concurrent bilateral facial palsies, consistent with Ramsay Hunt Syndrome. Comprehensive evaluations also revealed facial nerve involvement and VZV presence in the right ear, confirming the diagnosis.

Discussion: This case reminds of the challenge of evaluating recurrent facial palsy, particularly informing clinicians to rule out Ramsay Hunt Syndrome following a prior episode of Bell's Palsy. Existing literature lacks classification of recurrent facial palsy based on House-Brackmann grades, limiting direct comparisons between primary and recurrent cases. Chung et al report a recovery rate of 80.6% for ipsilateral recurrence and 72% for contralateral recurrence, however this underscores the need for further stratified analyses between Bell's Palsy and Ramsay Hunt.

Only one case of contralateral Ramsay Hunt Syndrome following Bell's Palsy has been reported in literature, suggesting its rarity in the context of recurrent facial palsies. This scarcity of documented cases of contralateral Ramsay Hunt Syndrome post-Bell's Palsy underscores the importance of individualized evaluations and treatment strategies. The absence of comprehensive classifications for recurrent facial palsy limits our understanding of prognostic factors and optimal management approaches.

Group A17

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Title: Cryptogenic Pontine Abscess Treated with Stereotactic Aspiration: A Case Report

Introduction : Brainstem abscesses are collections of pus within the brainstem, which can cause inflammation, tissue damage, and compression of adjacent structures, leading to headache, fever, and focal neurological deficits. Brainstem abscesses are considered rare and potentially life-threatening, and pontine abscesses are even rarer. Both are often caused by the spread of infection from nearby structures like the middle ear, sinuses, and mastoid air cells but can also result from hematogenous spread.

Case Description: A 54-year-old male presented with numbness and clumsiness in his left hand and leg over a three-day period. These symptoms were preceded by a headache that awoke him the night before without accompanying fever. An initial brain magnetic resonance imaging (MRI) showed a 1.5 cm ring-enhancing lesion in the right pons. The patient's blood cultures were negative as were screenings for tuberculosis, methicillin-resistant Staphylococcus aureus, human immunodeficiency virus, and hepatitis B virus; cysticercosis antibody testing was equivocal. The patient was started on ceftriaxone, vancomycin, and metronidazole.

Three days later, the patient showed worsening weakness in his left arm and leg. A repeat MRI showed thickening of the enhancing wall and formation of another lesion in the right dorsal paramedian pons. A lumbar puncture revealed 11 WBCs, two RBCs, a glucose level of 76 mg/dL, and a protein level of 62 mg/dL. Cerebrospinal fluid was clear, colorless, and negative for cultures, toxoplasma IgG, cryptococcal antigen, human simplex virus, and acid-fast bacteria.

The patient underwent transfrontal stereotactic drainage of the lesion which revealed 1.3 cc of a purulent, foul-smelling material and the cultures of which grew Streptococcus pyogenes. A postoperative MRI showed a 0.85 cm abscess without hemorrhage. The patient stated improvements in strength and functionality but residual hemiparesis. After eight weeks, all antibiotics were stopped after verifying decreasing abscess size on an MRI.

Discussion: The patient presented with a pontine abscess of both undetermined causal origins and unclear infections signs, namely the lack of fever and nausea which are commonly associated with brainstem abscess. Additionally, the stereotactic aspiration cultures grew Streptococcus pyogenes, which can exist in the oropharynx, yet our patient denied recent upper respiratory illness. This case reveals several learning points on cytogenic brainstem abscesses: the importance of early neuroimaging by MRI for a definitive diagnosis of brain abscesses and the value and utility of stereotactic aspiration, a minimally invasive procedure, which can treat nearly all brain abscesses measuring at least 1 cm, regardless of the location.

Group A18

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Title: Facet Replacement Surgery: A Systematic Review of Patient Reported Outcomes of Facet Replacement Devices

Introduction: Facet replacement surgery replaces damaged facet joints and preserves spinal motion. This study compares the patient-reported outcomes of three devices: Archus Total Facet Arthroplasty System (TFAS), Total Posterior Spine System (TOPS), and ACADIA Facet Replacement System (ACADIA) using the Oswestry Disability Index (ODI) and Visual Analog Scale for back pain (VAS) over preoperative (0), 3, 6, 12, and 24 months postoperative.

Methods: A PubMed, Scopus, and Embase search for peer-reviewed articles using search terms: ("Arthroplasty"[MeSH Terms] OR "TOPS" OR "Total Posterior Spine System" OR "total facet arthroplasty system" OR "TFAS" OR "ARCHUS" OR "facet arthroplasty" OR "lumbar arthroplasty" OR "facet replacement") AND ("Lumbar Vertebrae"[MeSH Terms] OR "Lumbar") AND ("Spine"[MeSH Terms] OR "Spinal Column" OR "Spine" OR "Vertebra" OR "Vertebrae" OR "Vertebral Column") was used. The inclusion criteria of primary, full-text studies in English focusing on lumbar facet arthroplasty outcomes extracted nine papers from 1332. Weighted mean ODI and VAS back pain for each device were compared over time. One-way ANOVA was performed and compared for each pain scale for 0, 3, 6, 12, and 24 months.

Results: Analysis included 445 patients for ODI and 236 for VAS assessments. TOPS and ACADIA consistently demonstrated a downward trend in weighted mean ODI and VAS scores across all time points. TFAS showed initial improvement in ODI and VAS scores but indicated an upward trend in later months, suggesting lesser long-term efficacy. No significant difference was found in mean ODI scores across the devices at any point except 12 months ($p < 0.05$); for VAS, significant differences emerged at 12 and 24 months ($p < 0.05$).

Conclusion: All three devices showed improvements in mean ODI and VAS back pain. TFAS had worse long-term outcomes, possibly due to small sample size, highlighting the necessity of larger, long-term studies to confirm these findings and optimize patient care.

Group A19

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Title: Case of Late-Onset Wilson's Disease with History of Migraines and Depression

Introduction: Wilson's disease (WD) is a rare autosomal recessive disorder caused by ATP7B gene mutations that lead to impaired copper transport. The course of this disease often includes the brain, liver, eyes, kidneys, or nerves. The prevalence in the U.S is 1 in 33,000 people. High variabilities in its presentation makes WD a difficult diagnosis to make.

Case Description: A 44-year-old woman presented to the emergency department (ED) with abdominal pain, distention, and bilateral leg swelling. Her past medical history includes symptoms over several years of migraine, anxiety, insomnia, depression, and extremity numbness. Initial findings in the ED suggested acute decompensated cirrhosis secondary to nonalcoholic steatohepatitis (NASH) and acute kidney injury. WD was not initially suspected. The diagnosis was later revised to alcoholic steatohepatitis and potential WD following the observation of Kayser-Fleischer rings and low ceruloplasmin.

Discussion: Diagnosing WD can take a long time, particularly if patients have neurological findings early on that could be explained by many other diseases. This can lengthen the time between symptom onset and treatment. Its manifestation of symptoms, such as hepatic failure, can mimic many other liver diseases. Moreover, they can occur over a long duration throughout a patient’s life, making it difficult to nail down the diagnosis in a timely manner. The average time from the beginning of symptoms to WD diagnosis often exceeds two years. This case adds to the need for more clinical awareness of WD in patients with unexplained liver, neurological, and psychiatric symptoms.

Conclusion: Clinicians should have a high index of suspicion for WD in patients with unexplained symptoms commonly found in the disease. This is especially of importance in atypical presentations where it may not be considered until late-onset. Patients of any age with liver injury of unknown etiology and neuropsychiatric history should be screened for WD.

Group A20

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Title: Keytruda (Pembrolizumab) Hypersensitivity Treatment with Intralesional Kenalog (Triamcinolone) Injections: A Case Report

Introduction: Melanoma is the most invasive and deadly form of skin cancer. Melanomas are caused by a combination of genetic and environmental factors, with sun exposure being predominantly responsible for most.

Case Presentation: A 90-year-old woman with metastatic melanoma (T4bN1a Stage IIIC), with locally advanced subungual disease of her left great toe, underwent toe amputation and Keytruda (pembrolizumab) therapy. Approximately 1 month into Keytruda treatment, she developed extensive pruritic ulcers on bilateral lower extremities, with lesions so severe that physicians originally suspected it to be squamous cell carcinoma. However, pathology showed interface dermatitis with eosinophilia, suggesting an allergic drug reaction of epidermal squamous hyperplasia to her melanoma treatment. Despite this reaction, treatment continued as recommended by Keytruda guidelines until the cancer improved.

Steroid treatment was instituted to treat the lesions topically along with selective intralesional treatment. All lesions received topical clobetasol propionate ointment 0.05% twice a day. In addition, the 8 most severe lesions (rotating amongst the 20+ lesions) received 0.5 cc Kenalog (triamcinolone 10 mg/cc) injections every 2 weeks. Lesions were selected if raised, pruritic, and >1 cm, and injected in the order of severity, given on a rotational basis rather than all at once. Reinjections were performed for lesions that remained raised. This combination therapy of topical and intralesional steroids resulted in a decrease of 80-90% of the lesions on her legs over 2-3 months of treatment.

Discussion: Pembrolizumab-caused cutaneous events occur in up to 49% of patients ranging in severity. Instead of solely using topical corticosteroids, ongoing intralesional Kenalog injections were given to multiple lesions. The combination of these injections with a topical steroid drastically improved the patient's lesions and should be considered for similar adverse reactions.

COLLEGE OF DENTAL MEDICINE

Abstract ID: A21

Submitter	Bohkyeong Suh,
Authors	Bohkyeong Suh; Hamid Ahmed; Jasraj Sandhu; Rashidah Wiley, DDS
Title	Dietary Guide for Oral Vesiculobullous Diseases
Abstract	**Study Objective:** A. Determine the role that diet plays in the activation, aggravation, or management of the oral manifestations of vesiculobullous diseases (VBD). B. Review clinical symptoms associated with the three most common vesiculobullous diseases (oral lichen planus, mucous membrane pemphigoid, and pemphigus vulgaris) affecting the oral cavity. C. Discuss the effects that vesiculobullous diseases and poor nutrition have on oral health. D. Creation of a dietary guide for patients diagnosed with vesiculobullous disorders affecting the oral cavity. **Methods:** The research team compiled relevant information from peer-reviewed journal articles related to the dietary details of oral lichen planus, mucous membrane pemphigoid, and pemphigus vulgaris. **Results:** The literature review revealed the role that nutrition has in helping with the immune response of VBD and maintenance of oral health. While a diet consisting of essential nutrients such as fruits and vegetables typically helps with the immune response, it may cause aggravation of the oral soft tissue in those with VBD. A bland diet is best for those experiencing active symptoms to prevent discomfort, however, over time this diet results in nutritional deficiencies which can affect the integrity of the oral hard and soft tissues. Studies are being completed to assess how essential vitamins, minerals, and supplements can be added to the bland diet to aid in the management of the disease process. **Conclusions:** Avoiding triggering food items and maintaining a well-nourished diet can decrease the symptoms noted during active episodes of vesiculobullous disease. While our research serves as a foundation for the potential benefits of certain nutritional foods, further investigation is needed to gain more knowledge about the disease process and how to create a holistic management process.

Abstract ID: A22

Submitter	Nisha Manila
Authors	Manila Nisha; Medina Jacqueline; Le Michael; Keating Kevin
Title	Imaging Insights: Guiding Dentists through the Labyrinth of Osteoradionecrosis and Medication-related osteonecrosis of the Jaws - Case Report
Abstract	**Objective:** •Identify key radiographic features of Osteoradionecrosis of the Jaw (ORNJ) and Medication-Related Osteonecrosis of the Jaws (MRONJ) as compared to radiographic appearance of normal bone. •Describe how the radiographic features of ORNJ and MRONJ inform about the feasibility of dental treatment that affects jaw bones. •Explain how identified radiographic features in ORNJ and MRONJ cases advise the choice of treatment options for ORNJ and MRONJ. **Methods:** We retrospectively studied patients diagnosed with ORNJ and MRONJ, focusing on their radiographic findings. Panoramic and Cone-Beam CT (CBCT) radiographs were investigated for specific features like sclerotic bone, radiolucencies, sequestrum formation, and cortical perforation. **Results:** ORNJ: •Radiographs typically revealed sclerotic bone with a "moth-eaten" appearance, often involving the mandible. •Areas of radiolucency noted representing bone resorption or sequestra. •Cortical perforation and pathologic fractures were occasionally observed. **MRONJ:** •Radiographic features were more irregular, varying from subtle periapical lucencies to extensive bone destruction. •Multifocal involvement and bilateral presentation were common. •Sclerotic bone was less frequently seen compared to ORNJ. **Treatment Considerations:** •Early diagnosis established via radiographic findings would facilitate conservative management approaches like debridement, antibiotics, and medication adjustments for MRONJ. •Advanced ORNJ cases often obliged surgical intervention like sequestrectomy or bone grafting. •Radiographic monitoring post-treatment is crucial to assess healing progress and detect potential complications. **Conclusion:** Osteoradionecrosis (ORNJ) and Medication-Related Osteonecrosis of the Jaws (MRONJ) present significant challenges for dentists due to their complex presentations and diverse treatment options. Radiographic imaging plays a crucial role in diagnosis, treatment planning, and monitoring the course of these conditions. By recognizing the distinct radiographic features of each condition, dentists can formulate appropriate treatment plans, optimize outcomes, and improve patient care.

Abstract ID: A23

Submitter	Nisha Manila
Authors	Manila Nisha; Mirfendereski Payam; Ahmed Umair; Essex Gwen
Title	Algorithmic Odontology: Navigating Ethical Horizons in AI-driven Dentistry for Patient Welfare
Abstract	**Objective:** This study critically investigates the ethical implications of integrating Artificial Intelligence (AI) into dentistry, specifically focusing on patient autonomy, privacy, and quality of care within a landscape dominated by algorithmic decision-making. **Methods:** A literature search was conducted across various scholarly databases, including PubMed, ScienceDirect and Medline using keywords such as "AI in dentistry," "ethical implications," and "patient well-being." Studies published between 2015-2023 were reviewed to identify pertinent literature. Inclusion criteria comprised peer-reviewed articles, academic papers, and relevant book chapters discussing the ethical challenges and opportunities arising from AI adoption in dental practice. **Results:** AI algorithms are trained on large datasets of patient data, precipitating concerns about data privacy, confidentiality, and safety. The potential for bias in AI algorithms, particularly in algorithms that rely on patient demographics or historical treatment patterns, could lead to unfair practices and prejudiced access to care. Moreover, the rising dependency on AI for decision-making could erode the sovereignty and expertise of dentists, possibly compromising patient-dentist relationships and the personalized care that is pivotal to dentistry. Our results emerged in the following five categories. 1. Bias and Fairness, 2. Transparency and Explainability 3. Autonomy and Control 4. Data Privacy and Security 5. Accountability and Responsibility **Conclusion:** The amalgamation of AI into dentistry presents a paradigm shift in healthcare delivery, offering significant advancements alongside ethical challenges. To ensure patient well-being in this evolving landscape, a balanced approach is essential. Dentistry must strive to harness AI's potential while upholding ethical principles. Collaborative efforts among dental practitioners, policymakers, engineers, and industry experts are crucial to establishing guidelines that prioritize patient welfare amidst the promising influence of AI in dental healthcare.

Abstract ID: A24

Submitter	Mironda Frankenberger
Authors	Dr. Mironda Frankenberger, BS, DDS; Adriana Canby; Bethany Cheng Paul Glassman DDS, MA, MBA; Valerie Phillips BS, MS, RDH, RDHAP
Title	"Starting from Scratch: How CNU CDM uses Literature Review to Successfully Launch its Community Rotations Program."
Abstract	**Objective:** Providing community-based clinical rotations (CBCR) is a Commission on Dental Accreditation (CODA) requirement for dental schools to become accredited. These rotations offer dental students the opportunity to provide dental care to underserved patient populations, all while improving the students' clinical reasoning, time management, cultural humility, and dental hand skills. The CNU College of Dental Medicine is in the preliminary stages of establishing its Community Rotations Program. As such, the purpose of this research is to use literature review to investigate the processes used by other CBCR programs within healthcare education as a means for increasing the success of our first cohort of rotating students, the CDM Class of 2025, in July 2024. **Methods:** This study involves a review of the dental education and general health care education literature on the process of establishing a CBCR program. The focus is on best practices, lessons learned, and things to avoid when establishing a CBCR program. **Results:** The literature provides lessons which inform and guide us on the process of developing a quality, community-based clinical rotation. These patterns include starting early in the planning process, enlisting agreements with more community sites than is presumed necessary, and assigning more preceptors per site than is presumed necessary. There are also suggestions about what to avoid, such as having community sites that are too far from the educational program's home-base, failing to calibrate preceptors, and failing to clearly set the expectations for all parties involved. **Conclusions:** Following the best practices of existing community-based clinical rotation programs will allow CNU CDM to be more successful in launching its Community Rotations Program.

Abstract ID: A25

Submitter	Valerie Phillips
Authors	Valerie Phillips, MS, RDH, RDHAP; Paul Glassman, DDS, MA, MBA
Title	Development and of a novel pre-doctoral dental course on health systems.
Abstract	**Study Objective:** The objective of this submission it to present a literature review and conclusions about teaching of health systems in U.S. dental schools. The California Northstate University, College of Dental Medicine (CDM) has introduced a novel pre-doctoral dental course on health systems in the United States. This new course is a requirement for first year dental students at CDM. The topics presented in this course, titled Health Systems, range from the traditional delivery and payment structure of health and oral health care to innovative approaches to delivery that have proven to be effective adjuncts to the conventional oral health care delivery models. The unique course informs dental students about new methods of oral health care delivery that are inclusive of all populations and especially those who have been left out of the traditional delivery model. Instruction on novel and expanded delivery systems is not part of the curriculum in most dental schools. **Methods:** A literature review of current dental school curricula demonstrates that the topics in this course are unique to CDM and establishes the significance of dental students gaining this knowledge. The review supports the development, implementation, and evaluation of the topics for an original pre-doctoral course on health systems. **Results:** This review presents evidence that most dental school curricula lack focus on innovative delivery systems that can impact oral health for the many populations who go without oral health care in traditional delivery models. **Conclusion:** The Commission on Dental Accreditation (CODA) mandates that dental schools provide education on health and oral healthcare delivery systems. As dental students graduate and enter practice, they should be aware of the many populations who need their care and how they can meet those needs in non-traditional systems of care.

Abstract ID: A26

Submitter	Aleena Khan
Authors	Aleena Khan; Ranna Alrabadi; Dr. Paul Glassman; Jenny Kattlove
Title	Envisioning the Prospective Role of Home Visitors in Advancing Oral Health Systems
Abstract	**Objective:** More than half of the children in the United States do not receive regular dental care due to lack of access and financial constraints, making them more likely to suffer from dental disease. Although, in the past decade there has been an increase in the number of people with dental benefit coverage, many low-income families still have difficulty finding dental offices that accept their insurance and have limited access to care. One promising approach is the addition of home visitors to the oral health system. The aim of this study was to review literature in this area and draw conclusions about the effectiveness of incorporating home visitors into oral health systems. **Methods:** A literature search was performed on the role of home visitors in oral health systems. In addition, recent trends in practice and payment laws related to the use of home visitors in oral health systems were reviewed. **Results**: The addition of home visitors in the oral health system plays a positive role for children and decreases their risk of dental disease. Home visitors are able to interact with the families regularly, ensure that children receive diagnostic and preventive services, and support families in adopting “mouth healthy habits.” **Conclusions:** There are significant opportunities for the use of home visitors in oral health systems, including community members serving on the frontline in oral health systems. Early childhood home visiting programs and the use of community health workers (CHWs) are being supported by initiatives such as the one being led by the California Department of Healthcare Access and Information (HCAI) program. HCAI is committed to expanding equitable access to healthcare among Californians. Early childhood home visiting programs have the potential to improve early childhood oral health by utilizing community members as the open door to accessible dental care.

Abstract ID: A27

Submitter	Andrew Nguyen
Authors	Jennifer Goss, DDS; Andrew Nguyen; Rita Shdid
Title	Early Introduction of Hands-On Surgical Experience as a Tool to Improve Dental Student Engagement
Abstract	**Study Objective:** Periodontology is a predoctoral course administered in the preclinical dental curriculum taught through didactic lectures and simulation lab. In addition to developing theoretical knowledge, dental students practice hand skills using typodonts or anatomical models before they transition to operating on patients in clinic. In an effort to keep students engaged, as well as allowing them to apply their newly acquired knowledge, a hands-on surgery and suturing lab activity was designed using pig's jaws. This study investigates early (second year of dental school) hands on simulation, using an animal model with the goal to stimulate an increased level of engagement. While there are numerous anatomical differences between humans and pig species, pig mandibles provide oral tissue that closely mimic human tissue ideal for suturing practice. The purpose of the research study is to investigate, using literature search and survey tools, if introducing hands on, active learning in the form of surgery on pig mandibles improve engagement of predoctoral dental students. **Methods:** A literature search was conducted to investigate dental student engagement and the use of animal models compared with simulated and virtual models for surgical training. A pre-project survey was conducted in which pig jaws were set up and students were guided through incision and suture exercises. 40 predoctoral (n=40) dental students participated in the post-course, 5-point Likert-like scale questionnaire on the efficacy of the pig jaw surgery exercise. Survey data was analyzed by descriptive statistics. **Results:** Most participants (93.5%) strongly agreed that practicing suture exercises utilizing pig mandibles significantly increased interest and engagement in the course. The post activity self-assessment forms indicated the activity was generally satisfying and interesting to students, and they requested more suturing activities. **Conclusions:** Periodontics curriculum that utilizes hands-on surgical exercises with pig mandibles increases dental student engagement. We conclude that animal models play a vital role in the transition from preclinical courses to clinical practice.

COLLEGE OF HEALTH SCIENCE

Abstract ID: A29

Submitter	Mahitha Ravipati
Authors	Mahitha Ravipati; Jayani Villuri; Nhukhoi Pham; Navya Muppidi, Ravi Ranjan PhD
Title	Effects of Temperature on Physiological Responses and Mental and Physical Performance
Abstract	**Study Objective:** Extreme temperatures can often have a negative impact on an average students' performance. This experiment aims to address that gap in knowledge to determine the effect of temperature on the physiological responses and cognitive function. It is hypothesized that the optimal cognitive performance would take place in an environment temperature of 20°C and deviations from this temperature can have a negative effect on one's cognitive function and physiology. **Methods:** The blood pressure and the heart rate were the physiological measures taken while the cognitive performance was determined through the use of standardized exams and a physical reaction time test. This weekly study was performed in a controlled testing room. The temperatures were set between the range of 10°C and 30°C, using 5°C intervals between each week during the first five weeks. During the sixth week, the temperature was set back to 10°C to determine if there were any confounding variables. **Results:** The research findings showed that there were differences among the genders as the male volunteers showed greater cognitive performances on the tests and decreased heart rates while being exposed to the extreme temperatures. The female volunteers showed a better cognitive performance in the warmer temperatures. Their heart rates increased as the temperatures increased. The blood pressure changed significantly for both genders as it rose during exposure to cold temperatures and decreased during exposure to hot temperatures. The best cognitive performance for both genders were seen at 20°C and 25°C as the physiological responses were the most stable around this temperature as well. **Conclusions:** The hypothesis was proven to be somewhat right as the cognitive performance and the stability of the physiological responses is the greatest at 20°C. However, these two variables are also the greatest at 25°C. Therefore, this range between 20°C and 25°C is the optimal temperature for cognitive performance.

COLLEGE OF PHARMACY

Abstract ID: A30

Submitter	Eugene Kreys
Authors	Jodi Calder[1]; Eugene Kreys[2] Affiliation: [1] CNUCOP Student [2] Department of Clinical and Administrative Sciences, California Northstate University College of Pharmacy
Title	Association of NSAIDs and Cytopenia Disorders: A Pharmacovigilance Study using Disproportionality Analysis
Abstract	**Objectives:** Several case reports were published linking certain non-steroidal anti-inflammatory drugs (NSAIDs) with anemia and thrombocytopenia. The objective of this study was to evaluate the association between NSAIDs and various cytopenia disorders. **Methods:** We conducted a case non-case study involving a disproportionality analysis using data from the Food and Drug Administration's Adverse Events Reporting System (FAERS) derived from MedWatch reports from 2014-2023. All commonly used NSAIDs were evaluated in a stratified manner and as a composite. Anemia, thrombocytopenia, immune thrombocytopenia, leukopenia, neutropenia, and pancytopenia were also evaluated in a stratified manner and as a composite. Proportion reporting ratios (PRR) as well as Reporting odds ratios (ROR) were calculated. Signals of disproportionate reporting (SDR) were determined by chi-square test and 95% Confidence Interval (95% CI). **Results:** Twenty-seven million unique cases were identified, 400,043 were linked to NSAIDs, with 552,789 were linked to a cytopenia, and 19,200 linking NSAIDs to a cytopenia. NSAIDs as a class demonstrated a statistically significant association with various cytopenia disorders including anemia with RRR of 4.3 (95% CI: 4.2-4.4), thrombocytopenia with RRR of 1.9 (95% CI: 1.8-2.0), immune thrombocytopenia with RRR of 4.5 (95% CI: 4.2-4.9), leukopenia with RRR of 1.3 (95% CI: 1.2-1.4), and pancytopenia with 1.6 (95% CI: 1.6-1.7). Of note, statistically significant association between immune thrombocytopenia and ketorolac was demonstrated with RRR of 37.6 (95%CI: 26.6-53.0), ibuprofen with RRR of 3.2 (95%CI: 2.7-3.8), and naproxen with RRR of 8.1 (95%CI: 6.5-10.1). **Conclusion:** NSAIDs appear associated with various cytopenia disorders.

Abstract ID: A31

Submitter	Linh Ho
Authors	Linh Ho[1], Tibebe Woldemariam[1], Tin Le[1], Jenny Nguyen[1##], Thanh Truc Do Nguyen[1##], Trung Ky Pham[1], Melanie Rose[1] Affiliation: [1] Department of Pharmaceutical and Biomedical Sciences; California Northstate University College of Pharmacy [##] Contributed equally to this work
Title	Investigation of Effects of Barberry Compounds on Chemoresistant-prostate cancer
Abstract	**Study Objective:** In this study, we explore the effect of compounds in Berberis vulgaris (barberry) on prostate cancer cells. Our goal is to elucidate the modes of actions by which barberry compromises chemoresistance in prostate cancer. **Methods:** The aqueous extract of barberry was prepared for the study. Briefly, the dried plant material (4g) was reduced to fine powders which were percolated at room temperature with 40 ml 100% distilled water for 24 hours. Evaporation of the solvent at reduced temperature (37oC) using 'Chefman 5 Tray Round Food Dehydrator' yielded a dried residue. The residue was then dissolved with water at desired concentration required for bioassay. To assess effect of the barberry extract on cell proliferation, we treated PC3 and LNCaP cells with barberry extract at 1 µg/mL, 10 µg/mL, 100 µg/mL, and 500 µg/mL for 72 hours followed by a BrdU assay. To determine mechanism of action of the aqueous barberry extract and its effect on Sirt3 activity, we used fluorometric assay, western blotting (WB), and quantitative PCR. **Results:** Aqueous barberry extract at different concentrations yielded lower Sirt3 activity in vitro compared to control of a putative 100% Sirt3 activity. Treatment with barberry at concentrations of 500, 100, 10, and 1 µg/ml inhibited cell proliferation and this effect was concentration dependence. In line with the inhibiting results of the barberry extract on Sirt3 activity in vitro, Sirt3 expression levels in PC3 cells were decreased with increasing barberry concentrations by WB. Interestingly, the phosphorylation levels of protein kinase B (p-AKT) also decreased when barberry concentrations increased. In sharp contrast, Sirt3 expression and p-AKT levels in LNCaP cells were increased with increasing barberry concentrations by WB. **Conclusions:** Barberry extract inhibited proliferation of prostate cancer cells with concentration dependence. For the first time, we showed barberry reduced Sirt3 activity, Sirt3 and p-AKT protein expression in PC3 when increased concentrations. Interestingly, Sirt3 protein expression and p-AKT both were increased when increased concentrations of barberry in LNCaP cells.

Abstract ID: A32

Submitter	Linh Hoang
Authors	Linh Thuy Hoang[1]; Tuan Duc Nguyen[2]; Nghiem Quan Le[2] Affiliations: [1] P_2 Student, California Northstate University College of Pharmacy [2] University of Medicine & Pharmacy HCMC, Vietnam
Title	Improving the Quality of Total Parenteral Nutrition Preparations for Neonates and Pediatric Patients: A Comprehensive Study at Vietnam's Pediatrics' Hospital II
Abstract	**Study Objective:** In Vietnam's Pediatrics' Hospital II, a specialized Total Parenteral Nutrition (TPN) regimen is exclusively prepared for neonates and pediatric patients who depend entirely on intravenous nutrition. This TPN formulation includes vital components such as glucose, amino acids, micronutrients, and electrolytes. However, there's a need for rigorous in-house standards to ensure the highest quality of TPN preparations, covering physico-chemical properties, microbiological safety, and precise ingredient quantities. Our primary goal is to establish internal criteria and a methodology to accurately measure ingredient concentrations in TPN tailored for pediatric patients. **Methods:** In-house specifications for compounding TPN, following guidelines from the United States Pharmacopeia, Vietnam Pharmacopeia, and the manufacturer's instructions, were developed. This study was conducted to develop and validate the reverse HPLC method for the quantitation of 19 essential amino acids. Photo diode array (PDA) detector combining the pre-column derivative formation with the FMOC-Cl reagent, and fluorescence detector (FLD) combining the pre-column derivative formation with OPA and FMOC- Cl ones were used for quantification of cysteine and the remaining amino acids, respectively, with a different chromatographic condition for each procedure High-Performance Liquid Chromatography (HPLC) methodology was employed under varying conditions to quantify the ingredients. **Results:** The study effectively established and recommended criteria for compounded TPN preparations in Vietnam. Cystein quantification by HPLC-PDA method (column Gemini C18 (150 x 4,6 mm; 5 µm); wavelength 286 nm; flow rate 1,5 ml/min). Other amino acid quantification by HPLC-FLD (column Gemini C18 (250 x 4,6 mm; 5 µm); wavelength varied by time: 0 - 40,5'(340 - 450 nm), 40,6 - 54'(266 - 310 nm), 55 - 70'(340 - 450 nm); flow rate 1,5 ml/min). The validation results showed that the developed methods have desirable selectivity, good sensitivity, high precision (RSD ≤ 2%), satisfactory accuracy, and a recovery rate from 98% to 102% (RSD ≤ 2%). **Conclusions:** The methods were applied for the analysis of amino acids in the studied parenteral feeding solution. The percentage amount of each amino acid was in the range of 90-110% compared to the label. The study significantly enhanced the quality and safety of TPN preparations for neonates and pediatric patients by establishing rigorous in-house standards and innovative analytical approaches.

Abstract ID: A33

Submitter	Tony Eid, Islam Mohamed
Authors	Amber Huynh*[1]; Madison Tan*[1]; Travis Lyon[1]; Tony Eid[2, 3]; Islam Mohamed[4] AFFILIATIONS: [1] CNUCOP Student [2] California Northstate University College of Pharmacy [3] Department of Family Medicine, 9th Medical Group, Beale AFB [4] California Northstate University College of Medicine *Equal Contribution
	Exploring the effects of Mounjaro, a dual GIP and GLP-1 receptor agonist, treatment on Lipoprotein (a) levels in patients with Type 2 diabetes.
Abstract	**Study Objective:** Patients with type 2 diabetes and Elevated Lipoprotein (a) (Lp(a)) levels have an increased risk of developing cardiovascular disease. Mounjaro, a dual GIP/GLP-1 receptor agonist, has been shown to help control patients' diabetes and cause weight loss. However, the effects of Mounjaro on Lp(a) is currently unknown. **Methods:** An ongoing observational case study series began in January 2023 . Patients were candidates for Mounjaro if they were considered obese (BMI ≥ 30kg/m2), with inadequately managed diabetes. All patients were initiated on Mounjaro 2.5mg SQ weekly. Baseline lipid panels, weight, and BMI and dietary/lifestyle modifications were obtained and followed up in each subsequent visit. Mounjaro's dose remained the same, or adjusted based on each follow-up visit's lab results, patient's tolerance to Mounjaro's side effects, and diabetes goal. Non-parametric paired analysis was used for evaluating the effects of Mounjaro between baseline and the first follow up visit. **Results:** A total of 9 patients were observed and classified into 2 groups based on their Lp(a) response levels: (A) Decreasing trend/no change in Lp(a) [n=7] and (B) Increasing trend in Lp(a) levels [n=2]. For group A, non-parametric paired analysis showed no significant reduction in triglycerides (P=0.16), LDL-C (=0.19), and total cholesterol (P=0.5). Whereas there were higher levels of weight loss (P=0.02) and BMI reduction (P=0.02) that was associated with the trend in decreasing Lp(a) levels. For group B, no significant differences were observed in triglycerides (P=0.37), LDL-C (P=0.47), total cholesterol (P=0.34), weight loss (P=0.17) and BMI reduction (P=0.13) levels between baseline and the first follow up visit. **Conclusions:** Our preliminary observations suggest a possible correlation between weight loss and BMI reduction and Lp(a) levels in response to Mounjaro treatment in patients with Type 2 diabetes. Further follow up is warranted for subsequent analyses of the longer-term effects of Mounjaro treatment.

Abstract ID: A34

Submitter	Hieu Huynh
Authors	Hieu Huynh[1], Sang Vuong[1], and Tibebe Z. Woldemariam[2] Affiliations: [1] CNUCOP Student [2] Department of Pharmaceutical & Biomedical Sciences, California Northstate University College of Pharmacy, Elk Grove, CA 95757
Title	The Pharmacogenetics of Natural Products: A Pharmacokinetic and Pharmacodynamic Perspective of Selected Plant Products
Abstract	**Study Objective:** Our study covers the effects of genetic variations in drug metabolizing enzymes, drug transporters, and direct or indirect interactions with the pharmacological targets/pathways on the individual response to natural products, and provides suggestions on increasing their effectiveness of natural products based on their pharmacokinetic and pharmacogenetic parameters. **Methods:** We will be conducting a literature review search using Pubmed, Cochrane Central Register of Controlled Trials, and Clinicaltrials.gov of various studies with a focus on research in the effectiveness of natural products pertaining to genetic variation. As with other synthetic chemical drugs, the selection of natural products can be optimized to improve efficacy and reduce toxicity according to the pharmacogenetic properties. With the emergence and development of pharmacogenomics, it is possible to discover and identify the targets/mechanisms of pharmacological effects and therapeutic responses of natural products effectively and efficiently at a genomic level. **Results:** We provide our viewpoints on the importance and necessity of pharmacogenetic and pharmacogenomic research of natural products in natural products development and clinical application of precision medicine based on our extensive search on the clinical research data of Cytisis Laburnum (Cytisine; smoking cessation), Morinda citrifolia L. (Noni, antipyretic, anticancer, etc.), and several other natural plant products. **Conclusions:** These findings provide the importance of the use of natural products because of their increasing popularity as potential lead sources of health improving therapy and their utilization as food sources is essential for prevention and treatment of both common ailments and serious diseases. Our data further contributes to the identification of patient populations with certain pharmacokinetics/pharmacogenomics optimal and selective drug development stages of natural products as a source of effective and safe alternative drugs. The chemical, physical, and clinical data of selected plants will be presented.

Abstract ID: A35

Submitter	Zhuqiu Jin
Authors	Zhuqiu Jin[1]; Teodros Mekonnen[2] Affiliation: [1] Department of Pharmaceutical and Biomedical Sciences; California Northstate University College of Pharmacy [2] CNUCOP Student
Title	Opposing Role of Akt in Comparison of Doxorubicin-induced Cell Death to Hydrogen Peroxide-induced Cell Death in Human Cardiac Microvascular Endothelial Cells
Abstract	**Study Objective:** Doxorubicin is an anthracycline drug for several cancers. A major limitation for the use of doxorubicin is cardiotoxicity. The mechanism of cardiotoxicity of doxorubicin is controversial. Oxidative stress-associated cell death represents a significant contributor to myocardial damage and is a leading cause of death. Akt is a serine/threonine kinase associated with cell survival. Nevertheless, there are few studies to compare the effect of Akt activation on the endothelial injury induced by doxorubicin to hydrogen peroxide (H2O2). **Methods:** Human cardiac microvascular endothelial cells (HCMECs) were cultured in endothelial cell medium supplemented with 5% fetal bovine serum in 5% CO2 incubator. HCMECs were exposed to doxorubicin or H2O2. Cell viability was determined by measuring the formation of MTT and the levels of LDH in medium. Western blot was used to determine the protein expression of total Akt and phospho-Akt (Ser473). To test effect of Akt modulation on cell viability, HCMECs were pretreated with an Akt inhibitor (MK-2206) or an Akt activator (SC-79) followed by insult of doxorubicin (1 μM for 24 h) or H2O2 (5 mM for one hour). **Results:** HCMECs were uniformly distributed on the spindle shape in the normal control group. After exposure to doxorubicin or H2O2, cells were converted into small oval or round shapes. Doxorubicin reduced expression of phospho-Akt (Ser473) whereas H2O2 increased its expression dose-dependently. Pretreatment of HCMECs with Akt activator SC-79 improve cell viability to doxorubicin. The cell death induced by H2O2 was prevented by Akt inhibitor MK-2206. Akt activator SC-79 exaggerated cell death at large dose. **Conclusions:** Our results indicated that both doxorubicin and H2O2 reduce HCMEC viability. Akt activation protects HCMECs against doxorubicin-induced cell death whereas deactivation of Akt protects HCMECs against H2O2-induced cell injury.

Abstract ID: A36

Submitter	Chrislyn Lawrence
Authors	Chrislyn Lawrence[1]; Eugene Kreys[2] Affiliation: [1] CNUCOP Student [2] Department of Clinical and Administrative Sciences; California Northstate University College of Pharmacy
Title	The Association Between Pharmacy School Characteristics and Performance Outcomes Over a Six-Year Period
Abstract	**Study Objective:** The objective of this study is to measure the association among eight different variables and four separate outcomes of pharmacy school performance over 6 years. **Methods** We conducted a retrospective analysis of all-time NAPLEX and MPJE pass rates, school characteristics, and PGY1 match rates. The subjects of the study were all U.S. pharmacy schools. NAPLEX and MPJE pass rates from 2017 to 2022 were obtained from the National Association of Boards of Pharmacy (NABP) website. PGY1 and PGY2 match rates from 2018 to 2022 were obtained from the American Society of Health-System Pharmacists (ASHP) website. School characteristics were obtained from PharmCAS. Descriptive analyses and repeated measures two-way ANOVA were performed. Repeated measures ANCOVA was conducted to account for confounding. **Results** One hundred forty-one US pharmacy schools were analyzed. Fifty-one percent of the schools were private, 40% were newer; 13% delivered an accelerated program; 96% required a bachelor's degree, 45% were associated with a healthcare center. NAPLEX pass rates demonstrated a statistically significant difference with private status ($p<0.001$), school age ($p<0.001$), program type ($p<0.001$), and affiliation with a healthcare system ($p=0.038$). MPJE pass rates showed difference with private status ($p<0.001$), school age ($p<0.001$), program type ($p<0.001$), and affiliation with a healthcare system ($p<0.001$). PGY1 match rates showed difference with private status ($p<0.001$), school age ($p<0.001$), accelerated program ($p<0.001$), region ($p=0.006$), and affiliation with a healthcare system ($p=0.002$). PGY2 showed no statistical difference for any characteristics. **Conclusion** The results of this study demonstrate a strong association between certain school characteristics and performance outcomes.

Abstract ID: A37

Submitter	Uyen Le
Authors	Uyen Le[1]; Tuan Tran[2]; Ruth Vinall[1]; Eugene Kreys[2]; Victor Phan[2]; Ashim Malhotra[1] Affiliation: [1] Department of Pharmaceutical and Biomedical Sciences; California Northstate University College of Pharmacy [2] Department of Clinical and Administrative Sciences; California Northstate University College of Pharmacy
Title	Impact of High-Stakes Exams, Incentives, and Preparation on Student Performance: Insights from the Pharmacy Curriculum Outcome Assessment
Abstract	**Study Objective:** Efforts to ensure the success of pharmacy students in passing pharmacy standardized exams require substantial investments by colleges of pharmacy. Engaging students effectively can be a challenge when there are no consequences for non-participation or poor performance. This study examines how engagement reinforcement, including high-stake exam requirements, instructional strategies, and incentives, can improve student performance on the Pharmacy Curriculum Outcome Assessment (PCOA). **Methods:** PCOA scores, milestone exams, grade point averages (GPAs), and PCOA preparedness assessments of cohorts Co2019, Co2020, and Co2021 which received high-stakes exams, incentives, and preparation was compared with those of cohorts Co2017 and Co2018 which did not. Students' perceptions regarding the reinforcement, incentive, and preparedness were evaluated using an anonymous survey. **Results:** Analyzing data from 545 students over five years, mandated PCOA preparedness, high-stakes PCOA requirements, and incentives in cohorts Co2019, Co2020, and Co2021 improved scores by 11-18% compared to Co2017 and Co2018. These increases corresponded to performance enhancements of 12-27 percentiles in cohorts Co2017 and Co2018, rising to 39-49 percentiles in cohorts Co2019, Co2020, and Co2021. In these later cohorts, PCOA scores consistently correlated with the school's milestone exams and students' cumulative GPAs (correlation coefficients 0.47-0.70, $p<0.001$), while no such correlation was observed in cohorts Co2017 and Co2018. Faculty-led PCOA preparation yielded better results (48.2% in Co2020, 45.8% in Co2021) than self-learning (42% in Co2019). Students using faculty-prepared assessments reported increased confidence in biomedical and pharmaceutical sciences. **Conclusions:** This study highlights the importance of high-stakes requirements, incentives, and thorough preparation for improving PCOA results.

Abstract ID: A38

Submitter	Brent Luu, Tarek Kassem
Authors	Brent Luu[1], Sampath Wijesinghe[2], Tarek Kassem[3], Justin Lien[4], Darrick Luu[4], Rynee Wijesinghe[5], Leianna Luu[6], Gerald Kayingo[7] Affiliations: [1] UC Davis Betty Irene Moore School of Nursing [2] Office of PA Education Stanford School of Medicine [3] California Northstate University COP [4] California Northstate University College of Health Science [5] California State University, Fresno [6] University of California, Riverside [7] University of Maryland Baltimore
Title	Drugs that Potentially Alter the Risk and Severity of COVID-19 Infection
Abstract	**Aims:** The goal of this study is to assist clinicians quickly identify the pharmacological factors used in primary care settings that could potentially alter the risk and severity of Covid-19 infection. Specifically, we aim to differentiate the risks versus benefits of these therapies by conducting an empirical review of the available data. **Methodology:** A systematic literature review was performed using PubMed, Medline, and Cochrane databases from 2018 to 2021. Only randomized control trials, systematic reviews, and meta-analyses were included. Selected articles were then categorized according to their respective drug classes. The risks and benefits of each drug class were differentiated according to the strength of evidence from these selected articles. **Results:** A total of 1,054 articles were from the Cochrane, 1,296 articles from PubMed, and 1,074 articles from Medline. After the removal of duplications, 559 articles left from the combined pools and 58 articles met the inclusion criteria for further review. Majority of the studies reported on drugs affecting the Renin-Angiotensin-Aldosterone system (RAAS). Other classes included Opioids, Acid Suppressants, NSAIDs, Steroids, Vitamin C, Vitamin D, Biguanides, and Statins. Deficiency of Vitamin D, omeprazole used alone, and alcohol have been linked to higher rates of Covid-19 infections. Steroid therapy appears to be a “double-edged sword” but no convincing evidence demonstrating NSAIDs increased the risk. **Conclusions:** There were many conflicting reports on various treatment options. The current evidence has not fully differentiated drugs that may increase risk versus benefits in Covid-19 infection. Further studies are needed in this area.

Abstract ID: A39

Submitter	Ashim Malhotra
Authors	Welly Mente[1], Ashim Malhotra[2] Affiliation: [1] Department of Clinical and Administrative Sciences, California Northstate University College of Pharmacy [2] Department of Pharmaceutical and Biomedical Sciences, College of Pharmacy, California Northstate University
Title	Assessing Pharmacy Students' Performance in Managing an Acute Kidney Injury Interprofessional Case in the Acute Care Educational Setting
Abstract	**Introduction:** Acute Kidney Injury (AKI) is a significant health condition occurring in a variety of patient settings and associated with several comorbidities. We created an interprofessional case conference and presented a pre-recorded video showing AKI simulation in the acute care setting to 200 second-year MD and third-year PharmD students. The goal of AKI simulation was to lead interprofessional student teams in the case management of AKI, with medical students providing diagnosis, evaluation and collaborating with pharmacy students in developing a pharmacotherapeutic care plan. Using Laerdal SimMan 3G, pharmacy and medical school faculty presented an AKI case in three stages, stopping to teach and question students, accompanied by a lecture on AKI. **Methods:** A pre-/post- self-confidence survey, pre-/post- quiz, and pre-/post- perception survey all were administered to CNUCOP students. Then, comparison of pre- vs post-confidence 10-question survey as the control using IBM SPSS Statistics tested whether there is a difference. Rank values assigned to Likert scale survey question selections ranged from 1 being not at all confident to 5 being completely confident. Descriptive statistics as non-parametric two independent samples statistical analysis using Mann-Whitney U test was calculated as the pre-/post- test statistical comparison. Also, the internal consistency of the survey questions was validated using Cronbach's alpha analysis. Alpha value ≥0.70 would be deemed acceptable. **Results:** Pre- vs. post-confidence survey question results showed statistical significance using Mann-Whitney U test. The 2-tailed test was set at an alpha of 0.05. A p value <0.001 was calculated for each survey question administered. Categories of self-confidence that significantly improved were ability to identify medications potentially increasing risk of AKI, demonstrate skills required for care and/or management of patients with AKI, ability to differentiate between AKI vs CHD, and managing AKI patients with clinical practice guidelines. Cronbach's alpha analysis shows Pre-Confidence Survey = 0.976, Post-Confidence Survey = 0.982 which is reliable. **Conclusion/Implications:** Faculty provided patient case and discussion helped bring together concepts from courses involving renal pathophysiology courses. Students experienced how patient case management occurs around general course content they have already learned in COP courses. This event allowed students to connect clinical decision-making dots.

Abstract ID: A40

Submitter	Fakhrul Ahsan, Ph.D.
Authors	Sakib M. Moinuddin, Tanoy Sarkar, Melanie Rose, Fakhrul Ahsan Affiliation: Department of Pharmaceutical and Biomedical Sciences, College of Pharmacy, California Northstate University
Title	Intratracheally Administered Peptide-Modified Lipid Admixture Containing Fasudil and/or DETA NONOate Ameliorates Various Pathologies of Pulmonary Arterial Hypertension
Abstract	This study examined the therapeutic potential of a combination therapy using fasudil, a Rho-kinase inhibitor, and DETA NONOate (DN), a nitric oxide donor, delivered as a lipid admixture modified with a cyclic homing peptide known as CAR (CAR-lipid mixture) for the treatment of pulmonary arterial hypertension (PAH). CAR-lipid mixtures were initially prepared via a thin-film hydration method and then combined with fasudil, DN, or a mixture of both. The therapeutic efficacy of this drug-laden lipid mixture was evaluated in a Sugen/Hypoxia (Su/Hx) rat model of PAH by measuring RV systolic pressure (RVSP), mean pulmonary arterial pressure (mPAP), Fulton indices, and assessing right ventricular (RV) functions, as well as evaluating pulmonary vascular morphology. Rats that received no treatment exhibited increases in RVSP, mPAP, Fulton indices, and changes in RV functional parameters. However, the treatment with the CAR-lipid mixture containing either fasudil or DN or a combination of both led to a decline in mPAP, RVSP, and Fulton indices compared to saline-treated rats. Similarly, rats that received these treatments showed concurrent improvement in various echocardiographic parameters such as pulmonary acceleration time (PAT), tricuspid annular plane systolic excursion (TAPSE), and ventricular free wall thickness (RVFWT). A significant decrease in the wall thickness of pulmonary arteries larger than 100 µm was observed with the combination therapy. The findings reveal that fasudil, DN, and their combination in a CAR-modified lipid mixture improved pulmonary hemodynamics, RV functions, and pathological alterations in the pulmonary vasculature. This study underscores the potential of combination therapy and targeted drug delivery in PAH treatment, laying the groundwork for future investigations into the optimization of these treatments, their long-term safety and efficacy, and the underlying mechanism of action of the proposed therapy.

Abstract ID: A41

Submitter	Fakhrul Ahsan
Authors	Sakib M. Moinuddin, Tanoy Sarkar, Melanie Rose, Fakhrul Ahsan Affiliation: Department of Pharmaceutical and Biomedical Sciences, College of Pharmacy, California Northstate University
Title	Dietary Guide for Oral Vesiculobullous Diseases
Abstract	**Study Objective:** A. Determine the role that diet plays in the activation, aggravation, or management of the oral manifestations of vesiculobullous diseases (VBD). B. Review clinical symptoms associated with the three most common vesiculobullous diseases (oral lichen planus, mucous membrane pemphigoid, and pemphigus vulgaris) affecting the oral cavity. C. Discuss the effects that vesiculobullous diseases and poor nutrition have on oral health. D. Creation of a dietary guide for patients diagnosed with vesiculobullous disorders affecting the oral cavity. **Methods:** The research team compiled relevant information from peer-reviewed journal articles related to the dietary details of oral lichen planus, mucous membrane pemphigoid, and pemphigus vulgaris. **Results:** The literature review revealed the role that nutrition has in helping with the immune response of VBD and maintenance of oral health. While a diet consisting of essential nutrients such as fruits and vegetables typically helps with the immune response, it may cause aggravation of the oral soft tissue in those with VBD. A bland diet is best for those experiencing active symptoms to prevent discomfort, however, over time this diet results in nutritional deficiencies which can affect the integrity of the oral hard and soft tissues. Studies are being completed to assess how essential vitamins, minerals, and supplements can be added to the bland diet to aid in the management of the disease process. **Conclusions:** Avoiding triggering food items and maintaining a well-nourished diet can decrease the symptoms noted during active episodes of vesiculobullous disease. While our research serves as a foundation for the potential benefits of certain nutritional foods, further investigation is needed to gain more knowledge about the disease process and how to create a holistic management process.

Abstract ID: A42

Submitter	Fakhrul Ahsan, Ph.D.
Authors	Sakib M. Moinuddin, Muhammad Ibrahim, Tanoy Sarkar, Melanie Rose, Md Ariful Islam, Fakhrul Ahsan Affiliation: Department of Pharmaceutical and Biomedical Sciences, College of Pharmacy, California Northstate University
Title	A Microfluidic Model for Studying Drug-Induced Pulmonary Arterial Hypertension
Abstract	Pulmonary arterial hypertension (PAH) is a severe and devastating disease that narrows and stiffens the pulmonary arteries and leads to elevated blood pressure, right heart failure, and respiratory symptoms. Recently, multiple research and clinical data suggested that certain drugs and medications can cause PAH. In this project, we studied multiple drugs to observe their effect on pulmonary arterial smooth muscle cells (PA SMCs), adventitial cells (PA ADCs), and endothelial cells (PA ECs). We studied dasatinib, benfluorex, bupropion, and almotriptan on PAH SMCs, PAH ADCs, and PAH ECs, and their results suggested that cell proliferation is increasing compared to the controlled (culture media and DMSO). Later, we mimicked the human pulmonary arterial in-vivo condition on in-vitro microfluidic chips. We seeded PAH SMCs, PAH ADCs, and PAH ECs on microfluidic chips and treated them with drugs; after 7 days of treatment, we fixed the chips and completed the immunocytochemistry (ICC) experiment. Literature evidence recommended increased DNA damage, endoplasmic reticulum (ER) stress, and autophagy when normal pulmonary cells are transformed to PAH. Our immunostaining results showed increased DNA damage, Endoplasmic reticulum (ER) stress, and autophagy. In the future, our microfluidic chips can be used during existing and new drug screenings to observe their effects on pulmonary arteries. Keywords: Pulmonary arterial hypertension (PAH), Microfluidic chips, Pulmonary arterial smooth muscle cells (PA SMCs), Pulmonary arterial adventitial cells (PA ADCs), and Pulmonary arterial endothelial cells (PA ECs), Immunocytochemistry (ICC)

Abstract ID: A43

Submitter	Robert Moir
Authors	Robert Moir[1], Eugene Kreys[2] Affiliation: [1] CNUCOP Student [2] Department of Clinical and Administrative Sciences, California Northstate University College of Pharmacy
Title	Association between County Characteristics on the Gap between Excess Deaths and COVID-19 Mortality
Abstract	**Objectives:** Determine the level of variation in the gap between excess mortality and COVID-19 mortality over time and determine the association of seven country characteristics and the gap between excess mortality and COVID-19 mortality. **Methods:** Data was derived from the World Mortality dataset, Our World in Data, and the World Bank. The gap between excess mortality and COVID-19 mortality was determined by calculating the difference between monthly excess mortality and monthly COVID-19 mortality divided by Population. Independent variables included: stringency index, GDP per capita, control of corruption estimate, government effectiveness, political stability and absence of violence terrorism, regulatory quality, rule of law, and voice and accountability. Repeated measures one-way ANOVA to determine the level of variation in the Gap between excess mortality and COVID-19 mortality over time. Unadjusted repeated measures two-way ANOVA was used to determine the association of various country characteristics and the gap between excess mortality and COVID-19 mortality. Multivariable repeated measures ANCOVA was used to determine the independent association of various country characteristics and the gap between excess mortality and COVID-19 mortality. **Results:** One hundred and fifteen countries were evaluated. Monthly variation in the gap between excess mortality and COVID-19 mortality were generally lower early in 2020 and 2021 and increased across both years. Findings revealed a significant negative correlation between the gap between excess mortality and COVID-19 mortality and GDP per capita ($p<0.001$), control of corruption ($p=0.042$), government effectiveness ($p= 0.042$), and voice and accountability ($p<0.001$). **Conclusion:** Nations with strong governance structures and higher economic indicators tended to experience lower disparities in these mortality rates.

Abstract ID: A44

Submitter	Karim Pajazetovic
Authors	Karim Pajazetovic[1]; Dayanjan Wijesinghe[2]; Ashim Malhotra[3] Affiliations: [1] CNUCOP Student [2] Virginia Commonwealth University [3] Department of Pharmaceutical and Biomedical Sciences, College of Pharmacy, California Northstate University
Title	A Novel Use for Generative AI for Immunology Patient Cases for TBL Application Exercises in a PharmD program
Abstract	Artificial intelligence is a powerful tool with the potential to engender disruptive and transformative educational changes in pharmacology teaching and learning. We implemented generative AI (GPT4)-based patient simulators for Team Based Learning application exercises in the immunology-pharmacology course sequence in our four-year Doctor of Pharmacy program. Our collaborative inter-university team of pharmacology and pharmacotherapy faculty, PharmD and graduate students created 11 GPT4-based "artificial patient simulators" to interact with student teams and present an immunology case in a patient counseling setting. An online platform using Amazon Web Services with user authentication was created by the pharmacotherapy team at VCU which hosted the GPT4-student teams interaction interface. Faculty and a PharmD student created a splenectomy patient case using peer-reviewed StatPearls and developed a rubric for the GPT4 to grade students. While the case was the same in content, care was taken to impart a different patient "personality" to each GPT4 "patient," essentially creating many different scenarios. The indications for splenectomy, patient symptoms, and pathophysiology were integrated into the patient case and designed to be presented by the AI program. Twelve student teams (N=59 students) were presented the patient case with dynamically altered scenarios based on the questions asked by the teams. The teams were required to create a pharmacotherapeutic care plan, with emphasis on counseling regarding specific infections common in splenectomy patients as the pharmacists' responsibility. We utilized a mixed methods approach to evaluate the impact on student learning and perceptions of learning. All student teams were scored by the AI-bot at least at a 75% competency level in assessing the patient simulation, identifying the immunology disease state, and patient counseling. Furthermore, all teams graded the activity above 90% in the different categories on the student perception instrument.

Abstract ID: A45

Submitter	Peter Tenerelli
Authors	Peter Tenerelli[1], Joanna Jullien[2], Suzanne Clark[3] Affiliation: [1] Department of Clinical and Administrative Sciences; California Northstate University College of Pharmacy [2] Office of Academic Affairs, California Northstate University [3] Department of Pharmaceutical & Biomedical Sciences; California Northstate University College of Pharmacy
Title	Impact of the Capital Leadership Forum: Translating Education into Practice
Abstract	**Study Objective:** To determine the impact of the Capital Leadership Forum, as a pharmacy continuing professional development (CPD) platform to effectively translate knowledge into practice transformation. **Methods:** Data was collected as part of a voluntary CPD education opportunity for participants of an online presentation. 111 participants attended the activity with 39 participants engaging in the CE assessment survey. Pre and post-test activities were performed to assess: 1. Enhancement of clinician knowledge and competence: via the delta of correct responses before and after the activity. 2. Improvement of clinician performance: via clinical willingness to implement changes due to the training. 3. Assessing how clinicians perceived the training to be meaningful, practical, evidence based, and free from bias. **Results:** 89% of participants perceived the training to be meaningful, practical and evidence based. 100% of respondents agreed there was no perception of bias. (97%) of respondents indicated that the program content was useful for their practice or other professional development. (100%) of respondents indicated that the speakers were knowledgeable about the topic. (97%) of the respondents indicated the learning objectives were achieved. 95% of respondents indicated the educational material was useful and valuable. (85%) of respondents indicated they would make changes to their practice because of this training, while 17% felt they needed more information/research before making changes. 28% reported their primary obstacle to implementing changes is financial restraints, while 18% report lack of time. Of the 39 participants who responded to the assessment, there was a (29%) increase in the number of correct responses post activity compared to pre-activity assessment. **Conclusions** Based on respondent perceptions and knowledge gap pre and post activity assessment, the CLF is a valuable tool to accelerate education to practice transformation. Research also identified obstacles which may be addressed in future presentations to increase results.

Abstract ID: A46

Submitter	Eurasia Vue
Authors	Eurasia Vue[1*]; Xinge Zheng[1*]; Vy Tran Luu[1] and Islam Mohamed[2] Affiliation: [1] CNUCOP Student [2]California Northstate University College of Medicine *Equal Contribution
Title	miR-146a; a potential link connecting shear stress-induced activation of the pro-inflammatory and pro-proliferative Osteopontin & TLR-4 pathways.
Abstract	**Study Objective:** MicroRNA-146a (miR-146a) is a key anti-atherogenic shear-sensitive microRNA. Our previous preliminary studies showed increased levels of Osteopontin (OPN), a shear-sensitive matricellular protein that promotes vascular inflammation, along with its receptor alphaV-Beta3 and downstream TRAF6, in Human Aortic Endothelial Cells (HAECs) subjected to oscillatory shear-stress (OSS) versus unidirectional shear stress (USS) control conditions. Nevertheless, little is known regarding the interplay between miR-146a, TLR-4, OPN & downstream pro-inflammatory signaling pathways. **Methods:** Human Aortic Endothelial Cells (HAECs) were subjected to simultaneous OSS and USS control conditions using the standard orbital shaking model in vitro. miR-146a and scramble control were over-expressed using standard transfection protocols. Levels of OPN, its receptor alphaV-Beta3 and TLR-4 & downstream signaling pathway were compared between groups using western blot analyses. **Results:** Our preliminary results showed that in parallel to increased trends of OPN & its receptor alphaV-Beta3 in HAECs subjected to OSS conditions compared to USS conditions, there was an associated increase in TLR-4 receptor and downstream TRAF6 levels. Whereas levels of downstream TICAM, HuR, IRF3, and MYD88 signaling pathways were not significantly different. HAECs cultured under static control conditions showed no difference in expression between HAECs isolated from the edge versus the center of the culture dish. Over-expression of miR-146a showed a trend towards blunted expression of OSS-induced OPN, alphaV-Beta3, TRAF6 & TLR-4 receptor levels compared to scramble control. **Conclusion/Implications:** Our findings suggest miR-146a; as a potential link connecting shear stress-induced activation of the pro-inflammatory and pro-proliferative OPN & TLR-4 pathways. Further studies are warranted for confirming the anti-atherogenic effects of miR-146a and its direct interaction with the OPN & TLR-4 pathways as a foundation for developing innovative miR-based therapeutic modalities for atherosclerosis.

Abstract ID: A47

Submitter	Tibebe Z. Woldemariam
Authors	Tibebe Z. Woldemariam Affiliation: Department of Pharmaceutical and Biomedical Sciences, California Northstate University College of Pharmacy
Title	Evaluating The Efficacy of Different Solvent Systems for Selective Extraction of flavonoids of the C-glucosylquinochalcone group from Safflower (Charthamus Tinctorius, Family Asteraceae.)
Abstract	**Study Objective:** The objective of this study is to develop effective extraction method flavonoids of the C-glucosylquinochalcone group from Safflower (Charthamus Tinctorius L.) and Asteraceae family without requiring the removal of the extraction solvent and reducing complexity and cost of processing. **Methods** Dried Safflower were obtained from a commercial supplier. The powdered flowers (5g) was extracted twice with different solvents including ethanol, methanol, isopropyl myristate, and TWEEN80 (30 mL each time) for 24 hours at room temperature. The solvent was filtered and the solution was then dried under reduced pressure. An aliquote from each extract was then weighed to evaluate the extraction efficiency of each solvent in question. **Results:** The extraction efficacy of different solvent systems was investigated for extraction of Hydroxysafflor A (HSYA), Carthamine (CY), Safflor A (SA), Safflower Yellow (SY), Hydroxysafflor B (HSYB), and Hydroxysafflor C (HSYC) from Safflower (Charthamus Tinctorius L.) which showed very broad specrum UV blockage. The biocompatible extraction solvent, TWEEN 80, was found to be very effective and non-toxic to extract in the liquid form directly in pharmaceutical formulations that is acceptable for human use, topically or orally. **Conclusion:** The extraction method developed does not require removal of the extraction solvent before topical or oral administration. The simple one-step extraction method developed in this laboratory can extract many plant species and active constituents with wide spectrum drug classes including those that are within the Safflower (Charthamus Tinctorius L.) in particular, and Asteraceae family. These data further contribute to the simple method of extraction of wide range of plant-derived classes of compounds including flavonoids of the C-glucosylquinochalcone group. This extraction method can be valuable, as a substitute for ethanol extractions that require removal of solvent in at least a second step.

Abstract ID: A48

Submitter	Noah Yang
Authors	Noah Yang[1]; Dipongkor Saha[2] Affiliation: [1] CNUCOP Student [2] Department of Pharmaceutical and Biomedical Sciences, College of Pharmacy, California Northstate University
Title	Analysis of Cytopathic Effects and Cytokine Production Induced by a Genetically Modified Oncolytic Herpes Simple Virus
Abstract	Oncolytic viruses, especially oncolytic herpes simplex viruses (oHSV) are an emerging treatment strategy for various cancers. One of the oHSVs, (T-VEC), was approved by the FDA for the treatment of advanced melanoma. However, safety and efficacy of T-VEC in various cancers have not been reported. G47Δ, another oHSV similar in design to T-VEC but lacking transgene expression, is approved in Japan for the treatment of glioblastoma (GBM) and is being currently used in other cancer types. However, prior studies show that G47Δ-Empty (a derivative of G47Δ lacking transgene) itself does not produce a durable response, as tested in immunocompetent mouse GBM models. To enhance the antitumor efficacy of G47Δ, Bommareddy and Colleagues (from Harvard Medical School and Rutgers Cancer Institute of New Jersey, and TTUHSC-Abilene) generated a novel oHSV expressing immunostimulatory cytokine murine IL-2 (G47Δ-mIL2) and tested its efficacy in mouse GBM, melanoma, and colon cancer models (unpublished data). As part of the CNUCOP Summer Research Fellowship project and training, G47Δ-mIL2 was re-evaluated for its cytolytic potential and ability to release IL-2 from infected cells *in vitro*. *Vero* cells were treated with G47Δ-mIL2, G47Δ, or PBS at a multiplicity of infection (MOI) of 0.1 for both viruses. After 24 hours and 48 hours post-treatment, cells were evaluated for cytopathic effect, and collected supernatants were assessed for IL-2 by ELISA. Both G47Δ-mIL2 and G47Δ produced cytopathic effects observed at both time points, whereas no cytopathic effects were observed in the PBS-treated cells. G47Δ-mIL2 treatment resulted in release of IL-2, with a concentration of 1224 pg/mL at 24 hours, which increased to 1527 pg/mL at 48 hours. No IL-2 secretion was noticed in the control groups (G47Δ or PBS). This study shows that G47Δ-mIL2 is efficient is releasing IL-2, a potent immunostimulatory transgene cytokine. Further research is needed to understand if and to what extent G47Δ-mIL2 releases IL-2 following infection of various cancer cells.

MASTERS OF PHARMACEUTICAL SCIENCE

Abstract ID: A49

Submitter	Ashutosh Rai
Authors	Ashutosh Rai, Abtin Anvari, Hadir Shoeib, Abdelbasset Farahat
Title	In Silico and in Vitro Assessment of Novel Amidine Derivatives as Hit Compounds Towards Development of TMPRSS2 Inhibitors Against Coronaviruses Diseases
Abstract	Coronaviruses including SARS-CoV-2, SARS-CoV, MERS-CoV and influenza A virus re-quire the host protease TMPRSS2 for viral entry into lung epithelial cells. Rather than targeting the continuously mutating viral proteins, targeting the conserved host-based entry mechanism could offer advantages. Nafamostat and camostat were discovered as covalent TMPRSS2 inhibitors. To circumvent limitations, a reversible inhibitor might be required. Considering nafamostat structure and using pentamidine as a starting point, a small set of structurally diverse rigid analogues were designed and evaluated in silico to guide selection of compounds to be prepared and biologically evaluated. Based on the results of in silico study, six compounds were prepared and evaluated in vitro. Three compounds (12, 11 and 8) were identified as potential hits inhibiting TMPRSS2-mediated membrane fusion with low micromolar IC50 values of 10.87, 13.70, 16.93 μM, respectively. Fur-ther in vitro evaluation showed that they are associated with non-specific effects. Together, this study presents compounds 12, 11 and 8 as TMPRSS2 inhibitors that might serve as starting points for developing of potential TMPRSS2 inhibitors with possible application against coronaviruses.

Abstract ID: A50

Submitter	Gurprit Garcha
Authors	Emily Waddle, Gurprit Garcha, Abdelbasset Farahat
Title	Comparison of antibody production and hospitalization with and without Covid-19 vaccines
Abstract	The Covid-19 vaccine expedited herd immunity and decreased hospitalization. The virus, SARS-cov-2, caused respiratory distress, fevers, and some experienced loss of smell. With mutation of this virus, we are now comparing built immunity from infection with old and new vaccines. Infection comes with risk, but it may increase antibody production more than vaccination. Older vaccines may be almost entirely ineffective in preventing infection and hospitalization as the virus has mutated beyond the vaccine's capabilities. More recent vaccines must be reformulated often to advance with the progression of mutations in the virus. The newer vaccines also may not be as effective as immunity built from infection. In this project we compare antibody production and hospitalization within the three groups of patients: patients with the most recent vaccination, patients that have older vaccinations, and patients with immunity from infection with the disease.

Abstract ID: A51

Submitter	Eslam Mohamed
Authors	Lin Tian, Priscilla Amador, Eslam Mohamed
Title	The role of mitochondria in cancer
Abstract	Mitochondria is critical in supplying energy for cellular survival, biogenesis, and various functional pathways. Mitochondrial hormesis is an adaptive response either cytosolic or nuclear triggered by exposure to mitochondrial stresses that can lead to protective effects. A decline in mitochondria function is often associated with chronic disease development and negative impact on lifespan. Cancer cells often induce mitochondrial biogenesis and metabolic reprogramming needed for the demands of proliferation and hinder apoptosis by activating mitochondrial maintenance pathways. The variable mitochondrial stress response pathways are used to counteract internal and external stressors to promote cancer cell proliferation, metastatic spread, and chemotherapy resistance. This holds the potential to offer insights into the vulnerability to mitochondrial stresses activating response signaling pathways that can counteract cancer cell survival. The aim of this project is to systematically review the mitohormesis adaptive responses from exposure to stresses affecting the mitochondria with an emphasis on investigating improvements in potential anti-cancer therapies.

Abstract ID: A52

Submitter	Petros Raygoza
Authors	Petros Raygoza, Ryan Lovell, Ahmed El Shamy, Catherine Yang, Eslam Mohamed
Title	Synthesis of novel Ara h2 hypoallergens using crosslinkers: BS(PEG)5 and BS(PEG)9
Abstract	"Peanut allergy is a prevalent IgE mediated food allergy that manifests a variety of adverse reactions. There are 16 allergenic peanut proteins associated with peanut allergy, but our focus is Ara h2 since it is the immunodominant protein among allergic individuals. There is no cure or safe treatment for peanut allergy, so our goal is to create safe alternatives. We managed to synthesize modified derivatives (allergoids) of Ara h2 by performing cross-linking reactions using two different crosslinkers: PEGylated bis(sulfosuccinimidyl)suberate (BS(PEG)5) and PEGylated bis(sulfosuccinimidyl)suberate (BS(PEG)9). The objective of our project is to confirm the presence of modified derivatives and test their binding to Ara h2 specific IgE antibody. Ara h2 was cross-linked using BS(PEG)5 and BS(PEG)9, then filtered using size inclusion columns to reduce levels of unreacted Ara h2. Coomassie Stain was used to confirm the formation of allergoids and Western Blot to confirm IgE binding to them in their linear conformations. With Sandwich ELISA, we evaluated binding of IgE to the conformational form of the modified derivatives. In Direct ELISA, we tested the binding of polyclonal antibodies in serum of allergic patients to the modified Ara h2. Coomassie Stain confirmed the synthesis of allergoids after cross-linking with BS(PEG)5 and BS(PEG). Western Blot showed a reduction of binding between IgE and the allergoids. In Sandwich Elisa, we confirmed the reduction of binding to the allergoid's conformational form. In Direct Elisa, the allergoids showed reduced binding to polyclonal antibodies in patient's sera. We successfully synthesized hypoallergenic derivatives of Ara h2 using cross-linkers: BS(PEG5) and BS(PEG 9), that show reduced binding to Ara h2 specific IgE. For future studies, we are planning to test the allergenicity of our products using Ara h2 sensitized mast cells and mice allergic to peanuts to determine the immune response towards these novel cross-linked proteins."

Abstract ID: A53

Submitter	Eslam Mohamed
Authors	Michelle Chiu, Petros Raygoza, Ahmed ElShamy, Catherine Yang, Eslam Mohamed
Title	Synthesizing Arah2 allergoid to develop a peanut allergy vaccine through Arah2 and 4-Fluorophenylgyoxal crosslinking reactions.
Abstract	The abstract won't be presented here due to the Patent applications. Please see their poster.

Abstract ID: A54

Submitter	Ashraf M. Mohieldin
Authors	Carter Bernal; Christiane How-Volkman; Madison Spencer; Ahmed El-Shamy; Ashraf Mohieldin
Title	The Role of Extracellular Vesicles in SARS-CoV-2-Induced Acute Kidney Injury: An Overview
Abstract	**Introduction:** The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has affected millions worldwide since its outbreak in the winter of 2019. Though SARS-CoV-2 has been extensively studied primarily for its deleterious respiratory effects in recent years, SARS-CoV-2 has demonstrated a pan-tropism. The kidney is one of the vital organs that SARS-CoV-2 can infect. Following infection with SARS-CoV-2, patients have developed Coronavirus Disease 19 (COVID-19), and there have been noted incidences of COVID-19 patients developing acute kidney injury (AKI). Objective: Due to COVID-19's multisystemic manifestation, our review focuses on the impact of SARS-CoV-2 infection within the renal system with an emphasis on the current hypotheses regarding the role of extracellular vesicles (EVs) in SARS-CoV-2 pathogenesis. **Methods:** A literature review was performed on PubMed with a combination of keywords “SARS-CoV-2,” “COVID-19,” “Acute Kidney Injury,” and “Extracellular Vesicles.” **Results:** Emerging studies have shown that SARS-CoV-2 can directly infect the kidney, whereas EVs are involved in the spreading of SARS-CoV-2 particles to other neighboring cells. Once the viral particles are within the kidney system, many proinflammatory signaling pathways are shown to be activated, resulting in AKI. Hence, clinical investigation of urinary proinflammatory components and total urinary extracellular vesicles (uEVs) with viral particles have been used to assess the severity of AKI in patients with COVID-19. Remarkedly, new emerging studies have shown the potential of mesenchymal stem cell-derived EVs (MSC-EVs) and ACE2-containing EVs as a hopeful therapeutic tool to inhibit SARS-CoV-2 RNA replication and block viral entry, respectively. **Conclusion:** Overall, understanding EVs' physiological role is crucial and hopefully will rejuvenate our therapeutic approach towards COVID-19 patients with AKI."

Abstract ID: A55

Submitter	Abdelbasset Farahat
Authors	Lina Ly, Abdelbasset Farahat
Title	Genetics of Aldehyde dehydrogenase amongst Asian populations
Abstract	"**Study objective:** This study aimed to examine the genetic influences on alcohol metabolism and the alcohol flush reaction in the Asian population. The researchers conducted a thorough literature review to collect data on the composition, operation, and genetic mutations of the aldehyde dehydrogenase (ALDH) enzyme and its involvement in alcohol metabolism. Additionally, the study delved into the occurrence of alcohol flush reactions among various Asian populations and its correlation with the mutation in the ALDH2 gene. **Methods**: We researched by reviewing literature from databases such as PubMed, ScienceDirect, and Google Scholar. Our focus was on studies that examined the structure and function of ALDH, the genetics of Aldehyde dehydrogenase in Asian populations, and the relationship between the ALDH2 gene and alcohol metabolism. We identified common themes and patterns from the selected articles and conducted a meta-analysis to synthesize the findings. **Results**: The study also found that the absence of a functional ALDH2 enzyme among some Asian populations may cause the alcohol flush reaction, which affects up to 36% of the population in East Asia and 47% in other parts of Asia. The gene mutation increases the chances of developing certain types of cancer due to exposure to more acetaldehyde. **Conclusions:** The study emphasizes the importance of comprehending the genetic variations of the ALDH enzyme and their impact on alcohol metabolism and the alcohol flush reaction in the Asian population. The research suggests that genetic factors, particularly the ALDH2 gene and its function, have a significant influence on alcohol use and alcoholism rates among Asians. Further research is necessary to investigate the relationship between alcohol-related genes and behavior. This will provide valuable insight into the factors that determine alcohol use among individuals with varying levels of genetic susceptibility to alcoholism."

Abstract ID: A56

Submitter	Hongbin Wang
Authors	Mengyao Liu; Vy Tran Luu; Hongbin Wang
Title	C4a, C4adesArg, and thrombin distinctively regulate platelet aggregation and phosphorylation of ERK and Akt in human endothelial cells
Abstract	" C4a was confirmed as an untethered ligand for protease-activated receptor (PAR)1 and PAR4, which can induce ERK phosphorylation and [Ca2+]i influx in human endothelial cells (ECs). PAR1 and PAR4 are typical receptors for thrombin. Our present study wants to address whether C4adesArg, a stable metabolite of C4a, can induce similar signaling and effector functions as C4a through PAR1 and PAR4; and whether C4a/C4adesArg resembles thrombin to generate the same downstream signaling and effector functions through PAR1 and PAR4. Platelet aggregation assay revealed that unlike thrombin, both C4a and C4adesArg at supraphysiological concentration of 3 □M failed to trigger platelet aggregation. In human ECs, C4adesArg can significantly induce ERK phosphorylation and [Ca2+]i influx but with the reduced efficacy as compared to C4a. Using respective antagonist to block PAR1 or PAR4, C4adesArg-induced ERK phosphorylation was inhibited by PAR4 antagonist tcY-NH2, but not by PAR1 antagonist RWJ56110, indicating C4adesArg-mediated ERK phosphorylation is PAR4-dependent in human ECs. The phosphorylation of Akt was monitored upon the treatment of C4a, C4aadesArg, and thrombin in human ECs. C4a and C4adesArg can induce significant Akt phosphorylation in a time- and concentration-dependent manner, whereas thrombin (0.1, 0.3, and 1 nM) significantly causes Akt de-phosphorylation. Our present study established that unlike thrombin, C4a and C4adesArg fail to cause platelet aggregation even at supraphysiological concentration. In addition, C4a and C4adesArg could induce Akt phosphorylation, whereas thrombin induces Akt de-phosphorylation in human ECs, indicating a unique role of C4a/C4adesArg in inflammation and coagulation through the association with PAR1 and/or PAR4. As compared to C4a, C4adesArg can induce [Ca2+]i influx and ERK phosphorylation with the reduced efficacy in human ECs. Moreover, distinct from C4a, C4adesArg-induced ERK and Akt phosphorylation is PAR4-dependent. Our data suggest that C-terminal arginine of C4a may govern its binding specificity or/and affinity to PAR1 and/or PAR4."

Abstract ID: A57

Submitter	Hongbin Wang
Authors	Mia Borlongan; Dipongkor Saha; Hongbin Wang
Title	Tumor Microenvironment: A Niche for Cancer Stem Cell Immunotherapy
Abstract	Tumorigenic cancer stem cells (CSCs), also referred to as tumor-initiating cells (TICs), constitute a distinct subpopulation of cells within the tumor. They distinguish themselves from bulk tumor cells due to their unique abilities in self-renewal, metastasis, and differentiation. Despite significant advances in CSC classification, these cells remain highly resistant to conventional radio- and chemo-therapy treatments, leading to cancer relapse. In this review, we aim to explore new avenues of research that delve into distinctive properties of CSCs within their surrounding tumor microenvironment (TME). Specifically, we will focus on the crosstalk between CSCs and cells of the lymphoid lineage, including T cells, B cells, and natural killer (NK) cells. Additionally, we will delve into their interactions with cells of the myeloid lineage, such as macrophages, neutrophils, and myeloid derived suppressor cells (MDSCs). Furthermore, we will shed light on CSC's communication with cells of mesenchymal origin, namely fibroblasts, adipocytes, and endothelial cells. Afterwards, we will highlight the significance of CSCs in relation to the surrounding tumor-associated extracellular matrix (ECM). Lastly, we will emphasize current innovative pre-clinical and clinical studies focused on immunotherapy targeting CSCs within the TME.

Abstract ID: A58

Submitter	Jackson Donald
Authors	Jackson Donald, Ahmed El-Shamy
Title	Long Covid: A Comprehensive Review on Prevalence, Epidemiological Factors, and Therapeutic Implications
Abstract	Since the emergence of the SARS-CoV-2 virus in 2019, nearly 700 million COVID-19 cases and 7 million deaths have been reported globally. Despite most individuals recovering within four weeks, the Center for Disease Control (CDC) estimates that 7.5% to 41% develop Post-acute Infection Syndrome (PAIS), known as 'Long COVID.' This review provides current statistics on Long COVID prevalence, explores hypotheses concerning epidemiological factors, such as age, gender, comorbidities, initial COVID-19 severity, and vaccine interactions, and delves into potential mechanisms, including immune responses, viral persistence, and gut dysbiosis. Additionally, we examine progress in developing models to predict Long COVID likelihood and symptom duration, emphasizing their role in therapeutic evaluation and treatment strategies. Our analysis suggests fatigue (23%), memory problems (14%), dyspnea (13%), sleep problems (11%), and joint pain (10%) constitute the leading symptoms of long COVID. Moreover, we concluded that women are more likely to experience Long COVID compared to men. The reasons for these differences are still not fully understood and likely involve a complex relationship between social, genetic, hormonal, and other factors. Furthermore, individuals with long COVID-19 appear to be more likely to endure economic hardship as a result of the persistent symptoms. In summary, our findings further illustrate the multifaceted nature of Long COVID and underscore the importance of understanding the epidemiological factors and potential mechanisms needed to develop effective therapeutic strategies and interventions.

COLLEGE OF PSYCHOLOGY

Abstract ID: A59

Submitter	Daleen Deck
Authors	Deck, Daleen; Garcia, Brooklyn; Mullen, Haley; Lillis, Jason
Title	The Association Between Sexual Minorities and Substance Use Among Adults in the United States
Abstract	**Study Objective:** A. Assess whether there are significant associations between genders, cannabis and tobacco use, and sexuality. B. Assess whether gender is associated with substance use within sexual minority groups. C. Assess whether tobacco and cannabis use are associated within sexual minority groups. **Methods:** The data set being utilized was AddHealth, a longitudinal study that uses individual responses throughout adolescence and into adulthood. The data being observed were adult individuals who responded to the survey, identified as a sexual minority, and legally able to consume cannabis and tobacco. We used the question, "What is your sexual self-definition?" to determine sexual minority status, the Heavy Smoking Index to assess an individual's nicotine dependence, and the Cannabis Abuse Symptoms Index to assess cannabis use. One way ANOVA's were utilized for all comparisons. **Results:** This study found that gender was not significantly associated with cannabis abuse symptoms among sexual minority groups, while the two were associated with sexual majority groups. Tobacco use was not associated with cannabis use within sexual minority groups, while the two were associated with sexual majority groups. Female individuals within sexual minority groups did not show increased cannabis use compared to males of the same group. **Conclusions:** There are significant associations between genders, cannabis and tobacco use, and sexuality within sexual majority groups. However, this study did not find evidence for significant differences within sexual minorities when comparing genders and when assessing for association between cannabis use and tobacco use.

Abstract ID: A60

Submitter	Sarah Bondy
Authors	Bondy, Sarah; Scott, Haleigh
Title	Interventions for Prolonged Grief Disorder in Children and Adolescents
Abstract	**Study Objective:** A. Review existing interventions for Prolonged Grief Disorder (PGD) in children and adolescents to better inform clinicians working with this population. **Methods:** The research team conducted a systematic review through Google Scholar and APAPsychNet. Studies were reviewed for participant age, prolonged grief symptoms or diagnosis, intervention, and outcomes. **Results:** Eleven studies were included for review with nine interventions identified. Results for each intervention were found to be generally positive in reducing PGD symptoms. Interventions were grouped by modality including group treatments, hybrid treatments (combined group or individual therapy with family therapy), family treatment, and individual treatment. Cognitive Behavior Therapy (CBT), Attachment Theory and Multidimensional Grief Theory were common theoretical bases for interventions and all shared elements of psychoeducation and integrating knowledge about the loss with existing knowledge. Involvement of surviving parents in treatment was found to be a common element across most child and adolescent interventions and was not included in PGD treatment for adults. **Conclusions:** This review was limited in scope due to lack of research on child and adolescent populations for PGD treatment and heterogeneity of intervention types. However, preliminary findings support the efficacy of interventions for PGD in children and adolescents and highlight parental involvement is a key difference in treatment for these populations.

Abstract ID: A61

Submitter	Mira Sridhar
Authors	Sridhar, Mira; Scardino, Francesca; Mohseni, Amir; Lillis, Jason
Title	The Relationship Between Fast Food Consumption, Alcohol Use, and Physical Activity
Abstract	**Study Objective:** A. Examine the association between eating habits such as fast food consumption and consumption of alcohol B. Review the correlation between the average number of drinks and fast-food consumption. C. Discuss the association of fast-food consumption and alcohol usage with the level of engagement in physical activity. **Methods:** The team did a data analysis using the National Longitudinal Study of Adolescent Health (AddHealth), which is the fourth wave of a longitudinal study of adolescents ages 24-32. The variables measured in this study were fast-food consumption, alcohol use, and levels of physical activity. **Results:** The data analysis revealed a relationship between the average number of alcoholic drinks and fast-food consumption. The ANOVA results and post hoc analyses show that people who have lower levels of physical activity seemed to have a higher frequency of fast-food consumption in a week. While there was not a significant relationship between an individual's past week in physical activity and level of alcohol consumption over the past 12 months, future directions of research can focus on analyzing levels of fast-food consumption with daily physical activity. Conclusion: There is a correlation between fast food consumed in the past seven days and the average number of alcoholic drinks consumed in the past 12 months. Given the AddHealth population, there was not a strong relationship between fast-food consumption, alcohol consumption, and physical activity levels. However, our data analysis serves as a foundation for future research to focus on participant age range in connection with daily physical activity levels, alcohol consumption, and fast-food consumption.

Abstract ID: A62

Submitter	Sophia Abdou
Authors	Nelson, Robyn; Abdou, Sophia; Sillay, Jana
Title	Understanding the Impact: Childhood Sexual Abuse and Recent Suicidal Thoughts
Abstract	**Study Objective:** A. Discuss the effects of early childhood adversity such as early-life sexual abuse on later life experiences. B. Explore the relationship, if any, between childhood sexual abuse and reported suicidal thoughts later in life. C. Exploration of the differences in patterns and responses between males and females regarding the development of later suicidal thoughts. D. Explore possible future applications to interventions and approaches in response to potential relationships between these factors. Methods: Data analysis was conducted using the National Longitudinal Study of Adolescent Health (AddHealth) Wave 4 Data. The longitudinal study followed U.S. participants starting between grades 7-12 until ages 24-32 and surveyed various topics including the questions used for this analysis regarding history of childhood sexual abuse and thoughts about suicide within the past year. Data analysis was then completed to explore potential relationship patters and associations between these factors. Results: The literature revealed that the times touched sexually before 18 showed an association with suicidal thoughts in the past year in both males (X^2=26, 5 df, p<001.) and females (X^2=49.28, 5 df, p<001.) Additionally, the Chi-Square test of independence suggests biological sex has a moderation effect on the relationship between suicidal thoughts and times touched sexually. Conclusions: Consistent with past research done on childhood adversity patterns and negative later life outcomes, there appears to be a relationship between childhood sexual abuse and suicidal thoughts later in life, this relationship was shown to be significant with an interesting variation in pattern and strength between male and female participants. While both continue to be significant, this effect can be interpreted through females showing a more linear relationship than we see in males and could be caused by the much more limited data available among males or potential patterns of underreporting among male participants. Future research into interventions and inclusion of screening for potential history of early life sexual abuse may prove beneficial in treating and decreasing suicidality in patients.

COLLEGE OF MEDICINE – NON SDSSP

Abstract ID: A63

Title: Two for the Price of One: A Case Report on a Single Forehead Flap Used to Reconstruct a Nasal and Facial Defect

Authors: Adira Kruayatidee[1,2]; Jay W. Calvert, MD, FACS[2]

[1] California Northstate University College of Medicine
[2] Roxbury Clinic and Surgery Center

Objective: The conventional reconstructive strategy for addressing concomitant nasal and facial defects typically necessitates use of two distinct flaps: initially, a local flap for the facial defect, followed by a distant, often forehead flap, for the nasal defect. There are no reports that characterize an approach that obviates the use of two donor flaps to reconstruct such defects. This study presents a single-flap naso-facial reconstruction employed in the case of a 55-year-old male who underwent Mohs surgery for basal cell carcinoma (BCC), resulting in a substantial nasal defect encompassing the ala, cheek, and lip. In addition to detailing the intricacies of this unique approach, we provide comprehensive insights into the optimal strategies for addressing and reconstructing the challenging nasal subunits, specifically the tip and alar rim.

Methods: Patient received a single pedicle paramedian forehead flap that was able to fulfill the nasal and facial defects. Over the course of ten months, the patient had three operations during which the flap was treated in expected fashion and pertinent grafts were added

Results: Patient's reconstruction defied established practices for handling such defects. The sole sequela was depression of donor site scar, with no morbidity, which was resolved by his final surgery. Per subjective evaluation and reported outcome, this reconstruction achieved restoration of the patient's soft tissue, structural integrity, symmetry, and proper airway function of his nose.

Conclusion: Satisfactory aesthetic and functional outcomes can be and were achieved with a single customized forehead flap for a defect violating multiple subunits.

Abstract ID: A64

A Shorter Interval Between Preoperative Corticosteroid Injections and Total Shoulder Arthroplasty Increases the Risk of Periprosthetic Joint Infection and Revision Surgery: A Systematic Review

Authors: Shaheryar Asad[1]; Muzammil Akhtar[1]; Daniel Razick[1]; Osamah Baig[2]; Sonia Aamer[3]; Jimmy Wen[1]; Nicole Hung[4]
[1] California Northstate University College of Medicine
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[3] Southern California Orthopedic Institute, Bakersfield, California
[4] Department of Orthopaedic Surgery, University of California Los Angeles

Background: The primary objective of this systematic review is to evaluate whether corticosteroid injection (CSI) administration prior to total shoulder arthroplasty (TSA) is a risk factor for periprosthetic joint infections (PJI) and revision surgery. A secondary objective is to evaluate the safe preoperative window of CSI administration prior to undergoing TSA.

Methods: A search following PRISMA guidelines was performed in the PubMed, Embase, and Scopus databases. The query was performed using variations of the terms “corticosteroid” and “total shoulder arthroplasty.” Quality assessment was performed using the MINORS checklist, and risk of bias was assessed using the ROBINS-I tool.

Results: A total of six retrospective studies were included in this systematic review. Two studies found significantly greater odds of PJI when CSIs were administered <1 month versus ≥1 month prior to TSA. One study found significantly greater odds of PJI when CSIs were administered <3 months versus ≥3 months prior to TSA. One study found significantly greater odds of revision when CSIs were administered <3 months versus ≥3 months prior to TSA. Another study evaluated outcomes based on the number of CSIs, and found that both one and two or more preoperative CSIs, when administered <1 year prior to TSA, were associated with greater odds of revision surgery but not PJI. Finally, one study found CSIs administered at a mean of 11.4 months (range, 2.5 to 172.5 months) did not result in significantly greater odds of PJI.

Conclusion: A minimum three-month interval between administering CSIs and TSA is recommended to avoid the risk of developing a PJI. To avoid the risk of requiring revision surgery, CSIs should also be administered at least a minimum of three months prior to TSA, however an interval of one year appears to be the safest option.

Abstract ID: A65

Approximately 50% of Patients Report Favorable Clinical Outcomes After Endoscopic Repair of Hip Abductor Tendon Tears According to Minimally Clinically Important Difference and Patient Acceptable Symptomatic State Achievement Rates: A Systematic Review

Authors: Carter Bernal[1], Muzammil Akhtar[1], Daniel Razick[1], Sonia Aamer[1], Osamah Baig[2], Ali Saeed[3] Khizur Kamran[4], Shaheryar Asad[1], Trevor Shelton[5]

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[5]Utah Valley Orthopedics and Sports Medicine, Intermountain Health

Objective: To systematically review clinical and functional outcomes of endoscopic repairs of hip abductor tendon tears.

Methods: A search following PRISMA guidelines was performed in the PubMed, Embase, and Cochrane databases using variations of the terms “endoscopy,” “gluteus medius,” “hip abductor,” “outcome,” “success,” and “failure.” Data for patient demographics, tear severity and location, patient-reported outcomes (PROs), clinical benefit, and rates of retears and revision surgery were collected and tabulated. Quality assessment was performed using the modified Coleman Methodology Score.

Results: 13 studies, three level III and 10 level IV, were included in this review, with a total of 272 patients whose ages ranged from 46.0 to 66.9 years and follow-up times from 16.4 to 46.7 months. Most tears were isolated to the gluteus medius, with the number of partial versus full-thickness tears being similar. Trendelenburg gait, reported by four studies, persisted in 0% to 13.6% of patients after repair. Of nine studies reporting both preoperative and postoperative PROs at latest follow-up, eight reported significant improvements in all PROs ($P < 0.05$). In five studies, rates of achieving MCID and PASS ranged from 50.0% to 93.3% and 40.7% to 75.0%, respectively. Surgical complication rates were 0% in 11 studies and 4.3% and 18.2% in two studies. Retear rates were 0% in 10 studies and ranged from 6.7% to 33.3% in three studies. Rates of revision due to retear, reported by 12 studies, were 0% in eight studies and ranged from 2.2% to 13.0% in four studies.

Conclusions: Endoscopic repairs of both partial and full-thickness hip abductor tendon tears have good to excellent PROs, and low complication, retear, and revision rates. However, rates of MCID and PASS achievement rates are highly variable and less than favorable.

Abstract ID: A66

Bethlem Myopathy: A Unique Presentation with Diffuse Spontaneous Keloids

Authors: Anuj Budhiraja[1], Alisha Mehta[1], Harrsion Shawa[2], Mirabel Dafinone[3], Rivkah Isseroff[3], Sara Dahle[4], Maija Kiuru[5]
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Background: Bethlem myopathy is a rare disease, affecting approximately 1 in 129,870 people, caused by dominant or recessive mutations in genes coding for the alpha chains of the extracellular matrix protein collagen VI (COL6A1, COL6A2, and COL6A3). The disease is characterized by progressive muscle weakness and contractures. Documented cases have also reported cutaneous manifestations such as hyperkeratosis and keloid formation.

Methods: The patient's medical records were thoroughly reviewed and whole genome sequencing was conducted using genomic DNA extracted from the patient's fibroblasts, blood, and RNA. Genetic data analysis focused on identifying somatic and germline mutations.

Results: We describe a case of chronic and extensive spontaneous keloid formation, unresponsive to various treatment modalities. Whole genome sequencing revealed various mutations, including a COL6A3 mutation, suggesting Bethlem myopathy. Bethlem myopathy is a "mild" form of COL6-related dystrophy and may present with keloid formation. While keloids are characterized by overactive fibroblasts producing high amounts of Type I and Type III collagen, Type VI collagen may also play a role in matrix assembly and fibroblast behavior within the dermis. Thus, alterations in collagen VI may lead to skin abnormalities, such as keloids.

Conclusion: Bethlem myopathy's rarity complicates timely diagnosis, hindering patient identification and prolonging suffering. Clinicians, notably dermatologists, physical medicine and rehabilitation providers, and rheumatologists, must remain vigilant for prompt intervention. Genetic studies identified a COL6A3 mutation consistent with BM, yet other mutations may contribute to keloid pathogenesis, revealing gaps in understanding. Further investigation into this complex disorder is warranted.

Abstract ID: A67

Title: Modulators of Urinary pH

Authors: Carter Chan[1], Wilson Sui MD[2], Marshall L. Stoller MD[2]

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Introduction: Modulation of urinary pH is an important tool for Urologists in the management of recurrent nephrolithiasis. Many options for accomplishing urinary alkalinization/acidification are available including: dietary change; home remedies; over the counter (OTC) formulations; and prescription medications which can be overwhelming for both providers and patients to choose from. The goal of this study was to identify, categorize and evaluate the many alternatives for modifying urinary pH.

Methods: The PubMed database was searched using specific terms to identify human clinical trials related to pharmacologic/dietary interventions to modify urinary pH. Eligible studies were selected based on the following criteria: (1) observational/interventional study; (2) reported outcome of urine pH; (3) urine pH data included a baseline/control; and (4) sufficient data for analytical purposes. Data from both stone and non-stone formers were abstracted and included the year published, intervention (route/dose), study duration, sample size, patient age, stone former status, method to test urinary pH, and urine pH data.

Results: A total of 86 studies met inclusion criteria: there were 61 randomized clinical trials, 20 crossover/prospective studies and 5 observational cohorts. Methods for urinary pH measurements were 48% 24-hour urine, 14% pH meter, 12% pH strip, 7% urinalysis, and 20% not reported. Mean changes in pH by intervention were tabulated (fig1). For urinary alkalinization, the most effective oral prescription, OTC option, home remedy and dietary change were bicarbonate, Moonstone™, Citro-soda™ and lacto-ovo-vegetarian diet respectively. For urinary acidification, the most effective were ammonium chloride, methionine, fructose supplementation and high protein diet respectively. Select dietary changes and home remedies showed similar efficacy in urinary pH modulation to prescription options.

Conclusion: The low cost, accessibility, and minimal side effect profile of OTC formulations, home remedies and dietary changes compared to prescribed oral medications may make them more appealing to patients and thereby improve compliance.

Abstract ID: A68

Title: Exploring Dietary Approaches in the Prevention and Management of Amyotrophic Lateral Sclerosis: A Literature Review

Authors: Ryan Chowdhury[1], Ubaid Ansari[1], Jimmy Wen[1], Isabel Taguinod[1], Dawnica Nadora[1], Denise Nadora[1], Forshing Lui MD[1]
[1] College of Medicine, California Northstate University.

Background: Amyotrophic lateral sclerosis (ALS) is a complex and often fatal neurodegenerative disease involving both upper and lower motor neurons of the central nervous system. The pathogenesis of ALS is idiopathic. Nonetheless, diet has emerged as a modifiable risk factor with the potential to offer neuroprotective effects towards neurological disorders such as Alzheimer's, Parkinson's and dementia. This review aims to further appreciate how diet can influence ALS onset and/or progression.

Methods: This review explores five popular diets (Mediterranean, Vegan, Carnivore, Paleolithic and Ketogenic) with an emphasis on their distinct macromolecule compositions, nutritional profiles, and biochemical pathways. Based on this information, their potential therapeutic effects on ALS are thoroughly examined.

Results: Upon review of a vast compilation of literature pertaining to the topic of interest, a recurring theme in the form of confounding factors was noted. Due to the fact that the composition within each diet varies between studies, the data being controversial, and the existence of conflicting studies on the effectiveness of nutrient intake derived from these diets, it remains a challenge to pinpoint exactly how a certain dietary restriction plays a role in the pathogenesis of ALS.

Conclusion: Although adherence to these five diets indicate that a higher intake of foods containing anti-inflammatory and antioxidant compounds predict a reduction in oxidative stress involving ALS, further research is required to directly attribute the preventative effect of these diets on the mechanisms leading to ALS and its progression. Future studies should conduct randomized controlled trials (RCTs) with standardized methodologies and patient populations.

Abstract ID: A69

Title: Clinical Characteristics and Long-term Natural History of Branch Retinal Artery Ischemia

Authors: Cortney Connor, BA[1]; Haley S. D'Souza, MD[2]; Raymond Iezzi MD MS[2]; Glenn C. Yiu, MD PhD[3]

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Purpose: To describe the clinical features of Branch Retinal Artery Ischemia (BRAI).

Methods: This is a retrospective, multi-center cohort study. Patients with a diagnosis of Hollenhorst plaque, Branch Retinal Artery Occlusion, Central Retinal Artery Occlusion, or Ocular Ischemic Syndrome were included. Fundus images of included patients were reviewed. Patients were excluded if fundus images were consistent with a known ocular diagnosis or if no images were available. Chart review was performed on all patients with BRAI.

Results: Of 526 patients that underwent image review, 13 patients with BRAI were identified. Mean age was 74.2 ± 9.4 years. 76.9% of patients had hypertension, 76.9% had hyperlipidemia, and 69.2% had type II diabetes mellitus. 69.2% had history of carotid artery disease and 30.8% had a history of prior stroke. 11 patients maintained visual acuity of 20/25 or better through the eight-year study period. No patients developed ocular neovascularization or stroke after BRAI.

Conclusion: BRAI is defined by a triad of features: Hollenhorst plaque, sectoral round retinal hemorrhages, and delayed arterial flow. Most patients with BRAI maintain good vision. BRAI should prompt referral for evaluation of vascular risk factors, as it may be the presenting sign of cerebrovascular or cardiac vascular disease.

Abstract ID: A71

Title: A Rare Case of Leukoencephalopathy Linked to a *GRIN2A* Genetic Variant

Authors: Dorsa Heydarlou MS[1], Arya Asghari MS[1], Shahnawaz Karim MD[2], Forshing Lui MD[1]

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Glutamate, a major excitatory neurotransmitter, is extensively involved in normal brain function. Glutaminergic N-methyl-D-aspartate receptors (NMDAR) hold a role in synaptic plasticity, learning, memory formation, and the pathophysiology of several neurological conditions. The glutamate ionotropic receptor NMDA type subunit 2A *(GRIN2A)* gene encodes the NMDAR's GluN2A subunit. Genetic alterations in the *GRIN2A* gene have been associated with neurological conditions, including epilepsy, movement disorders, developmental delay, and certain neuropsychiatric disorders. Although seldom reported, *GRIN2A* gene variants have been linked to leukoencephalopathy, which is a rare condition that affects the white matter of the brain. We report a rare case of leukoencephalopathy progressing to complex neuropsychiatric symptoms and death in a 47-year-old male. Initial presentation depicted white matter changes on imaging consistent with leukoencephalopathy that was followed by progression to seizures, inappropriate sexual advances, changes in hearing, and ultimately death. Genetic testing revealed an unidentified *GRIN2A* mutation, emphasizing the wide-range and potentially devastating presentation of *GRIN2A* variants in adults.

Abstract ID: A72

Title: Current Surgical Techniques in the Treatment of Adult Developmental Dysplasia of the Hip

Authors: Tri Huynh [1]; Muzammil Akhtar [1]; Daniel Razick [1]; Anand Dhaliwal [1]; Arya Afzali [1]; Alexander J. Nedopil[2]

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Objective: The surgical protocols currently used for the treatment of developmental dysplasia of the hip (DDH) are varied, with sufficient differences in clinical outcomes that warrant a review of the role of practicing orthopedic surgeons. This paper aims to summarize the current novel techniques within the realm of surgical treatment for adult DDH, thus serving as a guide to surgeons looking to quickly familiarize themselves with available techniques.

Methods: We performed computer systematic literature searches of the Embase and PubMed databases from 2010 to 2 April 2022. Study parameters as well as their respective patient reported outcomes (PROMs) were described in detail and compiled into diagrams.

Results: Two novel techniques were identified for the treatment of borderline or low-grade DDH. Six techniques which included modifications to the Bernese periacetabular osteotomy (PAO) were identified for the treatment of symptomatic DDH. Three techniques which include combinations of arthroscopy and osteotomy were identified for the treatment of DDH with concomitant hip pathologies such as cam deformities. Finally, six techniques, all of which are modifications to total hip arthroplasty (THA), were identified for the treatment of high-grade DDH.

Conclusion: The techniques detailed in this review equip surgeons with the necessary knowledge to improve outcomes in patients with varying degrees of DDH.

Abstract ID: A73

Title: Beta-adrenergic antagonist (Timolol) For the Healing of Chronic Diabetic Foot Ulcers

Authors: Amreen Karim[1]; Harrison Shawa MD[2]; Pallas Lim[3]; Mirabel Dafinone[3]; Rawlings Lyle[4]; Sara E. Dahle DPM[5]; R. Rivkah Isseroff MD[6]

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Objective: Diabetic Foot Ulcers (DFUs) are infamous for complex management. Our laboratory's work has shown beta-adrenergic antagonists (βAAs) enhance the rate of wound healing. We aim to examine topically applied beta-antagonist Timoptic-XE®'s (Timolol) efficacy, safety, and effects on healing compared to SOC (standard of care) in treating subjects with DFUs.

Methods: This phase two, randomized, double-blinded, controlled, and parallel-group clinical trial recruited patients from Veterans Affairs Northern California Health Care System (VANCHCS).[1] Group 1 has DFU patients with SOC plus Timoptic-XE®. Group 2 (placebo) has DFU patients treated with hydrogel. The study lasts up to 31 weeks, with three phases (a 2-week screening phase, up to a 12-week active phase, confirmatory visits two weeks later, and a follow-up phase with one visit/month for four months). The topical study drug or placebo will be applied daily by subjects on the foot ulcer for 12 weeks or until healed. Wound measurements and photographs are collected at all visits.

Results: 45/48 enrolled patients have completed the study. In Group 1, 40% of patients healed. In Group 2, 52% of patients healed. Data analysis shows a 95% Confidence interval (0.1 to 1.51) with a decreased odds ratio (0.41) regarding Timolol's impact on healing at the secondary endpoint (visit 19) and a p-value of 0.15. The mean wound healing rate in Group 1 was 0.154 cm^2/week and 0.0324 cm^2/week in Group 2, with a p-value of 0.153. The findings do not demonstrate statistical significance.

Conclusions: We hypothesized that subjects with DFU treated with a βAA would have more rapid complete wound closure. Current data analysis does not show statistically significant evidence that topical use of βAAs improves healing in DFU treatment. Our findings contribute to understanding new treatment models for DFU therapy.

Abstract ID: A74

Title: Isolated Microfracture Remains the Most Commonly Used Arthroscopic Technique to Treat Chondral Lesions of the Hip: A Systematic Review of the Literature from 2018 to 2023

Author: Deeksha Mamidi[1]; Muzammil Akhtar[1]; Jimmy Wen[1]; Daniel Razick[1]; Sonia Aamer[2]; Maaz Asim[2]; Ilham Tokhi[2]; Ali Saeed[3]; Trevor Shelton[4]
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[4] Utah Valley Orthopedics and Sports Medicine, Intermountain Health

Background: To systematically review outcomes of joint preservation procedures for chondral lesions of the hip through analysis of survival rates and PROs.

Methods: A literature search from 2018 to May 2023 was performed using the PRISMA guidelines in three databases: PubMed, Embase, and Google Scholar. Studies were included if they reported on outcomes of patients undergoing hip arthroscopy for the treatment of chondral lesions of the hip joint and if there were quantifiable postoperative outcome measures. Quality assessment was completed using the MINORS criteria.

Results: 27 studies were included, with 20 noncomparative and seven comparative studies. Microfracture (MFx) was the most common procedure, reported in 17 studies. Other procedures include autologous chondrocyte transplantation (ACT) (five studies), autologous matrix-induced chondrogenesis (AMIC) (three studies), MFx in conjunction with CarGel (three studies). Seven other novel procedures were reported in individual separate studies. Survival rates, defined by no revision surgery or conversion to THA at latest follow-up, for MFx (14 studies), AMIC (3 studies), and MFx in conjunction with CarGel (3 studies) ranged from 59.1% to 100%, 92.9% to 100%, and 94.4% to 95.7%, respectively. Survival rates of ACT, biological reconstruction, debridement and abrasion, micro-fragmented autologous adipose tissue transplantation, and ChondroFiller gel were all reported once in separate studies with rates of 100%, 100%, 85.4%, 100%, and 92.3%, respectively. All studies included PROs, most reporting statistically significant improvements ($P < 0.05$) at the latest follow-up.

Conclusions: Isolated MFx remained the most commonly performed technique, however, with lower survival and higher conversion to THA rates than in studies before 2018. Novel techniques that were performed in conjunction with MFx or which avoided MFx altogether had higher overall survival rates despite being minimally performed. The majority of patients across all techniques demonstrated significant improvements in PROs.

Abstract ID: A75

Title: Granuloma Annulare Onset Following COVID-19 Vaccination

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Introduction: Infection with SARS-COV-2 has shown the ability to damage nearly every organ system in the human body, including the largest organ - the skin. Granuloma annulare (GA) is a rare rash with unclear etiology that presents as annular, erythematous papules or plaques with central clearing. To our knowledge, there has only been one reported case of GA associated with COVID-19 vaccination published thus far.

Case Presentation: We present the cases of a 54-year-old female and a 66-year-old male who developed generalized GA and localized GA, respectively, following the administration of a COVID-19 vaccine, which worsened with subsequent boosters. This paper reviews the existing literature on GA associated with COVID-19 infection and vaccination, as well as the possible immunological mechanisms underlying the development of GA following vaccination. We especially note the striking similarities in disease morphology and temporal association with COVID-19 vaccination between our 54-year-old female and the first reported case of GA following COVID-19 vaccination.

Discussion: Despite the temporal association between COVID-19 vaccination and the development of GA, the exact causative relationship remains unclear. Further studies are needed to elucidate the underlying mechanisms and determine the true incidence and risk factors for GA associated with COVID-19 vaccination. Clinicians and dermatologists should remain vigilant in monitoring and managing cutaneous adverse reactions related to COVID-19 vaccination, including GA, and provide appropriate counseling to patients.

Abstract ID: A76

Title: Cardiac Imaging Modalities for Coronary Artery Disease

Authors: Cynthia L. Monroe[1], Dylan Cooper[1], Ashley Christensen[1], Jesse Wong[1], Vanshika Goyal[1], Eldo Frezza[1]

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Study objectives: Summarize the current literature on the various imaging modalities for coronary artery disease (CAD). Compare the risks and benefits associated with the different radiological imaging techniques.

Methods: A literature review was performed to outline and compare the current imaging modalities for CAD. For each imaging technique, we have described the fundamental concepts of the technology, its role in CAD diagnosis, unique capabilities, indications and contraindications, as well as advantages and disadvantages.

Results: X-ray Angiography

Invasive coronary angiography is widely considered to be the gold standard in diagnosing coronary artery disease. CA typically follows abnormal non-invasive stress testing results in the non-emergent setting, and should naturally only be used if the proposed information derived from the procedure outweighs the risks

PET: As compared to other imaging techniques, such as echocardiograms or MRI, which usually image the anatomy and structure of the heart, PET scans image the cellular function of the heart.There are two ways in which PET scans can assess myocardial viability: metabolism and perfusion.

MRI: Cardiac MRI can assess cardiac structure, left ventricular mass, volume, perfusion, function, metabolism, distinguish infarcted tissue from normal myocardial tissue, and determine systolic wall thickening as well as regional wall motion abnormalities.

CCTA: CCTA can offer valuable insight on CAD prognostic aspects, such as fractional flow reserve (FFR), perfusion with hyperemia, plaque burden, perivascular inflammation, wall motion, myocardial scarring and fibrosis, percent myocardium at risk, as well as Leaman risk scores.

Conclusions: Our comprehensive literature review has provided a thorough overview of the current imaging modalities for coronary artery disease (CAD). Each technique, including X-ray angiography, PET, MRI, and CCTA, offers unique insights into cardiac anatomy, function, and pathology. The choice of imaging modality should align with the specific diagnostic needs and risks associated with each patient.

Abstract ID: A77

Title: An Atypical Manifestation of Foot Necrotizing Fasciitis in a Patient with Type II Diabetes Patient

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Introduction: Approximately 90% of diabetes cases are attributed to Type 2 diabetes mellitus (T2DM), with diabetic foot ulcer being one of the most debilitating conditions for DM patients. Necrotizing fasciitis (NF), a life-threatening bacterial infection that affects the skin and the underlying soft tissue, increases the risk for limb amputation in individuals with DM. In this case report, we discussed a 32-year-old diabetic male patient who presented with right foot pain, three days following a spider bite. The foot progressively became swollen, preventing the patient from bearing weight on the foot. After admission to the emergency department, the examination showed discoloration of the dorsum of the proximal phalanx of the first toe with an open wound and pus. The patient received fluid resuscitation along with a course of metronidazole and levofloxacin. Subsequently, the patient was referred to an orthopedic and podiatric team where he underwent a complete foot fasciotomy. The procedure was successful and the patient recovered well. This case showcases a rare manifestation of NF and highlights the importance for future research with regards to NF and its association with diabetes.

Conclusion: This case serves as a caution regarding the simple underlying causes of NF in diabetic patients, such as a spider bite in this case report, as delayed treatment can lead to fatal outcomes. Moreover, any injury to the foot must be promptly assessed to prevent necrotic tissue from developing, particularly in patients with diabetes. The patient's condition was effectively addressed through a comprehensive review of the medical history and appropriate administration of antibiotics and surgical intervention. Furthermore, this case underscores the importance of evaluating any foot injury with proper diagnosis to avoid NF as well differentiating NF from other soft tissue infections that might obscure the clinical picture.

Abstract ID: A78

Title: Real-world experience using intravitreal Faricimab for previously treated neovascular age-related macular degeneration

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Purpose: Faricimab, a novel therapy for neovascular age-related macular degeneration (nAMD), inhibits both vascular endothelial growth factor (VEGF) and angiopoietin. It may be more effective than therapies targeting VEGF alone. To test this hypothesis, we report our real-world experience using intravitreal faricimab in nAMD eyes previously treated with other anti-VEGF therapy.

Methods: Single-center retrospective chart review (August 2022-August 2023) of patients receiving faricimab for nAMD for persistent macular fluid on other anti-VEGF drugs, excluding eyes with prior vitreoretinal surgery or other concurrent retinal condition. Clinical and demographic data including best corrected visual acuity (BCVA), number and type of anti-VEGF injection, and macular optical coherence tomography (OCT) with central subfield thickness (CST) were collected. Statistical analyses utilized t-tests and multiple linear regression.

Results: We identified 88 eyes (73 patients) meeting study criteria. The average age was 82$\pm$9 (range 57-101). The average number and duration of prior anti-VEGF injections were 27.5 injections (range 1-127) and 41.9 months (range 1-169), respectively. Mean baseline VA was 20/63 (range 20/20 to CF) with mean anti-VEGF injection interval of 6.1$\pm$2.0 weeks (range 4-15). Mean baseline CST was 292$\pm$73.0 □m. During mean follow-up of 30.9$\pm$1.5 weeks (range 7-60) after starting faricimab, the eyes received a mean of 5.1$\pm$2.4 injections (range 1-11). Mean BCVA remained at 20/63 ($p=0.11$), but mean injection interval increased to 7.4 weeks ($p<0.001$), and mean CST decreased to 261$\pm$63.2 □m ($p<0.001$). Multiple linear regression analysis revealed that the total number of anti-VEGF injections at baseline was not significantly associated with CST change on faricimab ($p=0.57$).

Conclusions: In nAMD eyes previously treated with other anti-VEGF, intravitreal faricimab use was associated with increased mean treatment interval and decreased CST but no improvement in mean BCVA. The benefit of faricimab on CST may be diminished in eyes previously treated with multiple different types of anti-VEGF therapy.

Abstract ID: A79

Title: Unraveling the Dynamics of Escalating Competitiveness in Diagnostic Radiology Residency Matching

Authors: Akash Pathak, BS[1], Tiffany R. Wong, MPS[1], Jean Shanaa, BS[1], Aleeha Noon, MD[2], Anh Dang, MD[3], Michael S. Wong, MD, MBA, FACS[1]
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Introduction: This study provides insights on match statistics trends and the competitiveness of diagnostic radiology (DR) to guide program directors and aid medical students in bolstering their chances of matching.

Methods: A 15-year retrospective study was conducted utilizing the NRMP's Annual Main Residency Match Results and Data (2008-2023) for DR match rates and Charting Outcomes (2007-2022) for USMLE Step 1&2 scores, volunteer experiences, percent in Alpha Omega Alpha (AOA), research productivity, and contiguous ranks for Matched DR Applicants (MDRAs), Unmatched DR Applicants (UDRAs), and All Specialties Matched Applicants.

Results: From 2008 to 2023, amongst PGY-1 & PGY-2 DR residencies, the match rate decreased from 50.12% to 35.36% while the number of total positions increased from 1085 to 1149. For PGY-1 and PGY-2 MDRAs, the match rate decreased from 20.83% to 11.76% and 79.45% to 62.47%, respectively.

Amongst MDRAs from 2007 to 2022, both mean USMLE Step 1 (235 to 245) and Step 2 (237 to 253) scores increased and mean research productivity increased 285% from 2.8 to 8.0. Amongst MDRAs and UDRAs, the percentage of students in AOA decreased from 25.8% to 19.3% and from 3.6% to 3.2%. The contiguous ranks for UDRAs and MDRAs increased from 3.0 to 7.5 (250%) and 12 to 14.9 (124%), respectively. The differences in the three applicant groups' Charting Outcomes metrics were significantly different from one another ($p<0.05$).

Conclusions: Over the past 15 years, the number of applicants outpaced the number of residency positions, and an upward trend in USMLE scores and research productivity cements the increasing competitiveness of DR. Prospective applicants should consider investing time in research, applying broadly, and be aware that Step 2 may assume greater importance as Step 1 is now pass/fail.

Abstract ID: A81

Title: The Cost of Delay: A Case Report of Doxorubicin Extravasation

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Introduction: Extravasation is a dangerous complication of doxorubicin administration. It may cause extreme pain, vascular damage, infection, and tissue necrosis. However, these adverse effects can be minimized with administration of the antidote (dexrazoxane) within six hours.

Case Presentation: The patient is a 40-year-old woman with invasive breast cancer, status post bilateral mastectomy and chest port failure who presents with doxorubicin extravasation in the left arm. Doxorubicin was administered through a peripheral IV and extravasation was observed on the fourth round of chemotherapy, where the patient noted a burning sensation, warmth, and tightness in her left arm. Dexrazoxane was administered 5.5 hours later, as extravasation was not immediately recognized and the infusion center did not have the antidote on site. Over the subsequent 1.5 months, the patient continued to experience pain and tenderness, developing a persistent ulcer and superficial thrombophlebitis at the administration site. She was admitted to the hospital for worsening symptoms despite continuous antibiotic treatment. An ultrasound revealing a small fluid collection along with sensory loss in the medial three fingers of her left hand prompted immediate explorative surgery and tissue debridement. During the operation a 3 cm subcutaneous pocket of pus was removed along with all necrotic and infected tissue. After surgery, the patient reported significant improvement of her pain and no lingering sensory abnormalities.

Discussion/Conclusion: This case report depicts the tremendous morbidity that may be associated with doxorubicin extravasation, highlighting multiple individual and system level errors in recognizing and treating doxorubicin extravasation. From failure to recognize the extravasation when classic signs and symptoms were displayed, to a near-miss of timely antidote administration, to many other mishaps along the way. This case exemplifies a need for further education on the signs of doxorubicin extravasation and the appropriate treatment to avoid long term complications and invasive interventions.

Abstract ID: A82

Title: Outcomes of Early versus Delayed Manipulation Under Anesthesia for Stiffness Following Total Knee Arthroplasty: A Systematic Review and Meta-analysis

Authors: Amalia Seibel1; Muzammil Akhtar1; Daniel Razick1; Shaheryar Asad1; Maaz Asim1; Ilham Tokhi1; Osamah Baig2; Ali Saeed3; Adithya Shekhar4
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Objective: The purpose of this systematic review is to evaluate functional and clinical outcomes of early versus delayed manipulation under anesthesia (MUA) for stiffness following total knee arthroplasty (TKA).

Methods: A search following PRISMA guidelines was performed in the PubMed, Embase, Scopus, and Cochrane databases in November 2023. Data regarding study characteristics, demographics, knee flexion and extension, patient-reported outcomes (PROs), complications, and revisions. Quality assessment was performed using MINORS.

Results: 14 studies analyzing 13445 knees, 72.1% of which underwent early MUA and 27.8% of which underwent delayed MUA, were included. The mean age of patients ranged from 55.2 to 65.6 years, and mean follow-up times from 1.5 to 90 months. The majority of studies divided early versus delayed MUA as within or past three months of the index TKA. Pre- and post-MUA knee flexion for the early/delayed groups was 71.3°/77.9° and 103.0°/96.1°, respectively. Upon meta-analysis, pre-MUA knee flexion was significantly higher in the delayed group ($P = 0.003$), whereas post-MUA flexion was similar in both groups ($P = 0.36$). The mean gain in knee flexion for the early/delayed groups was 32.4°/19.1°. The surgical complication and revision TKA rate for the early/delayed groups was 4.9%/10.3% and 5%/9%, respectively. Upon meta-analysis, the risk of surgical or medical complications and revision TKA were significantly higher in the delayed MUA group ($P < 0.00001$ and $= 0.002$, respectively).

Conclusions: Though post-MUA knee flexion is similar in patients undergoing early and delayed MUA following TKA, the mean gain in flexion for early patients is nearly double that of delayed patients. Delayed patients also have significantly higher risks of surgical or medical complications and revision TKA.

Abstract ID: A83

Title: An Unusual Case of Artery of Percheron Infarct Caused by Spontaneous Bilateral Postpartum Vertebral Artery Dissection

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Objective: Spontaneous postpartum vertebral artery dissection (PPVAD) is a rare complication of pregnancy occurring in 2.6-3 cases per 100,000 pregnancy-related hospitalizations. It most commonly presents with atypical head or neck pain. However, as headaches occur frequently and non-specifically in the postpartum patient, PPVAD is often an under-diagnosed cause of stroke. While the etiology of PPVAD is poorly understood, several theories have been proposed. We describe the case of a 34-year-old African American woman presenting with spontaneous bilateral PPVAD and explore the clinical manifestations, pathophysiology, neuroimaging findings, and differential diagnosis of this rare vascular event.

Methods: A 34-year-old G5P5 African American woman presented to the emergency department three weeks postpartum with loss of consciousness after a one-day history of vision problems, slurred speech, and bilateral posterior cervical headache. The patient had an uncomplicated pregnancy course and normal vaginal delivery of her fifth child. MRI of the brain revealed faint FLAIR and DWI hyperintensity with signal loss on the processed ADC map in the bilateral globi pallidi, suggestive of evolving infarctions. Subsequent CTA showed symmetric narrowing of distal V3 and V4 segments of bilateral vertebral arteries.

Results: Based on the patient's clinical presentation and imaging findings, bilateral PPVAD was diagnosed and antiplatelet therapy was initiated. The patient returned to baseline alertness and mentation within the following days.

Conclusions: While the prognosis of PPVAD is generally favorable, timely recognition, diagnosis, and management may be complicated by the often-delayed presentation of neurological sequelae and the nonspecific nature of symptoms. Our case features the importance of considering PPVAD as a differential in the postpartum patient presenting with headache and neck pain - even in a relatively healthy patient without the typical risk factors or comorbidities.

Abstract ID: A84

Title: Induction of Type I Interferons Blocks Monkey Pox Virus (MPXV) by Upregulation of Cholesterol 25-Hydroxylase and Down-Regulation of Fatty Acid Synthase (FASN)

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Study objective: This study elucidated the specific manner by which the innate immune system induces type I interferons to trigger the differential expression and suppression of more than 300 genes with the ultimate goal of fostering an antiviral state. Previous studies have shown that whereas the expression of most of these genes, known as interferon-stimulated genes (ISGs), is enhanced, the expression of a group of genes involved in lipid metabolism is suppressed to counterattack the viral growth. Specifically, we tested the effectiveness of inhibiting fatty acid synthase (FASN) and inducing cholesterol 25-hydroxylase (CH25H), both enzymes involved in de novo biosynthesis of fatty acids, in impeding infection by the monkeypox virus (MPXV).

Methods: Huh-7.5 cells were infected with MPXV and harvested at 1, 3, and 6 hours-post infection (HPI). The expression of candidate genes was then investigated by qRT-PCR. In addition, Huh-7.5 cells were either transfected with CH25H, transfected with a vector control, treated with the biological FASN inhibitor C75, or FASN was overexpressed for 24 hours prior to MPXV infection and cells were harvested to assess the rate MPXV replication via qRT-PCR.

Results: During MPXV infection, FASN was suppressed while CH25H was significantly increased, supporting the pro- and anti-viral functions of these two genes respectively. MPXV was more efficiently replicated in FASN-over-expressed cells but was substantially inhibited in CH25H transfected cells compared to control cells. In addition, C75 inhibited MPXV infection significantly.

Conclusion: Currently, most antiviral drugs target specific viral properties or proteins and are the result of years of extensive research. To effectively combat newly emerging viruses, we must utilize compounds that offer broadly acting antiviral properties as a first line of defense. Our study suggests that 25-hydroxycholesterol (25HC), derived from the IFN-I-inducible cholesterol 25-hydroxylase gene, and inhibitors of FASN may be used as broad-spectrum antiviral agents via alterations in the lipid metabolism pathway.

Abstract ID: A85

Title: Is intravascular lithotripsy (IVL) alone a therapy for treatment of aortoiliac occlusive disease (AIOD)?

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Background: Many patients with aortoiliac occlusive disease (AIOD) and peripheral artery disease are asymptomatic. While this makes determining the exact prevalence of the diseases in the general population difficult, estimates range from 3.56 percent to greater than 14 percent. Angioplasty, performed with or without stenting, is a percutaneous procedure used to widen occluded coronary arteries due to underlying atherosclerosis.

Methods/Results: We present a rare case in which a 63-year old male with a history of hypertension, diabetes mellitus, hyperlipidemia and previous coronary artery bypass graft (CABG) presented with bilateral external iliac artery near occlusion. We describe the utilization of lithotripsy balloon angioplasty as opposed to the traditional double-barrel stenting method or modified endovascular repair (EVAR) to treat the occlusion. Pre-operative computed tomography (CT) angiography demonstrated a 90 percent occlusion of both the distal aorta and right external iliac artery, and 99 percent occlusion of the left external iliac. Three years post-intervention, the patient remains symptom-free with normal right and left ankle-brachial indices, 1.34 and 1.32 respectively.

Conclusion: Intravascular lithotripsy is a safe alternative to conventional stenting for AIOD. We review the available literature regarding AIOD and discuss the advantages and disadvantages of novel and traditional treatment modalities. Understanding all treatment options is crucial for physicians who are presented with similar cases.

Abstract ID: A86

Title: Incidental Discovery of Autoimmune Hemolytic Anemia Associated with Recent Administration of mRNA Moderna COVID-19 Vaccine Booster

Authors: Gursimran Singh[1], Bahaar Kaur Muhar[1], Prasanth Kurup[1], Shahin Shahbazi MD[2]

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Introduction: Since the release of COVID-19 vaccines, researchers have examined their various adverse effects. Autoimmune hemolytic anemia (AIHA) is one of the more uncommon side effects associated with these vaccinations. AIHA is an acquired condition in which the immune system starts to attack the body's own red blood cells, causing hemolysis.

Methods: We report a case on a 76-year-old male patient who was diagnosed with AIHA. The patient was seen in Kaiser Permanente Roseville Medical Center. Patient mentioned “feeling poorly” for a two week period and it was discovered that he received the Moderna COVID-19 booster 3 weeks prior.

Results: After a CBC, the patient was found to have a mild macrocytic anemia. Follow up testing revealed a positive DAT, elevated indirect and direct bilirubin, reticulocyte count, and LDH. After ruling out other potential causes of hemolytic anemia, the patient was determined to have AIHA. Following treatment with methylprednisolone and folic acid, the patient's CBC, reticulocyte count, and LDH returned to standardized values and the patient reported improved levels of energy.

Discussion: This case outlines potential adverse effects of the Moderna COVID-19 booster that can occur 3 weeks after administration and emphasizes the importance of monitoring by physicians following the administration of vaccines.

Abstract ID: A87

Title: Socioeconomic Differences in Access to Scoliosis Care in the Pediatric Population: A Geographical Disparity Assessment

Authors: Faith Sumandea BS[1], Steven M. Garcia MD[2], Kian Niknam MAS[2], and Ishaan Swarup MD[2]
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Introduction: Adolescent idiopathic scoliosis (AIS) is a spinal deformity affecting pediatric patients. Up to 10% require surgical correction. Studies have shown disparities in access to care regarding race, ethnicity, and insurance type; but have not investigated the impact of patient residential settings–urban versus rural. This study aims to explore the disparities in care for AIS by examining differences in rates of readmission, revision, and infection between these two groups.

Methods: This retrospective cohort study utilized patient data from the Pediatric Health Information System (PHIS). Patients aged 0-18 who had a posterior spinal fusion (PSF) for AIS from October 2015-July 2022 were included. Diagnoses and procedures were identified by ICD-10 codes and internal tools in PHIS. Descriptive statistics were used to summarize data. T-tests, chi-squared tests, fisher-exact tests, and logistic regression were used to assess differences between populations.

Results: 15,703 patients had a PSF for AIS in the study period. 15,318 had residential data available and were included in the final cohort. Demographic differences were observed between urban and rural populations including age, race, and ethnicity ($p<0.01$). There were significant differences in insurance type between urban and rural patients ($p<0.01$), median household income ($51,622 vs. $34,942, $p<0.01$), and hardware removal rates (1.2% vs. 2.0%, $p<0.01$). No significant difference was seen in 30-day infection and readmission rates, nor 90-day infection rates. There was a significant difference in 90-day readmission rates between urban and rural populations (6.1% vs. 7.3%, $p=0.03$).

Conclusion: Significant differences were observed in patient demographics and surgical outcomes between rural and urban AIS patients undergoing PSF highlighting the importance of surgeon awareness of these differences. Further research is needed to characterize the reasons for these differences and develop strategies to improve outcomes.

Abstract ID: A88

Title: Kendo Headgear Concussion Safety Evaluation

Authors: Megan Hsu[1*], An-Phuc Ta[1*], Satori Iwamoto[1], Harrison Chu[1], Heidi Spantzel[1], Arnold Spantzel[1], Hillary Chu[1], Hao Chen[2], Gary Chu[1**]

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Introduction: Concussions present a potential risk in various contact sports, including the martial art of kendo. While there are regulations implemented on the production quality of shinai, the bamboo-based swords used in kendo, there is a lack of active standards enforced by an independent governing body for kendo armor to prevent head injuries like concussions. Interestingly, two separate independent governing bodies exist to regulate and ensure the quality of commercially-sold shinai, but none for armor. This study aimed to answer two important questions: firstly, whether high-end kendo helmets offer superior protection against concussions compared to entry-level helmets, and secondly, whether adding extra padding inserts to the helmets enhances overall concussion protection.

Methods: We asked several kendo practitioners and one non-practitioner to deliver a series of head strikes using a shinai on a mannequin wearing different kendo helmets, both with and without additional protective padding. Our objective was to measure the force of each strike and assess the associated risk of concussion.

Results: Both types of helmets sustained linear accelerations well below the threshold for the risk of concussion, which is set at 62.4g force. Notably, there were no statistical differences regarding impact forces received between the helmets ($p=0.13$). Interestingly, we found that commercial helmet padding inserts did not significantly reduce the risk of concussion. In fact, one of the commercially made helmet inserts performed worse than using a helmet alone ($p<0.01$).

Conclusion: Our study suggests that investing in an entry-level kendo helmet pattern can offer comparable concussion protection to a high-end helmet. As for commercially available padding inserts, their potential to provide additional concussion protection remains inconclusive and further studies are needed. Implementing a standardized evaluation process can aid consumers in making informed decisions when selecting protective gear to prevent concussions in kendo.

Abstract ID: A89

Title: Impact of Virtual Interviews on Neurological Surgery Match Outcomes for US Allopathic Senior Medical Students: An Analysis of Home Program Influence

Authors: Ethan A. Tabaie BS[1], Mouhamad Shehabat BS[1], Ramy Khalil BS[1], Jimmy Wen BA[1], Shaheryar Asad BA[1], Bhagvat Maheta BS[1], Michael S. Wong MD FACS[1], Allan R. Martin MD PhD FRCSC[2]

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Introduction: The COVID-19 pandemic prompted the Accreditation Council for Graduate Medical Education to transition to virtual residency interviews (VRIs) in neurological surgery (NS) for 2020-2021, continuing through 2021-2023. This study investigates the impact of VRIs on the match outcomes for senior US allopathic medical students, especially those lacking a home neurosurgical program (HP), in NS residency placements.

Methods: We analyzed data from the National Resident Matching Program from 2019 to 2023. Match statistics, proximity of residency programs to medical schools with or without home programs (HPs), and rankings of medical schools as top 40 NIH-funded institutions were examined, stratified by interview format. Location data was assessed using Google Mountain View.

Results: The study encompassed 741 senior US allopathic NS applicants, 619 from schools with HPs and 122 from those without. During VRIs, the match ratio (MR) for schools with HPs was 1.60% and 1.44% for those without; in-person interviews yielded 1.60% and 1.33%, respectively. Students from schools with HPs had 1.3 times higher odds of matching into NS during in-person interviews ($p=0.033$) and 1.1 times during VRIs ($p=0.011$). The proximity of matched NS programs to students' medical schools was statistically indifferent between those attending schools with or without HPs.

Conclusion: This study is the first to explore match outcomes for schools without HPs, stratifying them by interview format in NS. Limitations include the lack of data for applicants not matched into NS; however, an MR was calculated to circumvent this issue. Students from institutions with home NS programs exhibited a higher MR. Notably, the transition to VRIs improved outcomes for schools without HPs. Disparities persist in the percentage of students accepted into NS from schools without HPs, warranting further action by residency programs and medical schools.

Abstract ID: A90

Title: Case Report: Atraumatic Splenic Rupture with Epstein-Barr Virus Infection, Chronic Pancreatitis, and Benzodiazepine Use

Authors: Mabel S. Tang[1], Dave D. Manguerra Jr[1], Deeksha Panuganti[1], Nalin Ranasinghe, MD[2], Leonard Ranasinghe, MD, PhD[1]

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Introduction: Atraumatic splenic rupture (ASR) accounts for 3% of splenic ruptures worldwide. It is a life-threatening condition that can occur spontaneously due to a variety of etiologies like malignancy, infectious diseases, or iatrogenic causes. Epstein Barr Virus (EBV) with infectious mononucleosis is the highest reported etiology leading to ASR. While EBV is well-documented in the literature, there is a paucity of literature on ASR with relation to EBV, chronic pancreatitis, and benzodiazepine use.

Case Presentation: A 45-year-old female with a history of chronic pancreatitis and benzodiazepine use was evaluated in the emergency department (ED) for an abdominal pain flare-up radiating into the chest. She reported no history of recent trauma. Investigations showed evidence of acute EBV infection, anemia, proteinuria, splenic cyst, and a grade III pericapsular splenic hematoma. The patient was transferred to another hospital and received an embolization with coils placed. One week following the procedure, she returned to the ED with LUQ pain. Imaging showed an enlargement of the hematoma and ascites, and the patient was transferred to a trauma center for further care.

Discussion: In this case report, we describe a patient with a history of chronic pancreatitis and benzodiazepine use and evidence of EBV infection who presents with ASR. There is limited literature on the concurrent effects of EBV, pancreatitis, and benzodiazepine use on the spleen, potentially leading to ASR. Further research into ASR as a potential, rare complication of these conditions is needed.

Abstract ID: A91

Title: Influence of dietary patterns in the management of Huntington's Disease: A Literature Review

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Background: Huntington's disease (HD), a rare autosomal dominant neurodegenerative disease, causes the gradual deterioration of neurons in the basal ganglia and specifically in the striatum. HD displays a wide range of symptoms from motor irregularities such as chorea, dystonia, and bradykinesia to more debilitating symptoms like cognitive decline, behavioral irregularities, and psychiatric disturbances. Current research suggests potential in dietary interventions as viable strategies for slowing the progression of HD. Most notably, the Mediterranean, vegan, carnivore, paleo, and ketogenic diets have gained attention due to their hypothesized impact on neuroprotection and symptomatic modulation in various neurodegenerative disorders. Understanding the intricate interactions between these dietary regimens and HD pathogenesis could open avenues for personalized interventions tailored to the individual's specific needs and genetic background. Ultimately, elucidating the multifaceted effects of these diets on HD offers a promising framework for developing comprehensive therapeutic approaches that integrate dietary strategies with conventional treatments.

Results/Methods: In this review, five popular diets (Mediterranean, Vegan, Carnivore, Paleolithic and Ketogenic) and their distinct macromolecule composition, nutritional profile, biochemical pathways, and their potential therapeutic effects for HD were thoroughly examined.

Conclusion: HD is a complex autosomal dominant genetic disease in which effective treatments are still subjects of ongoing research. Recent studies have shown that diet has a potential role to play in reducing the progression of HD. These diets have been shown to have a slight alleviating effect on the pathogenesis of several other neurological disorders such as ALS, dementia, Parkinson's, and Alzheimer's. Due to various views regarding the benefits of these diets within the literature, future studies on the topic should be conducted through randomized controlled trials (RCTs) with relevant patient populations and standardized techniques to properly evaluate the effects of these diets discussed in this study on HD.

Abstract ID: A92

Title: Efficient and Effective Less PAINFUL Pre-Rounding: Introducing A Mnemonic for Medical Students and Trainees

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Introduction: This article introduces the mnemonic "Less PAINFUL pre-rounding" as a structured and efficient approach for medical students learning to pre-round on hospitalized patients. Acknowledging the underemphasis on pre-rounding in medical education, the mnemonic addresses critical aspects of patient care, including Pain and presenting symptoms, Ambulation, Ins and Outs (diet, IV fluids, drainage), Nurse or patient needs, and Follow-Up Labs & Imaging (FUL). The mnemonic provides medical students with a systematic framework, facilitating a thorough assessment of patients and promoting a patient-centered approach to care.

Discussion: Mnemonics serve as valuable teaching tools and offer medical students a structured and memorable guide, enhancing their ability to make informed clinical decisions. Importantly, studies indicate that the adoption of mnemonic-based approaches in medical training not only improves education outcomes but also leads to tangible enhancements in patient care delivery times, task completion times, and provider-patient contact time. The "Less PAINFUL" mnemonic, while not formally validated, demonstrates its potential to guide medical students in pre-rounding activities and positively impact patient care.

Conclusion: In conclusion, the "Less PAINFUL" mnemonic can serve as a practical and effective tool for medical students, exemplifying the broader potential of mnemonics in enhancing both education outcomes and tangible improvements in patient care, thereby contributing to the development of confident and competent healthcare providers.

Abstract ID: A93

Title: Clinical Risk Factors Contributing to Five-Year Mortality in a VA Population with Ascending Thoracic Aortic Aneurysms

Authors: Sally Tu[1], Vidur Kailash[1], Siavash Zamirpour[1], Tiffany Cao[1], William Pace[1], Marko Boskovski[1], Liang Ge[1], Elaine Tseng[1]

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Introduction: Current guidelines recommend surgical intervention for ascending thoracic aortic aneurysm (aTAA) greater than 5.5 cm in diameter. However, the cause of mortality in patients who did not undergo surgery remains unknown. We aim to evaluate clinical risk factors contributing to five-year all cause death in a veteran population who have dilated ascending aorta or aTAA and who did not undergo repair within five years.

Methods: 451 patients with ascending thoracic aortic size of at least 4.0 cm or greater were identified. Fifty-eight pertinent risk factors (including social, genetic, cardiac risk factors, comorbidities, date of diagnosis and aneurysm size, date of most recent CT scan and aneurysm size, etc.) that may contribute to adverse outcomes were evaluated. Patients who died before repair within 5 years of aTAA identification or had 5 years of follow-up without repair were further analyzed. Statistical analysis used logistic regression for the outcome of five-year all-cause mortality with stepwise variable selection based on the Akaike information criterion. $P<0.05$ was considered statistically significant.

Results: Of 451 patients, 179 had ≥5 years follow-up without aTAA surgical repair. 46 out of the 179 patients (26%) died within 5 years. The variable selection process retained 21 of 58 covariates. Variables of clinical interest and statistical significance in the adjusted model were age (odds ratio 1.22 per year, $p<0.001$), history of prior open or endovascular procedures (OR 5.18, $p=0.003$), history of angiotensin receptor blocker (ARB) use (OR 0.13, $p=0.008$), and aneurysm size (3.13 per cm, $p=0.037$).

Conclusion: Age, history of prior open or endovascular procedures, and aneurysm size increased the risk of all-cause death at 5 years. Among modifiable risk factors, only the use of ARB was protective in preventing five-year mortality. ARB use in the overall aneurysm population may be beneficial in reducing 5-year mortality and should be further investigated.

Abstract ID: A94

Title: A Peculiar Case of Profound Hypokalemia in a Type 1 Diabetic Patient and Barriers to Care: A Case Report

Authors: Tatiana Vazquez*, Marcello Kuan*, Kat Arnott*, Jiahua Zhou*, Nathaniel Tsai*, Mark Sheffield MD

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Introduction: Diabetes Mellitus (DM) is one of the most prevalent endocrinologic diseases in the United States. T1D (Type 1 Diabetes) involves the autoimmune destruction of pancreatic beta cells and is treated with insulin replacement. Without proper management, disease progression of T1D causes macrovascular and microvascular complications, such as retinopathy, nephropathy, and neuropathy. Hypokalemia is a common electrolyte disturbance in T1D. It can occur secondary to transcellular shifts, abnormal losses, or inappropriate intake of nutrients. Untreated hypokalemia can lead to cardiac arrhythmias, respiratory depression, rhabdomyolysis, and death, requiring immediate intervention to prevent significant complications.

Case Description: We report a 26-year-old anorexic male presenting to the emergency department for hypotension and hyperglycemia. Initial workup showed a glucose level of 558, HbA1C of 15, K of 1.6, Na of 130, beta hydroxybutyrate of 1.1, no ketonuria, with normal serum pH and bicarbonate. He had a presumed past history of T1D, anorexia, neurogenic bladder, exocrine pancreatic insufficiency without replacement, dumping syndrome, and gastroparesis. He reported receiving subtherapeutic insulin replacement and having limited access to food. The treatment goal was to replete K before starting insulin for hyperglycemia. On ICU day 1, his K increased to 3.5 and he was started on an insulin drip with continued K IV replacement. Overnight, his blood glucose decreased to 215, K decreased to 3.4, Phos decreased to 0.8. On day 2, the patient switched to SQ insulin with IV KCl. On day 3, K increased to 3.8, and Phos increased to 2.1. He gained 8.5 kg throughout treatment and was transferred to the medical floor.

Discussion: This case displays the rapid onset of late-complications of DM in a 26-year-old patient in the absence of appropriate access to healthcare, demonstrating the importance of proper management and education for patients with DM.

Abstract ID: A95

Title: Percutaneous Achilles Repair System (PARS) Achilles Jig System with FiberTape: A Case Report

Authors: Jimmy Wen, BA[1]; Mouhamad Shehabat, BS[1]; Bruce Lehnert, DPM[2]; Sarah Preiss-Farzanegan, MD[1]
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Introduction: Treatment for Achilles tendon rupture (ATR) is still controversial and is highly disputed in the literature. The aim of this case report is to highlight the clinical outcomes of Percutaneous Achilles Repair System (PARS), a mini-open technique for ATR.

Case Presentation: A 30-year old caucasian man, weighing 200 pounds with a height of 79 inches, presented with an acute left Achilles tendon rupture while playing basketball. Surgical repair versus nonsurgical repair were discussed and the patient desired to move forward with surgery, specifically using a mini-open approach with PARS.

Patient was full weight bearing by eight weeks post-operation. After completing physical therapy, the patient was able to return to his regular routine and to the gym with light loads as tolerated at five months post-operatively. As of 26 months after Achilles tendon repair, there has been no re-rupture or complications.

Discussion: Surgical patients have faster rehabilitation time, earlier restoration of calf muscle strength, and significantly lower re-rupture rate. Hence, surgical management is often preferred for athletes and patients with active lifestyles who want to return to pre-injury levels of activity. Patients undergoing PARS can expect to return to baseline physical activities in five months as exhibited in this case. Several recent studies have found that minimally invasive techniques are associated with better functional outcomes including higher postoperative patient reported outcome (PRO) scores, faster return to baseline activity, and lowering the rates of complications and re-ruptures. However, the nomenclature between the different surgery techniques for ATR is ambigious and may affect both non-surgical physicians and patient decisions for treatment. Future studies providing clear delineations of the indications for mini-open, open, or percutaneous repair would help educate non-surgical physicians and laypersons on best recommendations after ATR.

Abstract ID: A96

Title: Epinephrine-Induced Takotsubo Cardiomyopathy: A Case Report

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Introduction: Takotsubo cardiomyopathy (TCM) is an acute cardiac condition precipitated by physical or emotional stress or catecholamine administration characterized by an acute regional systolic left ventricular dysfunction. Named after a traditional Japanese octopus (tako) trap (tsubo), the hyperkinetic heart base and akinetic apex resemble the trap's round bottom and narrow neck, respectively.

Case Presentation: A 46-year-old female presented for VASER-assisted liposuction of back, hips, flanks, and arms, along with autologous fat grafting to her buttocks. After induction of general anesthesia, followed by 4.2 L tumescent infiltration (1 ampule of epinephrine and 150 mg of lidocaine per 1 L of Lactated Ringers) and approximately 20 minutes after the procedure began and 45 minutes after infiltration, the patient suddenly became bradycardic to 42 BPM and hypotensive to 42/18. Surgery was aborted, and 2 rounds of Epinephrine followed by Esmolol resulted in eventual return to sinus rhythm and normotension.

Within 3 minutes of these symptoms, a code and 911 were called. EMS arrived within 10 minutes and she was being treated in the ED within 43 minutes of symptoms. She was transferred to the ICU for supportive care as her systolic function continued to deteriorate. With a diagnosis of TCM, the patient was placed on a Dopamine drip and had a left intraventricular balloon pump placed. She required the support of both for about 1 week until successfully weaned off. She eventually made a full recovery with no sequelae.

Discussion: Because there is no specific treatment or preventable measure for TCM, the early transfer from the out-patient ambulatory surgery center to the ED was crucial in the patient's successful outcome. The presence of continuous cardiac monitoring facilitated the team's rapid decision making, likely preventing cardiac arrest commonly described in other similar surgery center cases.

POSTER SESSION 2 ABSTRACTS

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COLLEGE OF MEDICINE – SDSSP

Group B1

Authors: Ihab Abed[1], Ashley Christensen[1], Kailey Nguyen[1], John Cusick[1]
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Title: Elucidating the cellular localization and mechanism of cell death of RELT in breast cancer cells.

Introduction: Receptor Expressed in Lymphoid Tissues (RELT) is a Tumor Necrosis Factor Receptor that contains two paralogs (RELL1 and RELL2); these proteins are collectively referred to as RELT family members (RELTfms) and are associated with various cancers. We sought to learn how RELTfms function by assessing the mechanism of RELTfm-induced death, the binding partners of RELTfms, and by determining the cellular localization of RELT.

Methods: MDA-MB-231 cells, a model for triple-negative breast cancer, and HEK 293, a standard epithelial cell line, were transfected with plasmids for the indicated constructs, and western blots were used to verify RELTfm protein expression. Flow cytometry (FC) assessed expression of the apoptotic marker Annexin V (AV), the death marker propidium iodide, and activation of caspases 3 and 7. X-gal staining was used to confirm apoptotic morphology and transfection efficiency. Western blots were used to assess the localization of RELT. Co-immunoprecipitation tested the ability of RELTfms to bind the actin-binding protein Filamin A (FLNA), an important protein for many cancers.

Results: FC results demonstrate that RELTfms induce apoptosis in both cell lines, with RELT and RELL2 exerting more death than RELL1. Interestingly, the ability of RELT to induce death was not abrogated by either a mutant of RELT not able to bind the OXSR1 kinase, or by a kinase dead OXSR1 mutant. FC results also indicate that RELT activates Caspases 3 and 7. All three RELTfms bind the protein FLNA and RELT cellular localization was highest in the membrane and cytoskeleton fractions for both cell lines. Interestingly, RELT also localized to the nucleus and associated with chromatin, a novel finding.

Conclusion: These results provide novel evidence that RELTfms activate apoptosis in breast cancer cells, as assessed by Caspase 3/7 activation and AV staining. Furthermore, RELT does not need the OXSR1 kinase to activate death, indicating the p38 MAPK pathway previously identified to be activated by RELT through OXSR1 is not required for RELT-induced death. All RELTfms bind FLNA and this study provides the first evidence of an interaction between RELL2 and FLNA. Finally, novel findings indicate that RELT localizes to the nucleus and binds chromatin, which may help our understanding of how RELT induces death in cancer cells.

Group B2

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Title: The Quadriceps Tendon-Prosthetic Trochlea Distance Measured in the Kinematic Reference Planes is Related to Coronal Bony Alignment and Unrelated to Clinical Outcomes in Unrestricted Kinematically Aligned TKA

Introduction: A prior study of the native knee measured the medial-lateral distance of the quadriceps tendon relative to the trochlea groove (QT-TGD) in the femoral mechanical axis reference plane (FMARF) and concluded the location of the extensor mechanism was unrelated to bony anatomy and that a lateral location was predictive of patellofemoral arthritis. The present study analyzed computerized tomography (CT) scans after kinematically aligned total knee arthroplasty (KA TKA) and determined 1) whether the QT-prosthetic trochlear groove distance (QT-PTGD) measured in the kinematic reference planes (KRP) is related to coronal alignment and 2-year Oxford Knee and Forgotten Joint Scores (OKS, FJS) and 2) whether it differs between Coronal Plane Alignment of the Knee (CPAK) categories. We hypothesize that the QT-PTGD is unrelated to the 2-year OKS and FJS.
Methods: In 296 KA TKAs, evaluators used 3D image software to simultaneously orient the coronal, sagittal, and axial projections of the femur orthogonal to the long axis of the lugs of the femoral component in the KRP and measure the QT-PTGD. They also measured multiple bony and component alignment parameters on a post-operative long-leg anteroposterior scanogram.

Results: The QT-PTD correlated with the distal lateral femoral angle (DLFA) (r2= 0.4470), hip-knee-ankle angle (HKAA) (r2= 0.3930), joint line obliquity (JLO) (r2= 0.3925), and not the proximal medial tibial angle (r2= 0.0000), OKS (r2= 0.0008) and FJS (r2= 0.1104). The QT-PTD was significantly different between CPAK categories (p =0.006).

Conclusion: The present study, which used the KRP instead of the non-physiologic FMARF, contradicted the prior study's conclusions that the QT-TGD was unrelated to bony anatomy and that using KA with TKA would lead to extensor mechanism malalignment and adverse clinical outcomes. Instead, for KA TKA, the associations between the QT-PTGD and the DLFA, HKAA, JLO, and CPAK categories were significant, and a lateral location did not indicate extensor mechanism malalignment as the QT-PTGD did not predict the OKS and FJS.

Group B3

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Title: Comparing Lifestyle Habits Before and After Starting Medical School

Background: Stress is a common experience among medical students and is often associated with changes in habits and behavior. A study by Rotenstein et al. (2016) found that over 70% of medical students experienced symptoms of burnout, which can include changes in sleep habits, eating habits, and exercise routines. These changes can have a significant impact on overall health and well-being. It is hypothesized that due to the increased workload and stress associated with medical school, medical students have adopted increased unhealthy habits, such as poor sleep schedules, personal hygiene, and diet, as well as more sedentary lifestyles, in comparison to prior to starting medical school.

Materials and Methods: An online survey with 21 questions regarding demographics, lifestyle habits, and stress levels before and after the start of medical school was disseminated to first, second, and third year medical students at California Northstate University College of Medicine through SurveyMonkey. Data was collected and analyzed using Python and Microsoft Excel.

Results: Fifty-seven medical students responded to the survey. The age of respondents ranged from 20-32, with a mean age of 24.6 years. 56% were male and 44% were female. 30% were first-year medical students, 63% were second-year medical students, and 7% were third-year medical students. There was a significant decrease observed in the practice of several healthy habits, such as healthy eating, involvement in spiritual/religious activities, leisure reading, outdoor activities, and adequate sleep. No significant change was observed in gym/exercise habits as well as involvement in sports and arts activities. Among unhealthy habits, a significant increase in binge eating was observed. No significant change was observed in the use of tobacco, alcohol, recreational drugs, social media, or napping. There was also no significant change noted in stress levels before and after the start of medical school, but a trend of increasing stress levels with each year of medical school was observed.

Conclusion: There is a significant change in several lifestyle habits among medical students after starting medical school, including healthy eating, involvement in spiritual/religious and outdoor activities, leisure reading, sleep hygiene, and binge eating. Additionally, stress levels appeared to be greater in medical students further along their medical education. The findings of this study can be used by medical school administration across the country to develop programs to better support medical students during their training to help cope with increased stress and a larger workload.

Group B4

Authors: Ubaid Ansari[1], Burhaan Syed[1], Romteen Sedighi[1], Khadija Ansari[1], Muzammil Akhtar[1], Yinka Davies MD[1]

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Title: Disruption in Single-Site Laparoscopic Surgery and Its Feasibility, Economic and Overall Impact

Introduction: The solidification of components of bile within the gallbladder can result in the formation of painful gallstones (cholelithiasis), which are often relieved through surgical removal of the gallbladder, known as cholecystectomy, in symptomatic cases. Robotic Single-Site Cholecystectomy (RSSC) was a recent groundbreaking minimally invasive procedure for gallbladder removal. This review critically examines the available literature on the effectiveness and potency of RSSC compared to its predecessors in the modern healthcare environment, and proposes future directions through which innovation could more firmly establish the procedure as the standard for cholecystectomy.

Methods: A comparison and analysis of various research papers studying the efficacy, feasibility, and economic impact of RSSC when compared to more traditional modes of cholecystectomy was performed. The papers were reviewed and the individual studies contrasted with an emphasis on outcomes, scope, and statistical power in order to fully evaluate the strength of RSSC in a clinical setting. The methodology relied on searching databases for existing research on the topic. PubMed is the main database that was utilized, with searches including terms such as “cholecystectomy”; “single incision laparoscopy”; “multiport laparoscopy”; “da Vinci”; “robotic single site”.

Conclusions: RSSC utilizes robotic technology, offering enhanced dexterity through a single-incision approach and improved outcomes such as reduced postoperative pain and superior cosmesis. However, limitations such as restricted instrument movement, higher cost, increased physician stress, and a potentially heightened hernia risk complicate this evaluation. As widespread adoption of RSSC remains unresolved due to concerns over its economics, efficiency, and overall superiority to prior models, utilization of in vivo robotics, improved digital imaging, and re-engineering of the surgical instruments themselves are all potential avenues that may augment the current RSSC design.

Group B5

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Title: Studying the alterations in core fucosylation in macrophages exposed to secreted tumor factors

Introduction: Macrophages are key players in coordinating the innate immune response to cancer. In this context, tumor-infiltrating macrophages (TAMs) may adopt a pro-tumorigenic phenotype by blocking other immune cells like cytotoxic T cells from conducting an effective anti-tumor response. Fucosylation is a post-translational modification where fucose moieties are enzymatically transferred to folding proteins in the endoplasmic reticulum (ER) by fucosyltransferases (FUTs). FUT8 is unique since it's the only enzyme that mediates core fucosylation, placing it as a valuable target for investigation. Aberrations in fucosylation have been documented in models of lung cancer and HCC to increase tumor size and promote metastasis[i]. However, fucosylation pattern alterations in human macrophages exposed to the tumor microenvironment (TME) is less understood. Therefore, the aim of this study is to better understand how core fucosylation in macrophages is affected by factors in the TME including ER stress.

Methods: Monocyte-derived macrophages were exposed to breast cancer cell line MDAMB231 conditioned media to simulate the TME. THP-1 monocytes were used as controls for the macrophages. ER stress in macrophages was induced by incubating with tunicamycin or thapsigargin. Protein expression was measured using western blot analysis and quantified using ImageJ software. Core fucosylation pattern was measured by flow cytometry using the fucose-binding AAL.

Results: Our results show that FUT8 protein expression, as measured by western blot analysis via ImageJ software, increases once THP-1 monocytes differentiate to macrophages and decreases once the macrophages are exposed to tumor-conditioned media (TCM), along with the ER stress inducers, Tunicamycin and Thapsigargin. Accordingly, core fucosylation was increased in macrophages compared to their monocytic progenitors and reduced when the macrophages were treated with TCM media and ER stressors.

Conclusion: This study recorded significant alterations in core fucosylation in macrophages exposed to tumor factors and ER stress. Core fucosylation is uniquely mediated by FUT8 and the observed changes we identified in macrophages exposed to TCM support FUT8 as a possible target for immunotherapy which could be clinically beneficial. However, more work needs to be done to further understand the role of core fucosylation in TAMs.

Group B6

Authors: Emanuil Parunakian BS, Shoaib Ugradar MD, Joseph Tolentino BS, Emil Malkhasyan BS, Pershanjit Raika MBBS, Joseph Ghaly BS, Chirag Bisht MS, Raymond S Douglas MD PhD

Title: Teprotumumab Treatment and Light Sensitivity in Thyroid Eye Disease: A Prospective Observational Study

Introduction: Teprotumumab, an FDA-approved monoclonal antibody targeting the insulin-like growth factor-1 receptor (IGF-1R), has shown efficacy in treating thyroid eye disease (TED). While its impact on common TED symptoms is well-documented, the relationship between teprotumumab treatment and light sensitivity, a reported but underexplored symptom in TED, remains unclear. To investigate the effects of teprotumumab on light sensitivity in a large cohort of patients with active and chronic TED, and assess its potential correlation with other TED features.

Methods: A prospective observational study conducted from March 2020 to April 2023 included TED patients treated with teprotumumab. The Visual Light Sensitivity Questionnaire-8 (VLSQ-8) measured light sensitivity. Primary outcomes were changes in light sensitivity, proptosis, Clinical Activity Score (CAS), and MRD1/MRD2. Patients received teprotumumab infusions every 3 weeks over 24 weeks.

Results: Analysis involved [number] TED patients reporting baseline light sensitivity. Teprotumumab treatment demonstrated significant improvements in light sensitivity ($p < 0.05$), proptosis, CAS, and MRD1/MRD2. The VLSQ-8 revealed clinically significant improvements (≥2 points) in eight categories. Patients with chronic TED exhibited similar improvements compared to active TED counterparts. A correlation analysis indicated relationships between VLSQ-8 scores, CAS, and proptosis ($p < 0.05$).

Conclusion: This prospective study provides novel insights into teprotumumab's impact on light sensitivity in TED, showcasing its effectiveness in improving this symptom in both active and chronic cases. The observed correlations suggest interdependencies between light sensitivity and other TED features, underscoring the holistic benefits of teprotumumab in TED management. Further research is warranted to deepen our understanding of these relationships and optimize treatment strategies.

Group B7

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Title: Radial Artery Occlusion Following Left Heart Catheterization

Introduction: Cardiac catheterization may be used to treat various heart conditions, most commonly including arrhythmias and anginas. Due to the superficial location of the radial artery, it has become a leading location for the placement of arterial lines. While transradial catheterization is gaining popularity, complications such as hematoma and radial artery occlusion have become more common and pose challenges for clinicians in terms of diagnosis and treatment. As a result, it becomes increasingly important to bring awareness to potential complications.

Case Presentation: We present a case of a 40 year-old female who presented to the emergency department with right upper hand pain which radiated to the right neck. A week prior, she had a left transradial cardiac catheterization. The catheterization showed normal coronary arteries and moderately elevated left ventricular end-diastolic pressure. A right upper extremity ultrasound was negative for deep venous thrombosis of the right upper extremity and superficial venous thrombosis of the right arm. A right arm venous duplex showed monophasic waveforms in the proximal radial artery. Distally near the site of catheterization entry, there appeared to be an arterial collateral that coursed posteriorly. A mid to distal radial artery occlusion was noted as a probable cause of the patient's symptoms. She was given nitroglycerin and referred to vascular surgery for a re-evaluation. 6 months later, she was evaluated at the vascular clinic with improving symptoms, nearly symptom-free. Her wrist/brachial index measured 0.97 and 0.96 for the right and left sides, respectively, with no diminished finger photoplethysmography.

Discussion: This case illustrates the poorly understood complication of radial artery occlusions following transradial cardiac catheterization. There is a need for further research in this area as minimally invasive procedures, such as catheterizations, have become increasingly accessible and standard.

Group B8

Authors: Xinyu Pei[1], Anh Nguyen[2], Hannah Neiger[2], Wenjia Wang[2], William Bautista[2], Lily Wang[3], Alvan Cai[2], Valerie A. Gerriets[2], John Cusick[2], Yihui Shi[4]
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Title: Investigating the Synergistic Effect of Milciclib and PD0325901 in Colorectal Cancer Therapy

Introduction: Milciclib, characterized as a potent nanomolar inhibitor of multiple cyclin-dependent kinases, has recently emerged as a promising therapeutic agent in cancer treatment, particularly with its additional role as a spliceosome modulator. Our recent studies employing RNA sequencing technology revealed a comprehensive profile of Milciclib-induced transcriptional changes in colorectal cancer cells, identifying several key regulated pathways.

Methods: In light of these findings, we explored a novel therapeutic strategy: combining Milciclib with specific inhibitors targeting pathways upregulated by Milciclib treatment. This hypothesis is based on the rationale that such a combination could exert a synergistic effect. We have assessed the efficacy of this combinational therapy and found that the combination of Milciclib andPD0325901 greatly potentiates the killing of colorectal cancer cells versus either treatment alone. PD0325901 has been extensively studied for its efficacy in targeting the MEK/ERK signaling pathway, a critical pathway in many cancers, including colorectal cancer. To further characterize the underlying molecular mechanisms contributing to the observed synergistic effect, we applied quantitative proteomic analysis of 8107 proteins in human colorectal cancer cells with the treatment of different doses of Milciclib and PD0325901 administered alone, or in combination.

Results: Our results demonstrate 49 proteins were significantly decreased in a dose-dependent manner, and that many of these proteins are key players regulating pathways associated with the cell cycle, apoptosis, gene expression, metabolism, WNTsignaling, and the MEK/ERK signaling pathway. The discovery of the down-regulation of these proteins and pathways after treatment provides a molecular basis to elucidate the synergistic mechanism underlying Milciclib and PD0325901 combination therapy.

Conclusion: In conclusion, our study establishes the combinatorial use of Milciclib and PD0325901 as a potential breakthrough in the treatment of colorectal cancer, offering a promising prospect for enhancing future patient outcomes.

Group B9

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Title: Employee Head Injury Risk in Perioperative and Periprocedural Environments

Introduction: Mild traumatic brain injury (TBI), also known as concussion, is often caused by blunt non-penetrating head trauma. To the best of our knowledge, there are no studies evaluating the incidence and consequences of employee head strikes in hospital operating rooms and procedural areas. Our study is a quality improvement (QI) response within Massachusetts General Brigham (MGB) to the concern of increasing head strikes in perioperative and periprocedural clinicians.

Methods: To investigate the individual history of perioperative head strikes in the prior year, a short, voluntary survey was distributed among perioperative and periprocedural role groups within MGB. To estimate the head strike incidence, a mandatory quality assurance (QA) questionnaire was implemented to be filled out at the end of each anesthetic case for a subset of the MGB locations between July 22nd, 2022, and August 30th, 2022. Mandatory QA questionnaires, safety reports, and voluntary QA reports were examined to understand the nature of head injury, such as the timing of head injury, the source of head injury, and the contributing factors identified by those involved.

Results: Of the 551 perioperative and periprocedural personnel who responded to the voluntary survey on individual history of perioperative head strikes in the prior year, 58% had experienced at least one head strike, 22% reported having > 5 head strikes, and 4% reported their head strike to occupational health. The calculated head strike incidence from 8,399 mandatory QA survey responses was 1.4%. From the 164 reported cases of head strikes, our analysis suggested that head strikes occur at various stages of surgery, with the highest incidence happening intraoperatively. The side of the head was the most frequently hit area. Most head strikes were against ceiling-mounted equipment such as lights and monitors and majority of the head strikes were attributed to equipment issues such as suboptimal storage of equipment.

Conclusion: Our results suggest that head strikes in perioperative and procedural environments are underreported, contributing to a poorly understood and defined problem. Most head strikes involved ceiling-mounted equipment, and future QI efforts should aim at designing and implementing equipment and protocols to reduce head strike incidence in perioperative and periprocedural environments.

Group B10

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Title: Synergistic Effects of Fluoxetine with Various Antimicrobials

Introduction: Fluoxetine has been studied as topical adjuvant therapy for wound infection healing; however, the ability of fluoxetine to potentiate the activity of antibacterials against skin and soft tissue pathogens is poorly defined.

Methodology: Eight isolates were studies: two *Staphylococcus aureus* clinical isolates (MSSA 48 and 50), a reference strain for *S. aureus* (COL), two *Pseudomonas aeruginosa* clinical isolates (Pa 40 and 51), a reference strain P. *aeruginosa* (PA01), and two *Escherichia coli* isolates (AR #0017 and AR #0114) were analyzed. For *S. aureus*, timolol, vancomycin, linezolid, clindamycin, levofloxacin, and gentamicin were used in combination with fluoxetine. For *P. aeruginosa*, timolol, levofloxacin, gentamicin, ceftazidime, and polymyxin B were used in combination with fluoxetine.

The minimum inhibitory concentration (MIC) of the drug's antimicrobial properties were tested. Checkerboard analyses were conducted to determine MIC of the combination of two antimicrobials. FICI was calculated by adding the quotient of the MIC of drug A in combination with drug B and the MIC of drug A alone with the quotient of the MIC of drug B in combination with drug A and the MIC of drug B alone. FICI values of ≤0.5 indicate synergy, 0.5-4 indicates indifference, and a value of >4 indicates antagonism. Time kill (TK) was done to verify the synergy of the drugs determined in the checkerboard experiment.

Results: The MIC of fluoxetine was 64 mg/L for all three *S. aureus* isolates. The MICs ranged from 256 – 512 mg/L for *P. aeruginosa*. The MIC for AR #0017 ranged from 0.0625 - 1 mg/L. The MIC for AR #0114 ranged from 1 - > 4 mg/L. FICI calculations for *S. aureus* isolates were all values >0.5. FICI calculations were all ≤0.5 for fluoxetine and polymyxin B in all *P. aeruginosa* strains. The time kill experiments showed that the combination experiments against
P. aeruginosa conferred a greater than 2 log reduction in bacterial counts compared to the most active single agents.

Conclusion: The combination of fluoxetine and polymyxin B was synergistic against *P. aeruginosa*. Further evaluation of fluoxetine and polymyxins may be helpful for countering difficult-to-treat pathogens.

Group B11

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Title: Neuropsychiatric lupus in a 41-year-old female

Introduction: Systemic lupus erythematosus (SLE) is a chronic systemic autoimmune disease with a wide array of diagnostic criteria. A well documented manifestation is central nervous system (CNS) involvement. Neuropsychiatric SLE (NPSLE) can present with seizures, obtundation, visual, and cognitive impairment. NPSLE's complex pathophysiology and broad presentation complicates diagnosis, especially without established diagnostic laboratory or imaging biomarkers.[1]

Case Presentation: We highlight a 41-year-old female with SLE who presents to the emergency department after several generalized tonic-clonic seizure episodes and staring spells. During these episodes, she exhibited pinching of fingers, leg pedaling, and repetitive swallowing. On physical examination she was oriented only to self, had poor speech production, failed to follow commands, and responded only to noxious stimuli. Electroencephalography showed background diffuse and right temporal focal slowing followed by a right temporal focal onset seizure. The patient was started on Keppra, Vimpat, and Valproic Acid twice daily. After several days, Keppra was gradually discontinued to reduce psychiatric symptoms. Pertinent lab results include elevated CSF red blood cells, glucose, and protein. Serology showed speckled ANA 1:1280 with elevated anti-SCL-70, anti-RNP, anti-Smith, and anti-chromatin antibodies. Her continued altered mental status and seizures warranted IV immunoglobulin and Fycompa initiation. Serial MRIs revealed nonspecific findings in the hippocampi, temporal lobes, corpus callosum, and right frontal lobe, which were attributed to chronic seizure activity and microhemorrhages suggesting autoimmune encephalitis.

Discussion: While sub-classifications of NPSLE exist, this patient's findings span several categories and cannot be easily clustered. Clinicians should familiarize themselves with the broad manifestations of NPSLE in order to accurately diagnose and treat the condition.

Group B12

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Title: Using Computer-Aided Design Models to Enhance Students' Awareness of Visuospatial Relationships in Limb Anatomy

Introduction: With large groups present at each station and limited in-person access hours, the traditional cadaver lab setup may contribute towards poor visualization of anatomical structures instead of providing students with a comprehensive, hands-on approach to master the intricacies of human anatomy. Using computer-aided design (CAD) software to manipulate complex joints like the elbow, we propose that anatomically correct models can be generated with three-dimensional (3D) printing tools to solve this dilemma. Our study aims to create a novel 3D rendering of various elbow joint components (e.g., bones, cartilage, ligaments) and portray these aspects in a way that allows students to appreciate their association to one another.

Methods: A commercially available 3D file of an adult elbow joint was obtained from the online marketplace Turbosquid. After being reviewed for accuracy, this replica was imported into Blender, an open-source software program. The file was modified to remove superfluous anatomical features like skin, and individual joint components were exported as unique files. Each piece was then printed using the school's Formlabs 3B+ 3D printer and set aside for later use.

Results: We successfully assembled a comprehensive elbow joint model using the printed structures of interest. We arranged our completed model and displayed it alongside a series of other 3D elbow depictions, each of which was generated using the original artistic rendering and digitally modified to showcase specific joint components. The variations in detail level apparent on each successive model allowed us to portray differing degrees of anatomical complexity within the elbow joint.

Conclusions: This study demonstrates the utility of CAD models as digital learning tools to supplement students' knowledge of the human body – particularly for the musculoskeletal system. Further exploration of this model as a resource to improve students' understanding of anatomical relationships can be achieved using the Mental Rotations Test (MRT), a paper-and-pencil test of spatial ability. A randomized controlled trial comparing MRT scores from subjects with access to these 3D renderings to those without would provide measurable data for making further inferences regarding the effectiveness of 3D models as teaching tools in anatomy.

Group B13

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The Role of hBRCA2 in the Repair of Spontaneous and UV DNA Damage in *Saccharomyces cerevisiae*

Introduction: Women who express mutations in the human BRCA2 gene (*hBRCA2*) are predisposed to an elevated lifetime risk for breast cancer and ovarian cancer. *hBRCA2* transcribes proteins necessary for gene repair through homologous recombination (HR). Previous work showed that hBRCA2 can complement the loss of Rad52 in budding yeast, suggesting functional overlap between hBRCA2 and yeast Rad52. In order to better understand the role of hBRCA2 in response to specific types of DNA damage, the present study evaluated HR in yeast cells subject to spontaneous and UV damage in the presence or absence of hBRCA2.

Methods: HR was assessed in wildtype and *rad52D* mutant cells expressing hBRCA2 after spontaneous DNA damage and UV radiation. Cells from wildtype and *rad52D* mutants with or without a hBRCA2 expressing plasmid cultures were plated onto YPD and a medium lacking histidine using appropriate dilutions. The HR frequency was calculated from the number of His+ colonies relative to the total number of viable cells as determined by the number of YPD colonies.

Results: As expected, *rad52D* genotypes yielded lower recombination frequencies compared to wildtype in both spontaneous and UV exposure experiments. However, there was no significant difference between *rad52D* mutants with or without hBRCA2. Interestingly, higher UV exposure resulted in a relative increase in HR for only the *rad52D* mutant genotypes.

Conclusion: The results demonstrate that hBRCA2 complementation may not be as substantial in spontaneous or UV DNA damage compared to double-strand break DNA damage, as previous work has shown. While Rad52-mediated recombination is critical for efficient repair of UV damage, our results suggest a Rad52-independent repair process that is responsive to increasing UV exposure. Further experimentation is necessary to evaluate the role of hBRCA2 in the repair of other forms of DNA damage.

Group B14

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Title: Artificial Intelligence Interpretation of Echocardiography in Valvular Heart Disease: A Systematic Review

Introduction: Echocardiography is a non-invasive ultrasound imaging study of the heart that serves as the primary technique in the diagnosis of valvular heart disease. Echocardiography allows for detailed examination of valve structure and function in the diagnosis or evaluation of patients with valvular disease. As remarkable advances have been made in artificial intelligence software, the ability for these algorithms to assimilate information and accurately identify patterns in image processing presents a unique opportunity for implementation in interpreting medical imaging. The purpose of this project is to systematically review and analyze the efficacy of AI software in interpreting cardiac echocardiography for the diagnosis and long-term management of patients with valvular heart disease.

Methods: Our review involved an extensive search for peer-reviewed publications through Embase, Cochrane Central Register of Controlled Trials, and Pubmed citation databases using the following terms: "Artificial Intelligence" [OR] "Deep Learning"; "Echocardiography" [OR] "Echo" [OR] "Echocardiogram"; "Valvular Disease" [OR] "Stenosis" [OR] "Regurgitation" [OR] “Aortic” [OR] “Mitral” [OR] “Tricuspid” [OR] “Pulmonary”. The abstracts and citations of publications from each database were compiled in Rayyan, a collaborative screening software for review by two independent reviewers. Discrepancies between reviewers were resolved through discussion and full text screening was performed for potentially eligible studies according to PRISMA guidelines. Out of 713 publications that were initially identified, 20 articles were selected for inclusion in this review.

Conclusions: Artificial intelligence algorithms trained to diagnose and stratify the severity of valvular heart diseases, such as aortic stenosis and mitral regurgitation, operate with a high level of accuracy comparable to that of experienced physicians. Training features such as database size, spatio-temporal analysis, textural feature identification, and color Doppler analysis translated to increased accuracy in diagnosis and disease staging. The synthesis of these results presents numerous applications for artificial intelligence in point-of-care echocardiography as well as long-term management.

Group B15

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Title: Nondysraphic Intradural Spinal Lipoma: Case Report and Review of the Pathogenesis

Introduction: Intradural spinal lipomas are rare benign lesions that consist of cells similar to normal adipose tissue and typically present in the lumbosacral region of young patients with spinal dysraphism [2]. Spinal lipomas without dysraphism are usually diagnosed in children and young adults at onset or progression of symptoms including spastic extremity weakness, sensory changes, or gait difficulties [3]. Spinal lipomas without dysraphism have an incidence of 0.45-0.6% of all spinal cord tumors [4].

Case Presentation: We present a 42-year-old female with a 44-pound weight gain over 10 years and a 20-year history of persistent, periodically worsening lower back pain and recent lower extremity weakness. She reported numbness and tingling in her left lower limb, extending to the right. On exam, vital signs were normal except for a BMI of 43.4. No spinal abnormalities were observed. The spinal exam showed no tenderness and full motion range. Strength was largely intact, but left hip flexion was reduced (4/5). She exhibited a positive left Babinski sign, hyperactive ankle reflexes, and left-dominant unsustained ankle clonus. MRI revealed a T10-T11 lesion, identified as an intradural spinal lipoma causing rightward spinal cord displacement (Fig. 1). She underwent laminectomy with partial debulking and spinal cord untethering. Pathology showed a transitional type cord lipoma with mature fibroadipose tissue, blood vessels, and nerve fragments. After surgery, sensory symptoms and lower extremity weakness improved, except for 4+/5 left hip flexion. Persistent clonus and left Babinski sign indicated ongoing upper motor neuron damage. Follow-up imaging showed a residual lesion with reduced central canal stenosis and mass effect on the thoracic cord (Fig. 2).

Discussion: This case is notable for the patient's older age at neurological symptom onset and the infrequency of spinal lipomas without dysraphism. We believe it offers insight into the atypical presentation and embryopathogenesis of spinal lipomas.

Group B16

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Title: An Unusual Case of LGI1 (Leucine-Rich Glioma-Inactivated Protein 1) Limbic Encephalitis With Anti-acetylcholine Receptor and Anti-striational Autoantibodies

Introduction: Autoimmune encephalitis results from immune-mediated central nervous system damage with varying clinical manifestations depending on autoimmune antibodies and targeted antigens. Leucine-rich glioma-inactivated protein 1 (LGI1) is a leading cause of limbic encephalitis (LE). We present an unusual case of LGI1 autoimmune LE with two autoantibodies, anti-acetylcholine receptor (AChR) and anti-striational, in a patient with a thymoma.

Case Presentation: A 49-year-old female presented to the doctor's office with palpitations for several weeks and intermittent night terrors and dizziness. One week prior, she lost consciousness while driving, leading to a motor vehicle accident. She developed confusion, inability to recognize family members, and spontaneously resolving memory loss lasting up to 4 hours. Three weeks later, the patient presented to the emergency department for 10-15 minute episodes of loss of consciousness and features of paranoia, language difficulty, and behavioral changes. Cerebrospinal study showed slightly elevated protein level and presence of oligoclonal bands. Antibody testing was positive for anti-LGI1 receptor antibodies in CSF and anti-striational and anti-AChR antibodies. Chest CT showed a thymoma. A brain MRI revealed bilateral mesial temporal lobe T2 hyperintensity greater on the left side involving the hippocampus and extending to the fornix.

Discussion: While anti-LGI1 LE is commonly characterized by faciobrachial dystonic seizures and hyponatremia, our case was unique with the absence of both. Our patient also presented with two autoimmune antibodies, anti-AChR and anti-striational, suggesting underlying malignancy and a thymoma was discovered. The patient did not present with peripheral nervous system symptoms, despite anti-AChR's high specificity for myasthenia gravis. Bringing light to this case allows for improved recognition of LGI1 LE, which is vital for early detection, accurate diagnosis, and prompt treatment initiation.

Group B17

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Title: Clear Sight Ahead: The Value of Early Diagnosis for better Ocular Syphilis Prognosis

Introduction: Ocular syphilis is a significant complication of Syphilis. Harvey et al reports that the incidence of systemic syphilis at a large tertiary referral center has increased from 27 cases in 2010 to 105 cases in 2020 and seventeen patients were identified with ocular syphilis. Therefore the importance of early identification and treatment to prevent blindness cannot be overstated. Tsan (2020) states that with the timely diagnosis and appropriate treatment, ocular syphilis is curable. However, delayed diagnosis of ocular syphilis may result in long-term visual impairment. Inflammatory response of both the cell mediated and adaptive immune system leading to perivascular infiltrates and endothelial cell swelling.

Case Presentation: 41-year-old female with prior diagnosis of shingles, anxiety, depression, and rheumatoid arthritis presents with maculopapular abdominal rash, bilateral floaters, low grade fever, neck pain and eye soreness that began 3 months ago. Treponemal antibody with a pending rapid plasma reagent is positive. Endorses unprotected vaginal and oral intercourse in Nov 2022. No vaginal discharge. No focal deficits, weakness, or numbness.
Ocular exam shows R eye edema, R optic neuritis and vitritis concerning ocular syphilis. Maculopapular rash noted in the abdomen and extending to extremities.
Given positive treponemal antibodies and associated symptoms, there is concern for ocular and neurosyphilis. 2G Penicillin IV infusion was started and 4 million units Q4hrs was ordered. Patient was admitted for further work up and to initiate treatment.

Discussion: Although ocular syphilis is considered a late complication of Syphilis, this case demonstrates that ocular syphilis can occur at any stage of the disease process. Because the immune response mounted by every patient vary, it is imperative to keep in mind that duration of symptomatology may also differ. Importantly, it is imperative to always consider ocular syphilis as a top differential in any patient presenting with syphilis.

Group B18

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Title: Role of Microhomology in the Repair of Double-Stranded DNA breaks in *Saccharomyces cerevisiae*

Introduction: Of cellular repair pathways, microhomology-mediated end joining (MMEJ) is the most error-prone repair pathway for double-stranded DNA repair. High mutation and genome rearrangement rates associated with MMEJ contribute to genetic plasticity but may also induce malignancy, generating significant research interest. The project serves to investigate whether microhomology (MH) can be used in homologous repair using an intact homologous chromosome, adding to the current lack of literature in this field.

Methods: *Saccharomyces cerevisiae*, also known as budding yeast, were genetically engineered to possess varying lengths of shared MH between two *HIS3* genes on homologous chromosomes. The MH was either complete MH (25 bp, 20 bp, or 16 bp) or with a 2-base pair mismatch within the MH (14.**2**.2 bp, 14.**2**.4 bp, or 14.**2**.9 bp) and adjacent to an inducible double-stranded break (DSB) sequence. Repair of the induced DSB using each specific MH was monitored following serial dilution and plating onto nutrient rich media, YPD, and selective media, SD-His, plates to determine the frequency of HIS+ recombinants. Calculations for the percentage of successful repair and the median frequency of His+ recombinants +/- 95% confidence interval was determined for each MH length.

Results: Our results show a significant decrease of approximately 1248 to 2927-fold in repair efficiency when complete MH is used compared to 311 bp of homology, with no statistical difference in repair frequency when 25 bp, 20 bp, or 16 bp of MH is used. However, cells utilizing MH containing a 2-base pair mismatch showed a significant decrease in repair frequency of 30,000 to 1,268,000-fold compared to 311 bp and at least a 10 to 433-fold decrease compared to complete MH. Moreover, each mismatched MH repair frequency is significantly different from one another.

Conclusion: This study demonstrates, for the first time, that MH can be utilized in the repair of DSBs using an intact homologous chromosome. While overall DSB repair efficiency is much lower when MH is used, it is greatly influenced by the length and continuity of MH.

These results provide insights into the role of MH in DNA repair that contributes to genome rearrangements, tumor development, and eventual treatment.

Group B19

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Outcomes of the Mini-Open Technique for Achilles Tendon Repair: A Systematic Review

Objective: There is much debate on the optimal treatment for Achilles tendon rupture. Surgical repair consists of open repair, percutaneous repair, and mini-open repair. The purpose of this review is to evaluate studies reporting outcomes after mini-open Achilles tendon repair through analysis of return to activity, rates of complications, and postoperative patient-reported outcomes (PROs).

Methods: A systematic review search following the guidelines established by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was performed in three databases for studies including mini-open Achilles tendon repair. Study variables included title, author, publication date, study year, number of patients/Achilles, mean age, mean follow-up time, time to return to activity/sport/work, patient-reported outcomes (PROs), and rates of complications.

Results: 25 studies including 1371 patients with a mean age 39.34 ± 6.84 years and mean follow-up time of 29.48 ± 17.64 months were included in this study. The overall rates and range of return to activity, return to sport, and return to work were 96.46% (82.3%-100%) at 4 months (3.8-7), 92.7% (82.3%-100%) at 5.4 months (4.3-6.1), and 100% at 2.2 months (0.6-4.5), respectively. Mean postoperative PROs of AOFAS, ATRS, and VAS Pain were 95.5 (90.1-99.2), 90.3 (86-94.6), and 3.35 (0.2-8.85), respectively. The overall rate of complications for mini-open repair was 9.39%. Mean rates of sural nerve injury and re-rupture were 1.17% and 1.5%.

Conclusion: Patients undergoing mini-open Achilles tendon repair demonstrated high rates of return to baseline activity, low rates of complications, and excellent postoperative PRO scores. Mini-open repair is a reliable technique with comparable functional outcomes to traditional open repair with lower rates of infections and wound healing issues.

Group B20

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Title: A Recurrent Transient Ischemic Attack (TIA) in a Pediatric Female

Introduction: Transient ischemic attack (TIA) is a transient episode of neurologic dysfunction due to focal ischemia, without acute infarction or tissue injury, typically lasting minutes. Risk factors for TIA include family history of stroke or TIA, age above 55 years, male gender, high blood pressure and diabetes. While there is a wide variety of literature showing significant risk factors in predicting TIA in adults, very few studies have described it in a pediatric population (children 11-18).

Case Presentation: We present a case of a 17-year old Caucasian female with temporary loss of left lower extremity strengthening for several minutes. For 3 weeks, the patient has been having intermittent left lower leg weakness then at 9:50am, she lost strength of her left lower extremity. She was later transferred from a local hospital to a Level 1 Pediatric Trauma Center for a brain MRI.

Her past medical history is significant for morbid obesity, hypertension, hyperlipidemia, and cerebral artery occlusion with cerebral infarction two years ago. Patient currently takes coumadin due to prior stroke and TIA. The review of systems is positive for weakness, but the patient denies facial asymmetry, speech difficulty, numbness, and headaches. Her blood pressure is 117/75 and her weight is 143.3 kg. On neurological exam, the patient is alert, oriented, and there is no focal, cranial nerve, or sensory deficit. Lab results showed low MCV and MCH. CT brain without contrast demonstrated encephalomalacia with old infarct in the right MCA territory but no new large acute territorial infarction. ECG showed normal sinus rhythm with incomplete left bundle branch block.

Discussion: This case illustrates that pediatric and adult patients may have similar risk factors for recurrent TIA. High blood pressure and imbalance in lipid profile should be considered a greater threat for recurrent TIA in pediatric patients.

COLLEGE OF MEDICINE – NON SDSSP

Group B21

Title: Spinal signaling molecules implicated in the spinal neuroinflammation are regulated by AMPK

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Study Aims: Millions of patients worldwide suffer from persistent chronic pain induced by nerve injury, called neuropathic pain due to limited effective treatments currently available. Recent studies by us and others show that spinal neuroinflammation characterized by glial activation and over-production of pro-inflammatory cytokines are critically implicated in excessive neuronal activation in the spinal dorsal horn, an important relay center for the pain signal transmission. In the search of identifying molecular targets for the development of novel analgesics, in this study, we focused on understanding signaling molecules regulated by AMPK in the context of spinal neuroinflammation.

Methods: Male Sprague-Dawley rats (weight: 200 to 250 g) were used. I*n vivo* drug administration and molecular techniques (western blotting) were used.

Results: 1. Activation of TLR4 in the spinal cord with topical application of lipopolysaccharide onto the spinal dorsal surface induced neuroinflammation in the spinal dorsal horn, featuring activation of microglia and over-production of TNFa. These were temporally associated with suppressed protein expression of phosphorylated AMPK, LANCL2, and cell cycle braker P16INK4a. To determine the role of AMPK in the signaling pathway altered by activation of TLR4, AMPK activity in the spinal dorsal horn was inhibited by topical administration of an AMPK inhibitor, Compound C. We found that spinal dorsal horn treated with Compound C had suppression in AMPK activity, protein expression of LANCL2, and P16INK4a, which were temporally associated with microglial activation and over-production of TNFa.

Conclusions: Activation of TLR4 in the spinal dorsal horn produces strong neuroinflammation in the drug-treated area, which was associated with suppression in AMPK activity, LANCL2, and P16INK4a signaling molecules. TLR4 produces spinal neuroinflammation via suppression of AMPK. Therefore, targeting the TLR4 and AMPK mediated signaling pathway could potentially ameliorate neuropathic pain via controlling neuroinflammation.

Group B22

Title: What are the Options? Latest Management Techniques for Complicated Acute Cholecystitis: A Systematic Review of Randomized Controlled Trials

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Introduction: Beyond the standard approach, managing specific complexities encountered in acute cholecystitis, such as perforation, sepsis, or extensive adhesions, demands more nuanced strategies. Our study systematically evaluates the current state of the literature for techniques in managing complicated acute cholecystitis where conventional laparoscopic cholecystectomy may not be appropriate.

Methods: A total of 4,577 randomized controlled trials comparing different management options for acute cholecystitis were retrieved from the PubMed, EMBASE, and Scopus databases. Inclusion criteria were: randomized controlled trial, complicated acute cholecystitis, surgical or procedural management, and postoperative outcomes reported. Exclusion criteria included: not a peer-reviewed, published article. Two reviewers independently screened titles/abstracts and full-text articles using Covidence to determine inclusion eligibility. The Cochrane Risk of Bias tool was used to assess the quality of the included studies. Included articles were analyzed for patient comorbidities, procedural details, and postoperative outcomes. This study protocol was registered to PROSPERO: CRD42023454262.

Results: A total of 22 studies, with no overall high risk of bias, with 2,223 patients undergoing different managements for acute cholecystitis were included. Eleven studies tested unique techniques of laparoscopic cholecystectomies including the use of cold dissection, harmonic scalpel, and fluorescence cholangiography, of which ten studies showed a statistically significant improvement in postoperative outcomes such as length of hospital stay, patient reported pain, as well as reintervention rate. Ten trials studied variations of percutaneous cholecystostomy, of which nine demonstrated statistically significant improvements after the procedure. In patients undergoing endoscopic sphincterotomy by endoscopic retrograde cholangiopancreatography, patients were less likely to develop biliary sepsis compared to the conservatively treated group ($P<0.001$).

Conclusion: Newer techniques for laparoscopic cholecystectomies show promise in improving postoperative outcomes in complicated acute cholecystitis, and different approaches for percutaneous cholecystostomies are viable procedures on a case-by-case basis for select patients.

Group B23

Title: Sweetening the Deal? The Impact of Sugar Substitutes on Health and Parkinson's Disease

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Introduction: Artificial sweeteners are advertised to be zero calorie substitutes for caloric sugars. However, recent research has shown that chronic consumption of artificial sweeteners leads to increased insulin secretion, which can develop into insulin resistance, diabetes, and Parkinson's disease. This study addresses how the artificial sweeteners sucralose and saccharin affect insulin production, lifespan, locomotion, learning, and memory in *Drosophila melanogaster*. We explored our question with flies expressing reduced *methuselah*, which encodes a G-protein coupled receptor (GPCR) that, when inhibited, is seen to prolong lifespan. Because many drugs target GPCRs, if inhibiting *methuselah* can alleviate symptoms of chronic metabolic diseases, it can be developed into a potential treatment. It is hypothesized that reduced *methuselah* expression can delay the detrimental effects of artificial sweeteners in wildtype *Drosophila* and those with Parkinson's.

Methods: Wild type, *methuselah,* Parkinson's, and *methuselah* crossed Parkinson's flies were fed the following in diets in groups: added sucrose, sucralose, saccharin, or no additives. Negative geotaxis testing and T-maze learning were used to assess the flies' locomotion and memory, respectively. Lifespan was also recorded based on percent survival over a span of 30 days. The results were analyzed via one-way ANOVAs.

Results: Results show that flies given sucralose performed poorly on the locomotion test at 15 days old, but with reduced *methuselah* expression, their performance improved. For learning and memory, sucralose flies performed worse than controls, but more testing needs to be conducted. In male and female wild type groups, sucralose flies had the shortest lifespan. However, the lifespan of sucralose flies improved when crossed with *mth*.

Conclusion: Preliminary testing suggests that artificial sweeteners may negatively impact lifespan and brain function, which may be prevented through reducing *methuselah* expression. Additional research on the impact of artificial sweeteners and metabolism will be beneficial in understanding chronic artificial sweetener consumption and neurodegeneration.

Group B24

Title: Turning Telomerase Off: Computational Drug Discovery for Telomerase

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Introduction: Cancer is not one disease: any tumor may be the result of one or many pathways that manifest in a dysfunctional cell cycle. One causative pathway includes the activity of the enzyme telomerase, which regulates the relative age of the genetic material within a cell. Telomerase is an active enzyme before birth, and its overexpression is related to cellular replicative immortality, a hallmark of cancer. Therefore, drugs that target telomerase may prove to supplement or enhance chemotherapeutic treatment.

Methods: The first objective was to collect data on ligands that competitively inhibit telomerase function for chemotherapy drug design. Current telomerase inhibitors include BIBR1532, which is not readily bioavailable. Six thousand ligands from NCBI's Molecular Database were tested for telomerase active site binding using AutoDock Vina. The inhibitor candidates were analyzed for their ligand–enzyme interaction strength in Chimera, relative drug-likeness using SwissADME, and toxicity using the Toxicology Estimation Software Tool. BIBR1532 was used as a positive control throughout all calculations, and a scaled score was assigned to each tested ligand to determine the most promising inhibitor candidate.

Results: While most inhibitor candidates that bound strongly to the telomerase active site exhibited toxicity, ligand NCI2968 shows great potential due to its strong enzyme interaction and drug-likeness. Critical to overcoming the adaptive rewiring of cancer cells' survival response to drugs, the collected data may be used to develop new drugs that target alternative cancer pathways. The second objective was to inspire high school students interested in healthcare by educating them on this project's research. Arthur A. Benjamin High School students in Sacramento engaged in games, discussions, and informative illustrations to learn more about the breadth of scientific research. As strides are made in cancer development, encouraging the future generation to approach large issues in healthcare through scientific research becomes an important goal.

Group B25

Title: Medical Student Attitudes Towards Organ Donation

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Introduction: The increasing demand for organ transplants exceeds the organ donation rate. Addressing this discrepancy is challenging for organ procurement agencies and health professionals involved in the care of patients in dire need of organs. Research suggests that health-care professionals' knowledge of, attitudes toward, and behavior in terms of organ donation and transplantation are deciding variables in promoting organ donation. The aim of this study was to evaluate attitudes toward organ transplantation among medical students at California Northstate University College of Medicine.

Methods: An anonymous survey was sent to all first, second, and third year medical students at California Northstate University College of Medicine. The survey assessed knowledge and attitudes about organ donation.

Results: A total of 48 surveys were returned. Ninety-five percent of responders were supportive of organ donation and 67% had signed an organ donor card. Out of the responders who were not registered organ donors, 19% were considering signing up as an organ donor. Sixty percent of the participants have discussed organ donation preferences with their family members and 48% of responders were very likely to donate their family members organs upon death if their wishes were unknown to the responder. Seventy percent of responders were supportive of a presumed consent system while 10% were strongly opposing of it, all of them selecting that they would opt out if US changed to a presumed consent system. Forty-eight percent of responders selected that the topic of organ donation was never addressed during their medical training and 69% think that it should be a mandatory part of medical curriculum.

Conclusion: Although organ transplantation as a therapeutic method is widely accepted, there are still certain areas where considerable controversies exist. A structured, well-planned educational program should be implemented to improve awareness and attitude, especially among medical students.

Group B26

Title: Are There Prophylactic Effects of Vitamin D among Healthier Adult Patients? A Systematic Review of Randomized Controlled Trials

Authors: Caroline Goswami, MS[1]*; Sherrice Law, BS[1]*; Hannah Zhang, BS[1]; Hannah Park, BS[1]; Bhagvat Maheta, BS[1]; Katherine Arnott, MS[1]; Megan Hsu, BS[1]; Kevin Truong, BS[1]; Mark Sheffield, MD[1]; Zahid Iqbal MD[1]; Chainaronk Limanon, MD[2]; David Pai, MD[1]

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Introduction: In 2017, a study uncovered increasing trends in vitamin D supplementation, revealing that 18% of adults exceeded 1,000 international units (IU) daily, and 3% surpassed the safe limit of 4,000 IU, raising concern for severe hypercalcemia and associated pathological effects on the kidneys, heart, and vascular system. While vitamin D is well-established for prophylactic use against osteomalacia and osteoporosis, its extra-skeletal benefits for healthy individuals, such as improving insulin sensitivity and low-density lipoprotein, remain unclear. This study focuses on defining healthy adults and exploring the potential benefits and drawbacks of prophylactic vitamin D supplementation.

Methods: Using PubMed, EMBASE, and Scopus databases, 10,155 articles on vitamin D prophylaxis were identified. Randomized controlled trials targeting healthy patients receiving vitamin D for prophylaxis were included, with exclusions based on language, absence of reported outcomes, and patient history. Articles were screened and evaluated by Covidence and the Cochrane Risk of Bias tool, respectively. Dosage, form, frequency, duration, follow-up care, outcomes, and complications of included articles were recorded. This study protocol has been registered to PROSPERO: CRD42023446944.

Results: Out of 18 articles, 4,415 patients showed low bias risk by the Cochrane tool. Seven studies found significant improvements: protection against autoimmune reactions, elevated hematological and iron profiles, reduced influenza-like illness, and enhanced cognitive tasks. 5000 IU Vitamin D for four weeks significantly reduced cholesterol, unlike 1,000 IU for 16 weeks. Conversely, 11 studies revealed no Vitamin D impact on outcomes including hemoglobin-A1c, lipoproteins, BMI, blood pressures, and respiratory infections.

Conclusion: Except for a few outcomes, most prophylactic Vitamin D supplementation was generally not found to have statistically significant benefits in the healthy adult population. Future directions can include additional prospective studies with larger sample sizes of healthy adults testing for benefits and adverse effects of prophylactic vitamin D use.

Group B27

Title: Influences on Oral Cancer Screening Among US Adults: A Logistic Regression Analysis of NHANES Data, 2011-2016

Authors: Andrew Goulian[1] and Yavar Abgin[1]

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Objective: To identify and analyze factors influencing oral cancer exam screening among U.S. adults. This study particularly focuses on the roles of Oral HPV Result, smoking history, alcohol use, and demographic factors such as age, gender, and race/ethnicity.

Study Design: A retrospective analysis utilizing data from the National Health and Nutrition Examination Survey (NHANES) spanning from 2011 to 2016.

Methods: The study combined data from the 2011-2012, 2013-2014, and 2015-2016 NHANES cycles, representing a broad cross-section of the U.S. adult population. Logistic regression models were employed to evaluate the influence of Oral HPV Result, smoking status, alcohol use, and demographic variables on the propensity to undergo an oral cancer exam. The analysis was geared towards understanding how these factors individually and collectively impact screening behavior.

Results: The analysis, including 28,709 participants, unveiled multifaceted determinants of oral cancer screening. A positive Oral HPV result was associated with a 30% reduction in the likelihood of screening (Odds Ratio [OR] = 0.70, p = 0.00264). Smokers were found to be 25% less likely to engage in screening compared to non-smokers (OR = 0.75, p = 1.68e-06). Alcohol consumption did not exhibit a significant correlation with screening practices (OR = 0.998, p = 0.25784). The demographic analysis highlighted that screening likelihood escalates with age. It also revealed significant disparities in screening practices across different racial/ethnic groups, with Non-Hispanic Whites showing the highest propensity for screening. Furthermore, gender emerged as a significant factor, with males less likely to undergo screening compared to females.

Conclusion: This study underscores the need for nuanced public health strategies to enhance oral cancer screening rates. By identifying key influencing factors, including demographic disparities, our findings provide valuable insights for tailoring interventions and promoting equitable health practices in oral cancer prevention and early detection.

Group B28

Title: Cecal Bascule - An Unusual Onset Following Hysterectomy

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Introduction: Cecal bascule is a rare manifestation of intestinal volvulus in which the cecum is folded superioanteriorly to the ascending colon [1].

Case Presentation: We detail a 62-year-old female presenting to the emergency department with cecal bascule more than six months after a hysterectomy. She was treated conservatively and monitored with medication and IV fluids but did not receive surgical intervention. Three weeks following, the patient returned with pain that migrated from the right upper quadrant to the mid-abdomen. Subsequent CT found the cecum dilated to 10 centimeters and gas buildup in the abdomen.

Discussion: Cecal bascule is rare, constituting only 5-20% of all cases of cecal volvulus [4]. The formation of cecal bascules largely relies on redundancy or hypermobility of the cecum [5]. The cecum will fold in a superior and anterior fashion relative to the ascending colon, potentially leading to a bowel obstruction [1]. Cecal bascules are usually diagnosed following surgical procedures involving the abdomen, where the diagnosis is often made within two weeks of the procedure [6][7][8]. This patient had a hysterectomy more than 6 months prior to developing the bowel obstruction, as well as a past surgical history of a cholecystectomy. This is an uncommon timeframe to develop a cecal bascule following a surgical procedure.

Group B29

Title: Septic Emboli: A Unique Complication of *Clostridium septicum* Induced Myonecrosis

Authors: Iyawnna Hazzard, MS, BA[1]; Lily Xu, MPH, BA[1]; Faith Sumandea, BS[1], Yui Seo, BS[1]; Ardavan Afrasiabi, MD[2]

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Introduction: Spontaneous clostridial myonecrosis is a life-threatening infection leading to rapid muscle destruction from bacterial inoculation that is often fatal without prompt surgical intervention. This case presents a rare association of nontraumatic, spontaneous *Clostridium septicum* arm myonecrosis, preceding cerebral septic emboli, with underlying invasive colorectal adenocarcinoma.

Case Presentation: A 60-year-old male with a history of hypertension and poorly controlled diabetes presented to the emergency department with worsening left-sided chest pain radiating to his left shoulder since morning. Labs illustrated elevated D-dimer, troponin, CRP, WBC, and CPK. He was intubated following decompensation and administered antibiotics for empiric sepsis. Physical exam revealed left-upper extremity (LUE) crepitus. CT of the chest, LUE, and neck showcased innumerable soft tissue gas collections along the posterior aspect of the LUE.

Incision and drainage and myomectomy were performed in the OR due to concerns for myositis and possible necrotizing infection. Muscle biopsy revealed myonecrosis. Subsequent tissue samples grew *Clostridium septicum*.

Postoperatively, the patient required pressor support and several sessions of surgical debridement. He continued to deteriorate, developing rhabdomyolysis, acute kidney injury, and disseminated intravascular coagulation. A brain CT was ordered due to left-sided paralysis which revealed several white matter infarcts indicative of septic emboli. The patient slowly recovered neurologically. Months later, colonoscopy revealed cecal adenocarcinoma. Hemicolectomy and loop ileostomy successfully removed the mass. He was eventually discharged in stable condition, but with neurological defects, to a skilled nursing facility.

Discussion: Mortality rates associated with *C. septicum* have been reported to be as high as 70%, with nearly half of all patients having an associated colorectal malignancy. To our knowledge, this is the first case reported of septic emboli secondary to spontaneous myonecrosis with *Clostridium septicum,* highlighting a unique burden of emboli-induced neurological deficits. Therefore, early intervention is crucial to potentially mitigate the spread of infection.

Group B30

Title: A Rare Case of Isolated Metastasis of Invasive Lobular Carcinoma to the Gallbladder Found on Pathology Post Cholecystectomy

Authors: Mitchell Hee [1], Amreen Karim [1], Joelle Jakobsen MD [2]

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Background: Invasive lobular carcinoma (ILC) is the second most common histologic form of breast cancer and can represent up to 15% of all invasive breast cancers[1]. Usual sites of metastases for breast cancer involve the lung, liver, or bone[2,3]. While ILC has been reported to have a higher incidence of metastasis to alternative sites like the gastrointestinal tract compared to invasive ductal carcinoma, these presentations are rare and not often considered in clinical practice[4.] Since the 1960s, case reports about metastatic spread of ILC to the GI tract have been reported, and most cases were associated with concomitant metastases to the bone or other organs[5,6.] Here, we present a rare case of isolated metastasis of invasive lobular carcinoma to the gallbladder.

Case Summary: A 63-year-old female presented for an elective laparoscopic cholecystectomy due to chronic stone cholecystitis. Histopathologic assessment of the excised gallbladder tissue was consistent with metastatic lobular breast carcinoma. Nine years ago, the patient was diagnosed with left infiltrating lobular carcinoma (Stage 3a, ER/PR positive HER-2/neu negative). She presented with a five cm tumor, and her left axillary lymph node biopsy was positive for metastatic spreading. She underwent excision, radiation therapy, and chemotherapy and was considered in remission with maintenance hormone therapy using letrozole until her elective cholecystectomy. On follow-up with oncology, she was evaluated for other sites of metastases, and her resulting CT chest, abdomen, and pelvis found no additional metastatic disease, suggesting an isolated spread of breast cancer to the gallbladder.

Conclusion: This patient case provides evidence of initial metastatic spreading of ILC to the gallbladder and suggests that additional physician awareness and assessment of metastatic disease in the gastrointestinal tract may be warranted in patients with ILC.

Group B31

Title: A Unique Presentation of Reactivated Tuberculosis In Setting of Active Community Acquired Pneumonia

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Introduction: Cleft lip (CL) results from failure of fusion of the medial nasal prominence and maxillary prominences.[1] Cleft palate (CP) is failure of fusion of the palatal shelves of the maxillary processes, resulting in clefting of the hard and/or soft palates.[1] Bilateral CL/P surgical treatment includes surgery for CL repair at 3-6 months, and for CP repair between 10 and 12 months of age.[2] Postoperative complications of CL/P repair include wound dehiscence, requiring reoperation.[3] Effective prevention of postoperative wound dehiscence includes maintenance of an optimal healing environment and protection from external factors.[4]

Case Presentation: An infant male presented with a bilateral CL/P that was wide with protuberant premaxilla. Bilateral CL repair was completed at age 6 months.

One week postoperatively, the patient was brought to the emergency department, with confirmed surgical site dehiscence and epidermolysis of the skin over the incision site in the prolabial segment. Revision CL repair the following morning was successful and Dermabond was applied.

One day status post revision CL repair, there was recurrent detachment of Dermabond, potentially secondary to repetitive patient licking of the surgical site. Two weeks later, a second revision CL repair was attempted. Extensive manipulation of the surgical site and decreased availability of tissue at the vermillion presented increased risk for recurrent dehiscence. A retention suture type mechanism was needed to decrease tension between the maxillary prominences and medial nasal prominences, and prevent patient manipulation. A temporary apparatus using silastic sheeting was constructed, which was rolled underneath the vermillion and over the cutaneous lip to serve as a physical barrier between the patient's tongue and surgical site to facilitate wound healing. The patient healed well with no recurrent complications.

Discussion: This case illustrates an unique solution to wound dehiscence status post CL repair, which maybe useful in other similar circumstances.

Group B32

Subclinical Strokes and Dynamic Atherosclerotic Changes in the Brain: A Case Report

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Intracranial atherosclerotic stenosis is an intricate process shaped by a multitude of influential factors. The progression and regression of atherosclerotic stenosis reflect a dynamic mechanism that results in fluctuating degrees of intracranial arterial narrowing. Understanding this dynamic nature is crucial for comprehension of its role as a factor in ischemic strokes, as the periodic arterial narrowing influences cerebral blood flow and may result in cerebrovascular events. Not often widely discussed, this interplay of temporary reductions in blood flow may lead to transient neurological deficits, thus, it is imperative to recognize this as a potential cause when evaluating stroke. We present a case of a 57-year-old African American female with a 10-year history of multiple transient focal neurological deficits and abnormal vessel image findings that depict transient stenotic changes throughout this period.

Group B33

Title: How Have Factors Influencing Competitiveness of Specialties Changed Over Time (2013-2023)?

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Introduction: Some residency specialties have less than 300 spots each year nationwide, leading to an incredibly selective application process. As medical education continues to evolve, so do the factors contributing to what makes a specialty “competitive.” This study examines trends and factors that contribute to the competitive nature of these programs.

Methods: Phase I of data collection involved compiling the factors used by six official medical school consulting and information organizations to rank the most competitive specialties. Based on the definitions set forth by these organizations and prior literature, an evidence-based equation was developed to calculate a specialty's "competitiveness score." Phase II involved extracting data from annual National Resident Matching Program Reports and the Association of American Medical Colleges Resident Reports regarding specialty-specific statistics such as average USMLE Step 1 scores, number of research publications, fill rate, etc (2013-2023).

Results: 49 specialties were analyzed using the following evidence-based equation:

Competitiveness Score = {3*[Fill Rate] + 3*[5*Unmatched Rate] + 2*[(⅓)*Step1] + 3*[(⅓)*Step2] + [20*Average Research Citations]}/12

Competitiveness Score (post-2021) = {[3*[Fill Rate] + 3*[5*Unmatched Rate] + [20*Average Research Citations]}/7

Conclusion: Over the past decade, specialties considered to be the most "competitive" in the medical field have evolved due to factors such as global events, social movements, health equity research, and increased holistic assessments of applicants. Conversely, Plastic Surgery has continued to stay competitive, which may be influenced by the impact of social media and budding conversations concerning body image. Future directions may include better understanding the impact of USMLE Step 1 becoming Pass/Fail on how residency programs evaluate applicants.

Group B34

Title: Delivery of Anti-immunosuppressive Reagents in Tumor Microenvironment (TME) Using Oncolytic Virus

Authors: Tri M. Huynh[1], Brandon Bol [1], Hongbin Wang, PharmBS, MS, PhD[2]

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Study Objective(s): The aim of this study is to analyze the history, current standings, and future directions of oncolytic viral delivery of anti-tumor reagents. These CRISPR-modified oncolytic viruses elicit reduced pathogenicity yet preserve cytotoxicity and tissue specificity, allowing for dual antitumor effects: the target-specific delivery of tumor microenvironment (TME) immune-enhancers and initiation of antiviral immunity. Due to the high rates of mutagenesis in cancer cells, these oncolytic viruses should experience a selective lytic replicative advantage due to impaired antiviral pathways within these cells; thus, the resulting cytotoxicity should be highly immunogenic and attract immune cells to the cancer, especially when paired alongside pharmacologic cargos that combat immunosuppressants. [105 words]

Methods: We performed computer systematic literature searches of the PubMed databases that pertains to oncolytic viruses and the delivery of reagents that target immunosuppressive factors in the TME. We intend to look at multiple study designs that followed clinical trial phases, being tested first in animal models then followed by safety and efficacy in humans. [54 words]

Results: Pairing oncolytic virus engineered with different anti-immunosuppressive reagents, such as anti-PD-1, anti-PD-L1, anti-TGFβ, and anti-CXCL10, has been shown to sensitize the tumor to treatment, reduce tumor size and aid in tumor eradication by changing the landscape of the TME and allowing better immune cell infiltration. By utilizing oncolytic virus, this ensures that only tumor cells are targeted, sparing healthy cells. Oncolytic viruses present a possible safer alternative of tumor eradication that should be further explored. Additionally, the release of damage-associated molecular patterns (DAMP) molecules upon cellular lysis can aid in the establishment of memory cell generation and the prevention of downstream metastases. [102 words]

Conclusions: The different anti-immunosuppressive reagents that were co-expressed and co-delivered with the oncolytic virus, as outlined in this work, has shown to be a promising new method to be further explored in the future in patients with local and metastatic tumors. We anticipate that future directions include, but are not limited to, novel pharmacologic cargos, circumnavigating immune-restricted cancer sites, and usage of oncolytic viruses for tangent diseases. [66 words]

Group B35

Title: The Confounding Effects of Chronic THC Use: A Case Report

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Introduction: Cannabinoids are known to have clinical significance in relieving GI symptoms, such as nausea and vomiting. However, the increasing incidence of Cannabinoid Hyperemesis Syndrome (CHS), where patients have episodes of cyclic vomiting and abdominal pain, seems to contradict their intended medicinal use.

Case Presentation: This case report details the observation of CHS in a young woman with a six-month history of GI distress, without any known associated conditions. She visited multiple emergency departments before this visit with no resolution to her condition. Although she initially denied any drug use, her most recent visit to the emergency department revealed a positive urine drug screen for THC.

Discussion/Conclusion: CHS is a rare condition and an uncommon diagnosis, which made this case particularly difficult to diagnose at first glance. While hot showers and baths, topical capsaicin, and other antiemetic medications can help alleviate the symptoms of CHS, there is no established treatment regimen. Thus, the most effective method of resolving the symptoms of CHS is cessation of THC use. This case report is intended to promote awareness of CHS among medical professionals and THC users so that this condition can be recognized and resolved in future cases. Furthermore, it provides a call to focus future research on discovering primary therapeutics and factors that make some patients more susceptible to CHS than others.

Group B36

Title: Sex-specific programming of the Late Gestational Fetal Heart and Lungs with Prenatal T Excess

Authors: Mary Jabari[1], Divya Puswani[2], Brooke Pallas[3], Vasantha Padmanabhan[3], Arpita Kalla Vyas[2]

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Introduction: Cardiovascular disease (CVD) is the leading cause of death worldwide, resulting in an estimated 17.9 million deaths annually (WHO 2023). Barker's fetal origins hypothesis and numerous animal studies indicate that early life insults in utero lead to intrauterine growth restriction and adversely program the cardiovascular system, which can predispose to CVD later in life. One such insult, excess testosterone (T) exposure from early to mid-gestation (days 30-90), leads to adverse sexually dimorphic cardiac programming at fetal day 90 (Vyas et al 2022). This study investigates the effect of exposure to excess T on sex-specific cardiac and lung reprogramming persisting into the late gestational period (Day 120) utilizing sheep model.

Methods: Pregnant ewes were injected 100 mg T or oil-vehicle (C) twice weekly from day 30 to 90. Fetal lamb right ventricle and lung tissues harvested at day 120 were crushed, cDNA was prepared, and qPCR was conducted on markers of stress and insulin resistance in the heart (GLUT4, AKT) and markers of structure and function in the lungs (COL1A1, TGF-B1, TGF-B1R1). Protein lysates were prepared, Western Blot was used to visualize the protein and quantitatively assess the abundance of GSK-3B and AKT.

Results: Analysis of RV weights showed T-treated RVs of both sexes are elevated. GLUT4 was found to have a nonsignificant decrease in males and a large magnitude decrease in females (d=1.09). COL1A was found to be downregulated in males and upregulated in females non-significantly. TGF-B1 and TGF-B1R1 decreased non-significantly in both sexes. Akt and GSK3-B showed no change in the abundance of protein, but AKT was reduced in males significantly (d=0.43) and females non-significantly in the RV(d=0.03).

Conclusion: Our preliminary data indicates COL1A1 was significantly upregulated in females. GLUT4 was significantly downregulated in females. GSK-3B showed decreased protein abundance in males with a moderate effect size.

Group B37

Title: Nationwide Geographical Analysis of DEI Community Representation among Department Chairs in Academic General Surgery Departments

Authors: Amreen Karim [1]; Daniel Razick [1]; Ihab Abed [1]; Meraj Alam [1]; Vince Thomas [1]; Zohaer Mutallib [1]; Vijay Khatri MD [1]

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Objective: Diversity, equity, and inclusion (DEI) has been a topic of great discussion in recent years, particularly within the field of surgery. This review aims to analyze the geographical trends among academic institutions in the United States regarding the prevalence of general surgery department heads who identify as part of the Diversity, Equity, and Inclusion (DEI) community.

Methods: 126 academic centers were included in the study and characteristics (race, gender) of department heads and other senior department staff were noted. The definition used to qualify individuals as members of the DEI community was anyone other than caucasian males. Data was extracted directly from hospital websites. Two reviewers independently viewed profiles and made decisions on race and gender for all department chairs. Any conflicts were resolved by a third reviewer who independently analyzed the profiles in question.

Results: Of the 126 academic general surgery department chairs that were publicly available, 46 (36.5%) were classified as members of the DEI community, with 80 (63.5%) classified as non-DEI. Of the 46 DEI chairs, caucasian females made up the greatest proportion at 15 (32.6%). Notably, there were zero black female department chairs. Geographically, 19 of the 46 chairs were found in the southern region of the United States, while only 5 hailed from the midwest. However, California had the largest number of DEI chairs (8). Non-DEI representation was much more evenly spread, with the exception of the west coast (7), with 26 chairs in the south and midwest respectively and 21 in the northeast. New York had the greatest number of non-DEI chairs (9).

Conclusion: While advances have been made in recent years with respect to DEI and female representation within surgery, there is still progress to be made. Institutions must continue to explore avenues to increase diversity and representation within surgical specialties.

Group B38

Title: Variables Impacting NBME Neurology Shelf Scores: A Systematic Review

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Introduction: This review aims to determine the factors that influence NBME Neurology Subject Exam scores. Numerous factors may contribute to a student's success, as measured by their exam score, following their neurology clerkships. These include the timing of the neurology clerkship in relation to other clerkships, quality of preclinical education, and availability of resources and support, such as integrating standardized patients into the preclinical curriculum.

Methods: A systematic review was conducted following the PRISMA guidelines to identify factors that impact medical students' performance on the NBME Neurology subject exam. A comprehensive literature search was performed using the Embase, Scopus, and PubMed databases by two authors independently.

Results: Embase, Scopus, and Pubmed collectively yielded 336 articles, of which nine were selected for analysis. The selected papers were put into three overarching categories based on the factors they emphasized: educational methods, clerkship scheduling, and preclinical resources. After analysis, the statistical relationship between these categorical variables and their effect on students' NBME Neurological exam was determined.

Discussion: The findings of this review highlight the importance of scheduling, preclinical factors, and educational method variation in determining students' performance on the National Board of Medical Examiners Subject Examination in Neurology. Upon analysis, it was found that prior exposure to other core clerkships positively correlated with higher scores on the neurology NBME Neurological exam. Additionally, busier rotation sites, access to study materials such as practice exams, and strong faculty mentorship all correlated with higher test scores. Stronger performance on subjective assessments and faculty clinical scores resulted in higher exam scores as well.

Conclusion: Implementation and student awareness of the importance of these factors can be utilized to attain higher scores on their NBME Neurology Shelf exam and allow educators to tailor curriculum and assess the quality of their education to improve student success.

Group B39

Title: Efficacy of the Acute Care Surgery Model in the United States: A Systematic Review.

Authors: Devan Abhari BS [1], Stella Knowlton BS [1], Anand S Dhaliwal BS [1], Tara Gallant BS [1], Vijay P. Khatri, MBChB, MBA, FACS, FSSO [1]

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Introduction: The Acute Care Surgery (ACS) model, which encompasses emergency general surgery, trauma, and critical care, was established fifteen years ago. While there have been multiple studies evaluating the efficacy of this system in relation to particular surgery outcomes, there is little analysis on the ACS system as a whole. This review aims to assess the efficacy of the ACS system compared to traditional emergency surgery services (ESS) in the United States.

Methods: The systematic review was registered on Prospero. Literature searches were performed following PRISMA guidelines using PubMed, Embase and Cochrane online databases. Studies included were selected based of location and outcomes. The Newcastle-Ottawa Scale, a known scale for assessing nonrandomized studies was used as a quality assessment of the included studies.

Results: The literature search yielded 6,301 articles, of which 4 were selected for analysis. The review looked at four major outcomes: mortality, complications, hospital length of stay, and cost. In studies comparing ACS to traditional practice, overall 30-day mortality was either decreased or had no statistical difference. There was also a decrease in overall complications, hospital length of stay, and cost in the ACS model.

Conclusion: To our knowledge, this is the first systemic review analyzing the efficacy of the ACS model in the United States. There is an apparent trend within the literature showing either no effect or a significant decrease in the outcomes assessed when comparing ACS to the traditional model. This review demonstrates that ACS has a positive effect on the delivery of ESS.

Group B40

Title: The Impact of Virtual Interviews on Plastic Surgery Residency Applicants: A Study of the Past Six Years

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Background: In 2023, 332 applicants entered the Match for plastic surgery with only 207 (62%) successfully matching. Identifying what factors bring a candidate over the line for a successful match needs to be elucidated. Historically, applicants who come from medical schools with affiliated home programs are positively selected for by their institution. In this study we evaluate the match rate to students' home programs between 2018-2020 and 2021-2023.

Methods: This was a 6-year retrospective study from 2018 to 2023 looking at United States Doctor of Medicine programs and their integrated plastic surgery residency matched students. Data was obtained through publicly available residency match lists published on official school websites. Though 130 US M.D. programs were analyzed, 43 US M.D. programs were included based on complete datasets. For each school, we analyzed several variables: presence of a home program, total number of plastic surgery residency matches, percentage of plastic surgery matches, and residency program matched into.

Results: The data was split into two groups based on the implementation of virtual interviews: 2018 to 2020 and 2021 to 2023. From institutions with an affiliated home program between 2018 and 2020, an average of 19.79% of applicants matched at their home program. Between 2021 and 2023, an average of 23.90% of applicants matched at their home program, with a notable increase in 2021 to 33.90%. Using a two-tailed t-test, the difference between the match rate of students to their home programs before and after the institution of virtual interviews was insignificant ($p=0.52$).

Conclusion: Regardless of whether interviews are conducted virtually, there has been a consistent trend in at least 15% of applicants matching at their home institutions. The factors leading to this trend warrant further investigation.

Group B41

Title: Subcutaneous Emphysema: A Rare Complication Following Open Ventral Hernia Repair

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Introduction: Subcutaneous emphysema (SCE) is the presence of air beneath the dermal tissue layer. The air is either created as a byproduct of bacterial infection or introduced from outside the body, such as during external trauma. SCE is a known complication of laparoscopic surgeries. However, it is rarely reported secondary to open surgeries. Here, we report a case of a patient who underwent elective open ventral hernia repair and developed extensive SCE of the abdomen and chest.

Case presentation: This is a 75-year-old man with a ventral incisional hernia presenting for an elective open hernia repair with mesh placement. The patient was in his usual state of health leading up to the surgery. No complications were noted during the operation, and he arrived at the PACU in stable condition. On post-op day 1, the patient was noted to have significant SCE that began in the right abdomen and spread upwards toward his chest. CT Abdomen/Pelvis and CT Chest were ordered, which ruled out abdominal wall infection, gastrointestinal perforations, pneumomediastinum, and pneumothorax. The patient's SCE improved over the next few days, and he was ultimately discharged on post-op day 7 with no further complications.

Discussion: The exact mechanism of this patient's SCE remains unclear. It is possible the patient sustained barotrauma secondary to endotracheal intubation during the procedure, the surgery itself introduced air into the subcutaneous layers, or a pre-existing pulmonary bleb may have burst during the surgery leading to the SCE. This case highlights SCE as a potential complication of open surgeries. Although typically benign, SCE can pose serious risks, including a missed pneumothorax and respiratory failure. Given these risks, it is important for medical providers to be mindful of the development of SCE, even in atypical circumstances, and perform a thorough evaluation following surgery to assess for SCE.

Group B42

Title: Selective Androgen Receptor Modulators (SARMs) Effects on Physical Performance: A Systematic Review of Randomized Control Trials

Authors: Jared Leapart, BS[1]; Jimmy Wen, BA[1]; Burhaan Syed, BS[1]; Mouhamad Shehabat, BS[1]; Ubaid Ansari, BS[1]; Muzammil Akhtar, BS[1]; Daniel Razick, BS[1]; David Pai, MD[1]

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Introduction: Selective Androgen Receptor Modulators (SARMs) are compounds developed with the goal of ameliorating age-related physical dysfunctions from sarcopenia, cachexia, and chronic illnessess such as cancer. The purpose of this systematic review is to analyze the effect of SARMs on physical performance, body composition, and evaluate the safety profile.

Methods: A systematic review search criteria following the guidelines from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was performed in three databases for studies reporting physical parameter outcomes after SARM intervention. Study variables included title, author, publication date, study year, number of patients, dosage, mean age, mean follow-up time, pre and post intervention reported outcomes, and rates of complications.

Results: Nine studies, including 970 patients with a mean age of 57.1 years (35.3 to 75.9) and a mean follow-up of 80 days (14 to 180) were included in this study. Six SARMs were analyzed: LGD-4033 (0.1-1 mg), PF-06260414 (1-400 mg), GSK2881078 (0.05-0.96 mg), GTx-024 (0.1-3 mg), MK-0773 (50 mg), and OPK-88004 (1-15 mg). Mean pre-intervention stair climbing power, 1 repetition maximum leg press, and short physical performance battery (SPPB) score, lean body mass, and fat mass were 352.24 W (69.79-678.7), 1822.77 N (1176.8-2407.3), 9.15 (7.95-9.9), 49.46 kg (30.94-63.9) and 21.99 kg (13.3-33), respectively. Mean post-intervention values were 315.16 W (89.46-525.73 W), 2191.27 N (1375.87-2462.9 N), 9.79 (8.88-10.4), 50.86 kg (31.02-67.29) and 21.85 kg (12.54-32.16 respectively). Majority of the reported adverse effects were determined to not be drug related.

Conclusion: SARMs have a significant positive effect on physical performance and body composition and is well tolerated with no serious adverse events observed.

Group B43

Title: Uncut Gemella: A Case of Bacteremia, Atrial Fibrillation, and Acute Respiratory Failure with No Clear Entry Site

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Objective: *Gemella haemolysans* is a gram-positive cocci known to colonize the oropharynx, genitourinary system, gastrointestinal system, and upper respiratory tract as an opportunistic pathogen. A retrospective study by Berge et al. found the frequency of Gemella species bacteremia to be 4.5 and infective endocarditis to be 0.31 per 1,000,000 inhabitants yearly. We report the first case of *G. haemolysans* bacteremia presenting as new onset atrial fibrillation with rapid ventricular response (RVR) and acute respiratory failure, and we present a case series on *G. haemolysans* bacteremia and infective endocarditis.

Case Presentation: A 58 year old male with past medical history including aortic valve bioprosthetic replacement, type 2 diabetes, CABG, coronary arterial stenting, and hypertension who presented with shortness of breath and confusion. Examination and testing revealed a 104.7°F fever, acute hypoxemic respiratory failure, atrial fibrillation with RVR, congestive heart failure, lactic acidosis, acute renal failure, and no drug use, dental wounds, or pneumonia. Diltiazem, metoprolol, aspirin, atorvastatin, insulin, heparin, and ceftriaxone were started. TTE and TEE revealed no clear vegetations. Blood cultures revealed *Gemella haemolysans*, and ceftriaxone was continued. The patient became stable, was electrically cardioverted, then transferred to an external hospital, planning to complete ceftriaxone 2g daily for 6 weeks.

Conclusion: Our patient presented with multiple comorbidities at a younger age compared to the mean (66) and median (70) age of the 4 bacteremia cases in our 8-case series. With infection risk from his bioprosthetic heart valve, he was preemptively treated with 6 weeks of daily ceftriaxone. A wide variety of antibiotics have been used previously with varying results. The shortest course was 16 days with most courses lasting 4 to 7 weeks. With no standard treatment, this case series suggests *G. haemolysans* historically tends to be susceptible to beta-lactam agents.

Group B44

Title: Lower Rates of Complications, Readmission, and Reoperations in Outpatient versus Inpatient Total Ankle Arthroplasty: A Systematic Review and Meta-analysis

Authors: Deeksha Mamidi[1]; Muzammil Akhtar[1]; Daniel Razick[1]; Sonia Aamer[2]; Fayez Siddiqui[1]; Jimmy Wen[1]; Khizur Kamran[2]; Adithya Shekhar[3]

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Background: Total ankle arthroplasty (TAA) has primarily been performed in the inpatient setting, however, with the advent of fast-tracked joint arthroplasty protocols, TAA has slowly been shifting to the outpatient setting. Therefore, this systematic review aimed to evaluate outcomes of outpatient TAA and compare them to inpatient TAA.

Methods: A literature search was performed on October 23, 2023 in the PubMed, Embase, and CENTRAL databases using the PRISMA guidelines. Studies were included if they reported on outcomes of outpatient TAA or if they compared outcomes between outpatient and inpatient TAA. Pooled odds ratios and mean differences were calculated using a random-effects model. Quality assessment was performed using the MINORS criteria.

Results: 12 studies were included, with four outpatient-only and eight outpatient-inpatient comparative studies. Patients in the outpatient group were generally younger, had a lower BMI, and had fewer comorbidities relative to the inpatient group. For outpatient vs. inpatient TAA, the pooled complication rate was 2.6% vs. 3.6%, readmission rate was 2.5% vs. 4%, and reoperation rate was 3.6% vs. 5.5%. We found significantly lower odds of complications (OR = 0.47; CI: 0.26-0.85; P = 0.01), readmissions (OR = 0.63; CI: 0.54-0.74; P < 0.00001), and reoperations (OR = 0.66; CI: 0.46-0.95; P = 0.03) in the outpatient versus inpatient group.

Conclusions: Outpatient TAA had lower rates of complications, readmissions, and reoperations compared to inpatient TAA. Candidates for outpatient TAA should, however, be appropriately selected, as younger patients with a lower BMI and fewer comorbidities may have superior postoperative outcomes.

Group B45

Title: Where Will I End Up? Relative Location of Sports Medicine Fellowship Compared to Residency Among Recent Graduates

Authors: Dave Manguerra, BS[1]; Jimmy Wen, BA[1], David Park, BS[1], Daniel Razick, BS[1], Mouhamad Shehabat, BS[1], Burhaan Syed, BS[1], Muzammil Akhtar, BS[1], Bhagvat Maheta, BS[1], Caroline Goswami, MS[1], Jose Luis Puglisi, PhD[1], Sarah Preiss-Farzanegan, MD, FAAPMR[1]

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Objective: The purpose of this study is to understand and analyze the relative distance between residency programs and Sports Medicine (SM) fellowship. Additionally, the primary residency that graduates' completed will also be analyzed.

Methods: SM fellows between 2019 to 2023 were identified from publicly available data, and relationships between fellowship location and prior residency location were examined. These locations were categorized as within 100 miles, same state, same region, or different region compared to their residency. Odds ratios (OR) were calculated to determine if primary training specialties matched into SM fellowship based on geographical locations.

Results: A total of 852 fellows, from 135 (65.2%) of the Accreditation Council for Graduate Medical Education accredited programs, were included in this study. A majority of fellows (64.4%) were from Family Medicine (FM), 14.9% were Physical Medicine & Rehabilitation, 7.1% were Pediatrics, 7% were Emergency Medicine (EM), and 6.2% were Internal Medicine (IM). A greater proportion (67.7%, n=577) stayed in the same geographic region as their residency. FM graduates were more likely to stay within 100 miles (OR 1.47 [1.10-1.95]), in the same state (OR: 1.81 [1.37-2.42]), or in the same region (OR: 1.61 [1.20-2.16]) as their residency program ($p=0.0093$, $p<0.0001$, $p=0.0018$, respectively). In contrast, fellows from EM residencies were more likely to not remain within 100 miles (OR: 0.47 [0.25-0.85]) or the same state (OR: 0.52 [0.30-0.91]) for SM fellowship ($p=0.0131$, $p=0.0214$, respectively).

Conclusions: Overall, graduates were most likely to stay in the same geographical region for their SM fellowship. These results can inform future trainees, program directors, and advisors on current trends in geographical distribution and prior training of SM fellows.

Group B46

Title: Can I Still Breastfeed? Breast Reconstruction Options Post Chest Burns: A Systematic Review

Authors: David Chen[1*], Emma R. McIntyre[1*], Hannah M. Zhang[1], Kailey B. Nguyen[1], Taylor M. Ngo[1], Caroline Goswami[1], Bhagvat J. Maheta[1], Aleeha Noon[2], Chainaronk Limanon[3], Michael S. Wong[1]

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Introduction: Thermal injury to the anterior chest wall causes physical and emotional trauma and leaves survivors grappling with disfigurement, lack of physiologic function, such as breastfeeding, and impaired quality of life. This review evaluates possible breast reconstruction options for patients following thermal injury by comparing the aesthetic outcomes, complications, and functionality through breastfeeding ability.

Methods: PubMed, EMBASE, and Scopus were used in an unrestricted search for postburn breast reconstruction cases. 5,933 articles were screened through an independent and blinded dual review to ensure they included patients with at least one breast affected by burns, provided details about breast reconstruction surgery, and reported postoperative outcomes. Included articles were further analyzed for patient and burn characteristics, reconstruction specifications, and the effectiveness of breast reconstruction procedures in retaining breastfeeding ability. Registered on PROSPERO: CRD42023437347.

Results: There were 47 articles with an overall low risk of bias, analyzing 494 female patients with a history of chest burns. 30 of these studies utilized either local, regional, or distant autologous flaps from various donor sites, including Z-plasties, Thoracodorsal Artery Perforators (TDAPs), Transverse Rectus Abdominis Myocutaneous (TRAMs), and gracilis, with 14 reported satisfactory cosmetic results. 23 of the 47 articles described reconstruction using full- or split-thickness skin grafts, with 11 reporting high patient satisfaction. In patients with minimal damage to the nipple who received skin grafts, breastfeeding ability was reportedly retained.

Conclusion: This review highlights how breast reconstruction following thermal injury requires careful consideration of affected anatomic structures. The level of destruction of important anatomic structures such as the nipple were key in determining future breastfeeding ability. This review provides physicians with a collective evaluation of the breast reconstruction options after chest burns and their differences in outcomes, satisfaction, and potential effectiveness of retaining the ability to breastfeed to better inform patients about their treatment options.

Title: Timolol Lowers Transepidermal Water Loss in Recently Healed Diabetic Foot Ulcers

Authors: Alisha Mehta[1], Anuj Budhiraja[1], Mirabel Dafinone[2], Rawlings Everett[2], Rivkah Isseroff[2], Sara Dahle[3]
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Background: We evaluated transepidermal water loss (TEWL) in diabetic foot ulcers (DFUs) healed with topical timolol versus saline. Given timolol's emergence as a potential wound healing agent, our study explored its impact on epidermal permeability.

Type of Study: RCT Post-Hoc Analysis

Methods: Nineteen patients with healed DFUs, having completed a randomized blinded controlled trial with either topical timolol (n=8) or saline (n=12) treatments, were evaluated. TEWL was measured at the healed DFU and contralateral (control) sites with a Vapometer™, multiple times over 3-4 months. TEWLs were compared using Welch's t-test between arms. Linear regression and a mixed model analyzed TEWL's relationship with patient demographics and medical factors.

Results: Significant decreases in TEWL were observed in the healed timolol treated wounds (21.71 g/m^2h) compared to the saline treated wounds (25.60 g/m^2h, $p<0.001$). In timolol treated wounds, the TEWL of the former wound site was closer to the TEWL of the uninvolved contralateral site ($p<0.001$) than those treated with saline. TEWL at healed sites were moderately correlated with contralateral TEWL ($r = 0.532$, $p<0.001$). The mixed model identified smoking and contralateral TEWL as significant predictors, while BMI, HbA1c, age, and diabetes duration were not.

Conclusion: Timolol-treated healed DFUs had significantly lower TEWLs than saline treated DFUs. Additionally, DFU site TEWLs were more closely aligned with the uninvolved contralateral sites in timolol-treated DFUs. These novel findings suggests that timolol may enhance wound healing by improving epidermal integrity as evidenced by decreased TEWL, a potential mechanism that merits further exploration.

Group B48

Title: An exosome marker-enriched fibro/adipogenic progenitors (FAPs) population promotes muscle regeneration

Authors: Mengyao Liu[1,2], Olivia Wu [1], Xuhui Liu[2], Hubert Kim[2], Brian Feeley[2], Valerie Gerriets[1]

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Introduction: Muscle interstitial fibro/adipogenic progenitors (FAPs) are non-myogenic, interstitial, mesenchymal progenitors that play an important role in

maintaining muscle extracellular matrix and regulating other muscle progenitor cells, including satellite cells. FAPs actively communicate with SC and other cells, including immune cells during muscle regeneration particularly through exosomes. Exosomes are nano-sized membrane EVs that are secreted by almost all cell types. In this study, we isolated a subgroup of FAP with a high expression level of the exosome marker of CD81 and tested their role in promoting muscle regeneration in a mouse volumetric muscle loss model.

Methods: Human FAPs (hFAPs) were isolated from hamstring muscle from patients undergoing anterior cruciate ligament reconstruction by flow cytometry. CD81+ hFAPs were then transplanted to muscle injury created by biopsy punch. Gait analysis was conducted to measure hindlimb function at 6 weeks after injury. TA muscles from the injured legs were then harvested for histologic analysis for muscle atrophy and fibrosis. A separated group of human FAPs underwent single cell RNA-sequencing utilizing 10x Genomics 3' kits. The datasets were analyzed using Cellranger, an analysis pipeline for processing scRNAseq reads and Seurat, an R toolkit that allows for the exploration of scRNAseq data, to cluster cells and determine differential gene expression between different FAP subpopulations ($p = 0.05$).

Results: Digigait analysis showed significantly increased Stride length, stance width, and paw area at the peak stance in the CD81+hFAPs group compared to matrigel.There was a significant increase in muscle fiber area in the CD81+ hFAP transplanted group compared to

the heterogeneous hFAP group. scRNAseq analysis showed FAPs with high expression level of CD81 have their unique expression pattern. Compared to hFAPs with low CD81 expression, CD81 high hFAPs have reduced expression of SFRP1 and MYOC and upregulation of MFAP5, TIMP1,CLEC3B, and CD55.

Group B49

Title: Whipple's Disease Presenting as Limbic Encephalitis

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Objectives: Whipple Disease (WD) is a rare, multisystemic infectious disorder caused by the bacterium *Tropheryma whipplei* that typically presents with abdominal pain, diarrhea, gastrointestinal bleeding, and weight loss. Prevalence of central nervous system involvement as rhombencephalitis is among the rarest of non-classic WD cases. These uncommon presentations are important to consider as prompt treatment with antibiotics and attentive follow-up are critical for a favorable outcome. We describe the case of a 46-year-old male who had primary central nervous system Whipple disease presenting with limbic encephalitis and discuss the symptomatic manifestations, diagnostic findings, differential diagnosis, and management of this condition.

Methods: A 46-year-old male initially presented for arthritic complaints and progressively developed anxiety, panic attacks, retrograde amnesia, personality changes, aphasia, anhedonia, dysarthria, and impairment of activities of daily living over 5 years. He was evaluated by neurology for rapidly progressive dementia. Brain magnetic resonance imaging revealed relatively symmetric T2 FLAIR hyperintensities with enhancements in the medial temporal lobes, hippocampi, hypothalamus, and optic nerve. Lumbar puncture showed mild pleocytosis and elevated protein, and cerebrospinal fluid was negative for an autoimmune or paraneoplastic etiology. The patient was treated empirically as limbic encephalitis with plasmapheresis and steroids while further workup with temporal lobe and duodenal biopsies was performed.

Results: While no histological evidence of WD was found on duodenal biopsy, periodic acid-schiff and Grocott methenamine silver staining of temporal lobe tissue revealed intracytoplasmic and extracellular rod-like structures. Detection of *T whipplei* DNA by polymerase chain reaction confirmed the diagnosis of WD.

Conclusions: Though typical cases of WD affect the gastrointestinal system, it can also lead to an array of neurological symptoms and the diagnosis should be considered in atypical cases of limbic encephalitis. A high index of suspicion among physicians can help early detection and management to prevent irreversible neurologic sequelae and ultimately, death.

Group B50

Title: Evaluation of Responses to Cardiac Imaging Questions by the Artificial Intelligence Large Language Model ChatGPT

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Objective: The Large Language Model ChatGPT presents both potential opportunities and challenges with its artificial intelligence capabilities in patient care. We assessed ChatGPT's ability as an educational resource for educating patients and clinical support for physicians on various aspects of cardiac imaging, including diagnoses, interpretation of radiology reports, next step management, and preventative care.

Methods: 30 questions were formulated and posed to ChatGPT-3.5 three times in three separate chat sessions. To measure accuracy, a total of 90 responses from ChatGPT were scored as correct or incorrect by two cardiologists and one radiologist. For an answer to be scored as correct, the majority must vote correct on at least two of the three ChatGPT sessions. Consistency of responses for a given question across the three sessions was evaluated as consistent or inconsistent. To qualify as consistent, the answer must receive matching scores, either correct or incorrect, from at least two of the three observers in each of the three ChatGPT sessions. Data were summarized as counts, percentage, 95% confidence intervals, and standard error.

Results: It was found that 18/30 (60%) responses were correct and 12/30 (40%) were incorrect, while 24/30 (80%) responses were consistent and 6/30 (20%) responses were inconsistent. The responses demonstrated an overall performance of 15/30 (50%) consistent and correct, 9/30 (30%) consistent but incorrect, 3/30 (10%) inconsistent but correct, and 3/30 (10%) inconsistent and incorrect. For the individual score breakdowns, Observer 1 scored 56/90 (62%) correct, Observer 2 scored 51/90 (57%) correct, and Observer 3 scored 51/90 (57%) correct.

Conclusion: While ChatGPT answers over half of cardiac imaging questions correctly, inaccurate and inconsistent responses suggest the need for further refinement before its application in cardiac healthcare settings.

Title: Medical Supply Delivery Unmanned Aerial Vehicles: Current Applications and Practical Next Steps

Authors: Robert J. Monroe[1], Sarah Preiss-Farzanegan [1]
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Introduction: The delivery of medical supplies carries a set of critically important requirements. Nearly 100 years ago, the 1925 Serum Run to Nome that used dog teams to transport diphtheria antitoxin to a remote Alaskan town illustrated the value that speed, endurance, and remote accessibility have. Unmanned aerial vehicles (UAVs) satisfy all these criteria. In recent years, the development of UAVs has opened a niche for the use of cargo-carrying UAVs in the delivery of medical supplies to remote destinations and emergent situations. This paper examines the current implementations of medical supply delivery UAVs and discusses their usefulness in the field in the context of available platforms' capabilities.

Method: This paper performed a review of the literature to determine the capabilities of UAVs that different companies, academic institutions, and independent teams are currently producing and operating internationally and in the United States. Additionally, the major challenges and considerations that face the development of such systems are outlined.

Results: Current applications for medical supply delivery UAVs overwhelmingly tend towards rural regions and rapid response, emphasizing range and speed. Payloads are limited to only 5 pounds and can contain antivenom, tPA, PRBC, vaccinations, an IV start kit, or AED. Cost is a major limitation. Implementation of safety and privacy protocols may encourage the Federal Aviation Administration (FAA) to revise its restrictive regulations.

Conclusion: This paper recommends that it would be a worthwhile endeavor to develop a UAV designed for regional use to improve the quality of American rural hospitals by supplementing their medical supply logistics. The UAV must achieve cost-effectiveness beyond currently prohibitive expenses. Rural facilities have poorer outcomes for high mortality conditions outlining a need for additional support. The sparse population in these areas provides immense mitigation for the safety and privacy risks of this emergent technology.

Group B52

Title: Impact of Health Care Insurance on California State Economy and Patient Care: A Literature Review

Authors: Zohaer Muttalib[1], Layla Ali[1], Amidala Geetaumesh[1], Minh-Khang Ving[1], Vanshika Goyal[1], Eldo Frezza[1]
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Objective: This literature review aims to discuss the impact that healthcare insurance coverage has had in the state of California both economically for the state as well as for care that patients have received. Additionally, we hope to discuss the different types of healthcare insurance models within the state, including private and government options, as well as principal government regulations such as the Affordable Care Act which have made health insurance coverage more widely accessible to patients. Through this review, we also hope to evaluate the greater importance that healthcare insurance plays for patients, communities, and the state of California at large.

Methods: In this literature review, we used various articles that were relevant to the effects of health insurance coverage, from PubMed and NIH databases. Information regarding the various healthcare options in California alongside government insurance plans was obtained from the diverse array of review articles. Relevant studies that provided information on health care insurance plans, the economic impact of health insurance, and articles discussing government laws and coverage plans were included.

Results: Health insurance in the state of California has seen a greater increase in acceptance as up to 92% of patients are now covered as of 2023. Historically, a sizable percentage of patients did not hold coverage. Still, as a more diverse number of government insurance plans have been created and patients have become more educated on health insurance coverage, health insurance coverage has seen a steady increase. Although the literature has not shown conclusive evidence that health coverage has clear beneficial health outcomes, it has allowed more lower-income patients to receive coverage and access to care.

Conclusion: Health insurance coverage in California has seen a steady increase as a wider variety of plans have been implemented allowing more patients to gain coverage within the state. This has had a major economic effect on the state and has increased the health insurance sector. Additionally, the government has made a push for more patients to receive coverage by implementing plans like MediCare and MediCal. As a greater number of patients receive health care coverage, the importance that health care coverage plays has been taking an ever larger role in the field of health care.

Group B53

Title: Impact of Away Rotations on Residency Match Rates for Fourth-Year Medical Students: A Systematic Review

Authors: Mariam Khalil, BS1, Dana Aboukhalil, BS 1, Shilpi Kalra, BS 1, Shannon Dwyer, BA 1, Akash Pathak, BS 1, Michael S. Wong MD, MBA, FACS 1

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Background: Numerous factors impact where and if medical students match. Fourth year medical students are encouraged to complete away rotations because of the perceived positive benefits of matching into their desired program through increased specialty exposure and mentorship opportunities.

Objective: To determine the impact of away rotations on match rates.

Methods: A systematic review was conducted to identify the impact of away rotations on residency match rates. Comprehensive literature searches using Embase and PubMed databases were carried out. The search yielded 150 articles and of these 19 articles were analyzed and grouped into three categories: 1) impact of away rotations on match rates, 2) impact of away rotations or a rotation at home programs on match rates, and 3) impact of COVID-19 on away rotations and match rates.

Results: Completion of away rotations positively correlates with matching, with some specialties showing significant impact such as orthopedic surgery. Home students were ranked higher than away rotators by programs, and both were ranked higher than non-rotators. The impact of COVID-19 shifted residency program preference in favor of students from their own programs in orthopedics, plastic surgery, otolaryngology, and urology.

Conclusion: Although completing away rotations demands significant time and financial investment, it is advantageous for medical students who want to match into general surgery, orthopedics, vascular surgery, urology, dermatology, plastic surgery, radiation oncology, and otolaryngology. Completing away rotations increased the likelihood of matching into their preferred residencies.

Title: Miliary pneumonia: How an Automated CBC Differential Can Give Clues

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Introduction: Histoplasmosis is caused by Histoplasma capsulatum, which enters hosts through inhalation of spores from sites inhabited by birds and bats. Clinical manifestations include fever, malaise, weight loss, and respiratory symptoms, while physical exam reveals lymphadenopathy, hepatomegaly, and/or splenomegaly. The most common causes of miliary pneumonia include TB, cryptococcosis, and histoplasmosis, and exposure risk includes immigrants and travelers form endemic areas.

Case description: A 23-year-old male, who immigrated to the US from Guerrero, Mexico 1.5 years prior, presented to the ER with a one-month history of appetite and weight loss and five-day history of fevers, night sweats, submandibular swelling, and productive cough. He was febrile and in septic shock and admitted to the ICU where he was newly diagnosed with HIV/AIDS. Due to respiratory failure, he was intubated.

The patient had a bronchoscopy with bronchoalveolar lavage, which revealed a positive Aspergillus galactomannan antigen index with optical density 7.1; fungal culture grew Histoplasma capsulatum. Bone marrow biopsy with Grocott's methenamine silver stain and Periodic acid-Schiff stain was performed, along with a peripheral blood smear with Wright-Giemsa stain, which showed macrophages with intracellular yeast, either Histoplasma capsulatum or Cryptococcus neoformans.

The patient was started on liposomal Amphotericin B, and later Flucytosine was added while trying to differentiate the morphological appearance of Histoplasma Vs Cryptococcus in the bone marrow biopsy and bronchoalveolar lavage fluid. On hospital day 3, the patient developed cardiac arrest and passed away.

Impact/Discussion: The patient presented with a syndrome of miliary pneumonia and septic shock in the setting of newly diagnosed HIV/AIDS, which was likely present for years. Images from the automated CBC differential revealed 2-4 um intracellular budding yeast consistent with Histoplasma (approximately 2-4 um) rather than Cryptococcus (approximately 4-10 um). We emphasize the importance of direct microscopy, which offers rapid turn-around times in disseminating Histoplasma infection in highly susceptible patients.

Group B55

Title: Factors Affecting Breast Cosmesis After Whole Breast Radiation Therapy for Breast Cancer

Authors: Anna Okabe[1], Michael Kwan[2], & Jason Ye MD[2]

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Introduction: Early-stage breast cancer is commonly treated with breast conservation therapy, which consists of lumpectomy and whole breast radiation. However, the cosmetic result after treatment can be variable and hard to predict. Analysis of various factors affecting patient cosmesis may help better predict outcomes for future patients.

Methods: A retrospective chart review for 118 female patients with early-stage breast cancer who underwent lumpectomy followed by whole breast radiation at Keck School of Medicine of USC was performed. Demographic, clinical, surgical, and cosmetic data were collected. Cosmesis and symmetry were measured on the 4-point Harvard scale by the treating physician at the time of consultation and follow-up. Statistical tests include Kendall's tau-b and Mann-Whitney U.

Results: The median age at diagnosis was 56.5 years (ranging from 35-88). The median time to follow up was 19 months. Baseline cosmetic ratings were 5.4% Fair, 32.1% Good, and 62.5% Excellent, which changed to 10.3% Fair, 29.9% Good, and 59.8% Excellent at the last follow-up.

No significant correlations existed between the final reported cosmesis and patient demographics, radiation dose/boost, or radiation position (supine or prone). A decline in cosmesis from baseline to the last follow-up was found to be significantly associated with the presence of radiation pneumonitis during treatment ($P<0.001$), a large tumor size ($P<0.05$), and the lack of plastic surgery or reconstruction following lumpectomy ($P<0.05$). Notably, there was a significant correlation between the physician-scored baseline cosmesis and the cosmesis at the final follow-up ($P<0.001$).

Conclusion: The presence of radiation pneumonitis during treatment, a large tumor size, and the lack of reconstruction surgery were associated with a decline in breast cosmesis. Baseline cosmesis is a good prognostic indicator for the cosmetic outcome following radiation therapy.

Title: Artificial Intelligence in Healthcare and the Revolutionization of Medicine

Authors: Deeksha Panuganti[1]; Justin Ji[1]; Noorafsha Khan[1]; Daniel Razick[1]; Vijay Khatri[1]

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Introduction: Artificial Intelligence (AI) is becoming a major part of several industries, particularly in healthcare, with the potential to alter the landscape of medicine as we know it. Healthcare leaders must not only comprehend AI but also embrace it for their personal leadership growth and to guide their organizations in adapting to the evolving environment. It is important to understand definitions to facilitate a better understanding of AI. The primary objective of this review is to provide definitions of key AI terminology and explore how AI is revolutionizing various aspects of healthcare, encompassing diagnosis, clinical operations, and treatment.

Methods: A literature review was conducted to find relevant studies explaining the implementation of AI in the field of medicine. We describe a framework to help facilitate the selection and deployment of AI in healthcare. Finally, we review the potential benefits and drawbacks of AI, specifically concerning diversity, equity, and inclusion (DEI), cost-effectiveness, and the impact on healthcare jobs.

Results: AI has the potential to improve patient safety, efficiency, caregivers experience and the patient experience. AI can influence diversity, equity, and inclusion efforts both positively and negatively. A strong commitment to DEI is essential when working with AI to prevent the perpetuation of biases present in current algorithms. AI can automate routine and repetitive tasks, potentially reducing some administrative positions in the future. Integrating AI into healthcare generates short-term and long-term costs. The short-term costs relate to the initial investments and the staff education. In the long term, maintenance costs need to be balanced against long-term cost reduction by streamlining workflows, reducing administrative tasks, and reducing adverse events. From a physician perspective, AI is unlikely to entirely replace physicians but by making the practice of medicine more efficient.

Conclusion: AI can have a major impact on clinical operations reducing administrative burden both on the patient facing clinical areas and the back-office functions. AI has the potential to improve patient safety, efficiency, caregivers experience and the patient experience.

Group B57

Title: Navigating the Diagnostic Radiology Residency Match: The Impact of Home Institution Affiliation on Matching

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Introduction: For students without an affiliated home residency program, there may be difficulty in establishing mentorship, networking, research, and exposure to the field of diagnostic radiology (DR). This study examines applicants without home programs in DR and the impact of an affiliated home residency program on match rate.

Methods: A 5-year retrospective study from 2019 to 2023 was conducted analyzing 155 U.S. M.D. programs and their DR matched students. Data was obtained through the Offices of Student Affairs (OSA) and publicly published residency match lists on official medical school websites. Of the 155 programs, 37 were excluded from the study due to lack of data. For each medical school, we analyzed: presence of a home program and residency program affiliation (academic, community, university-affiliated community based, or military).

Results: From 2019 to 2023, 87 medical schools had an affiliated residency program. A matched student is 5.3 times more likely to be from an institution with a home program. There was a statistically significant ($p<0.05$) difference in the mean number of matched students between the groups (332 students per year).

Of the 1902 and 372 total matched applicants from institutions with and without home programs respectively, institutions with home programs showed a significantly greater proportion of matched applicants join academic centers (78.1% to 72.6%), while matched applicants without home programs more frequently joined university-affiliated programs (12.9% to 15.9%), general community programs (7.1% to 9.4%), and military programs (1.0% to 2.2%). $p<0.05$ for all program affiliation comparisons.

Conclusions: It is vital for prospective DR applicants to understand the implications of attending a medical school without a home residency program. It may be helpful to start early on networking, research, clinical opportunities, and finding mentors for match success.

Group B58

Title: A Case of Catheter-Associated Urinary Tract Infection by *Pseudomonas mendocina*: a rare microorganism in the setting of COVID-19

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Objective: The primary objective of this case report is to present the first documented case of catheter-associated urinary tract infection (CAUTI) caused by the rare bacterium *Pseudomonas mendocina*. Secondary objectives include expanding on the understanding of infections occurring secondary to COVID-19, and introducing observations about the causes of CAUTIs, particularly in the setting of multiple predisposing conditions.

Methods: The method of our analysis includes gathering documentation from the patient's hospital visit and drawing correlations and discussion points from the collected information while incorporating knowledge from a search of existing literature.

Results: A 70-year-old male presented to the emergency department with altered mental status. Past medical history included COVID-19 infection eight days prior to hospitalization, a chronic indwelling catheter, obstructive uropathy secondary to benign prostatic hyperplasia, chronic kidney disease, hypertension, hemorrhagic stroke, and encephalopathy with dementia. Urine cultures demonstrated the presence of *P. mendocina* and *Enterococcus faecalis*. Antibiotic susceptibility testing revealed *P. mendocina* sensitivity to cefepime and ceftriaxone; our patient's treatment regimen consisted of cefepime, ciprofloxacin, and fosfomycin, and he was discharged after a 14-day hospital stay.

Conclusion: While it is well understood that *Pseudomonas aeruginosa*, a close relative to *P. mendocina*, can cause CAUTIs, and that increased catheter indwelling time is associated with the occurrence of a CAUTI, *P. mendocina* remains largely undocumented amongst human infections. We present this case as a notice to the medical community to maintain vigilance for this rare microorganism, especially in susceptible patient populations as depicted in this case. Based on our preliminary investigation, we have found many potential links regarding the emergence of this rare organism concurrent with COVID-19, and our goal is to continue exploring this case study, ultimately contributing to the body of research on *Pseudomonas mendocina* and raise clinician awareness of this emerging pathogen.

Group B59

Title: Stroke Secondary to Air Embolism Following Laparoscopic Nissen Fundoplication: A Case Report

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Objective: Air embolism is characterized by the entry of gas into the circulatory system leading to possible occlusion of blood vessels, posing a life-threatening risk. While commonly associated with lung trauma or decompression sickness, it can also result from medical procedures. We present the case of a 65-year-old female who suffered a stroke secondary to an air embolism after undergoing a laparoscopic Nissen fundoplication in which carbon dioxide insufflation of the abdominal cavity was utilized. We discuss the elusive etiology of this complication as well as diagnostic procedures, treatment, and preventative measures.

Methods: A 65-year-old female with gastroesophageal reflux disease and a hiatal hernia underwent laparoscopic Nissen fundoplication. After an uncomplicated surgery, the patient presented with significant neurological deficits including left-sided hemiplegia, left-hand numbness, hemianopsia, and dysarthria.

Results: CT and MRI findings were significant for several low density foci and evidence of acute infarct, respectively, in the right frontal lobe. These findings were correlated with the patient's clinical presentation to establish the diagnosis of a right-sided middle cerebral artery infarct. After intubation and supportive treatment for three days, the patient was extubated and was able to follow commands with some residual left-sided weakness. At the two-month follow-up visit, the patient no longer displayed any focal neurological deficits.

Conclusion: Air emboli are a rare but serious complication of laparoscopic surgeries. While some patients may be asymptomatic with small emboli, others may exhibit pulmonary symptoms, cardiac arrest, or neurologic impairment. Proper intraoperative trocar positioning and optimal gas insufflation pressures may help decrease the risk of gas embolization. More importantly, given the wide range of clinical presentations, the increased mortality of laparoscopic procedures complicated by air emboli, and the rare occurrence of neurological symptoms as depicted in this case, prompt diagnosis with close postoperative observation is vital for positive patient outcomes.

Group B61

Title: Role of the UNC13 family in human diseases: A literature review

Authors: Vaniya Qureshi[1], Ubaid Ansari[2], Vincent Chen[2], Romteen Sedighi[2], Burhaan Syed[2], Zohaer Muttalib[2], Khadija Ansari[3], Fatima Ansari[3], Denise Nadora[2], Daniel Razick[2], Forshing Lui MD[2|]
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Study Objectives: This review aims to consolidate the current knowledge surrounding UNC13A, UNC13B, UNC13C, and UNC13D, highlighting their contributions to human diseases and illuminating potential avenues for future research and therapeutic intervention.

Background: The Uncoordinated-13 (UNC13) protein family, encompassing UNC13A, UNC13B, UNC13C, and UNC13D, plays a pivotal role in the pathogenesis of various human diseases. These proteins, which are evolutionarily conserved and crucial for synaptic vesicle priming and exocytosis, have been implicated in a range of disorders, spanning from neurodegenerative diseases like amyotrophic lateral sclerosis (ALS) and frontotemporal dementia (FTD) to immune-related conditions such as familial hemophagocytic lymphohistiocytosis (FHL).

Methods: A comprehensive search of the following databases was done for published studies from 1950 to 2023: PubMed, EMBASE, and Scientific Electronic Library Online (EciELO). The following terms were utilized to generate a search: unc13; neurotransmission; amyotrophic lateral sclerosis; frontotemporal dementia; familial hemophagocytic lymphohistiocytosis; autism spectrum disorders; oral squamous cell carcinoma; hepatocellular carcinoma; Alzheimer's disease. The selection process of the review articles elucidated the role of UNC13A, UNC13B, UNC13C, and UNC13D in disease development and progression.

Results: The involvement of UNC13A in neurotransmitter release and synaptic plasticity is linked to ALS and FTD, with genetic variations affecting disease progression. UNC13B, which is closely related to UNC13A, plays a role in autism spectrum disorders (ASD), epilepsy, and schizophrenia. UNC13C is implicated in oral squamous cell carcinoma (OSCC) and hepatocellular carcinoma (HCC), and has a neuroprotective role in Alzheimer's disease (AD). UNC13D has an essential role in immune cell function, making it a key player in FHL.

Conclusion: This review highlights the distinct molecular functions of each UNC13 family member and their implications in disease contexts. This allows for detailed therapeutic strategies during patient management. Further understanding these proteins' roles and their molecular interactions offers new insights into the management, drug development, and treatment of neurological and immunological disorders.

Title: What Should I Use? Impact of Adhesion Barriers on Postoperative Abdominal Complications: A Systematic Review

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Introduction: Adhesions are a feared complication of abdominal surgery since they can cause increased incidence of readmission, morbidity, and need for reoperation. There have been many new adhesion barriers developed and tested, however, there is no recent systematic review analyzing all the published literature. To address this, we aimed to analyze the different types of adhesion barriers, and determine their effects on postoperative outcomes in patients undergoing abdominal surgery.

Methods: A total of 14,038 articles utilizing adhesion barriers in abdominal surgery were retrieved from the PubMed, EMBASE, and Scopus databases. Inclusion criteria were: patients undergoing abdominal surgery, patients receiving an adhesion barrier, and reported postoperative outcomes. Two reviewers independently screened titles/abstracts and full-text articles using Covidence to determine inclusion eligibility. The ROBINS-I tool was used to assess the quality of the included studies. Included articles were analyzed for adhesion barrier type, procedural details, and postoperative outcomes. This study protocol has been registered to PROSPERO: CRD42023458230.

Results: A total of 72 studies, with no overall high risk of bias, with 184,780 patients were included. Most studies showed an equivocal benefit for adhesion barriers, with no singular adhesion barrier type that had definitive superior outcomes compared to the others. Bioresorbable barriers emerged as the most extensively researched adhesion barrier type, exhibiting promising results in colorectal surgery. Starch-based adhesion barriers also exhibited a reduction in overall postoperative bowel obstructions, and may be beneficial for stoma sites and port closures. On the other hand, many studies raised concerns regarding complications associated with adhesion barriers, including a risk of abscess formation, fistula development, peritonitis, and anastomotic leakage.

Conclusions: Adhesion barriers should be considered on a case-by-case basis with respect to the patient's clinical presentation, however, they should not be utilized prophylactically in all abdominal surgeries due to their risk of significant complications.

Group B63

Title: Treatment of Parental Anxiety with Virtual Reality: A Prospective, Randomized Study

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Introduction: Caregivers of pediatric patients with complex diseases will frequently experience anxiety as well as financial and emotional burdens. Long-standing stress and anxiety in parents can result in the development of post traumatic stress disorders. Few interventions have focused on the well-being of caregivers during their child's hospitalization. Virtual reality (VR) has been proposed as an effective strategy for relieving parental anxiety. The primary aim of this study is to determine whether virtual reality distraction can decrease anxiety in the caregiver population of hospitalized children.

Methods: This was a prospective, randomized control study conducted at Lucile Packard Children's Hospital Stanford, a quaternary care academic pediatric hospital. Participants, caregivers over the age of 18, were randomized to either a five minute session using a VR meditation application or a five minute session of caregiver-initiated activities, such as reading, texting, or resting. The primary outcome investigated whether VR could decrease parental anxiety whose children are in the hospital for procedures. Parental anxiety was assessed using a modified Visual Analogue Scale (VAS) and the State-Trait Anxiety Inventory (STAI) before and after the intervention. The secondary outcome examined the personality traits of caregivers and their satisfaction with the intervention using an Anxiety/Patient Characteristics Survey (PCS) and Parental Satisfaction Survey.

Results: The current sample includes 101 participants (79.1% Female, 20.9% Male; 62 English speaking participants, 39 Spanish speaking participants). 46 caregivers were randomized to standard of care (SOC) and 55 were randomized to VR. 69.2% of English participants reported that using VR helped them feel more relaxed and 57.1% reported that VR helped distract them during their child's procedure/hospital stay. 82.4% of Spanish participants reported that using VR helped them feel more relaxed and 83.3% reported distraction benefits with VR.

Conclusion: VR meditation may prevent anxiety in the parental population during their children's hospitalization.

Group B64

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Title: Antiphospholipid Syndrome Presenting with Transient Slow Speech, Ipsilateral Synchronous Left Peroneal Nerve and Facial Nerve Palsy

Background: Antiphospholipid syndrome (APS) typically manifests with micro or macro-vessel thrombosis with various organ dysfunctions, recurrent first-trimester miscarriages, and anti-phospholipid. This case highlights the atypical neurologic presentation of APS with Bell's palsy, transient slow speech, and synchronous ipsilateral left peroneal nerve palsy.

Case: A female in her fourth decade presented with left-sided Bell's palsy (lack of movement of eyebrow), and left foot drop which started 5-10 minutes after a car accident. She also had transient slow speech, mimicking aphasia. MRI of the brain and angiogram did not report stroke or intracranial bleeding. Tests reported positive anti-nuclear antibodies and anti-beta-2 GPI IgG, IgM and anticardiolipin IgM. Lyme disease antibodies, Factor V Leiden and prothrombin mutation were reported negative. The patient had a history of similar episodes after vaccinations and first-trimester miscarriages.

Discussion: The ipsilateral peripheral nerve palsies associated with transient slow speech imposed a diagnostic challenge. Typically, stroke-related aphasia comes with right-sided weakness. The patient's symptoms included Bell's palsy with ipsilateral peroneal nerve palsy, which could be explained by microvascular complications of APS. However, the transient speech problem was concerning for stroke. The imaging, including an MRI of the brain, did not support ischemia or stroke. Notably, Bell's palsy can be associated with problems with speech, possibly due to problems with the lips and cheeks which can be the cause of the speech problem in this case. Further studies are needed to explore the causative relationship between APS episodes and vaccination or trauma.

Conclusion: Antiphospholipid syndrome may present with synchronous peripheral nerve palsies, potentially affecting speech. In such cases, imaging is crucial to exclude central nervous system involvement. This case broadens the understanding of APS manifestations, emphasizing the importance of proper clinical evaluation and use of imaging tools in proper diagnosis and management of this disease.

Group B65

Title: Hearing Health Among Professional Students: Single Center Results

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Background: Hearing loss is a prevalent disability, leading to higher rates of dementia, depression, and worse overall physical health. Medical students may be at risk for hearing loss due to increased headphone use and clinical environment. Early intervention are crucial for managing hearing loss and its consequent academic challenges. However, research is needed on the effectiveness of subjective questionnaires in predicting hearing problems among this population.

Methods: A cross-sectional study was conducted among 1st and 2nd year medical students. Participants completed a self-administered questionnaire assessing demographics, phone-reported health information(PRHI), and hearing-related symptoms. Pure-tone audiometry (PTA) was used to measure hearing thresholds.

Results: 11 medical students participated (35% female, 100% aged 22-25 years). The average threshold in dB across the tested frequencies was 6.0 in the left ear and 5.3 in the right ear. 45.5% report wearing insert earphones 1-3 hours per day. 36.4% report noticing buzzing in their ears. Finally, the average environmental sound level reported by the phones was 78.5 dB.

Conclusion: Subjective questionnaires and PRHI can be valuable tools for preliminary hearing loss screening in medical students, mainly when used with objective measures like PTA. Further research, including a more diverse medical student population and a larger sample population, is needed to improve the specificity of these questionnaires to assess hearing problems in this population better. Implementing routine screening programs with comprehensive assessment methods can help to ensure early detection and management of hearing loss among medical students, promoting their academic success and future professional well-being.

Group B66

Title: Scrutinizing the use of contrasted chest CTs in extremity sarcoma staging and surveillance

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Study Objective(s): Since 2015, the American College of Radiology (ACR) has recommended staging for lung metastasis via chest computed tomography (CT) without contrast for extremity sarcoma staging and surveillance. The purpose of this study was to determine our institutional compliance with this recommendation.

Methods: This was a retrospective chart review of patients diagnosed with sarcoma in the extremities who received CT imaging of the chest for pulmonary staging and surveillance at our institution from 2005 to 2023. A total of 1916 CT studies were included for analysis. We scrutinized ordering patterns before and after 2015 based on the ACR-published metastasis staging and screening guidelines. An institutional and patient cost analysis was performed between CT modalities.

Results: The prevalence of CT scans ordered and performed with contrast was greater than those without contrast both prior and post-ACR 2015 guidelines. Furthermore, 79.2% of patient's final surveillance CTs after 2015 were performed with contrast. A cost analysis was performed and demonstrated an additional $297,704 in patient and institutional costs.

Conclusions: At our institution, upon review of CT chest imaging for pulmonary staging and surveillance in patients with extremity sarcoma the use of contrast has been routinely utilized despite a lack of evidence for its necessity and contrary to ACR guidelines.

Group B67

Title: Choroidal changes in rhesus macaques in aging and age-related drusen

Authors: Yevgeniy Sazhnyev[1,2], Tzu-Ni Sin[1], Anthony Ma[1,2], Ellie Chang[1], Leon Huynh[1], Karolina Roszak[1], Sangwan Park[1], Kevin Choy[3], Sina Farsiu[3,4], Ala Moshiri[1], Sara M. Thomasy[1], ForShing Lui[2], Glenn Yiu[1]

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Purpose: Choroidal vascular changes occur with normal aging and age-related macular degeneration (AMD). Here, we evaluate choroidal thickness and vascularity in aged rhesus macaques to better understand the choroid's role in this nonhuman primate model of AMD.

Methods: We analyzed optical coherence tomography (OCT) images of 244 eyes from 122 rhesus macaques (age 4-32 years) to measure choroidal thickness (CT) and choroidal vascularity index (CVI). Drusen number, size, and volume were measured by semi-automated annotation and segmentation of OCT images. We performed regression analyses to determine any association of CT or CVI with age, sex, and axial length, and to determine if the presence and volume of soft drusen impacted these choroidal parameters.

Results: In rhesus macaques, subfoveal CT decreases with age at 3.2 μm/year ($R^2 = 0.481$, $P < 0.001$), while CVI decreases at 0.66% per year ($R^2 = 0.257$, $P < 0.001$). Eyes with soft drusen exhibited thicker choroid (179.9 ± 17.5 μm vs. 162.0 ± 27.9 μm, $P < 0.001$) and higher CVI (0.612 ± 0.051 vs. 0.577 ± 0.093, $P = 0.005$) than age-matched control animals. Neither CT or CVI appear to be associated with drusen number, size, or volume in this cohort. However, some drusen in macaques are associated with underlying choroidal vessel enlargement resembling pachydrusen in human AMD patients.

Conclusions: Changes in the choroidal vasculature in rhesus macaques resemble choroidal changes in human aging, but eyes with drusen exhibit choroidal thickening, increased vascularity, and phenotypic characteristics of pachydrusen observed in some AMD patients.

Group B68

Title: Patients Receiving Allograft for Arthroscopic Hip Labral Reconstruction Have Significantly Higher Revision Rates Compared to Autograft: A Systematic Review and Meta-analysis

Authors: Amalia Seibel[1]; Muzammil Akhtar[1]; Daniel Razick[1]; Osamah Baig[2]; Ali Saeed[3]; Ilham Tokhi[1]; Maaz Asim[1]; Khizur Kamran[1]; Sonia Aamer[1]; Trevor Shelton[4]

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Objective: Studies have reported outcomes of allografts or autografts for arthroscopic hip labral reconstruction individually, however studies directly comparing outcomes of allografts versus autografts are limited. The purpose of this study was to perform a systematic review to evaluate clinical outcomes in addition to rates of failure and conversion to total hip arthroplasty (THA) following hip labral reconstruction with allograft versus autograft.

Methods: A systematic review following PRISMA guidelines was performed in the PubMed, Embase, and Cochrane databases on June 23, 2023 using the terms “labrum,” “hip,” “acetabulum,” “reconstruction,” “augmentation,” “allograft,” and “autograft.” Methodological quality of studies was assessed using the MINORS score.

Results: Four studies were included with a total of 306 patients, with one study being level II and three studies being level III. 109 patients with allografts had a revision rate of 15.6% and a conversion to THA rate of 11.9%. 197 patients with autografts had a revision rate of 5.6% and a conversion to THA rate of 5.6% as well. The allograft group had a significantly higher revision rate compared to the autograft group (OR = 2.72; 95% CI, 1.35-5.48; p = 0.005), whereas there were no significant differences in terms of rates of conversion to THA between the groups (OR = 1.68; 95% CI, 0.76-3.72; p = 0.20). Additionally, there was no significant difference in mHHS, HOS-SSS, NAHS, and VAS Pain (p = 0.28, 0.41, 0.20, and 0.19, respectively) between both groups, however the allograft group had significantly higher (p = 0.04) patient satisfaction.

Conclusions: Patients undergoing arthroscopic hip labral reconstruction using either an allograft or autograft demonstrated no significant difference in rate of conversion to THA and postoperative PROs. However, autograft may be superior due to a lower rate of revision.

Group B69

Title: Maximizing Time with Patients and Improving Electronic Health Record Documentation

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Introduction: In response to an increase in Electronic Health Record (EHR) utilization by US physicians, this literature review aims to understand the EHR utilization in US healthcare today and to investigate potential strategies to streamline physician EHR utilization in order to increase time available for direct patient care.

Methods: A literature search was performed on PubMed to identify articles published in the last 10 years discussing EHR utilization. Identified articles were included based on their relevance to understanding current physician EHR utilization and investigating strategies for reducing physician EHR workloads. Perspectives and solutions in minimizing physician EHR utilization were identified in the included literature to determine contributing factors and potential solutions in addressing the electronic documentation burden faced by physicians.

Results: Based on the literature, key areas of improvement for physician EHR utilization are adequate software training, efficient integration of EHR in clinic workflows, and the utilization of scribes in alleviating the documentation workload. Due to the large variety of available softwares and continual changes to operating systems, many physicians pointed to inadequate EHR software training as a major factor in increasing time spent documenting. The literature especially highlights the role of medical scribes in alleviating the clerical workload on physicians. We see an increased EHR utilization by physicians in specialties like pediatrics and family medicine while also noting decreased EHR utilization by physicians in emergency and surgical specialties where scribes are highly utilized.

Conclusions: EHR documentation has become a significant portion of physicians' workloads and the recent literature has shown how this has contributed to physician burnout and documentation errors. The contributing factors and solutions identified in this literature review must be further explored to understand how best to minimize physician EHR utilization and allow for increased time spent in direct patient care while also reducing documentation-related burnout.

Group B70

Title: Alkyne as a Latent Warhead to Covalently Target SARS-CoV-2 Main Protease

Authors: Jean Shanaa[1], Chau Ngo[2], William Fried[3], **Saba R Aliyari PhD[4]**, Joshua Feng[2], Chao Qin[5], Shilei Zhang[4], Hanjing Yang[3], Pinghui Feng[5], Genhong Cheng[4], Xiaojiang Chen[3], Chao Zhang[2]

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Study objective: While vaccinations continue to demonstrate effectiveness in conferring immunity against COVID-19, the persistent modification of the spike protein in SARS-CoV-2 variants has raised concerns regarding their sustained efficacy due to the potential increase in non-specificity of their neutralizing antibodies. The main protease M^{pro}, however, plays a pivotal role in SARS-CoV-2 replications, thereby representing an attractive target for antiviral development. We thus sought to identify novel electrophilic warheads for efficient, covalent inhibition of M^{pro} to potentially discover new opportunities to treat COVID-19.

Methods: A panel of cysteine-targeting warheads were installed on a common peptidomimetic scaffold, and their inhibition was compared against M^{pro} in a fluorescence resonance energy transfer (FRET)-based cleavage assay in vitro. Clickable probes based on the alkyne inhibitors were developed to measure target engagement, drug residence time, and off-target effects. To evaluate the antiviral activity of our most potent M^{pro} inhibitors, Hela-ACE-2 cells were infected with SARS-CoV-2, then treated with an alkyne-containing inhibitor for 24 hours. Lastly, cell lysates were evaluated for quantification of viral RNA transcripts using RT-qPCR.

Results: Several terminal alkynes were found to afford strong inhibition of M^{pro}. Notably, synthetic compounds Alk-4d and 4i were found to have an IC50 of 0.3 uM, roughly two times lower than that of nirmatrelvir, a known clinically used M^{pro} inhibitor. Furthermore, our alkyne-containing inhibitors exhibited strong anti-viral activity and minimal cell toxicity in cellular models of COVID-19 infection.

Conclusion: By synthesizing and screening a panel of warheads, we found that the terminal alkyne could undergo an efficient, covalent modification of M^{pro}. Biochemical and X-ray structural analyses support the notion that the alkyne forms an irreversible vinyl-sulfide linkage with the catalytic cysteine of M^{pro}. The best alkyne-containing inhibitors effectively prevented SARS-CoV-2 infection in cell models, indicating the potential of using alkyne as a latent warhead to target cysteine proteases in viruses and beyond.

Group B71

Title: Assessing the Efficacy of Amyotrophic Lateral Sclerosis Drugs in Slowing Disease Progression: A Literature Review

Authors: Fayez Siddiqui[1], Ubaid Ansari[2], Meraj Alam[2], Dawnica Nadora[2], Zohaer Muttalib[2], Vincent Chen[2], Isabel Taguinod[2], Megan FitzPatrick[2], Jimmy Wen[2], Zaid Ansari[3], Forshing Lui MD[2]

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Background: Amyotrophic lateral sclerosis (ALS) is a fatal and intricate neurodegenerative disease that impacts upper and lower motor neurons within the central nervous system, leading to their progressive destruction. Despite extensive research, the exact pathogenesis of this multifaceted disease remains elusive. Currently, the United States Food and Drug Administration (FDA) has granted approval for seven medications designed to address ALS and mitigate its associated symptoms. These FDA-sanctioned treatments are Qalsody, RELYVRIO, Radicava, Rilutek, Tiglutik, Exservan, and Nuedexta.

Methods/Results: This literature review summarizes the effects of Qalsody, RELYVRIO, Radicava, Rilutek, Tiglutik, Exservan, and Nuedexta on ALS based on their mechanism of action, dosing, and clinical presentations. Each medication offers a distinct approach to manage ALS, aiming to alleviate the burdensome symptoms and slow the disease's progression, thereby improving the quality of life for individuals affected by this debilitating neurological condition.

Conclusion: The landscape of Amyotrophic Lateral Sclerosis management has witnessed significant advancements with the approval of seven different medications by the United States Food and Drug Administration. These drugs, each with different mechanisms of action, signify a collective effort to alleviate the burden of this neurodegenerative disease. From inhibiting glutamate release to addressing specific genetic subtypes, these interventions offer a spectrum of approaches to managing ALS symptoms and potentially slowing disease progression. The approval of new treatments and the refinement of existing ones underscore the commitment to enhancing the quality of life for individuals affected by ALS, and highlights the strides made in ALS research that offer not only symptomatic relief but also potential avenues for slowing the disease's progression. However, the urgent need for effective interventions persists, and ongoing research and clinical trials will be crucial in refining existing treatments and discovering new therapeutic approaches.

Group B72

Title: Mid- to Long-term Outcomes of Medial Patellofemoral Ligament Reconstruction: A Systematic Review and Meta-analysis

Authors: Faith Sumandea[1]; Daniel Razick[1]; Muzammil Akhtar[1]; Tri Huyhn[1]; Mohammad Sidiquee, MD[2]

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Introduction: Patellar injuries, such as patellar dislocation, are severe and happen most frequently among teenage patients, especially among teenage athletes, and young adults. MPFL reconstruction offers a reliable method of improving patellar pain and instability. Short-term outcomes of the procedure have been discussed in great detail, but there remains a paucity of studies describing longer term results. The primary objective of this paper is to evaluate studies reporting the medium to long-term outcomes of MPFL reconstruction through analysis of patient-reported outcomes (PROs), re-dislocations, and range of motion.

Methods: A search following guidelines established by the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) was performed in three databases on October 23, 2023: PubMed, Embase, and the Cochrane Library. The query was performed utilizing the Boolean search phrase "(Medial patellofemoral ligament reconstruction OR MPFL reconstruction). There were no restrictions set to the search. Studies were included if they solely reported on outcomes of MPFL reconstruction at a minimum follow-up of 5 years. 12 studies were ultimately included.

Results: 498 patients were included with a mean follow-up period of 86 months. Autologous gracilis and semitendinosus grafts were the most common sources used for MPFL reconstruction. Mean postoperative range of motion was 142°. The mean preoperative to postoperative Kujala, Lysholm and Tegener scores were 60.1 to 88.2, 69.3 to 91.6, and 3.2 to 5.5 respectively. The overall re-dislocation rate across all studies was 2.4%, while revision rate was 1.4%.

Conclusion: MPFL reconstruction demonstrates excellent mid- to long-term patient reported outcomes with low dislocation and revision rates and can be safely considered in patients with patellar injuries.

Group B73

Title: Bearing the Burden: Unraveling the Challenges of Electronic Health Record Documentation for Residents

Authors: Ashita Tanwar[1], Siddharth Selvakumar[1], Shaheryar Asad[1], Bethany Joy[1], Vince Thomas[1], Nasrin Dhapa[2], Eldo Frezza MD MBA[1]

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Background: This thorough literature review investigates the significant burden placed on resident doctors by the current state of electronic health record (EHR) documentation. Particularly, residents are experiencing considerable strain on their time management and emotional well-being, resulting in prevalent burnout. We aim to highlight the specific challenges faced by medical residents due to the burden of increased documentation expectations and unintuitive EHR systems.

Methods: A literature review of 15 publications, including quantitative studies of EHR metrics and qualitative surveys of residents' experiences, was conducted to compile and analyze the burden of EHR documentation upon residents.

Results: Our findings highlight the significant impact of EHR documentation on medical residents. Time constraints emerged as a primary concern, leading to compromised patient care and increased emotional burden. The correlation between excessive EHR tasks and burnout is evident, emphasizing the urgent need for improvements in current systems.

Discussion: To alleviate these challenges, we propose potential improvements to current EHR programs. Making user interfaces more intuitive, incorporating dictation technology, and integrating artificial intelligence to automate routine tasks are among the suggested enhancements. These innovations aspire to streamline the documentation process, allowing residents to improve patient care and reduce their risk of burnout.

Conclusion: This research sheds light on the critical issue of EHR-related burden experienced by resident doctors. By understanding the challenges and proposing practical solutions, we hope to contribute to the ongoing dialogue surrounding burnout in the medical field, ultimately fostering a healthier and more efficient work environment for medical professionals.

Group B74

Title: An Analysis of Dermatology Match Statistics and Other Metrics of Competitiveness

Authors: Tiffany R. Wong, MPS[1]; Mildred Min, BS[1]; Emma McIntyre, BS[1]; Kishore M. Bharadwaj, MS, MPS[1]; Bhagvat Maheta, BS[1]; Victor Huang, MD[2]; Michael S. Wong, MD[1]
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Introduction: Dermatology is recognized as a competitive specialty. We sought to assess its competitiveness to better inform applicants how to increase their chances of matching into dermatology residencies.

Methods: We reviewed the National Residency Matching Program's (NRMP's) Annual Main Residency Match *Results and Data* (2008-2023) for Dermatology match rates and *Charting Outcomes* (2007-2022) for mean Step scores, research productivity (number of experiences and abstracts/presentations/publications), volunteer experience, percent in AOA, and contiguous ranks (number of ranked programs) of Dermatology-Matched Applicants (DMAs) versus Dermatology-Unmatched Applicants and All Matched Specialty Applicants (AMSAs) over time. To compare differences between the three groups, one-way ANOVA was performed for each metric followed by t-tests with Bonferroni corrections comparing DMAs against the other groups.

Results: From 2008 to 2023, PGY-1 dermatology match rates decreased from 15.9% to 10.4% while PGY-2 match rates fluctuated from 54.5% in 2008, to as high as 67.1% in 2020, and back down to 57.4% in 2023. Although the number of positions increased, the number of applicants increased proportionately, thus maintaining specialty competitiveness. Mean DMA Step-1 (238 to 248) and Step-2 (242 to 257) scores, research productivity (5.7 to 20.9), and volunteer experiences (7.7 to 11.0) increased over time and were significantly higher than other groups' means. Over time, mean AOA percentages decreased (51.4 to 39.7) for DMAs while other groups' means increased. All three applicant groups' *Charting Outcomes* metrics were significantly different from one another ($p<0.05$) as were all paired comparisons against DMAs ($p<0.025$).

Conclusion: While dermatology residency positions continue to expand, more applicants are applying, thus maintaining competitiveness. Matching into dermatology is increasingly competitive based on increasing Step scores, research productivity, and volunteer experiences.

Group B75

Exploring the Impact of CEO Educational Background on Academic Hospital Leapfrog Safety Grades and Revenue: A Data Analysis Review

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Objective: This review aims to investigate the influence of Chief Executive Officer (CEO) educational backgrounds on hospital performance metrics, specifically Leapfrog safety grades and hospital revenue in 2022. The goal is to discern patterns and correlations to shed light on the potential impact CEO education may have on patient safety outcomes as well as financial success.

Methods: 73 academic and university affiliated hospitals across the United States were included in the study. Information regarding CEO background was obtained through hospital websites, while total revenue was obtained through the American Hospital Directory (AHD). Leapfrog safety scores were found through the Leapfrog Safety Grade website. The study analyzed the distribution of safety grades and total revenue for 2022, comparing statistics between hospitals with CEOs with varying educational backgrounds (MD, MBA, MHA, etc.) Additionally, variables including hospital size, location, and total patient days were included.

Results: 27 hospitals were led by MDs, 9 of which were MD/MBAs, 13 were led by MBAs, 9 were led by MHAs and 17 were led by CEOs with other degree types. The average number of beds was similar regardless of CEO background at 688 (595-749). Of the 18 A-rated hospitals included, 5 (27.7%) were led by physicians, 5 by MBAs (27.7%), 3 (16.6%) by MHAs, and 4 by other degree types (22.2%). Hospitals led by MHAs saw the highest average patient revenue during 2022 at $7.826 billion USD while those led by MDs with no other degrees saw the lowest average revenue at $3.848 billion USD. Among hospitals led by MDs with and without other degrees, MD/MBA CEOs saw a 54% higher average revenue than hospitals led by MDs without other degrees.

Conclusion: The present study contributes to the discourse surrounding the impact of educational background on hospital leadership, with particular emphasis on safety grade outcomes and financial success in the year 2022. The findings suggest CEO educational background has less of an impact on overall hospital performance than what may have previously been hypothesized. However, depending on the main priorities of a hospital with regard to financial outcomes, certain CEO backgrounds may be preferred over others. This study has the potential to assist academic health centers in selecting CEO candidates best suited to meet their healthcare quality and financial goals.

Group B76

50 to 89-Year-Old Patients Discharged Home on the Surgery Day and Self-Administering Their Rehabilitation Have a Similar Pace of Recovery after Kinematically-Aligned Total Knee Arthroplasty

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Introduction: The study analyzed patients treated with unrestricted kinematic alignment (unKA) total knee arthroplasty (TKA) who were discharged home on the surgery day and self-administered their rehabilitation to determine whether 'the pace of recovery' as measured by improvement in motion and patient-reported outcome measures between preoperative and 6-week follow-up and the incidence of 30-day readmission were different between patients 50-59, 60-69, 70-79, and 80-89 years of age.

Methods: Between November 2021 and May 2023, a single surgeon treated 206 consecutive patients. Preoperatively and at six weeks, patients filled out the Oxford Knee Score (OKS), Knee Society Score (KSS), Knee Function Score (KFS), and KOOS JR Score (KOOS) on an iPad.

Results: The analysis included 31, 79, 71, and 25 patients in the 50-59, 60-69, 70-79, and 80-89 age cohorts, respectively. The improvement in knee extension and flexion, OKS, KSS, KFS, and KOOS JR at six weeks relative to preop was not different between age cohorts ($p = 0.2319$ to 0.9888). For all patients, the mean improvement/6-week postop value was 6°/-2° for knee extension, 0°/119° for knee flexion, 7/31 for the OKS, 39/96 for the KSS, 7/64 for the KFS, and 13/62 for the KOOS.

Conclusions: Surgeons who perform unKA can counsel 50 to 89-year-old patients that they can expect a similar pace of recovery, regardless of age, as measured by better motion and PROMs at six weeks than preoperatively with a small 30-day risk of hospital readmission (1%) and emergency room treatment (2%) after being discharged home on the surgery day and self-administering their rehabilitation.

Group B77

Where Will I Go? Relative Location of Physical Medicine & Rehabilitation Residencies Compared to Medical Schools Among Recent Graduates

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Introduction: Physical Medicine and Rehabilitation (PM&R) is a relatively new field but has rapidly been garnering interest as healthcare increases the emphasis on rehabilitation and management for acute and chronic diseases. This study analyzes recent geographical trends of PM&R residents and the influence it has when pursuing residency.

Methods: PM&R residents from class of 2022 to 2026 were identified from publically available data. The relative distribution from medical school to residency, medical school to preliminary program, preliminary program to residency were analyzed. These locations were categorized as within 100 miles, same state, same region, or different region. Additionally, the odds ratio (OR) were calculated for the aforementioned relative locations with respect to the presence of a home residency program at the residents' medical school.

Results: A total of 1836 residents, from 91 (85%) Accreditation Council for Graduate Medical Education (ACGME) accredited PM&R programs. There were 37 (40.7%) categorical, 44 (48.4%) advanced, and 10 (10.9%) combined programs. The preliminary years that were completed by advanced residents were Internal Medicine (54.3%), Transitional Year (32.8%), General Surgery (11.8%), and Pediatrics (1.1%). The majority of residents (51%) stayed within the same region as their medical school. Residents from medical schools with a home program were more likely to stay within 100 miles (OR: 3.64), the same state (OR: 3.19), and the same region (OR: 2.56).

Conclusion: Overall, PM&R residents are likely to stay within the same region as their medical school and preliminary year. Additionally, the presence of a home program significantly increases the odds of matching within 100 miles, same state, and same region.

Group B78

A COMPREHENSIVE LITERATURE REVIEW ON GASTRIC VOLVULUS AS A COMPLICATION OF HIATAL HERNIA

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Objective: Gastric volvulus (GV) is a rare and poorly recognized condition that occurs when the stomach rotates itself along its transverse or longitudinal axis and often results as a complication of hiatal hernia. The purpose of this paper is to investigate the etiology, causes, presentation, diagnostic methods, and treatment of GV cases that result as a complication of hiatal hernia.

Method: Using the PubMed search engine, 16 recent case reports were selected from the last 4 years with the search term: "Gastric volvulus + hiatal hernia." The topic of choice was GV as a complication of hiatal hernia. The etiology, comorbidities, lifestyle factors, diagnostic tests, treatments, and results were recorded on an excel sheet and counted.

Results: The mean age of the patients was 69.875 (SD = 12.1867). 81.25% of the patients in the case reports were female (N = 13) and 18.75% were male (N = 5). Various lifestyle factors among the patients include Alcohol Use (12.5%) and Smoking history (12.5%). Common comorbidities include gastrointestinal reflux disease (31.25%), hypertension (31.25%), and diabetes (18.75%). Common symptoms include vomiting (93.75%), abdominal pain (68.75%), nausea (43.75%), constipation (6.25%), dark stool (25%), and necrosis of the gastrointestinal tract (25%). The most prevalent diagnostic procedure was a CT scan (93.75%). Most underwent successful surgical intervention (75%). There were no significant differences between males or females in any of the categories collected.

Conclusion: Our findings indicate that most patients presenting with GV and hiatal hernia are females, with no significant difference in any categories between sexes. The most common comorbidities were gastric reflux, hypertension, and diabetes. The most common presentations were vomiting, abdominal pain, and nausea. The diagnostic tool used was computed tomography. Finally, surgical interventions, namely gastropexy and fundoplication appear to be most effective.

Group B79

Use of Dexamethasone in Diabetic Patients Undergoing Total Knee or Hip Arthroplasty: A Systematic Review and Meta-analysis

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Objective: Dexamethasone has been shown to effectively reduce postoperative nausea and vomiting in orthopedic procedures like total hip and knee arthroplasty (Wegener 2016). However, the potential adverse impact on blood sugar glucose levels, especially in diabetic patients, necessitates thoughtful consideration and vigilant monitoring to balance its benefits and risks in the surgical perioperative context. The primary objective of this systematic review is to evaluate whether the administration of dexamethasone is beneficial in diabetic patients undergoing total joint arthroplasty.

Methods: A search following guidelines established by the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) was performed in three databases to find relevant studies. The query was performed utilizing the Boolean search phrase "((dexamethasone) AND (diabetic)) AND (((total joint) OR (total knee)) OR (total hip))."

Results: A total of 10 retrospective studies were included in this systematic review. The most important finding of this study was that compared to control diabetic patients who did not receive dexamethasone, administration of dexamethasone in diabetic patients undergoing TJA resulted in significantly elevated glucose levels on postoperative day 1 (POD1); however, by POD3, the situation had reversed with controls demonstrating significantly higher glucose levels compared to the dexamethasone group. Additionally, incidences of complications, infections, and readmissions were similar between intervention dexamethasone and control groups.

Conclusion: Administration of dexamethasone pre- or peri-operatively in diabetic patients results in an elevated POD1 glucose level, which returns to baseline levels by POD3. Further investigation is warranted regarding usage amount, number of doses, and timing of administration to optimize the beneficial effects of dexamethasone while preventing excessive hyperglycemic effects in diabetic patients.

Group B80

Factors Influencing Leapfrog Safety Grades in California Hospitals: A Comprehensive Data Analysis Review

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Background: The state of California is home to diverse healthcare institutions; thus, the thorough assessment of hospital safety protocols and practices is critical. Known for its emphasis on patient safety and stringent healthcare regulations, California houses 284 hospitals participating in the Leapfrog Safety Grade system. By critically assessing hospitals in California, our goal is to provide patients and healthcare workers alike with a holistic view of the current landscape of healthcare in the state.

Methods: 284 hospitals across California were included in the study. Hospitals were categorized by geographic region, size, rural/urban classification, and larger system affiliation status, facilitating a nuanced understanding of the interplay between these variables and Leapfrog safety grades.

Results: Of the 284 hospitals included in the study, 95 were given a grade of A, 68 given a grade of B, 93 given a grade of C, 23 given a grade of D, 2 given a grade of F, and 3 were not graded. On average, hospitals that received a grade of D were significantly smaller than those that received a grade of A, while hospitals that received a grade of B or C were similar in size. 107 hospitals were affiliated with a larger healthcare system. 70% of hospitals affiliated with a system received an A or B grade, while 50% of unaffiliated hospitals received an A or B grade.

Conclusion: The results demonstrate a need for improving healthcare access and quality in medically underserved urban and rural areas. Hospitals in rural areas are often understaffed and under-resourced, which may have contributed to the lower grades in those regions. Additionally, hospitals affiliated with a larger healthcare system received higher grades than unaffiliated hospitals, suggesting that affiliation may also play a role in the implementation and mitigation of factors that contribute to Leapfrog Safety Grades.

Group B81

Immunosuppression and impaired fracture healing in polytrauma

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Introduction: Bone healing is primarily concerned with treating isolated fractures in orthopedic patients. However, fractures in over 30% of polytrauma patients with multiple injuries exhibit impaired healing. There are significant gaps in our understanding of how fractures heal in this polytrauma environment.

Objectives: We aimed to characterize the temporal local and systemic immune responses to polytraumatic injuries in a polytrauma murine model using four experimental groups including healthy, chest trauma, isolated fracture and polytrauma groups.

Methods: To study the local and systemic immune responses and cytokine expression after injury, we collected serum, bone marrow from uninjured limb, femur, and lungs after 0 h, 6 h, 12 h, 24 h, 72 h & 3W of healing. Immune cell distribution from isolated bone marrow, femur, or lung tissue were assessed with a BD Fortessa 18-color flow cytometer. Femur tissues were collected after 3 weeks to study fracture healing using micro computed tomography, histological staining, immunohistochemistry, torsion test and small angle X-ray scattering. **Results:** Our flow cytometry results indicated significantly higher expression of innate immune cells in the polytrauma group compared to other groups locally and systemically. On the other hand, the expression of B and T cells was dramatically suppressed in this group after 6h of trauma and remained low throughout the 3 weeks' timeline of the study. The decreased expression of B and T cells demonstrated an exhaustion of the adaptive immune system response that could be a contributor to fracture nonunion (**Figure 1A**). Our data confirms the early, dysregulated inflammatory state in polytrauma which correlated well with our data on the bone formation characteristics indicating the formation of a poor and dysregulated callus in this group (**Figure 1B&C**).

Conclusions: Taken together, this study elucidates the role of persistent immune and inflammatory dysregulation that could lead to poor fracture healing.

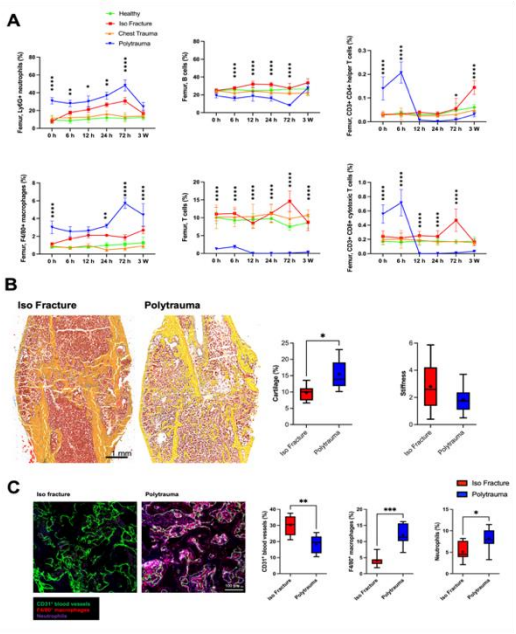

Figure 1. A) Local versus systemic innate and adaptive immune response to polytrauma. Flow cytometry data comparing the percentage of neutrophil, macrophage, T cells and B cells at the femur fracture site (local), lungs and bone marrow (systemic). BM (bone marrow). **B)** Innate immune response and blood vessel formation to polytrauma at the fracture site. Immunohistochemical analysis of CD31+ blood vessels (green color), F4/80+ macrophages and neutrophils at the fracture site for isolated fracture and polytrauma groups. **C)** Statistical analysis and representative images of monitoring bone healing in three groups including healthy, isolated fracture and polytrauma using Movat Pentachrome histology staining for mineralized tissue (yellow), non-mineralized tissue (red), cartilage formation (green), bone marrow (brown) (scale bars = 1 mm). N=8. Significant differences were presented as *P < 0.05 and **P < 0.01, ***P <0.001 and ****P <0.0001.

Group B82

Hangman's Fracture: Don't Hang Around, It Could Be Incidental. A Case Report and Review of the Literature

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Introduction: Neck injury fractures are commonly associated with high-impact trauma such as motor vehicle accidents or falls from heights. However, this case underscores that it is possible to sustain a C2 Hangman's fracture even from a minor fall. As of now, there are no such reported cases. The objectives of this study are to present a unique case study and review the literature surrounding this type of fracture, emphasizing the importance of obtaining a thorough medical history in cases of in-home injuries to prevent serious complications.

Methods: This is a case report of a patient with an incidental Hangman's fracture after a fall. He did not present to the emergency room but was diagnosed in clinic after a CT of the neck.

Results/Case Description: A 59-year-old male experienced a fainting episode after suffering from vomiting and diarrhea, resulting in him hitting his head. The patient attributed his neck pain to a sudden twisting of his neck. The pain originated from the base of his skull, primarily on the left side, and extended to the scalp and the left shoulder. After enduring four days of intense pain that limited his ability to rotate his neck and bend to tie his shoes, he sought medical attention and underwent a neck CT scan, which led to the diagnosis of a Type 1 "Hangman Fracture." He was treated conservatively by the neurosurgeon with hard collar for 3 months.

Conclusion: Healthcare providers should inquire about the circumstances of the fall, the patient's position, associated symptoms, and any relevant pre-existing conditions. This approach ensures an accurate diagnosis and timely treatment. Comprehensive history-taking is essential for identifying high-risk situations and preventing complications that may arise from overlooked minor falls, ultimately enhancing patient safety, especially in cases of neck and spine injuries.

Group B83

Outcomes of Surgical versus Non-Surgical Treatments of Iliopsoas Impingement After Total Hip Arthroplasty: A Systematic Review and Meta-analysis

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Objective: To evaluate studies reporting outcomes of both nonsurgical and surgical treatments of iliopsoas impingement (IPI) after total hip arthroplasty (THA) through analysis of patient reported outcomes (PROs), complications, persistence of IPI symptoms following treatment, and the need for further or revision surgery.

Methods: A systematic review following guidelines established by the Preferred Reporting Items for Systematic Reviews and Meta-analyses was performed in three databases regarding IPI after THA. Studies were categorized based on the specific treatment modality: conservative treatment consisting of steroid injections, iliopsoas tenotomy, or acetabular revision.

Results: Six studies (151 patients) discussed conservative treatment, 21 studies (452 patients) discussed iliopsoas tenotomy, and five studies (103 patients) discussed acetabular revision as treatment options for IPI after THA. The mean preoperative to postoperative Harris Hip Scores (HHS) for the three groups were 64.8 to 78.6 ($P = 0.03$), 54.9 to 83.1 ($P < 0.00001$), and 56 to 82.4 ($P < 0.00001$), respectively. The complication rate for surgical treatment was 2.3% in the iliopsoas tenotomy group and 15.7% in the acetabular revision group. Persisting IPI symptoms were noted in 53.6% (conservative), 17.8% (iliopsoas tenotomy), and 12.6% (acetabular revision) of patients. Further or revision surgery was required by 16.4% (conservative), 4.5% (iliopsoas tenotomy), and 3.9% (acetabular revision) of patients.

Conclusion: Iliopsoas tenotomy and acetabular revision are successful treatment options for IPI after THA, with tenotomy yielding a lower complication rate in comparison to revision. However, conservative management has relatively much higher rates of both persisting IPI symptoms and requirement of further surgery, and is therefore not recommended for long-term relief of IPI.

Group B85

Arthrex Achilles Midsubstance SpeedBridge™ Repair: A Case Report, Surgical Narrative, and Review of the Literature

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Introduction: Historically, Achilles tendon (AT) ruptures have been surgically managed with the open repair technique; however, open repair is associated with a higher incidence of complication (i.e. infections, wound complications, deep venous thrombosis, or sural neuritis) when compared to the more recently developed minimally invasive techniques. Mini-open repairs are a form of minimally invasive surgical repair of AT ruptures that provides better visualization of the sural nerve and decreased risk of soft-tissue complications compared to percutaneous and open repair techniques, respectively. We present a case of a young patient with unique AT rupture characteristics and delayed weight-bearing status following the Arthrex Achilles Midsubstance SpeedBridgeTM Repair.

Case Description: A 26-year-old male suffered an acute left lower-limb injury while playing basketball after landing on the plantar aspect of his left forefoot and attempting to run from a dorsiflexed position. He presented to the emergency department with a positive Thompson's test and palpable defect present in the left AT. Partial AT rupture was suspected based on ultrasound. The patient opted to pursue surgical intervention two weeks after the initial injury after consultation with podiatry indicated a complete AT rupture.

Intraoperative findings revealed a complete AT rupture to be more proximal than typical, with a 5-6 cm gap and AT shredding noted at the rupture site. The unique nature of the AT rupture left the proximal rupture site thin and slightly shredded following repair. Consequently, additional precautions were taken concerning the patient's weight bearing status and return to activity.

The postoperative period was complicated by international travel three weeks after surgery and prolonged non-weight bearing status, which prompted the development of calcaneal osteopenia.

Discussion: This case illustrates an AT rupture with unique pathology and the precautions implemented to ensure sufficient time for tendon regeneration.

Group B86

Optimizing Allopathic Anesthesiology Residency Applications: USMLE Changes and Key Success Factors

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Introduction: Each year, candidates from allopathic medical schools apply to anesthesia residency programs all around the country. The National Residency Matching Program (NRMP) has consistently reported aggregate data regarding matching outcomes, including more detailed information on each specialty.

Methods: We analyzed the different factors that encase a competitive allopathic anesthesiology applicant for residency programs. We also studied the impact of the USMLE pass/fail grading system on match outcomes as well as its effect on the weight of the other factors of a candidate's application, such as research, extracurricular activities, and test scores.

Results: We found that NRMP data showcasing the number of anesthesiology residency positions available compared to the number of programs displays a dichotomous trend - the rise of average positions per program from PGY-1 programs compensates for the falling number of positions from PGY-2 programs. When comparing matched anesthesiology applicants to unmatched applicants, nearly all charting outcome metrics outside of obtaining a PhD were significant in improving the likelihood that an applicant matches.

Conclusions: These findings will help guide future anesthesiology residency applicants to be more competitive during the application process. Eliminating a numerical Step 1 score may inadvertently harm applicants from lesser-recognized medical schools, who may experience diminished opportunities to interview at highly-ranked programs due to the loss of an inability to distinguish themselves with a top percentile test score. Accordingly, focusing on other quantifiable aspects of their application can potentially lead them to be more competitive as a candidate.

Group B87

Roles of TLR7 in the regulation of spinal neuroinflammation and chronic pain caused by systemic lupus erythematosus

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Study Aims: Treatment of chronic pain in patients with systemic lupus erythematosus (SLE) remains a clinical challenge due to the limited efficacy and safety profile of current analgesics. We recently demonstrated that controlling spinal neuroinflammation is an effective approach for the treatment of pain in mice with SLE. In this study, we aimed to explore roles of the TLR7 signaling pathway in the spinal neuroinflammation and synaptic plasticity in lupus mice with chronic pain.

Methods: MRL/lpr mice (SLE mouse model) and control mice were used. Behavioral assay, *in vivo* drug administration, molecular biology, and patch clamping techniques were used.

Results: MRL/lpr mice developed thermal hypersensitivity (chronic pain) starting from the age of 11 weeks. Lupus mice with chronic pain exhibited increased activation of microglia and astrocytes in the spinal cord. Protein expression of TLR7 was increased in the same area, which was temporally accompanied by elevated protein levels of cathepsin-B, phosphorylated p38, phosphorylated ERK. These pathological changes were recapitulated when spinal TLR7 was pharmacologically activated by TLR7 agonists (DSR). TLR7 was expressed in microglia but not in astrocytes or neurons in the spinal dorsal horn. Furthermore, frequencies but not amplitudes of miniature excitatory postsynaptic currents (mEPSCs) in lupus mice with chronic pain were significantly increased in comparison with those obtained from control mice, indicating that increased glutamate release from presynaptic nociceptive afferents contributes to increased neuronal activation in the spinal dorsal horn in lupus mice with chronic pain. Bath perfusion of the TLR7 agonist onto the normal spinal slices induced changes in mEPSCs similar to those in lupus mice.

Conclusions: TLR7 is critically implicated in the regulation of spinal neuroinflammation, enhanced glutamatergic synaptic activity, and genesis of chronic pain induced by SLE. Targeting the TLR7 signaling pathway may be a novel approach for management of chronic pain in SLE patients**.**

Group B88

The Effects of Gas Evacuation Techniques after Laparoscopic Abdominal Surgery on Postoperative Pain and Complications: A Systematic Review

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Introduction: Retention of intra-abdominal air following laparoscopic abdominal surgery can lead to increased postoperative pain. This has the potential to lead to increased pain medication utilization, longer hospitalizations, and increased risk of postoperative complications. This systematic review aims to evaluate the efficacy of active air removal techniques and their impact on postoperative well-being.

Methods: A comprehensive search was conducted on Cochrane, EMBASE, Pubmed, and Scopus databases yielding 4,334 randomized controlled trials. Studies were included if they met the following criteria: (1) randomized controlled trial design, (2) implementation of active air removal, (3) focus on surgical or procedural management, and (4) reporting of postoperative outcomes. Two reviewers independently screened titles, abstracts, and full-text articles using Covidence software. The Cochrane Risk of Bias tool was used to assess the methodological quality of included studies. A detailed analysis was conducted to categorize active air removal techniques and their impact on postoperative outcomes, including pain. This study protocol was registered to PROSPERO: CRD42023490335.

Results: Twenty studies including 1,936 patients undergoing active air removal techniques were included. Most focused on laparoscopic cholecystectomies. Eight studies utilized forms of suction drains, with six studies showing improved outcomes after 12 hours post-operation. Six studies tested the efficacy of active gas aspiration from a port site of which five demonstrated improved patient pain and decreased analgesic use. Additional studies focused on alveolar and pulmonary recruitment maneuvers and saline infusion at differing temperatures.

Conclusion: Gas evacuation techniques reduce postoperatiliuve pain and analgesic use and multiple techniques may be combined for greater efficacy. Future directions may consider testing gas evacuation techniques on different types of laparoscopic abdominal surgery.

Group B89

Title: Trends in Urology Residency Applications in the Last Ten Years

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Introduction: Residency match statistics across all disciplines, including urology, have changed dramatically over the last 10 years. There has been an overall increase in residency programs, positions, and applicants which is welcomed with the shortage of physicians in the US, especially for urologists which has seen significant declines in practicing physicians per capita. The goal of this study was to analyze the urology residency match statistics and identify trends over the last 10 years.

Methods: National urology residency match statistics from 2013 to 2023 were analyzed using publicly available data from the American Urological Association. Data extracted included: match year; number of programs, positions, applicants, and matches; and gender of matched/unmatched applicants. The match rate was calculated by dividing the number of applicants by the number of matches for each year.

Results: The number of urology residency programs and available positions offered has steadily increased from 117 programs with 279 positions in 2013 to 145 programs with 386 positions in 2023 (R^2=0.97 and R^2=0.98 respectively), and with greater variation, the total number of applicants has increased from 434 in 2013 to 508 in 2023 (R^2=0.36) (fig1A). In addition to the increasing class size, the percent female in accepted cohorts have also increased from 24.7% in 2013 to 37.1% in 2023 (R^2=0.70), with an increase in the match rate from 64.3% in 2013 to 75.4% match rate in 2023 (R^2=0.23) (fig 1B).

Conclusion: From 2013 to 2023, the number of programs and available residency positions has increased, along with the percent female matched. The number of applicants slightly declined from 2013 to 2019, however has increased after 2019. These findings demonstrate an increase in gender inclusion as well as a growing interest in urology as a subspecialty.

Group B90

Title: An Unusual Case of Secondary Recurrent Idiopathic HLH in a Middle-Aged Male Patient

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Abstract: Hemophagocytic Lymphohistiocytosis (HLH) is a life-threatening, rapidly-progressing disease, characterized by a hyper-inflammatory cytokine storm. HLH is divided into primary and secondary causes, the former occurring mainly in children due to genetic causes and the latter occurring mainly in adults due to immune dysregulation such as malignancies and viral infections. This study is a rare case of HLH in a healthy, young adult male who had recurrence after initial diagnosis and subsequent death secondary to hepatic encephalopathy. Our goal is to contribute to the limited body of knowledge regarding this rare condition and to improve the efficiency of providing potential HLH patients with an accurate diagnosis. A comprehensive literature review was conducted to find retrospective analyses, other similar case studies, and information on the etiology of HLH that would give insight into the clinical manifestations of this patient. Our patient was initially hospitalized for recurrent fever with unknown etiology and was diagnosed with HLH. The patient had been compliant with treatment. Laboratory workup showed leukocytosis, neutrophilia, thrombocytopenia, acute liver failure, hyponatremia, and hyperferritinemia. Initial treatment included etoposide, anakinra, and dexamethasone with initial improvement; however, the patient exhibited another HLH flare after dexamethasone was tapered down with the goal of completing a lymph node biopsy. This was carried out but provided inconclusive results. He was then empirically started on chemotherapy for a suspected underlying lymphoma. Soon after, the patient was admitted to the ICU due to worsening multiorgan failure and multifactorial encephalopathy as a result of liver failure and uremia, and was subsequently intubated. The patient passed away soon after. Although initial treatments improved his symptoms, his condition worsened, ultimately leading to the patient's death. Our case suggests that, even with the improvement of symptoms with treatment, determining the secondary cause is crucial in the effective treatment of the disease.

Group B91

Title: COVID-19 Disruption of Knee Arthroscopies

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The purpose of this study was to examine the proportion of patients who returned for their previously scheduled knee arthroscopy procedure following state-mandated cancellation of elective procedures during COVID-19 lockdown. We reviewed a retrospective cohort of patients who had planned knee arthroscopies, excluding ligament reconstruction and irrigation/debridement, cancelled for a date between March and June 2020. The cohort was evaluated for scheduling outcome, returned versus did not return for surgery, before March 2022. Cancellation and reschedule dates, reason for not returning for surgery, patient demographics, and planned surgical characteristics were collected. Characteristics between patients who returned versus did not return were compared using statistical tests of independence. The cohort consisted of 66 patients; 53 (80%) rescheduled and 13 (20%) did not return. For those who rescheduled, the average time between cancellation and surgery was 115 days (*sd*=16 days). There were various reasons for not rescheduling surgery: eight (62%) had symptom alleviation; two (15%) had logistical barriers; three (23%) were lost to follow-up. Obesity status had a trend towards significance with lower proportion of rescheduled procedures for non-obese patients (68%) compared to obese patients (89%, p=0.057). Our study highlights a natural experiment in forced delay of elective knee arthroscopies, which may be a surrogate for conservative management. The proportion of patients who did not return for a scheduled knee arthroscopy surgery (20%) is higher than what has been reported previously (11%) and 62% of these patients found symptom relief. However, 80% of the cohort did return for knee arthroscopy in within two years, suggesting delaying surgery will not alleviate symptoms for the majority of patients.

Group B92

Title: Orphan Applicants in Orthopedic Surgery: Where do allopathic applicants without an affiliated residency program match?

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Background: Orthopedic surgery is one of the most competitive specialties to match into a residency. With a plethora of qualified applicants and the subjective nature of matching into any residency program, it can be difficult to accurately assess the chances of successfully matching into orthopedic surgery. The purpose of this study is to examine orphan applicants in orthopedic surgery and compare match statistics with applicants with an affiliated residency home program.

Methods: This was a 5 year retrospective study from 2019 to 2023 looking at 115 United States Doctor of Medicine (M.D.) programs and their orthopedic residency matched students. For each medical school, we analyzed several variables: presence of a home program and number of orthopedic physician faculty, total number of orthopedic residency matches, percentage of orthopedic matches, residency program matched into, if the student took a gap year for research during medical school, and residency program affiliation (academic, community, university-affiliated community based, military).

Results: Of the 2066 total matched applicants from institutions with home programs, 1508 (72.99%) matched into academic centers, 315 (15.25%) into university-affiliated community programs, 172 (8.33%) into community programs, and 71 (3.44%) into military programs. In contrast, of the 219 total matched applicants from institutions without home programs 144 (67.75%) matched into academic programs, 36 (16.44%) into university-affiliated community programs, 28 (12.79%) into community programs, and 11 (5.02%) into military programs. Across the 5 years, an average of 17.5% of applicants matched internally at their home programs.

Conclusion: Students with home programs matched into academic programs at a significantly higher rate than students without home programs, while students without home programs matched into community programs at a significantly higher rate than students with home programs.

Group B93

Title: Fat Droplets in the CSF Spaces of the Brain

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Introduction: It is rare to find fat droplets free floating in the CSF spaces of the brain. When fat droplets are seen in the CSF spaces, the most common cause is rupture of a dermoid cyst. Intracranial dermoid cysts are rare, benign cysts composed of epidermal and dermal structures. These include abnormal proliferation of fat cells, squamous epithelium, hair follicles, teeth and sweat, apocrine and sebaceous glands.[1] Dermoid cysts are congenital inclusion cysts that form during neural tube closure between the third-fifth weeks of embryogenesis.[2]

Case Presentation: We describe a case of a 73-year-old, right-handed female who presented with an acute onset of visual disturbances and left-hand numbness. Visual disturbances were blue prisms. Headache, speech and language disturbances were absent. Vitals obtained: BP 134/79, HR 84 BPM, RR 22 and O_2 saturation 98%. CT and MRI of the head revealed hypodense "lesions" in the lateral ventricles and basal cisterns. The CT Hounsfield unit was –41 to -83 HU, compatible with fat rather than air. The T1 weighted and FLAIR MRI showed hyperintense lesions "floating" on top of the CSF in the lateral ventricles typical for fat droplets presumably caused by a ruptured dermoid cyst. Imaging showed no evidence of residual cyst or hydrocephalus, and the patient was discharged.

Discussion: Hounsfield units distinguish lesions by density; fat ranges -50 to –150 HU and air is –1000 HU. Pneumocephalus is the presence of air in the epidural, subdural or subarachnoid space.[3] Pneumocephalus is relatively common following neurotrauma/neurosurgery and can cause confusion, nausea, seizures and focal neurological symptoms. [3] A feared complication of dermoid cysts is rupture that can lead to seizure, cerebral ischemia, chemical meningitis and obstructive hydrocephalus.[1] Careful analysis of neuroimaging findings in the CT with or without MRI is important in making a correct diagnosis of pneumocephalus vs a ruptured dermoid cyst.

Group B94

Title: Navigating Medical Education: A Longitudinal Study on the Impact and Preferences of Flipped Classroom Teaching

Authors: Dylan Cooper[1], Garrett Henkle [1], Pranshul Goel [1], Justin Tang [1], Savannah Zemeida [1], Alyssa Abram [1], Yennie Shyu [1], Alyssa Abram [1], Esther Chang [1], Emily Chou [1], Valerie Gerriets [1], John Cusick [1]
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STUDY OBJECTIVES: Medical educators are looking for novel teaching pedagogies that cater to both the evolving healthcare atmosphere and today's generation of future physicians. Our objective was to investigate the effectiveness and student perceptions of one such teaching strategy, the "flipped classroom", over the span of four academic years at California Northstate University College of Medicine.

METHODS: From 2021 to 2023, each data collection corresponded to one of three potential immunology lectures presented. To evaluate student understanding of immunology content participants were randomly placed into one of three groups in which a quiz was given after (1) watching a pre-recorded voiceover lecture and attending an in-class Jeopardy-style review game ("flipped classroom"), (2) attending an in-person lecture, or (3) no use of any learning modality (blind control). Likert scale-associated surveys assessing how participants perceived the voiceover lecture and review game were concomitantly given with each quiz.

RESULTS: Quiz results showed that students in the control group scored significantly lower than students in either the traditional lecture group or the flipped classroom group. No significant difference was found between average scores in the lecture group vs. the flipped classroom group. Survey results indicated that medical students enjoy third-party resources, and largely prefer active learning practices in concordance with the "flipped classroom" to traditional lecture format, albeit by a small margin. Students assessed in 2021 showed the highest preference for voiceovers, while students whose data was collected in each year thereafter showed progressively declining interest in voiceovers. In contrast, student enthusiasm for review games remained relatively consistent throughout the longitudinal study.

CONCLUSION: Medical students appear to prefer a combination of traditional lectures, third-party resources, and "flipped classroom" teaching. The comparable efficacies and perceptions of both traditional lecture format and the "flipped classroom" suggests potential future directions in medical school curricula.

Abstract ID: B95

Title: Assessment of Characteristics and Methodological Quality of the 50 Most Cited Articles in Hip Arthroscopy

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Background: The purpose of this study is to analyze the characteristics and methodological quality of the 50 most cited articles related to hip arthroscopy.

Methods: The Clarivate Analytics Web of Knowledge database was queried for articles related to hip arthroscopy. Characteristics of the 50 most cited articles were recorded, and methodological quality was assessed using the methodological index for non-randomized studies (MINORS) and modified Coleman Methodology Score (MCMS). Correlations between study characteristics and methodological quality were determined using the Spearman correlation coefficient (RS).

Results: The top 50 articles were published between 1998 and 2019, with the mean number of citations, citation density, and LOE being 241.1 ± 79.1 (162-631), 19.8 ± 11.2 (4.9-64.8), and 3.5 ± 0.8 (1-4), respectively. 31 articles eligible for methodological assessment had a mean MINORS score and MCMS of 13.2 ± 4.4 (5-24) and 63.0 ± 16.0 (28-96), respectively. Articles published after versus before 2010 had a significantly higher mean citation density ($P < 0.0001$), level of evidence (LOE) ($P = 0.0013$), MINORS score ($P = 0.0017$), and MCMS ($P = 0.002$). A greater citation density was significantly correlated with a greater number of total citations, LOE, MINORS score, MCMS, and more recent publication year (RS = 0.46-0.84). A greater LOE was significantly correlated with a higher MINORS score, MCMS, and more recent publication year (RS = 0.50-0.58). A more recent publication year was significantly correlated with higher MINORS scores and MCMS (RS = 0.65 and 0.83).

Conclusions: Among the top 50 articles, there was a temporal shift towards higher methodological quality, LOE, and citation density, suggesting that more recent research in hip arthroscopy may be better suited to making data-driven patient-care decisions.

Abstract ID: B96

TITLE: A Comparison of Diagnostic Criteria for Mild Cognitive Impairment in the Prediction of White Matter Hyperintensities in Aging Veterans

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Study Objectives: Mild cognitive impairment (MCI), a common clinical condition in aging, represents a critical phase substantially raising risk for progression to dementia such as Alzheimer's disease (AD). Neuropsychological criteria was shown to more accurately predict this transition in older adults compared to typical criteria and have stronger associations with AD biomarkers. Few studies have investigated how these criteria may relate to neuroimaging-based biomarkers. We compared three MCI diagnostic schemes: 1) neuropsychological criteria; 2) Alzheimer's Disease Neuroimaging Initiative (ADNI) criteria; and 3) typical MCI criteria by their associations with neuroimaging-based biomarkers in a sample of nondemented Vietnam-era Veterans.

Methods: 228 Veterans (mean age=69.65) were evaluated for MCI according to 1) ADNI criteria: subjective memory concern, WMS-R Logical Memory below cut-offs, and Clinical Dementia Rating Global=0.5; 2) Neuropsychological criteria: >1 standard deviation (SD) below norms on two tests within any cognitive domain, or one test across domains; and 3) Typical criteria: subjective memory concern, >1.5 SD below norms on any 1 test score. Neuroimaging metrics included log-transformed total white matter hyperintensity volume (log-WMH) from FLAIR MRI sequences, hippocampal volume, and cortical thickness in temporal regions calculated by Freesurfer software from T1 scans. Linear regression models evaluated relationships between MCI diagnosis and neuroimaging measures, adjusting for age, education, and hypertension history.

Results: MCI diagnosis by neuropsychological criteria was associated with higher log-WMH (B=0.43, SE=0.18, p=.02). MCI diagnosis by ADNI or typical criteria was not associated with log-WMH (p>.05). None of the criteria were associated with hippocampal volume or temporal cortical thickness.

Conclusions: When compared to two widely used MCI diagnostic schemes, neuropsychological criteria are more strongly associated with the presence of cerebrovascular disease evidenced by WMH burden. MCI diagnostics would benefit from incorporating comprehensive neuropsychological methods that more effectively predict neurological changes known to increase risk for dementia in at-risk older adults.

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