Missouri Health

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Editorial Leadership

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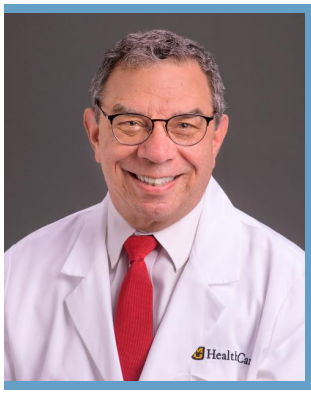
School of Medicine



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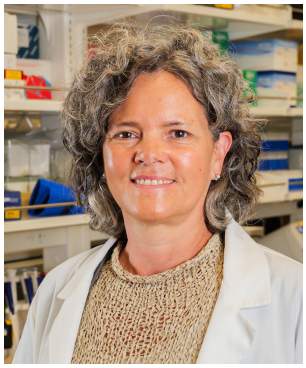

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Table of Contents

About the Cover

By Marie Nau Hunter

Deputy Director
Museum of Art and Archaeology
University of Missouri-Columbia

On front: Frank Stack (American, b. 1937), *Red Campus/View of Columbia*, 1975, watercolor on paper, bequest of Frances Thompson Kyllonen (2006.75)

We are so pleased that *Missouri Health* editors have again looked to the Museum of Art and Archaeology's permanent collection when selecting a cover image for this publication. With more than 16,000 objects in our care and very limited gallery space, we are especially pleased when alternative avenues for highlighting art present themselves.

The selection, by well-known and much-loved local artist Frank Stack, memorializes many of the university's most recognizable buildings. Jesse Hall's dome; the spires of Memorial Union; and the tower of red campus' Pickard Hall, the museum's longtime home from 1976 until 2013; are all visible above the horizon line. A skilled watercolorist, Stack came to MU in 1963 to teach in its department of art (now called the School of Visual Studies) until his retirement in 2001. Stack still lives in Columbia.

While *Red Campus/View of Columbia* is not currently on view at the museum, many other paintings, drawings, and prints are displayed, as well as sculpture, textiles, and mixed media objects. This spring semester, three new exhibitions will open in addition to the ongoing displays in the Gallery of European and American Art and the Saul S. and the Gladys D. Weinberg Gallery of Antiquities, named in honor of the museum's founders.

Please plan a visit to the museum to see works of art as they are best viewed, in-person. The museum is located in the heart of campus, in the lower east side of Ellis Library, with entrances off Hitt Street, Lowry Mall, and from within Ellis. Regular hours during the week are 10 a.m. to 4 p.m. Tuesday through Friday, and noon to 4 p.m. on Saturdays and Sundays. Admission to the museum is always free.

For more information, including a calendar of events and a searchable database of the museum's permanent collection, visit maa.missouri.edu.

Advancing Health Sciences Through Collaborative Innovation

By W. David Arnold, MD

Editor-in-Chief, Missouri Health
Executive Director, NextGen Precision Health Initiative
Professor of Physical Medicine and Rehabilitation, Neurology, and Medical Pharmacology and Physiology
University of Missouri-Columbia School of Medicine

As we launch Volume 2, Issue 1 of *Missouri Health*, I would like to emphasize the profound impact that multidisciplinary collaboration has on advancing health sciences. This issue highlights the remarkable work being done by students, clinicians, and researchers at the University of Missouri and beyond, all united in the mission to improve patient care through innovation and rigorous scientific inquiry.

This edition showcases a diverse array of studies spanning molecular science, public health, clinical interventions, and health disparities. From exploring the complexities of COVID-19's neurological impacts to advancing treatments in triple-negative breast cancer and pediatric spasticity, each contribution reflects a commitment to addressing real-world health challenges and improving patient outcomes.

What makes this issue particularly inspiring is the breadth of research that bridges the gap between the laboratory and the clinic. Whether it's pioneering virotherapy approaches in oncology, optimizing surgical outcomes in orthopedics, or tackling barriers in diabetic retinopathy screening in rural Missouri, these studies exemplify the power of translational research to directly impact patient care.

The abstracts from the 2024 Health Sciences Research Day further underscore the depth of talent and curiosity within our academic community. It is inspiring to witness the next generation of physicians and scientists taking on critical health issues while pushing the boundaries of medical knowledge. These emerging leaders are not only advancing science but also shaping the future of healthcare.

This issue also reflects our ongoing commitment to inclusivity in research and education. Studies examining disparities in heart failure outcomes based on insurance status or assessing racial consciousness in medical education remind us of the vital role that social determinants play in patient care. Addressing these disparities is crucial to achieving equitable health outcomes for all.

At the heart of *Missouri Health* is a dedication to fostering innovation and collaboration across disciplines. This publication serves as a platform for sharing discoveries, sparking dialogue, and encouraging future research that will continue to transform healthcare. I hope that the work presented here will inspire new ideas, promote interdisciplinary partnerships, and contribute to the collective goal of advancing health sciences.

I extend my deepest gratitude to our editorial team, contributors, and the broader University of Missouri community for their hard work and dedication. Together, we are shaping the future of health sciences and improving lives in Missouri and beyond.

W. David Arnold, MD
Editor-in-Chief, Missouri Health
Executive Director, NextGen Precision Health Initiative
Professor of Physical Medicine and Rehabilitation, Neurology, and Medical Pharmacology and Physiology
University of Missouri-Columbia School of Medicine

The Next Generation of Missouri Health

By Jay Devineni

Managing Editor, Missouri Health
Class of 2025
University of Missouri-Columbia School of Medicine

When we launched *Missouri Health* in April 2024, we did so with the goal of liberating health care trainees from the pervasive predatory practices that plague many medical journals. With our open-access philosophy, we have published over 600 abstracts (including the ones in this issue), almost all of which were written by learners at the University of Missouri-Columbia. But this journal is not just about decreasing barriers to publication. It also strives to stimulate scientific creativity.

To that end, we are proud to announce that with the publication of this issue, we are moving beyond our initial phase of exclusively publishing abstracts and will officially begin accepting a wide variety of full-length submissions. These can include original research, review articles, case reports, perspective/commentary pieces, and clinical images/media. Submission of pilot data and other early work performed by our students, residents, fellows, and postdoctoral researchers is also highly encouraged.

Of course, we will still accept abstracts, and we remain committed to the annual publication of the work accepted to Health Sciences Research Day and other scientific meetings on our campus. But we hope that many of those abstracts, including some in this issue, will be featured as full-length articles in future issues of the journal. With that in mind, I am delighted to present the abstracts on the following pages from Health Sciences Research Day 2024, not just as a showcase of the next generation research performed by trainees at MU, but also as a mark of transition to the next generation of *Missouri Health*.

Jay Devineni
Managing Editor, Missouri Health
University of Missouri-Columbia School of Medicine, Class of 2025

Letter from the Founding Editor

By Richard J. Barohn, MD

Founding Editor, Missouri Health
Executive Vice Chancellor for Health Affairs
Hugh E. and Sarah D. Stephenson Dean, MU School of Medicine

I am pleased that we are now publishing Volume 2, Issue 1 of *Missouri Health*. This issue contains most of the abstracts presented at the November 2024 Health Sciences Research Day. The goal is to continue to publish abstracts from this annual event, as well as from other scientific meetings held on campus.

I want to congratulate all of the student and faculty editors for creating an impressive academic publication. In particular, I know that Jay Devineni has put in a great deal of effort from the inception of this project. I especially enjoyed his editorial in this issue in which he states that medical journals such as this one, emanating from a school of medicine, greatly benefit students and also, in a small way, decrease the power of large companies over access to publishing.

In addition, as Jay announced in his editorial, *Missouri Health* is now crossing the milestone of accepting full length articles. These can be articles based on previously published abstracts, or they can be case reports, case series, pilot data, and other early work done by our students, residents, fellows, and post docs under the supervision of our faculty.

Congratulations to Jay on his upcoming graduation. I am confident that the other managing editors will continue to produce outstanding future issues. As years go by, I look forward to the next generation of medical students getting involved with *Missouri Health*.

Thanks also go to Dr. Dave Arnold, the executive director of the NextGen Precision Health Initiative, for serving in the role of senior faculty adviser to *Missouri Health*. Dr. Arnold is an ideal physician scientist leader who shares my passion for working with students and encouraging them to publish early in their careers.

As with the previous issue, I want to thank Marie Nau Hunter, the Deputy Director of MU's Museum of Art and Archaeology. She provided an informative summation about the work of art that the student editorial board selected for this issue's cover. As a life-long aficionado of all art forms, and an avid collector of visual arts, I believe strongly in the value of health care professionals and scientists taking moments out of their busy work life to appreciate and consume the arts. I am so pleased that the student editorial board has embraced the idea of featuring original visual art on the journal's cover. What a great example of making time to consider a beautiful image that is magnified by publicizing the selection for all to enjoy in this open access journal format.

Richard J. Barohn, MD
Executive Vice Chancellor for Health Affairs / Hugh E. and Sarah D. Stephenson Dean, School of Medicine

Exploring the link between COVID-19 and migraine onset in ophthalmology patients: A retrospective study

Nadine Abdeljabbar,[1] Amal Hamed,[1] Donia Shawn,[1] Kasem Rifai,[1] Hetty Bai,[1] Daniel Cho,[1] Vaibav Nandeesh,[1] Divya Pothuri,[1] Jieon Kim,[1] Ayan Farah,[1] Samer Hajji,[1] Brady Blanton,[1] Thomas Varghese,[1] Safa Ahmad,[1] Kinda Sibert,[1] Rawan Ebada,[1] Ayman Sulieman MD[1,2]

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Introduction

Migraines have been reported as a neurological complication associated with COVID-19. This study aims to investigate whether COVID-19 is correlated with the new onset of migraines, and to assess the influence of potential risk factors such as hypertension, smoking, and other comorbidities in increasing or decreasing this likelihood.

Methods

A retrospective evaluation was conducted on patients diagnosed with both COVID-19 and migraines. Variables studied included population characteristics, comorbidities, clinical examinations, and the time interval between COVID-19 diagnosis and migraine onset. Comparisons were made to assess the relationship between risk factors and migraine occurrence, focusing on the likelihood of new-onset migraines in patients with prior COVID-19 infection.

Results

The study included a cohort of 40 patients, with an average age of 43.8 years, of whom 82.5% were female. Smoking was the most prevalent risk factor, present in 55% of patients, followed by hypertension (40%) and hyperlipidemia (35%). The analysis showed significant correlations between age and hypertension ($r = 0.48$), age and hyperlipidemia ($r = 0.41$), and BMI and diabetes ($r = 0.39$).

Conclusion

The findings suggest a potential correlation between COVID-19 and the new onset of migraines, particularly in patients with pre-existing conditions like hypertension and smoking. These risk factors may increase the likelihood of developing migraines following a COVID-19 infection. Further research is needed to explore the underlying mechanisms linking COVID-19 and neurological manifestations such as migraines.

Various pain control interventions during IUD insertion: A systematic review

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Introduction

Management of pain during intrauterine device (IUD) insertion is a topic that has been heavily contested in the literature since as early as 1980. Various options, from NSAIDs, opiates, different formulations and applications of local anesthetics, virtual reality, ultrasound guidance, aromatherapy, and acupuncture, have been evaluated for their efficacy in pain reduction during IUD insertion. Pain during the insertion procedure is a widely cited reason that patients defer or avoid obtaining an IUD. Currently, there is no standard of care for pain control during IUD insertion, with the American College of Obstetrics and Gynecology stating that "more research is needed to identify effective options to reduce pain for IUD insertion."

Methods

We conducted a systematic review, initially identifying 84 articles and ultimately including 45 RCTs in analysis after exclusion of literature reviews and non-medication interventions. The majority of the data was centered on the lidocaine paracervical block, prostaglandin analogs, NSAIDs, and topical lidocaine with multiple different administrations.

Results

NSAIDs were found to only reduce pain post-insertion. Prostaglandin analogs had inconclusive evidence but seem to increase ease of insertion but not decrease pain scores. Paracervical lidocaine injection was largely found to decrease pain scores but carries its own pain with the injection. Topical lidocaine was evaluated in multiple forms, including intracervical gel and gel or spray on the cervix, finding that lidocaine gel in and on the cervix overall did not reduce pain scores during the insertion process overall but topical spray lidocaine and lidocaine/prilocaine cream reduced pain during insertion.

Conclusion

While there is a large amount of data surrounding pain control interventions with IUD insertion, the overall literature does not plainly support the use of any individual method. More research is required to determine the best pain control intervention or the appropriate indications for different methods.

Histone deacetylase inhibitor, Trichostatin A enhances triple negative breast cancer oncolytic virotherapy

Fahim Ahmed,[1] Martin Ramos-Gonzalez,[1,2] Nestor Rubio-Infante,[1,2] Haval Shirwan PhD,[1-3] Esma S. Yolcu PhD,[1-3] Jorge G. Gomez-Gutierrez PhD[1-3]

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[3]Department of Pediatrics

Introduction

Patients with breast tumors that do not express the estrogen receptor, progesterone receptor, nor Her-2/neu are classified as having "triple-negative breast cancer" (TNBC). These patients generally have poor prognosis, with high rates of recurrence and refractoriness to conventional therapy, regardless of adjuvant treatment choice. Therefore, there is an urgent need for a novel approach that efficiently targets TNBC. Oncolytic virotherapy is an emerging treatment consisting of cancer selective viruses that replicate, spread, and kill cancer cells by viral oncolysis, leaving the normal cells intact. Oncolytic adenovirus (OAd) may represent a promising approach to treat TNBC, however OAds efficacy is limited in TNBC due to reduced infectivity and replication. The viral life-cycle is dependent on the acetylation and deacetylation of lysine residues in histone tails and in cellular and viral proteins. Therefore, we hypothesize that epigenetic drugs such as histone deacetylase inhibitors (HDACi) could enhance OAd potency in TNBC cells.

Methods

In this study we evaluated the ability of HDACi, Trichostatin A (TSA) to increase OAd replication and oncolysis in TNBC cells. Human TNBC MDA-MB-231 and HCC1937 and human lung cancer A549 cells were infected with an OAd expressing the red reporter fluorescent protein mCherry (OAdmCherry) on the virus capsid alone or in combination with TSA.

Results

Combined therapy of OAdmCherry + TSA displayed greater killing effect than each agent alone. In an infection efficacy study using a replication-defective Ad expressing green fluorescent protein (AdGFP) we found that the number of GFP positive cells increased in a TSA dose-dependent manner, which suggest that the increased killing effect was at least in part due to increased infectivity.

Conclusion

This therapeutic regimen remains to be evaluated in a preclinical mouse model of TNBC.

Dosing patterns and botulinum toxin utilization in pediatric spasticity patients aged 2-5

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[2]Department of Physical Medicine and Rehabilitation

Introduction

To investigate the utilization and dosing parameters of botulinum toxin in pediatric spasticity patients. FDA-approval in pediatrics was initiated in 2016 for lower limb spasticity and in 2019 for upper limb spasticity. Many pediatric uses remain "off-label", and dosing guidelines are limited. Current guidelines are based on safety data from phase 3 trials. We retrospectively reviewed initial pediatric botulinum toxin procedures over the past 10 years to analyze dosing patterns, choice of toxin, and adverse outcomes .

Methods

This study retrospectively analyzed the initial botulinum toxin injections of spasticity patients aged 2-5, conducted in a pediatric procedure suite and affiliated PM&R clinics. A total of 94 procedures were analyzed. Patients with sialorrhea or torticollis were excluded. Data included demographic information, weight, primary diagnosis, amount and type of toxin utilized, and extremities injected. We calculated dosing per kilogram of both Botox and Dysport. Adverse outcomes were assessed by reviewing hospital admissions or unscheduled clinic or emergency room visits.

Results

The average total dose per kilogram (kg) was 16.2 for Botox and 30.86 for Dysport. Dysport was used more frequently than Botox (56.38% vs. 43.62%). There were no significant adverse outcomes.

Conclusion

This study highlights utilization and dosing practices in pediatric spasticity patients. These findings underscore the need for more tailored dosing guidelines to potentially improve therapeutic strategies for pediatric spasticity management.

Ventilation and other factors contributing to tracheostomy outcomes in neonates with grade 3 bronchopulmonary dysplasia

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Jennifer Hanford NNP,[2] Akshaya Vachharajani MD,[2] Dana Bichianu MD[2]

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Introduction

Neonates admitted to the Neonatal Intensive Care Unit (NICU) and diagnosed with bronchopulmonary dysplasia (BPD) are classified as grade 3 BPD if they are invasively ventilated and Grade 2 BPD if they are on noninvasive ventilation at 36 weeks corrected gestational age. Some of the infants with Grade 3 BPD need a tracheostomy and some do not. We hypothesize that the initial mode of ventilation and the peak ventilator pressures influence the need for tracheostomy.

Methods

We conducted a retrospective chart review of 12 neonates with Grade 3 BPD admitted between January 1 2018 and December 31 2021 to the University of Missouri Women's and Children's Hospital NICU. We compared those who needed a tracheostomy versus those who did not. Continuous variables were analyzed using Mann Whitney U test and binomial variable were analyzed using Fischer's exact test. A p value of <0.05 was considered significant.

Results

The group that received tracheostomies were more likely to be treated with high frequency jet ventilation (HFJV) ($p = 0.0189$), had higher peak pressure ($p=0.03486$). Difference in the frequency of positive end-expiratory pressure (PEEP) wean approached statistical significance ($p = 0.08726$). No significant differences were found in maternal comorbidities such as obesity, diabetes, hypertension, ethnicity, age and receipt of prenatal steroids. There were no significant differences in babies' gestational age, birth weights or growth parameters, treatment for of patent ductus arteriosus, or diagnosis of pulmonary hypertension.

Conclusion

In babies with Grade 3 BPD, initial treatment with HFJV (compared to conventional ventilator), use of higher peak airway pressure and lower frequency of weaning PEEP were associated with need for tracheostomy. Study limitations include its retrospective nature, small sample size and probably lack of external validity. Strengths include a focused chart review and revelations of local practices.

Targeting endoplasmic reticulum stress to sensitize pancreatic cancer to microbial immunotherapy

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Durai Muniswami PhD,[1,2]
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Pancreatic cancer (PanC) remains one of the leading causes of cancer-related deaths worldwide. Therapeutic options are limited by the fibrotic and immunosuppressive nature of PanC. Strategies to break PanC physical and immune barriers are urgently needed. Here we report genetically attenuated strains of Salmonella Typhimurium (S2631 and S3092) that safely target tumors, modulate PanC stroma to penetrate the tumor core, and stimulate tumor immunity. Initial efficacy studies, showed that S2631 reduced tumor size by ~ 30% in mouse models of PanC. Interestingly, PanC multi-omics studies revealed that in the setting of S2631, PanC deregulates endoplasmic reticulum (ER) stress response, a known modulator of tumor immunity. We hypothesized that inhibition of ER stress signaling by targeting the ER stress response molecule GRP78 (using YUM treatment) will sensitize PanC to S2631, resulting in therapeutic synergy. We compared the tumor size reducing effects of single agent S2631 or S3092 or GRP78 blockade to S2631/YUM or S3092 combination treatments in a syngeneic mouse model of PanC. S2631/YUM showed a trend toward therapeutic synergy and this effect was markedly amplified in animals treated with S3032/YUM. S3092 differs from S2631 in that it expresses inhibitory RNA against CMTM6, an emerging suppressor of tumor immunity in PanC. Our findings suggest that combining the stroma modulating and immuno-stimulating strain S3092 with ER stress response blockade may generate durable survival benefits in PanC.

Assessing racial consciousness in anatomy educators

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Introduction
Faculty teaching anatomy courses can affect how race is discussed and portrayed in the curriculum, such as choosing which images to use or which textbooks to assign and reference. Some anatomy instructors may decide to discuss race as biological and/or social category in their course. However, many do not. These instructional differences can have serious implications for medical students and their future patients. Current literature suggests that when medical students are taught certain racial groups have distinct epidemiology and diagnosis, they harbor implicit bias about minority patient populations that could further public distrust of the medical community.

Methods
We conducted a survey of American gross anatomy faculty from various institutions. This survey consisted of broad demographic questions about course instructors and their student populations, and questions that quantitatively evaluated the extent to which a curriculum is racially conscious. It also included open-ended questions that we evaluated using qualitative, thematic analysis.

Results
With the quantitative results from the survey, we analyzed the textbooks that anatomy instructors recommend or require in their classrooms and their satisfaction with the diversity represented within them. We also analyzed the frequency with which race is discussed in the medical curriculum vs. in the anatomy curriculum at a respondent's institution. Finally, we analyzed how race was discussed is discussed in the curricula and classrooms of our respondents. Responses to open-ended questions asking how individual educators approach discussing race in their classroom activities fell into two main themes: the scope of material included in the anatomy classroom and lack of resources.

Conclusion
We hope the insights from this study will help us understand information gaps and create a more racially conscious anatomy curriculum.

Optimal timing for perioperative exercise following breast surgery: A review

Besher Alayoubi,[1] Faisal Shurafa,[1]
Benjamin Kirby MD,[1-3] Stephen Colbert MD[1-3]

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[3]Division of Plastic Surgery

Perioperative exercise after oncologic breast surgery confers several benefits including decreased pain intensity1and improved quality of life (QOL)2. Many studies have examined this relationship to determine whether starting exercise early post-operatively improves patient outcomes. Klein et al., 2021, examined the effects of starting physical therapy on post-operative day 1 on patient outcomes including pain, upper limb function, and range of motion and found that exercise improved pain levels in the intervention group at one month and six months compared to standard of care patients in the control group. This outcome overlapped with another article, Tehreen et al., 2022. This study demonstrated significant differences in pain, range of motion and quality of life in the treatment group compared to the control group.

While these studies highlight the benefits of early post-operative exercise, the evidence for optimal timing and types of physical activity following surgery remains limited. Additionally, the potential impact of perioperative exercise on post-surgical complications such as seroma and hematoma are poorly understood. This systematic review aims to identify the optimal timing for initiating physical exercise post-breast reconstruction surgery and to assess whether early exercise increases the risk of post-operative complications. We hypothesize that early exercise improves patient-reported outcomes but may increase the incidence of post-operative complications.

Contrast sensitivity performance of Tecnis 1, Eyhance, Acrysof, Bausch and Lomb, and Clareon platforms

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[2]Department of Ophthalmology

Introduction

The Technis, Bausch and Lomb, and Clareon platforms all offer a unique newfound gift of sight to the patient following cataract extraction. Each platform targets a different goal with Technis' new Eyhance lens focusing on intermediate visual performance with an extended depth of focus, Bausch and Lomb's enViata lens offering an improved emphasis on distance corrected near vision, and Clareon introducing a novel PEA/HEMA copolymer lens to the IOL market. The Clareon and enVista also offer a wider optical zone at 6mm compared to the 4.9mm optical zone offered by the Technis. While the distance for the corrected visual acuity target may change between the various IOL's offered, none of the lenses can perfectly replicate the function of the natural crystalline lens. This is specifically apparent in contrast sensitivity of the IOL. This study aims to determine if there is a difference in contrast sensitivity in the new Alcon platform compared to the older platform as well as between IOLs with different optical zones.

Methods

This is a prospective study that used a healthy population of eyes following uncomplicated cataract removal and IOL implantation. Patients returned for a one-month post-operative appointment and contrast sensitivity was tested using a projected Snellen chart.

Results

The average contrast sensitivity of the compared IOLs in descending order is as follows: Eyhance (21.6%), Alcon Acrysof (17%), Alcon Clareon (14.6%), and enVista (14%).

Conclusion

The Clareon and enVista IOL platforms that offer a wider optical zone were found to have a higher contrast sensitivity compared to the IOL platforms with a smaller optical zone. Additionally, the newer Alcon Clareon platform offers an improvement in contrast sensitivity compared to the older Acrysof platform. The improvement of contrast sensitivity offers potential for future use of IOLs with a wider optical zone in patients with unhealthy eyes.

A comparison of flexor tendon injury and recovery in patients with and without obesity

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Introduction

Flexor tendon injuries can significantly impair hand function and consequently affect almost every aspect of an individual's daily life. While numerous factors may influence post-treatment recovery from these injuries, the impact of obesity on recovery remains an opportunity for exploration. The aim of this study was to determine the effects of obesity on injury patterns, outcomes, and complications in patients with flexor tendon injuries in the state of Missouri.

Methods

An IRB-approved, retrospective study was performed to include patients from the state of Missouri with flexor tendon injuries who had flexor tendon repairs from 1/1/2009 to 1/1/2023. Demographic and comorbidity data was collected. Obesity was defined as a BMI >30.0. Univariate analyses were performed for dichotomous and continuous variables, depending on the distribution of data. All statistical tests were two-tailed, with the threshold for statistical significance set at a α value of 0.05.

Results

Of the 457 patients, 128 were obese (26%) and 329 were not obese (67%). The most common mechanism of injury in obese patients was knife wounds (36%). The most common comorbidities in the obese population were hypertension (29%) and depression (19%). The most common complications were stiffness (54%) and numbness (53%). Obese patients had an average follow up time of 30.78 + 48.9 weeks, and median follow up time of 13.71 (range: 0.00-327.57) weeks.

Conclusion

Findings from this study may be used to provide insight into the differences between obese and non-obese patients with flexor tendon injuries. By recognizing and addressing these differences, clinicians will be better equipped to provide personalized care, helping patients make informed decisions that improve hand function and overall recovery outcomes.

Yittrium-90 radioembolization of unresectable hepatocellular carcinoma: A single center experience

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Introduction

Hepatocellular carcinoma (hcc) is the most common malignant tumor and is often unresectable due to poor liver function from pre-existing cirrhosis. As a result, the prognosis of unresectable hcc is extremely poor. Therefore, the purpose of this study was to assess overall survival (os) and identify adverse predictors of os at 12 months after y-90 radioembolization for unresectable hcc.

Methods

Retrospective review of patients that underwent y-90 radioembolization for unresectable hcc from 2018 to 2021 was performed. Basic demographics, comorbidities, radiation dose to tumor, disease status at 3, 12 and 24 months, tumor distribution, bclc score, and laboratory data were gathered. Death during the follow up period or lost to follow up was also recorded. The primary endpoint was os at 3, 12, and 18 months. Intergroup comparisons were performed using unpaired t-test (welch's t-test) or pearson's chi-squared test for predictors of os at 12 months. Kaplan meier was used to model os following y-90 radioembolization. Statistical significance was set at p value <0.05.

Results

In total, 48 patients that underwent y90 mapping for unresectable hcc were screened of which 4 patients (8.3%) Passed away before undergoing y90 radioembolization. Thus, 44 patients (39 male, mean age 66.5 +/- 6.71 Years) that underwent radioembolization were analyzed for this study. Technical success was achieved in 100% of cases. Thirteen patients (29.5%) Underwent more than one y90 radioembolization procedure. The os rate was 91%, 70.5% And 43.2% At 3, 12, and 18 months. Univariate analysis identified hepatitis c infection (p =0.03), Elevated pre procedural alpha-fetoprotein levels (p=0.02), And diabetes mellitus (p=0.03) Adversely predicts os at 12 months.

Conclusion

Y-90 radioembolization is a safe and can prolong the os of patient with unresectable hcc. Hcc secondary to hepatitis c, elevated alpha-fetoprotein, and diabetes mellitus adversely impacts os at 12 months after y-90 radioembolization.

Are protein biomarkers from tissues recovered from anterior cruciate ligament reconstruction surgery related to patient reported outcome measures?

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Introduction

Anterior cruciate ligament (ACL) reconstruction (ACLR) surgery using tendon autografts is the most common treatment option for patients with ruptured ACLs. There is a need to determine if there is a relationship between the metabolic environment of the knee and the degree of knee functionality and pain in patients after surgery. This study was designed to determine if the protein content in ACL, synovium (SYN) and quadricep tendon (QT), and their secretome correlates to the KOOS JR interval scores of the patients before and after surgery.

Methods

With IRB approval and informed patient consent, ACL, SYN, and QT tissue were recovered from patients undergoing ACLR surgery. Tissue explants were created either cultured for 3 days or stored for tissue protein extraction. Day 0 tissue protein extracts and Day 3 culture media were analyzed for protein biomarker concentrations using commercially available assays. Patients filled out the KOOS-JR surveys preoperatively (PRE-OP), and 1, 3, and 6 months postoperatively (POST-OP). A Spearman's rank correlation was used to identify moderate to strong significant ($p<0.05$) correlations between KOOS JR scores at each time point and the protein content of the tissue and media.

Results

There are moderate to strong significant correlations were observed between the protein content of the tissue and the secretome of the SYN, ACL and QT tissues and the PRE-OP and POST-OP KOOS JR scores of the patient.

Conclusion

Of the tissues assessed in this study, the protein content of the QT secretome had the most moderate to strong significant correlations to POST-OP KOOS JR scores, indicating that metabolic responses of the QT may be associated with short term patient outcomes after ACLR.

Mechanistic investigation into the effects of cholesterol metabolism on colorectal cancer initiation and progression

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Introduction
Hepatocellular Carcinoma (HCC) is the most common malignant tumor and is often unresectable due to poor liver function from pre-existing cirrhosis. As a result, the prognosis of unresectable HCC is extremely poor. Therefore, the purpose of this study was to assess overall survival (OS) and identify adverse predictors of OS at 12 months after Y-90 radioembolization for unresectable HCC.

Methods
Retrospective review of patients that underwent Y-90 radioembolization for unresectable HCC from 2018 to 2021 was performed. Basic demographics, comorbidities, radiation dose to tumor, disease status at 3, 12 and 24 months, tumor distribution, BCLC score, and laboratory data were gathered. Death during the follow up period or lost to follow up was also recorded. The primary endpoint was OS at 3, 12, and 18 months. Intergroup comparisons were performed using unpaired t-test (Welch's t-test) or Pearson's Chi-squared test for predictors of OS at 12 months. Kaplan Meier was used to model OS following Y-90 radioembolization. Statistical significance was set at p value <0.05.

Results
In total, 48 patients that underwent Y90 mapping for unresectable HCC were screened of which 4 patients (8.3%) passed away before undergoing Y90 radioembolization. Thus, 44 patients (39 Male, mean age 66.5 +/- 6.71 years) that underwent radioembolization were analyzed for this study. Technical success was achieved in 100% of cases. Thirteen patients (29.5%) underwent more than one Y90 radioembolization procedure. The OS rate was 91%, 70.5% and 43.2% at 3, 12, and 18 months. Univariate analysis identified hepatitis C infection ($p = 0.03$), elevated pre procedural alpha-fetoprotein levels ($p=0.02$), and diabetes mellitus ($p=0.03$) adversely predicts OS at 12 months.

Conclusion
Y-90 radioembolization is a safe and can prolong the OS of patient with unresectable HCC. HCC secondary to hepatitis C, elevated alpha-fetoprotein, and diabetes mellitus adversely impacts OS at 12 months after Y-90 radioembolization.

G2PDeep-v2: A web-based deep-learning framework for phenotype prediction and biomarker discovery using multi-omics data

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Introduction
The G2PDeep-v2 server is a web-based platform powered by deep learning, for phenotype prediction and markers discovery from multi-omics data in any organisms including humans, plants, animals, and viruses. The server provides multiple services for researchers to create deep-learning models through an interactive interface and train these models using an automated hyperparameter tuning algorithm on high-performance computing resources.

Methods
Unlike the previous version of G2PDeep, the new version, G2PDeep-v2, now supports multiple inputs for multi-omics data, offers a broader array of model selection options, advanced settings for tuning model hyperparameters, and includes comprehensive Gene Set Enrichment Analysis (GSEA) functionalities. Notably, compared with other available applications, G2PDeep-v2 provides end-to-end management of machine learning and deep learning projects from multi-omics dataset creation, all the way to model interpretation, which also supports individual omics or any combination of up to 3 multi-omics data selection for the predictions. It is equipped with a fully automated pipeline to process and organize multi-omics data such as gene expression, miRNA expression, DNA methylation, protein expression SNP, and CNV.

Results
To accelerate scientific research for survival analysis in cancer studies, we utilized G2PDeep-v2 for long-term survival prediction and established biomarkers/candidates associated with survival for 23 cancer studies using The Cancer Genome Atlas (TCGA) datasets. Various models, including our proposed multi-CNN (CNN), Logistic Regression (LR), Support Vector Machine (SVM), Decision Trees (DT), and Random Forest (RF), were employed for predictions. To ensure reproducibility, the data for each cancer study underwent a systematic division into a training dataset (60% of the entire data) for model training, a validation dataset (20% of the entire data) for hyper-parameter tuning, and a test dataset (20% of the entire data) to evaluate model performance. Quantification of predictive performance was achieved by calculating the mean area under the curve (AUC) over a 5-fold cross-validation framework.

Conclusion
The G2PDeep-v2 framework provides a one-stop solution for scientist and computational biologist to utilize the power of machine learning and deep learning to analyze and understand their data while avoiding the overhead of constructing pipelines from scratch.

The influence of postnatal steroid exposure on need for tracheostomy placement in infants with grade 3 bronchopulmonary dysplasia

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Introduction

Bronchopulmonary dysplasia (BPD) is a complication among preterm infants, often requiring prolonged respiratory support, including tracheostomy for long-term invasive ventilation. Both antenatal and postnatal corticosteroids are used to improve neonatal outcomes, with betamethasone promoting fetal lung maturation and postnatal (oral and inhaled) steroids reducing inflammation to manage chronic lung disease. However, the influence of steroid exposure on the need for tracheostomy and prolonged ventilation remains unclear. This study investigates the association between corticosteroid exposure and the need for tracheostomy in infants with grade 3 BPD to optimize treatment strategies and improve respiratory outcomes.

Methods

A retrospective analysis of 12 patients with grade 3 BPD treated at the University of Missouri were included. Demographic, comorbidity, and treatment data during initial NICU stay was collected for patients that received (n=7) and did not receive (n=5) tracheostomy placement. Continuous variables were analyzed using Mann-Whitney U and binomial variables were analyzed using Fisher's exact tests, with a p-value of <0.05 considered statistically significant.

Results

The two groups were well matched for gestational age, birth weight, and maternal factors. Prior to extubation or tracheostomy placement, inhaled steroid exposure (budesonide, fluticasone, budesonide/formoterol) was greater in the tracheostomy group ($p<0.05$). Antenatal betamethasone and postnatal diuretic use approached significance but did not cross the p value. There was no statistically significant difference in dexamethasone courses between the two groups.

Conclusion

The requirement for long term invasive ventilation is multifactorial. In patients with grade 3 BPD, the increased use of inhaled steroids postnatally did not display a protective effect on the indication for tracheostomy placement. Given the sample size limitation, larger studies are needed to further explore the role of antenatal steroids and diuretics in this context. Investigating factors that contribute to tracheostomy placement is essential for clinical decision-making and improving outcomes in this population.

Robotic-assisted repair of spigelian hernia

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Introduction

Spigelian hernias are an uncommon hernia type, referring to the formation of a hernia in the section of the aponeurosis of the transverse abdominal muscle that lies between the linea semilunaris laterally and the lateral edge of the rectus muscle medially. Given their high incarceration risk, it is generally recommended that they be managed surgically. We present a case of an approximately 65-year-old male who underwent laparoscopic repair of his Spigelian hernia with robotic assistance.

Case Description

An approximately 65-year-old M with no past surgical history presented to an outpatient general surgery clinic with a left-sided ventral hernia present for at least three years. This hernia caused him pain and had been progressively enlarging, though he denied any symptoms of incarceration or obstruction. A computed tomography scan of the abdomen and pelvis identified a fat-containing left spigelian hernia. The patient was taken to the operating room where he underwent robot-assisted transabdominal preperitoneal repair with placement of Bard soft mesh and primary closure of the four centimeter hernia defect. He had an uneventful postoperative course with no recurrence of defect or significant postoperative pain at his two week follow-up.

Discussion

Spigelian hernias may present similarly to other ventral hernias but correctly identifying them is critical due to their high strangulation risk. The advent of laparoscopic surgery has allowed for more seamless recovery, shorter hospital stays, and lower postoperative morbidity compared to open repair. Though data is preliminary, robotic-assistance presents a promising advancement in hernia repair as it allows for better visualization and ergonomics for more precise repair. This case is presented to provide evidence that robotic repair presents a viable option for index repair of spigelian hernia as well as provide an overview of their presentation and potential management strategies.

Moving forward: Quetiapine in the treatment of hyperactive ICU delirium in mechanically-ventilated, critically-ill surgery & trauma patients with traumatic brain injury

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Introduction

ICU delirium, a frequent complication among critically-ill patients, is associated with increased mortality risk. For trauma patients with traumatic brain injury (TBI), longer mechanical ventilation and ICU length of stay (LOS) often lead to a higher likelihood of tracheostomy and worse outcomes. Quetiapine, an atypical antipsychotic, is noted for its favorable side effect profile and lower risk of QTc prolongation compared to other antipsychotics. This study aims to evaluate whether quetiapine can reduce ICU and hospital LOS in mechanically-ventilated TBI patients.

Methods

This retrospective cohort study includes patients aged 15 years and older with TBI admitted between January 1, 2020, and November 1, 2023, who were diagnosed with hyperactive delirium while mechanically-ventilated. Patients treated with quetiapine were compared to those who received non-quetiapine antipsychotics.

Results

26 patients with TBI and hyperactive delirium on mechanical ventilation. Of these, 9 received quetiapine and 17 were treated with alternative sedative-hypnotics. Quetiapine did not significantly reduce ICU or hospital LOS compared to alternative treatments. There was no notable increase in harm associated with quetiapine use. Potential benefits, such as reduced need for continuous sedatives and benzodiazepines, suggest quetiapine remains a viable option for managing hyperactive delirium in this patient population.

Conclusion

While quetiapine did not demonstrate a clear reduction in ICU LOS or hospital stay in this study, it may offer benefits in managing delirium symptoms compared to other sedatives. The investigation highlighted gaps in the documentation of delirium and sedation assessment tools such as CAM-ICU and RASS scores. Investigators are currently designing a quality improvement project to establish a standardized, objective documentation protocol on which to base delirium treatment in the ICU.

Comparison of cervical and lumbar annulus fibrosus secretome related to radiographic grade of intervertebral disc degeneration

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Introduction

Chronic neck and back pain are a common cause of disability worldwide and is often associated with intervertebral disc (IVD) degeneration (IVDD). While the IVDs in both regions have the same tissue structure, the biomechanical forces the IVDs in the two regions experience are significantly different. Therefore, it is possible that there are significant differences in the responses of the tissues of the IVD during IVDD. This study was designed to determine if there are significant differences in the secretome of the annulus fibrosus recovered from the cervical and lumbar regions of the spine of patients with IVDD. It was hypothesized that tissues from the lumbar region will have significantly higher pro-inflammatory and pro-degradative biomarker concentration in the secretome compared to tissues from the cervical region.

Methods

With IRB approval and informed patient consent, IVD tissues were recovered from symptomatic clinical IVDD patients (n=141). Explants were created and cultured for 3 days. Media were analyzed for inflammatory cytokines, degradative enzymes, degradation inhibitors, and growth factors. The Pfirrmann grading system was used to grade level of IVDD using pre-surgical MRI images. Samples were grouped based on grade of IVDD. Significant ($p \leq 0.05$) differences in the ex vivo protein secretome between cervical and lumbar were determined using T-Tests.

Results

Numerous significant differences were identified between cervical and lumbar AF tissues at different Pfirrmann grades. For example, at grade 3 the release of IL-1RA, MIP-1β, MMP-1, MMP-13, and RANTES were significantly higher for lumbar compared to cervical. At grade 5, PDGF-AA was significantly lower, and MMP-9, MMP-3, MIP-1α, GRO-α, and IL-6 were significantly higher for lumbar compared to cervical.

Conclusion

The data from this study indicates that development of symptomatic lumbar IVDD results in higher concentration of pro-inflammatory and pro-degradative biomarkers in the secretome of the AF compared to cervical IVDD.

Relationship between patient reported outcome measures and the secretome of symptomatic intervertebral discs

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Introduction

Intervertebral Disc (IVD) Degeneration (IVDD) is a significant source of pain and disability in patients. Patient Reported Outcome Measures (PROMs), Oswestry Disability Index (ODI) and Patient-Reported Outcome Measurement Information System (PROMIS) Global Physical Health (PGPh), are used to subjectively assess patient perception of pain and disability. This study was designed to determine if there are significant differences in the concentration of pro-inflammatory and pro-degradative biomarkers by IVD tissues based on patient ODI or PGPh scores, anatomic location (CERV or LUM), or Pfirrmann grade of IVDD are associated with changes in tissue biomarker production. It was hypothesized that IVD tissues from patients with higher ODI or lower PGPh scores would release significantly higher concentrations of pro-inflammatory and pro-degradative proteins during culture compared to those with lower ODI or higher PGPh scores.

Methods

With IRB approval and informed patient consent, IVD tissues were recovered from symptomatic patients undergoing surgery for IVDD. Pre-operative ODI, PGPh, and Pfirrmann grade were collected. Tissue explants were created, cultured for 3 days, and the media were tested for protein biomarker concentration. Significant differences ($p<0.05$) between ODI or PGPh scores were determined for all samples, CER and LUM, and Pfirrmann grade of IVDD using a Mann-Whitney Rank Sum test or Kruskal-Wallis test based on number of groups being compared.

Results

Significant differences in the release of MMPs and TIMPs by IVD tissues were determined based on patient ODI scores. IVD tissues from patients with higher PGPh scores released significantly higher MMP and inflammatory biomarkers compared to patients with lower PGPh scores.

Conclusion

The data from this study indicates differences in the protein secretome of IVD tissues recovered from clinical patients and their PROMs prior to surgery. Understanding these factors may help improve the quality of life for patients with symptomatic IVDD.

Comparison of management and outcomes of heart failure hospitalizations by insurance type

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Introduction

Significant inequities in heart failure outcomes exist based on insurance type, but it is unclear if these trends have persisted post Medicaid expansion. We examined the relationship between insurance type and hospital outcomes, including in-hospital mortality, management, length of stay, home discharge, and total charges.

Methods

We analyzed adults admitted for heart failure from the National Inpatient Sample (2016-2021).

Results

The study included 1,048,428 heart failure admissions: Medicare (748,422), Medicaid (129,525), Private insurance (134,103), and Self-Pay (36,378). Mean age was 70.1 years. Compared to privately insured individuals, Medicaid beneficiaries were younger (54.1 vs 61.5 years old) and more likely to be Black (40.1% vs 27.2%). Unadjusted rates of in-hospital mortality were lower among Medicaid beneficiaries compared to privately insured individuals (1.6% vs 3.0%). After adjusting for baseline characteristics and clinical comorbidities, Medicaid beneficiaries had shorter length of stay (RR 1.01; CI 1.00-1.02), lower odds of in-hospital mortality (OR 0.76; CI 0.70-0.82), and lower total charges (RR 0.89; CI 0.88-0.91) compared to privately insured individuals. Medicaid beneficiaries also had lower odds of ICD/CRT/PPM utilization (OR 0.89; CI 0.82-0.97), IABP/pLVAD/ECMO (OR 0.52; CI 0.46-0.59), coronary angiography (OR 0.60; CI 0.58-0.62), LVAD placement (OR 0.44; CI 0.36-0.54), and heart transplantation (OR 0.29; CI 0.23-0.38) compared to privately insured individuals.

Conclusion

Medicaid heart failure admissions had lower in-hospital mortality rates than privately insured individuals but were significantly less likely to receive advanced therapies and heart transplantation. Significant inequities persist among heart failure patients according to insurance type.

Inflammatory and degradative proteins in symptomatic intervertebral discs are associated with increased Pfirrmann grades

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Introduction

The CDC reports that 50-80% of adults experience back pain at some point in life, and many studies have found a positive correlation between intervertebral disc (IVD) degeneration (IVDD) severity and pain. However, it is not possible to predict symptom occurrence or severity based on IVDD severity alone. Therefore, this study was designed to understand how other factors such as inflammation may be related to IVDD severity in symptomatic patients so that therapeutic targets may be developed to mitigate or prevent symptom development in at-risk patients. It was hypothesized that higher Pfirrman grades (PG) would be associated with significantly increased IVD contents of pro-inflammatory and pro-degradative biomarkers.

Methods

With IRB approval and informed consent, diseased IVD tissues normally discarded as part of standard-of-care spine surgery were recovered from patients (n=364 patients) treated for symptomatic IVDD. Tissue explants were created and frozen for protein extraction. Protein extracts were assayed for inflammation and degradation related biomarkers. Biomarker data were natural log transformed. Significant ($p<0.05$) differences in media biomarker concentrations based on Pfirrmann grade were determined using ANOVAS with post-hoc analyses.

Results

Sample testing was ongoing with results pending at the time of publication.

Comparison of plain film radiographs and EOS imaging in patients with malalignment

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Introduction

Malalignment of the lower limb contributes to knee pain and joint degradation, requiring a three-dimensional evaluation across coronal, sagittal, and axial planes. Standard extremity alignment radiographs assess the coronal plane, while supplemental imaging like CT scans are needed for the sagittal and axial planes. The FDA-approved EOS system offers simultaneous imaging of the limbs in both coronal and sagittal planes. This study aims to evaluate the advantages of EOS imaging over traditional alignment assessments.

Methods

Between February and April 2023, thirteen patients (26 limbs) were prospectively enrolled from a tertiary orthopedic clinic. Patients underwent both digital long-leg AP radiographs and 3D EOS images for lower limb alignment analysis. Radiographs were taken with patients in a weight-bearing position, and EOS images followed the system's protocol. Two investigators independently assessed seven standard lower limb alignment measurements. Both modalities were compared for radiation exposure, time spent in radiology, and alignment measurement differences using 2D outcomes. Measurement agreement was analyzed using Bland-Altman analysis, with statistical comparisons via the Wilcoxon Signed-Rank test.

Results

The study included seven males and six females, with a mean age of 66.1 years and mean BMI of 34.0. Most alignment measurements were comparable between the two imaging techniques. Bias was observed in Mechanical Axis Deviation (right side) and Mechanical Lateral Proximal Femoral Angle (bilaterally), with EOS showing significantly larger values. EOS used significantly less radiation than traditional radiography ($p=0.01436$), though there was no significant difference in time spent in radiology ($p=0.2532$).

Conclusion

Both EOS and traditional radiography capture comparable alignment measurements, though EOS offers the key advantage of reduced radiation exposure. The detected bias may result from differences in software and patient positioning. EOS's lower radiation dose makes it ideal for multiple follow-ups or complex assessments.

Femoral head fractures: Can we change outcomes?

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Introduction

Femoral head fractures are rare, complex injuries often resulting from high-energy trauma, such as motor vehicle crashes. Despite the Pipkin classification's long-standing use, variability in classification, surgical approaches, and outcomes remains. This study evaluates femoral head fracture treatment across multiple centers to better guide clinical decision-making and assess complications.

Methods

A multicenter retrospective cohort study was conducted across 32 trauma centers, including 1,678 patients treated for femoral head fractures from 2005 to 2023. Data collected included patient demographics, injury details, classification, treatment methods, surgical approaches, and complications. The relationship between treatment methods and complications was analyzed using Chi-squared tests.

Results

Of the 1,678 patients, the mean age was 36.19 years, with 71.87% being male. Motor vehicle crashes were the most common cause (79.7%), with Pipkin IV fractures most frequent (65.6%). Posterior hip dislocations occurred in 92.2% of cases, and 52.7% had posterior wall fractures. Operative treatment was employed in 79% of cases, with the posterior approach without hip dislocation being most common (38.9%). Major complications occurred in 31.3% of patients, including post-traumatic osteoarthritis (10.5%), heterotopic ossification (HO) (6.2%), and avascular necrosis (AVN) (14.5%). The surgical hip dislocation (SHD) approach had the highest HO rate (7.1%), while the posterior approach without SHD was 0.46 times less likely to result in HO compared to anterior approaches ($p = 0.0347$). Conversion to total hip arthroplasty occurred in 24.9% of patients.

Conclusion

This large multicenter study confirms the high complexity and complication rates of femoral head fractures, with Pipkin IV fractures most common and AVN the predominant complication. The posterior approach without SHD demonstrated lower HO rates, suggesting surgical approach significantly influences outcomes. These findings emphasize the need for tailored surgical strategies to minimize complications and improve patient outcomes.

Impact of postoperative glaucoma medication strategies on long-term intraocular pressure control following shunt surgery: A retrospective analysis

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Introduction

Glaucoma shunt surgery is an effective treatment for managing refractory intraocular pressure (IOP). However, the optimal use of postoperative glaucoma medications for maintaining long-term IOP control remains uncertain. Determining whether fewer medications can achieve adequate pressure control post-surgery is of clinical interest, as reducing medication use could simplify management. This study aims to assess the relationship between the total number of glaucoma medications and IOP outcomes over one year, comparing two surgeons with differing postoperative medication strategies.

Methods

This retrospective single-center observational study analyzed the relationship between the total number of glaucoma medications and IOP over one year in patients who underwent glaucoma shunt surgery by two surgeons (Surgeon 1, n=35; Surgeon 2, n=49) between 2020 and 2024. Medications, including topical IOP-lowering drops and oral carbonic anhydrase inhibitors, were recorded at six time points: one day, one week, one month, three months, six months, and one year postoperatively. Combination drops were counted as two medications. Data was compared between the two groups to assess differences in medication use and IOP control.

Results

At the one-year mark, Surgeon 1's patients averaged 3.05 drop medications and an IOP of 13.2 mmHg, while Surgeon 2's patients averaged 1.79 drop medications and an IOP of 14.3 mmHg. Further statistical analyses are planned to assess the significance of these findings.

Conclusion

Preliminary findings reveal that differences in medication strategies between the surgeons resulted in similar IOP control based on drops alone. Further analyses will determine whether the reduction in medications leads to statistically significant differences in long-term IOP control for total medications. Additionally, we will compare the number of medications at the different time points, including potential differences in the hypertensive phase and any associations with postoperative complications and interventions. We will also investigate these potential differences based on patient demographics.

Pre-op resilience scores are not strong predictors for post-ACL reconstruction success, function, or pain

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Introduction

Anterior cruciate ligament reconstruction (ACLR) is a common orthopaedic procedure aimed at restoring knee stability, however, 3-6% of patients report a surgical failure by 2-years following ACLR. Understanding the factors that influence recovery and long-term success is crucial for optimizing treatment strategies. One factor is resilience, a psychological attribute that reflects an individual's ability to adapt to adversity and stress. Resilience has been shown to play a significant role in various health outcomes, but its impact on clinical outcomes following ACL reconstruction remains underexplored. Therefore, this study's aim was to examine the association of patient-reported resilience on patient-reported outcomes (PROs) after ACLR.

Methods

With IRB approval, a prospective, longitudinal cohort was completed. The Connor-Davidson Resilience Scale (CD-RISC), Patient Reported Outcomes Measurement Information Systems (PROMIS), pain, and knee function surveys were collected to evaluate resilience and its correlation with recovery. Fisher's exact tests were used to examine categorical variables, and rank sum tests for continuous variables. Spearman correlations were used to compare resilience and PROs.

Results

41 patients met inclusion criteria (n= 41, male 51.22%) with a mean follow-up of 11.7 months (range 0-20). 2 patients (4.89%) suffered an ACLR failure during study follow-up, with no significant difference in resiliency scores between patients who had successful ACL reconstruction surgery versus those that failed (p= .50). Resilience scores were not significantly different based on gender (p=.80) and were not correlated with age (p=.79) but were higher for patients that underwent reoperation (p=.008). Higher resilience was positively correlated with higher pre-operative PROMIS Mental Health scores (r=.70, p<.001) and PROMIS Physical Health scores (r=.38, p=.014). No other significant differences were found for resilience and PROs.

Conclusion

In patients undergoing ACLR, resilience is significantly associated with higher pre-operative mental health scores, however, resilience was not associated with ACLR success or post-operative patient-reported outcomes for pain and function.

Providers and patients in rural southwest Missouri: Understanding perceived barriers to diabetic retinopathy exam compliance rates

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Introduction

This study aims to identify specific perceived barriers to diabetic retinopathy (DR) screening among patients living in rural areas, as viewed by both patients and physicians. DR is a leading cause of preventable blindness in the United States. DR often develops without noticeable vision changes, making annual screening essential. Despite this, only 62.3% of diabetic patients in the U.S. receive annual screenings, with rural patients exhibiting even lower rates.

Methods

Patients completed a survey with 16 demographic prompts about race, ethnicity, livelyhood, and distance to eye-care, as well as 18 questions to assess their understanding of diabetic eye disease, likelihood of annual exams, attitudes towards eye care, access to care, and perceptions of DR. Physicians completed a separate survey with 11 prompts to evaluate their perceptions of patients' knowledge, attitudes, access, and logistical barriers, as well as demographic data about livelihood and years in practice. Data were analyzed using unpaired t-tests to compare means between patient and provider responses.

Results

Fourteen patients and eight providers completed surveys. Patients rated their knowledge of diabetic retinopathy ($M = 4.04$, $SD = 0.91$) significantly higher than providers expected ($M = 2.63$, $SD = 1.88$) ($p = .002$). Patients rated their access to eye care ($M = 4.57$, $SD = 0.36$) and attitudes towards care ($M = 4.51$, $SD = 0.71$) more positively than providers (access: $M = 3.63$, $SD = 0.92$, $p = .002$; attitudes: $M = 3.13$, $SD = 0.83$, $p = .0005$). Patients' perceptions of care and eye health ($M = 4.70$, $SD = 0.37$) were also rated higher than providers' expectations ($M = 3.25$, $SD = 1.04$) ($p < .0001$).

Conclusion

The study reveals a significant disconnect between patients' and providers' perceptions of barriers to diabetic retinopathy screening. Patients consistently rated barriers as less impactful compared to providers' assessments.

A case of subretinal abscesses with Charles Bonnet Syndrome presenting secondary to endogenous endophthalmitis with MRSA bacteremia

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Introduction

This report covers a rare presentation of endogenous endophthalmitis with Charles Bonnet Syndrome (CBS) and subretinal abscesses in a patient with MRSA bacteremia. This case aims to highlight the diagnostic challenges and management considerations associated with this atypical manifestation.

Case Presentation

A 73-year-old male with a history of recurrent necrotizing fasciitis and MRSA bacteremia presented on hospital day 3 with visual hallucinations and deteriorating vision. Diagnostic procedures included comprehensive ophthalmic examination, fundoscopic evaluation, and imaging studies to identify the presence of subretinal abscesses. The patient's medical history, clinical progression, and response to treatment were documented. The research adhered to the tenets of the Declaration of Helsinki, and informed consent was obtained from the patient's family. Institutional review board (IRB) approval was obtained for the case report. The patient exhibited hand motion vision in the left eye and 20/400-1 vision in the right eye. Bilateral endophthalmitis was diagnosed, along with CBS and subretinal abscesses. Treatment included intravenous antibiotics and surgical intervention to remove infected knee hardware. Despite aggressive management, the patient transitioned to palliative care due to the progression of his condition and family preferences.

Conclusion

The combination of CBS and subretinal abscesses in endogenous endophthalmitis is a rare clinical presentation. This case underscores the importance of considering comprehensive ophthalmologic evaluation in patients with severe bacterial infections presenting with cognitive and visual symptoms. Early recognition and intervention are crucial in managing such complex cases.

Associations between temperature and cardiopulmonary visits at the University of Missouri Health Care emergency department

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Introduction

Temperature fluctuations have been linked to influence cardiopulmonary events. Cold temperatures can induce vasoconstriction, increasing blood pressure and the risk of cardiovascular events such as stroke and heart failure. Conversely, hot temperatures can worsen air quality, exacerbating conditions such as asthma. Understanding the relationship between temperature and cardiopulmonary events is critical, particularly in Columbia, Missouri, where the transient and diverse nature of a college population may present unique challenges in managing these health risks.

Methods

A retrospective observational study was conducted using records from University of Missouri Health Care Emergency Department (ED) from January 2023 – December 2023. Daily temperature data, including maximum, minimum, and average temperatures, were obtained from the National Weather Service. Cardiopulmonary ED visits for stroke, acute URIs, asthma, heart failure, and STEMIs were identified using ICD-10 codes. Data was analyzed using descriptive analysis to assess the relationship between temperature variations and ED visits.

Results

Preliminary analysis revealed a bimodal distribution of stroke and asthma visits, with fewer visits during temperate weeks compared to the hottest and coldest weeks of the year. Asthma visits during the coldest weeks were significantly longer than those during temperate weeks ($p = 0.027$). Additionally, stroke visits were significantly higher during both the hottest ($p = 0.037$) and coldest weeks ($p = 0.048$) compared to temperate weeks.

Conclusion

Monitoring temperature-related health trends is crucial for optimizing emergency care and developing preventive measures. By focusing on climate-health relationships at the local level, communities can implement targeted interventions and coordinate data-based policies that effectively reduce the burden of temperature-related ED events, ultimately enhancing community well-being and resilience.

The foundation of identifying burnout accurately within a department wellness program in an academic health care organization

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Introduction

The Maslach Burnout Inventory-Human Services Survey (MBI-HSS) is the gold standard for evaluating burnout in healthcare providers. This is a 22-question survey with three metrics for burnout, fatigue, depersonalization, and personal accomplishments. In 2021 and 2022, the University of Missouri School of Medicine's well-being survey revealed that the Department of Obstetrics and Gynecology had 78% and 53% burnout rates, respectively. Yet, the departmental MBI-HSS in 2021 and 2022 found it to be 53% and 36%, respectively. This project focuses on understanding the discrepancy between the two surveys and identifying an accurate burnout survey tool for the department wellness program.

Methods

The 2021 and 2022 well-being surveys from the SOM and MBI-HSS were evaluated for cost, time commitment, and pertinent burnout data. The MBI-HSS done in 2021 and 2022 within the OB/GYN department was compared to the burnout from the SOM surveys specific to the OB/GYN department.

Results

The 2021 and 2022 MBI-HSS surveys within the department revealed burnout to be 55% in 2021 and 36% in 2022. The MBI-HSS identified depersonalization as the burnout metric for both years. The SOM well-being survey identified department burnout to be 78% in 2021 and 53% in 2022. The SOM well-being survey incorporated an abbreviated burnout survey of 1-2 questions.

Conclusion

The MBI-HSS burnout survey can identify burnout as one of three etiologies: fatigue, depersonalization, and personal accomplishments. When fatigue is the etiology of burnout, an abbreviated single-question survey can accurately assess burnout. The MBI-HSS identified depersonalization as the burnout source for the OB/GYN department. The SOM well-being survey provided higher burnout rates and no insight specific to burnout etiologies. Abbreviated burnout surveys can overestimate burnout when fatigue is not the primary etiology for burnout. Effective burnout initiatives require an accurate assessment of burnout and the corresponding etiology.

MentorMatch: A mobile platform connecting students with research opportunities

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Introduction

Medical students often struggle to identify and secure research opportunities. To address this issue, we developed MentorMatch, a mobile application designed to streamline the process of connecting medical students with research opportunities available at the University of Missouri - Columbia campus. In addition to assisting medical students, MentorMatch aims to help PhD students select rotation supervisors and master's students find projects or thesis advisers. Further, it aims to reduce the burden on Primary Investigators (PIs) and faculty by simplifying student recruitment. The app presents PIs actively recruiting students and specifies the types of students they seek (e.g., Master's, PhD, Medical Students, Residents). By offering a campus-wide platform, MentorMatch encourages students to explore opportunities beyond their immediate disciplines, fostering interdisciplinary collaboration.

Methods

We are employing a user-centered design approach in the development of MentorMatch, collaborating with key faculty members and deans for insights. The application will undergo Beta Testing, and we plan to collect user analytics and leverage industry-standard System Usability Scales (SUS) to evaluate its functionality and user interface.

Results

The study is currently ongoing, with MentorMatch in the Alpha version stage. We aim to assess its impact on students, particularly in the School of Medicine at the University of Missouri, and their ability to identify mentors or supervisors.

Conclusion

MentorMatch has the potential to revolutionize how students at the University of Missouri - Columbia find and engage with research opportunities. By providing a user-friendly, centralized platform, we aim to enhance the research experience for students and reduce the recruitment burden on PIs. As the application moves from Alpha to Beta testing, we will continue to refine its features based on user feedback and usability testing. Ultimately, we hope that MentorMatch will foster greater interdisciplinary collaboration and support the academic and professional growth of medical students across various disciplines and specialities, including growing primary care research.

Reducing electrolyte monitoring in the NICU: Safely optimizing testing, cost-effectiveness, iatrogenic anemia and reducing pain: A retrospective cohort study in the NICU

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Introduction
Low-value care encompasses tests and treatments providing minimal benefit, have the potential for harm, and are not evidence-based, thereby increasing avoidable healthcare costs. This study focuses on identifying low-value laboratory testing in day-to-day neonatal care and promoting system-wide improvements ensuring safe, cost-effective practices. We specifically focus on means of reducing the frequency of neonatal blood draws to mitigate the risk of iatrogenic anemia and decrease pain in infants.

Methods
We conducted a retrospective cohort study reviewing electronic health records and charts of preterm infants (<34 weeks' gestation) admitted to a Level III NICU in Columbia, MO, from March 1, 2022, to February 28, 2023. Infants who died, were transferred, or had genetic anomalies were excluded. Demographic data were collected for the mother-infant dyad. Electrolyte lab data for these infants before and after they achieved full enteral feeds (FEF) and were breathing room air. Infants were categorized into quartiles based on the number of lab tests, and the growth chart data of infants with electrolyte estimation (EE) in the 25th and 75th quartiles were compared.

Results
We compared infants in the 25th and 75th quartiles of laboratory testing. Results showed that infants with EE in the 25th quartile were more mature, more likely to be appropriate for gestational age at birth and exhibited better growth than those in the 75th quartile. Our findings indicate that unnecessary EE can increase healthcare costs, pain, blood loss, and the likelihood of iatrogenic anemia in infants. Infants who exhibited good growth may not require protocol-based EE.

Conclusion
In conclusion, reducing EE in preterm infants can lower healthcare costs and improve neonatal care by minimizing unnecessary pain and blood loss. Limiting routine lab draws after infants achieve FEF and are on room air, and adopting growth-based testing protocols, may enhance safety and cost-effectiveness in NICUs.

Outcomes in post-operative spinal surgical site infections: A retrospective cohort study

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Introduction

Post-operative infection is a significant problem seen in 0.7-16% of spinal operations and leads to increased cost of hospitalization, rates of complication, and mortality.1,2 When post-operative spinal infections (POSI) occur, the typical treatment involves surgical irrigation and debridement (I&D) to remove infected and necrotic tissue and collect specimens for cultures followed by antibiotic therapy.3 While research has described risk factors for POSI and individuals who may require multiple I&Ds, there is less written on risk factors for recurrent POSI in the literature.4 In this study, patient, microbial, and surgical factors will be explored to elucidate the role they play in the risk of recurrent POSI.

Methods

Data was collected via chart review of patients treated for POSI within the University of Missouri Health Care system in Columbia Missouri from October 2021 – June 2024. POSI was classified as patients who received an I&D after spinal surgery and had intraoperative specimens that showed microbial growth on culture. Recurrent infection was diagnosed by an unplanned readmission to the hospital for another I&D and had intraoperative specimens grow microbes on culture.

Results

Forty-eight patients fulfilled the criteria for POSI, of whom only one was found to have recurrent infection. Many of the potential risk factors for POSI were unable to be analyzed. Of the variables that could be measured, none were statistically significant.

Conclusion

The small sample size and imbalance in the data lead to many variables being unanalyzable, and the ones that were analyzed are likely to be unreliable. Although the data collected to this point has been in a retrospective cohort fashion, the rarity of recurrent POSI has brought out some of the limitations of this study design. Moving forward, this topic will be better analyzed as a case-control study and expanding the patient inclusion criteria.

Risk of hamstring injuries in National Football League players by short, normal, or long rest weeks

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Introduction

Hamstring strains can lead to significant time missed from practices and games in the NFL and can have significant morbidity. Players that return to sport have worse overall performance compared to pre-hamstring injury. NFL players typically play games once a week on Sunday, allowing for 6 days between games. Deviation from the usual 6-day rest week has been proposed as a potential risk for injuries. The main objective of this study is to evaluate the risk of increased or decreased rest on hamstring injury rates in NFL players.

Methods

Hamstring injury data of NFL players from the 2012-2019 seasons were gathered from publicly available sources. Player demographic data, position, age at time of injury, seasons played, and days between games. Injuries were characterized as short, normal, or long week injuries. Hamstring injuries that occurred during the preseason, postseason, or during week 1 were excluded. Descriptive statistics were calculated to report means, ranges, and percentages. Data was analyzed to determine statistically significant differences using Fisher's exact, chi-square, or one-way ANOVA tests.

Results

A total of 754 hamstring injuries were recorded during the study window. 129 hamstring injuries occurred during short weeks, 135 during long weeks, and 489 during normal weeks. Players were 1.2 times more likely to injure their hamstring during a long week compared to a normal week ($p < .001$), and 1.1 times more likely to injure their hamstring during a short week compared to a normal week ($p < 0.001$).

Conclusion

The findings from this study suggest that deviation from the normal 7-day NFL week increases the risk of a hamstring injury in NFL players when increasing or decreasing rest time. Further research exploring the impact of short and long rest times on player injury risk should be conducted to prevent injuries.

Fingerprintlessness associated with inclusion body myositis

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Introduction

A 70-year-old male patient with inclusion body myositis presented to dermatology clinic for evaluation for loss of fingerprints. He had fingerprints taken eight years prior for a permit, and recently he was unable to renew this permit due to an inability for the machine to read his fingerprints.

Methods

Prior to this event, the patient had noticed a loss of skin lines that gave his fingers a shiny appearance, most prominently on the left hand, which he had associated the inclusion body myositis due to weakness in this hand. Inclusion body myositis was diagnosed four years prior and was confirmed by muscle biopsy after the patient developed muscle weakness in his left lower extremity and right upper extremity.

Results

Upon exam, the fingers of his hands, most prominently the left 3rd and 4th digits, had a smooth texture and glossy appearance circumferentially associated with the diminution of skin lines and palmar dermatoglyphics.

Conclusion

Although overlap between systemic sclerosis and autoimmune myositis has been reported, workup for connective tissue and other autoimmune diseases was negative. We propose that wasting of the digital musculature may be the underlying mechanism for fingerprintlessness in inclusion body myositis.

Skin metastasis to surgical wound as first presenting sign of stage IV lung adenocarcinoma

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A 74-year-old female presented to her PCP with recurrence of cysts on her right shoulder. Within two weeks of her presentation, the area became swollen and painful, requiring drainage in surgery clinic. Excision/debridement of two lesions followed, with pathology consistent with benign epidermal inclusion cysts. Patient returned 1 month later with pain and discoloration of one wound site. Biopsy revealed metastatic adenocarcinoma compatible with lung primary. PET scan showed FDG avid RUL mass 7.2x6.5x7.6cm with hilar and mediastinal lymphadenopathy and distant metastasis to skin of right shoulder 4x3x3.9cm. MRI brain showed 5mm metastasis in posterior right frontal lobe. Treatment included 6 cycles of pembrolizumab, palliative radiation to skin adenocarcinoma, and stereotactic radiation to brain metastasis. Metastatic lesions had significant response to treatment despite disease progression in the lung. Patient currently treated with Sotorasib. It has been reported that cutaneous metastases develop in one to twelve percent of patients with lung cancer, with 20-60 percent of these patients presenting with the skin lesions before or at the same time of the primary tumor diagnosis. The phenomenon of inflammatory oncotaxis, in which tissues are predisposed for cancer metastases after mechanical trauma, could have played a role in this patient's clinical course.

Magnetic resonance imaging in the detection and characterization of proximal fibula injuries associated with concurrent tibial plateau fractures

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Introduction
Tibial plateau fractures (TPF) are often associated with proximal fibular injuries (PFI). However, little is known about magnetic resonance image (MRI) patterns of PFI in relation to TPFs. As a result, the primary objective of the study was to determine the incidence, pattern, and location of PFI in the context of concomitant TPF. The secondary objective was to determine the relationship between PFF incidence and Schatzker classification of TPF.

Methods
387 patients with a TPF evaluated on X-Ray and MRI between 2010 and 2023 were identified and retrospectively evaluated. Demographics, Schatzker classification, presence of PFI on X-ray and MRI, and fracture pattern and location were collected. Statistical analysis was performed using SPSS 29, chi-square test, and student t-test.

Results
MRI revealed an incidence of PFF in 51.2% (198/387) of TPF. Occult fibular injuries were present in nearly one third (29.7%) of cases. 94.4% of all fibular fractures involved the head, while 35.5% involved the neck and 8.1% the shaft. 55.9% of all fibular head fractures were comminuted, followed by 20.2% bone contusion, 12.2% avulsion, 7.4% transverse, 3.7% oblique, and 0.5% segmental. 50% of all fibular neck fractures were comminuted, followed by 27% transverse, 12.2% oblique, 6.8% avulsion, 2.7% segmental, and 1.5% bone contusion. 41.2% of fibular shaft fractures were comminuted, 23.5% transverse, 23.5% oblique, 5.9% avulsion, and 5.9% bone contusion. The most typical TPF patterns associated with PFI were Schatzker VI and Schatzker V with a PFI incidence of 78.4% and 68.6%, respectively.

Conclusion
Proximal fibular injuries were identified in over half of all TPFs in this case series. PFIs tend to be comminuted, involve the fibular head, and accompany bicondylar TPFs. To our knowledge, this is the first study to use MRI to describe incidence and characteristics of proximal fibular fractures in the setting of tibial plateau fractures.

High rate of occult femoral condyle injuries in association with tibial plateau fractures: A magnetic resonance imaging study

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Introduction
Tibial plateau fractures (TPFx) can result in unrecognized femoral condyle injury (FCI). MRI allows us to identify a spectrum of FCIs from bone marrow edema to nondisplaced fractures. The primary objective of this study is to determine the incidence of FCIs and their morphological and topographic characteristics with respect to the medial and lateral femoral condyles.

Methods
A retrospective case-series study was conducted in a single center between 2010-2023, identifying TPFx evaluated with X-ray and MRI. Patient demographics, Schatzker classification for TPFx, and the presence of FCIs on imaging was collected. We applied frequencies, a chi-square test to compare nominal variables and a student t-test for continuous variables for statistical analysis.

Results
387 patients were included in the study. Associated FCIs were found in 205 patients and in 93.7% of the cases, these injuries were not seen on initial radiographs. Half of the associated FCIs were found in Schatzker type II and VI TPFx (25.8% and 24.9% respectively). The lateral femoral condyle was more frequently involved compared to medial (75.6%vs38.5%; $p<0.05$) and was more frequently associated with type II TPFx (29.7%) and type VI (27.1%) Medial femoral condyle injuries were mostly seen in type IV TPFx (29.1%), and type VI (22.8%). There was no difference in injury pattern between both condyles. Bony contusion was the most common condylar injury pattern (62% lateral and 60% medial), followed by subchondral impaction (23.9% lateral and 20.3% medial).

Conclusion
This is the first study assessing the presence of FCIs in TPFx using MRI. FCIs were present in more than half of our population study. Most of these injuries were radiographically occult, with bony contusions and subchondral impactions the most common injuries. The clinical relevance of these findings should be further investigated to determine the impact of femoral injuries on development of post-traumatic osteoarthritis.

Breast cancer survivorship and lymphedema: Exploring pain, self-pay costs, and physical limitations in a large national dataset

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Introduction
Breast cancer survivorship is increasing worldwide. Treatment side effects, such as lymphedema, create significant challenges to survivors. Returning to occupational work, paying for routine follow-up care, and maintaining quality of life continues across the lifespan. Exploring population data such as the Medical Expenditure Panel Survey (MEPS) dataset can provide foundational insights. We aimed to examine associations between breast cancer, lymphedema, self-pay expenditures, and pain

Methods
2021 Household Component and Medical Conditions MEPS files were accessed between February-July 2024. Activity limitation and social determinants of health binary variables were selected and analyzed. Lymphedema presence was imputed using activity limitations, creating a binary variable. We trimmed the total self-pay variable to the 99th percentile. Univariate and bivariate analyses were conducted using descriptive statistics and multivariable regression analyses using ordinary least squares regression.

Results
486 breast cancer survivors were identified, 30% of whom had lymphedema. Mean age was 68 years. Racial and ethnic composition of the sample contained those reporting White, Black/African American, American Indian/Alaskan Native, or Asian or Pacific Islander (85.3%, 10.4%, 0.6%, 1.6%, and 2.0%, respectively). Breast cancer survivors with lymphedema [$\beta = .21$, $p < .001$] and reporting pain [$\beta = .35$, $p < .001$] significantly predicted work limitations. Being married [$\beta = 454.88$, $p = .033$], completing high school [$\beta = 952.55$, $p = .004$], and White Non-Hispanic race/ethnicity [$\beta = 1030.33$, $p < .001$] had significantly higher self-pay expenditures for medical care. Feelings of isolation [$\beta = .11$, $p = .011$] significantly predicted activity limitations, due to pain.

Conclusion
Breast cancer survivors living with lymphedema may be challenged by pain and isolation, contributing to occupational and physical limitations in the years following treatment. Increased self-pay for medical needs can create financial challenges. Examining these critical dimensions underscores the necessity of lifetime screening and treatment strategies.

Differences in neurophysiological markers between primary progressive aphasia variants

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Introduction

Primary Progressive Aphasia (PPA) is a neurodegenerative syndrome characterized by language impairments and atrophy in language networks. PPA consists of three variants: nonfluent (speech production impairments, agrammatism), semantic (naming and comprehension impairments) and logogenic (word finding and language repetition impairments). The differentiation of neurophysiological markers (atrophy and activation in language regions) in nonfluent and logopenic PPA variants is not well understood. This project aims to investigate differences in neurophysiological markers between nonfluent and logopenic PPA variants on language abilities in a neuroimaging pilot study.

Methods

Adults aged 50+ with a PPA diagnosis (logopenic or nonfluent) from the baseline of a double-blind crossover clinical trial (NCT06066710; PI: Beversdorf) are actively being enrolled from the National Aphasia Association, Association of Frontal Temporal Dementia, medical records, and patient referrals. Participants will complete structural and functional magnetic resonance imaging (MRI), and cognitive language abilities of word retrieval [Neuropsychological Assessment Battery (NAB)-Naming Test], and verbal letter fluency [Controlled Oral Word Association Test (COWAT)] and semantic fluency [categorical fluency test (CFT)]. Statistical analysis will examine differences between variants in baseline data of atrophy and activation in neural language networks and on language abilities in the neuroimaging pilot study with currently enrolled participants.

Results

Presently, a total of 5 PPA (3 logopenic/2 nonfluent) are enrolled in the study with starting dates in Fall 2024. One-way ANOVA analyses will evaluate differences between PPA variants (logopenic vs nonfluent) and neuropathophysiological markers and on language abilities. Anticipated pilot results may indicate variant specific neuropathophysiological markers that may contribute to language abilities.

Conclusion

Expected findings from the present pilot study may inform variant-specific neuro-pathophysiological markers that may contribute to disease symptomology. This is significant given the variation in neurophysiological markers that PPA patients exhibit. Findings may provide potential beneficial neural markers for monitoring future therapeutic intervention for individuals with PPA.

Long-term outcomes of Malone anterograde continence enema and cecostomy in rural Missouri patients

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Introduction

Antegrade continence enemas (ACE) are administered via an appendicostomy or a cecostomy to manage various types of pediatric chronic constipation. Cecostomies utilize tubes/buttons that require periodic exchanges, whereas in appendicostomies, the appendix is sutured to the skin. The aim of our study is to evaluate long-term outcomes of those approaches in a mixed rural patient population.

Methods

A retrospective cohort analysis was performed on pediatric patients who underwent either Malone type ACE or Laparoscopic Cecostomy (LC) between 2014 and 2024. The cohort consisted of 27 patients, 8 (30%) MACE and 19 (70%) LC patients.

Results

Average age at time of procedure was significantly higher in the MACE group (14.6 vs 8.1 years, p=0.028). MACE patients had a longer length of stay compared to LC (7.5 days vs. 4.5 days, p=0.014). 30-day readmission rates were significantly higher in the MACE (5) compared to the LC group (1) (p=0.001). There were no significant differences in persistent soiling, surgical site infections, ileus, stomal dehiscence, or bowel obstruction between groups. Stomal stenosis was only observed in MACE (37.5%) patients (p=0.005). Granulation tissue was significantly more prevalent and was the most common complication seen in LC compared to MACE patients (89.5% and 13% respectively, p<0.001). MACE patients had a higher rate of surgical revision (25%) compared to none in LC patients (p=0.024).

Conclusion

We observed an overall low complication rate and low incidence of major complication over a 10-year period. The higher re-admission rate observed in MACE patients leads to a higher healthcare utilization impact, in addition to a financial, travel, social and academic burden to these families. Revisions of MACE were necessary when performed alongside Monti procedures. The complications of each procedure should be considered in future practice to tailor care based on patient characteristics.

Incidence of referral and treatment following hip fracture in elderly patients

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Introduction
Hip fractures often occur secondary to osteoporosis in the elderly population, leading to severe health consequences including increased mortality, impaired mobility, and decreased quality of life. The risk of subsequent fracture increases following an initial fracture, with timely referral to bone health (BH) specialists for evaluation and management helping to mitigate these risks. Access, cost concerns, and missed referrals prevent patients from completing recommended BH screenings. The primary aim of this study was to examine factors associated with BH referrals and completed evaluations in elderly patients following hip fractures.

Methods
A retrospective chart review was conducted at the University of Missouri-Columbia for elderly patients (>65 years) experiencing a hip fracture between January 1, 2019, and December 1, 2022, who survived their inpatient stay.

Results
578 patients met inclusion criteria and were included for analysis. 304 patients (52.5%) were referred for BH evaluation. Female patients (p=0.044), patients who underwent operative fixation (ORIF) instead of total hip arthroplasty (p = .033), patients with higher calcium values (p=.008) and patients with a shorter length of stay (LOS) (p=.011) were more likely to be referred to BH. Marital status, age, mental health history, tobacco use, vitamin D values, and insurance status were not different between groups. For the 304 patients referred to BH, 183 (60.2%) successfully attended their initial BH evaluation. Younger age (p=.003) and shorter hospital stay (p = 0.031) were the only factors significantly associated with visit attendance.

Conclusion
Shorter LOS, higher calcium values, female, and ORIF patients were significantly more likely to be referred for BH evaluation following hip fracture. These findings highlight disparities in referrals, as every included patient met guidelines for bone mineral density screening. Future research should focus on improving referral rates and addressing barriers to attendance, particularly for older patients and those with extended hospital stays.

Combo 10 by 2: Analyzing vaccination rates at a rural medical center

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Introduction
Federally Qualified Health Centers (FQHCs) quantify routine immunization success by calculating the percentage of children who receive the Combination 10 vaccines by their second birthday. FQHCs report their Combo 10 completion rate is typically less than 5%, and leaders of rural FQHCs believe the requirement of two doses of influenza vaccines and the rotavirus vaccination series are barriers to higher rates. This study evaluates which vaccines drive the low completion rates.

Methods
Vaccination and encounter dates for children seen at one FQHC comprised of four clinics in Missouri born between January 1, 2017 and April 24, 2022 were collected. These dates were cross-referenced to Missouri's Immunization Information System, ShowMeVax. Completion rates for each vaccine series were calculated for each year within the 5-year span, as well the Combination 7 and Combination 10 metric for each year. The percentage of each vaccination accurately stored by both the clinic and ShowMeVax were also generated. Data were analyzed using SAS 9.4.

Results
Within a subset of patient data received, roughly 20% had completed the Combination 7 series, which includes the same vaccines as the Combination 10, minus Hepatitis A, Rotavirus, and Influenza. As the clinic leaders predicted, the number of patients receiving at least 1 influenza vaccine was only 7%, while the number of children completing their rotavirus series was 17%. However, the rate of DTaP completion was the lowest rate within the Combo 7 series at only 23%. The rest of the vaccination rates, as well as the Combo 10 rates, will be presented.

Conclusion
In one sample rural FQHC, the rotavirus and influenza vaccination rates appear to drive low compliance with the Combo 10 completion metric. However, other vaccinations, such as DTaP, may be contributing to the low completion rate. Future projects aiming to catch missed opportunities at well-child visits will be explored.

Intermittent hypoxia induces ovarian dysfunction via epigenetic changes in senescence pathways

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Introduction
Studies indicate an association between sleep disorders and unfavorable outcomes in women's health, specifically related to fertility, pregnancy, and labor. Intermittent hypoxia (IH), an effect of sleep apnea, has been shown to increase systemic aging in mice. Here, we investigate potential epigenetic pathways involved in cellular aging of the ovary.

Methods
Female CD1 mice were exposed to IH (n=28) or room air (RA) (n=27) for 6 weeks. DNA methylation profiling in representative ovary samples (n=5/group for IH and RA) was conducted using the Infinium Mouse Methylation Array (Illumina). Superovulation was induced with pregnant mare serum gonadotropin (PMSG) and human chorionic gonadotropins (hCG). Oocytes were counted and ovaries were embedded in OCT. Histology of the ovary with H&E was used to examine differences in follicles between the groups. Immunofluorescence of collagen was performed to examine fibrosis of the ovary, and immunofluorescence of p16 and EGFR as senescent markers.

Results
Ovaries of IH-exposed mice revealed a significantly higher mean Age.Acc than RA (3.0±0.3 and 2.1±0.2, respectively; p=0.034). The average number of oocytes per animal was significantly lower in IH-exposed mice compared to RA (22.7±16.3 and 32.2±10.8, respectively; p=0.015). Histological assessment exhibited a larger number of un-ovulated antral stage follicles in the ovaries of IH-exposed mice. Immunofluorescence reveals increased expression of collagen, p16, and EGFR in IH ovaries indicating fibrosis and increased senescence.

Conclusion
Our findings demonstrate the phenotype of impaired fertility induced by IH-exposure, and the key role of epigenetic dysregulation and biological aging of the ovary. Increased expression of p16 and EGFR senescence markers signify a potential mechanistic pathway for further research.

What factors influence limb preservation outcomes following treatment of open fractures requiring soft tissue coverage procedures?

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Introduction
Open extremity fractures that require soft tissue coverage may be at risk for amputation. Patients and clinicians must weigh risks for procedure failure, multiple operations, recurrent infection, fracture nonunion, pain, and dysfunction for shared decision-making. Risk factors including tobacco use, history of infection, and complexity of wound and fracture care are reported to impact outcomes, but amputation risk following treatment of open fractures requiring soft tissue coverage has not been well characterized. The aim of this study was to examine patient-specific risk factors for amputation following open fractures requiring soft tissue coverage.

Methods
Patients were eligible for inclusion if they experienced an open extremity fracture requiring at least one soft tissue coverage procedure (skin + muscle rotational or free-flap). Patient demographics, operative variables, and outcomes were extracted from the IRB-approved University of Missouri Limb Preservation Registry and the medical record. Outcomes were defined as success (functional limb preservation) or failure (amputation).

Results
Ninety patients met inclusion criteria (n= 65 male), with a mean age of 47 years (range 14 – 89). Ten patients (11.1%) required amputation. Fracture site infection (p=.011, OR 6.5) and tobacco use (p=.03) were associated with significantly higher likelihood of amputation. Patient age, sex, marital status, BMI, cardiovascular disease, and diabetes were not significantly associated with amputation risk. Surgical variables including flap size, location, or use of matrix were not significantly associated with amputation risk. Multivariate analysis found that fracture site infection in tobacco users was associated with a 21-times higher amputation risk (p<.001).

Conclusion
Patients with open extremity fractures that require soft tissue coverage are at greater risk for amputation if they are tobacco users or have a fracture site infection prior to the soft tissue coverage procedure; this risk triples for patients with both risk factors. These risk factors should be considered for shared decision-making.

Recurrent stroke: An analysis of acute clinical and demographic risk factors

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Introduction
Stroke is one of the leading causes of morbidity and mortality worldwide. Stroke survivors are also at a high risk of secondary events; 7-20% suffer a recurrent stroke after initial recovery. Recurrent stroke could be preventable. Understanding factors impacting this is crucial for optimizing patient secondary prevention. This retrospective study analyzed stroke recurrence focusing on demographic and clinical variables collected during the acute stroke hospitalization.

Methods
Demographics (age, sex, race, ethnicity), clinical (stroke severity at admission, stroke type, localization, comorbidities, and medications) variables, and recurrent stroke incidence were extracted from a sample of 374 patients admitted at the Missouri Health Care. Fisher's exact test and logistic regression analysis were used to test the relationship between the variables and stroke recurrence. Variables statistically significant in the univariate analysis were kept in the logistic regression model. To avoid overfitting the model, a subset of variables was selected based on the Akaike information criterion (which measures the model fit) and AUC (area under curve, predictability)
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Results
The univariate analysis showed that stroke severity at admission (p=0.02), electrolyte imbalance (p=0.001), and neurological comorbidities (p=0.002) were risk factors for recurrent stroke. The parsimonious logistic regression included age (p=0.08) and stroke severity (p=0.38) at admission, electrolyte imbalance (p=0.017), neurological comorbidities (p=0.30), mental disorders (p=0.27), and medication including antihypertensive (p=0.13), analgesic (p=0.13), cholesterol-lowering (p=0.24), and corticosteroids (p=0.31). When controlling for other variables, the electrolyte imbalance (p=0.017) with odds ratio=0.25, and 95% CI=(0.08, 0.78) was the only significant factor affecting the development of stroke recurrence. The AUC was 0.72.

Conclusion
This study identified one independent risk factor in impacting stroke recurrence, and the prediction model had acceptable performance; those with electrolyte imbalance during the acute stroke have the lower risk of developing recurrent stroke, probably due to early detection and treatment of this imbalance.

Chemogenetic activation of melanin concentrating hormone neurons corrects sleep disturbances and promotes recovery after ischemic stroke

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Introduction

Ischemic stroke (IS) is the fifth leading cause of mortality and highest contributor to disability annually. The majority of stroke survivors display sleep disturbances, including insomnia and daytime sleepiness, which negatively impact recovery while accentuating the risk for stroke recurrence. These post-stroke sleep disturbances are considered a potential therapeutic target for stroke management and rehabilitation; however, the underlying mechanism of IS-induced sleep disturbances and their impact on stroke recovery is still unknown.

Melanin-concentrating hormone (MCH) plays a pivotal role in the regulation of many physiological functions, including a) sleep (especially REM sleep), b) learning and memory, c) locomotor activity and energy expenditure via modulation of the activity of GABAergic neurons and dopaminergic tone in the striatum. Recently, MCH has been shown to be involved in regulating oxidative stress, neuroinflammation, and circadian gene via SIRT-1 pathway, and its potential as an anti-stroke agent has been envisaged; however, it has yet to be investigated.

Methods

This led to the hypothesis that "MCH activation will promote sleep and promote recovery in mice with IS." To test our hypothesis, transgenic MCH-cre C57BL/6J mice (expressing cre recombinase in the MCH neurons) instrumented with sleep recording electrodes were used. IS was induced utilizing a widely used middle cerebral artery occlusion (MCAO) method. Designer Receptor Exclusively Activated by Designer Drug (DREADD) was employed to selectively activate MCH neurons for sleep promotion.

Results

Mice subjected to IS displayed insomnia-like symptoms and excessive daytime sleepiness, along with motor and cognitive deficits until day 7 post-IS. Chemogenetic activation of MCH on Days 1 and 2 post-IS attenuated IS-induced effects on sleep-wakefulness, sensorimotor and cognitive behavior.

Conclusion

Our findings strongly indicate that sleep disturbances following IS negatively impact post-stroke recovery. Additionally, MCH may serve as a novel therapeutic target for treating sleep disturbances and promoting accelerated recovery post-IS.

Optimizing short-term post-operative patient outcomes in glaucoma shunt procedures: A retrospective analysis of tube fenestration techniques

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Introduction

Postoperative hypotony can lead to vision-threatening complications following glaucoma drainage device (GDD) tube-shunt implantation. Non-valved GDDs require a dissolvable ligature suture to restrict initial aqueous flow, while tube fenestrations (fens) provide early postoperative intraocular pressure (IOP) control until ligature dissolution. Wicks of various suture material placed through fens help modulate flow but may result in hypotony. There is no standardized fen technique to optimize early IOP control. We aimed to determine early postoperative safety and effectiveness of common fen techniques in non-valved GDD procedures.

Methods

Retrospective study of 59 eyes (55 patients) from case-logs of three glaucoma specialists between 2021-2024. Outcomes measured were IOP change, changes in logarithm of the minimum angle of resolution visual acuity (logMAR VA), rates of numerical hypotony (≤6mmHg), and rates of hypotony-related complications, all within the 1-week postoperative period (POW1).

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Results

Within POW1, IOP change was -14.91±12.35 mmHg in eyes with any type of wick and -7.80±11.14 mmHg without wicks (p=0.0266). IOP change was -17.2±14.68 mmHg in the >2 fens group and -9.93±10.80 mmHg in the ≤2 fens group, regardless of wicks (p=0.042). Chi-Square showed 46.15% rate of numerical hypotony in the vicryl group versus 0% with nylon (p=0.017), but no difference in hypotony-related complications (p=0.30). Fisher's Exact Test showed increased rate of numerical hypotony in the >2 fens with vicryl wicks group (62.5%) compared to >2 fens without wicks (p=0.026), ≤2 fens without wicks (p=0.014), and ≤2 fens with nylon wicks (p=0.026), but no difference compared to ≤2 fens with vicryl wicks (p=0.40). There was no difference in the rate of hypotony-related complications (p=0.14) or change in logMAR VA among groups.

Conclusion

For greater IOP reduction, wicks and/or more fenestrations can be placed. Vicryl wicks increase the rate of numerical hypotony, particularly with >2 fens. However, no technique results in greater hypotony-related complications.

The contribution of CD47, an immune checkpoint molecule, to maintaining immune tolerance between mother and fetus during pregnancy

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Introduction
The protection of the semi-allogeneic fetus presents a significant challenge for the maternal immune system. During pregnancy, specialized maternal macrophages are in close contact with fetally-derived trophoblasts and play a role in phagocytosing apoptotic trophoblasts, cell debris, and foreign pathogens. It remains unclear, however, how allogeneic and healthy trophoblasts evade macrophage-mediated recognition for destruction, and how macrophages adopt a pro-tolerogenic phenotype. In this study, we address these questions by investigating the role of CD47, a cell surface-expressed immune checkpoint molecule. While CD47 is known to inhibit macrophage phagocytosis through its interaction with signal regulatory protein alpha (SIRPA) on macrophages during cancer development—a process that bears notable similarities to placentation—its significance in reproduction remains largely unexplored.

Methods
Immunostaining, flow cytometry, Western blotting, qPCR, and bulk RNA sequencing were employed to assess the effects of CD47 expression in trophoblasts on macrophage function.

Results
CD47 expression was strong on the outer surface of the outermost layer of the villi, the syncytiotrophoblast (STB), in the first trimester human placental tissue. Blockade of the CD47–SIRPA interactions increased the capacity of THP1-macrophages to engulf STB cells differentiated from a human trophoblast stem cell line, CT27 (CT27-STB). The distribution pattern of CD47 was altered during staurosporine-induced apoptosis of CT27-STB specifically showing the reduced CD47 expression on the cell surface. In addition, conditioned medium from CD47-silenced CT27-STB enriched the genes associated with pro-inflammatory responses in both THP1-macrophages and pregnant women's peripheral blood mononuclear cells-derived macrophages.

Conclusion
Our results reveal that cell surface CD47 protects healthy STB against macrophage phagocytosis and that the secretory factors from CD47-expressing STB contribute to macrophage polarization toward an anti-inflammatory phenotype. These findings suggest that CD47-mediated signaling may help to balance maternal pathogen defense and protect the allogeneic fetus.

Relationship between cholesterol levels and antipsychotic use in adult ASD

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Introduction
Individuals with autism spectrum disorder (ASD) exhibit a high prevalence of metabolic and gastrointestinal (GI) comorbidities. Antipsychotic medications are frequently prescribed in this population. This study aims to evaluate the effects of antipsychotic treatment on metabolic and GI comorbidities and to assess age-related variations in these effects within an adult ASD cohort.

Methods
We retrospectively analyzed 279 charts from patients with ASD, ages 16-62 (mean = 27.97, SD = 8.89). The abstracted data included demographic information, medications taken, gastrointestinal (GI) and metabolic comorbidities, and recent values for body mass index (BMI) and total cholesterol. Further information was collected regarding the duration of antipsychotic exposure, as well as specifying concomitant metabolic related medications (cholesterol-lowering, anti-diabetic, and other weight-loss drugs). Participants were separated into two groups based on antipsychotic use. Between-group differences were calculated for the prevalence of GI comorbidities and mean values for BMI and total cholesterol. Binary correlations were calculated for age and total cholesterol and age and BMI.

Results
No significant difference was found between the prevalence of GI comorbidities for the two groups. No significant difference was found in the mean BMI or total cholesterol for metabolic factors. Binary correlation analysis also revealed no significant correlation between age and BMI for patients in either group. A significant correlation was found between age and total cholesterol for patients both taking and not taking antipsychotics.

Conclusion
Although nearly one-third of participants in this study were receiving antipsychotic medication, no significant differences were observed in gastrointestinal or metabolic comorbidities. However, cholesterol levels increased with age, independent of antipsychotic use. Further research should continue to assess the metabolic effects with aging in adult ASD patients, regardless of antipsychotic exposure.

Characteristics influencing maternal ratings of typicality and distress of their infants' cries

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Introduction

Cry acoustics have emerged as a possible early indicator of autism, as infants later diagnosed with autism produce cries with distinct acoustical qualities. Parental response to cries is one area of exploration to better understand how these acoustic features may impact development. This study investigates the influence of caregiver characteristics on cry perception.

Methods

Participants were 1,036 mothers of 1,053 infants from an ongoing longitudinal birth cohort study. Mothers recorded and rated their infants' cries on 4-point scales of typicality and distress during the first six weeks postpartum. At nine months post-partum, mothers completed the Broad Autism Phenotype Questionnaire (BAPQ), which assesses subclinical autism-related personality characteristics in adults.

Results

T-tests compared ratings from different groups. There was no significant difference in ratings based on infant sex or gestational age at birth. Primiparous mothers (n=379) rated their infants' cries as significantly more distressed than multiparous mothers (n=672; p=0.01). Mothers with an older autistic child (n=60) rated their infants' cries as significantly more typical than mothers with a typically developing older child (n=609; p =0.03). Linear models indicated that, regardless of BAPQ scores and caregiving experience (first born status or having an older autistic child), minority status significantly accounted for variance in distress ratings; minorities rated their infants' cries as significantly less distressed than non-minorities.

Conclusion

Our diverse cohort allows for comprehensive exploration of real-time cry perception. Our findings set the stage for future research on how a mother's prior caregiving experience and other individual characteristics influence cry perception, parenting responses, and ultimately emerging parent-infant relationships. There are also clinical implications for cry acoustics as an early autism screening tool, as well as further understanding SIDS, child abuse, colic, postpartum depression, and more.

Effectiveness of preclinical education in Step 1 preparation: A survey study

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Introduction

Understanding factors that influence USMLE Step 1 success is critical for curriculum improvement. The current study evaluates student perceptions of the effectiveness of teaching methods, lecture and resource utilization, assessment feedback, and other preclinical factors at the University of Missouri School of Medicine. By associating these factors with perceived Step 1 preparedness, the goal is to identify improvements that enhance student success.

Methods

Third year medical students at the University of Missouri were asked to fill out a survey regarding the pre-clerkship phase and their satisfaction with various elements of the curriculum. 47% (63/134) third year medical students completed the survey. Agree/Disagree responses were collected, along with ratings for specific educational experiences. The survey items measured satisfaction with teaching methods, lecture attendance, resource usage, and feedback quality. Key metrics such as teaching quality, curriculum integration, and exam preparedness were assessed through Likert scales and open-ended responses.

Results

Most students (88.9%) were satisfied with their preclinical education. However, only 33.3% found patient-based learning (PBL) block lectures effective, while introduction to patient care (IPC) lectures were more positively rated (53.97%). Most students (92%) used third-party resources such as UWorld and First Aid for Step 1 preparation. While 77.8% agreed that end of block summative assessments administered by the School of Medicine aligned with course objectives, only 33.3% felt they mirrored USMLE Step 1 items.

Conclusion

The current study highlights the need to enhance curriculum integration and ensure alignment between assessments and Step 1 content. Increased use of interactive and application-based learning methods, along with improved feedback and assessment formats, may enhance student perceptions of their preparedness for USMLE Step 1. Additionally, integration of third-party resources and supporting stress management strategies are essential for student success.

Pre-injury methamphetamine use is associated with increased length of hospital stay in rural orthopaedic trauma patients

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Introduction
The current study examines whether rural methamphetamine-positive patients experience longer hospital stays compared to urban methamphetamine-positive patients after orthopaedic trauma. Understanding the impact of rural residence on hospital outcomes may guide resource allocation and care strategies.

Methods
A retrospective cohort analysis was conducted at an academic Level I trauma center. Patients with traumatic orthopaedic injuries who underwent urine drug screening between 1/1/2013 and 1/1/2023 were included. Patients were categorized as urban, suburban, or rural based on home residence zip codes using Rural-Urban Commuting Area codes. Demographic, injury, hospital stay, and follow-up data were extracted from medical records. Statistical analyses, including Chi-square, Fisher exact, unpaired t-tests, and ranked sum tests, were used to compare groups. Significance was set *a priori* at $p < 0.05$.

Results
A total of 249 patients met inclusion criteria. Methamphetamine-positive patients were more likely to be younger, undergo surgery for orthopaedic injuries, experience complications, and discharge to home or rehabilitation facilities compared to methamphetamine-negative patients. Urban patients had shorter hospital stays than suburban and rural patients, regardless of methamphetamine use status. Additionally, patients with Medicare, military, workers' compensation, or commercial insurance were significantly more likely to attend follow-up appointments than those with Medicaid or self-pay.

Conclusion
Methamphetamine-positive patients do not experience longer hospital stays compared to methamphetamine-negative patients overall. However, methamphetamine-positive patients are more likely to experience a medical complication and less likely to be operatively treated for orthopaedic injuries. Rural methamphetamine-positive patients have significantly longer hospital stays compared to their urban counterparts. These findings highlight the need for tailored healthcare strategies for rural methamphetamine-positive patients to address potential disparities in care.

Spinal ependymoma discovered post-partum following neuraxial anesthesia

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Introduction

Ependymomas are the most common tumors of the spinal cord. They present indolently with headache and nausea before progressing to focal neurologic symptoms. On average, patients experience symptoms for 8 months before receiving a diagnosis. This case is a G1P0, 21-year-old female with a past medical history significant for chronic back pain who received an epidural for childbirth. On post-partum day four, she presented to the emergency department (ED) with back pain. She had no neurologic deficits and was sent home with ketorolac. She returned to the ED two days later with continued pain and paresthesia of both legs. MRI revealed a myxopapillary ependymoma with internal hemorrhage. Laminectomy and total resection of the mass was performed the following day. Two weeks later, the patient returned to clinic with complete resolution of symptoms and no residual tumor on follow-up MRI.

Methods

Case documentation was reviewed via Cerner PowerChart. Information was obtained from the epidural report, ED visit notes, radiology reports, and neurosurgery procedural notes. Data was compiled and discussed with the attending anesthesiologist who oversaw the case.

Results

The surgical pathology and radiology reports confirmed the presence of a spinal ependymoma. The tumor was found to have internal hemorrhage, which was likely induced by inflammation from the neuraxial anesthesia.

Conclusion

Neuraxial anesthesia is commonly administered for childbirth. A common symptom following childbirth is back pain. One potential cause of post-partum back pain is the unmasking of a spinal neoplasm. Despite the rarity of this particular malady, it should prompt clinicians to maintain a broad differential when evaluating post-partum women with back pain and resist the temptation to dismiss their discomfort as simple post-partum changes.

Traumatic brain injury post-acute care in the era of rural hospital closures

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Introduction

Traumatic brain injury (TBI) is a leading cause of disability in pediatric and young adult populations. Timely, multi-disciplinary post-acute care is critical for long-term outcomes. Rural hospital closures have raised concerns about the impact on healthcare access and flow of care. This study investigated transition to post-acute care in TBI patients and rural hospital closures.

Methods

Admissions to a rural-serving level 1 trauma center for moderate-severe TBI (n=202) were retrospectively reviewed for length-of-stay (LOS) and discharge disposition. Pre-closure or post-closure comparison groups were based on date of discharge relative to closure dates retrieved from public record. LOS and other continuous data were analyzed via two-tailed t test. Chi-squared analysis was performed for disposition and other categorical variables.

Results

There were 202 patients admitted from the ED for TBI care. In comparing the pre-closure population (n=61, $\bar{x}$=8.07, SD=9.04) to the post-closure population (n=147, $\bar{x}$=12.59, SD=13.25), there was a significant difference in total hospital LOS ($p<0.01$). Though there were some observable differences in discharge disposition, these results were not found to be statistically significant ($p=0.26$).

Conclusion

This study observed TBI patients hospitalized after rural hospital closures had an increased LOS compared to the pre-closure population. Discharge disposition was not significantly impacted. These results suggest rural hospital closures could be associated with efficiency of post-acute care in TBI patients. Future research should explore the broader implications on patient outcomes and applicably to other conditions requiring post-acute care.

Grading of corneal neovascularization using DEEPCNVDELTA method from slit-lamp captured patients images

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Introduction

Corneal neovascularization (CNV) is a pathological disorder that affects millions of people annually, and improper intervention of CNV leads to vision loss. No standard automation algorithm exists to grade the severity of CNV. The objective of this study was to develop an automated standardized AI-based open-source classification model to detect and predict the grade of CNV levels by capturing images in patients.

Methods

This study evaluates CNV detection and grading from live slit lamp-captured corneal images. CNV progression was recorded and graded by three independent blinded clinicians. The graded images were classified using a deep learning algorithm composed of Mask R-CNN for image segmentation and random forest regression for quantitative automated CNV grading and named DeepCNVDELTA.

Results

The DeepCNVDELTA classifier showed a high level of sensitivity, precision, specificity, and accuracy of more than 95% on the training and testing instances for corneal extraction, segmentation, and refinement with an R2 value of 0.78 at patient-level CNV grade prediction. Further, biological validation of the DeepCNVDELTA was performed using humanely euthanized mice corneal tissues. The histology data of H&E, flat-mount lectin staining, and CD31 protein expression validated the prediction of CNV grades by DeepCNVDELTA. The DeepCNVDELTA method with an amalgamation of Mask Region-based convolutional neural network (R-CNN) and random forest (RF) classifier-based CNV grading applied on our in-house collected slit-lamp images.

Conclusion

DeepCNVDELTA has the potential to automatically identify and grade CNV in a reproducible unbiased manner, offering clinical and translational opportunities. In addition, the DeepCNVDELTA can potentially be used for the angiogenesis quantification of other biological tissue with few modifications.

Effect of patient age and BMI on the metabolic responses of osteoarthritic cartilage to load

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Introduction

Osteoarthritis (OA) is a degenerative whole-joint disease resulting in significant pain and disability in patients. Increased patient age and BMI have been associated with increased OA incidence and progression. However, the effect of patient age and BMI on the metabolic responses of OA cartilage to compressive load are still poorly understood. It was hypothesized that increased patient age and BMI would be associated with increased production of pro-inflammatory and pro-degradative biomarkers by OA cartilage samples during ex vivo culture with and without compressive load.

Methods

With IRB approval and informed patient consent, articular cartilage tissue was recovered from patients undergoing total knee and hip arthroplasty for OA. Cartilage explants were cultured with or without compressive load for 3 days, and culture media was collected for protein biomarker analysis. Samples were grouped based on patient age or BMI and load group during culture. Significant ($p<0.05$) differences between groups were determined using a Mann-Whitney or Kruskal-Wallis test and post-hoc pairwise comparison. A two-way ANOVA was performed using the age and BMI groups to determine significant ($p<0.05$) differences groups in the loaded or unloaded samples based on the interaction of patient age and BMI group.

Results

It was found that there are significant differences in biomarker concentrations when grouping patients based on BMI and age groups for samples cultured with or without load.

Conclusion

The data from this study indicates significant changes in OA cartilage metabolic responses to culture and compressive load are associated with patient age and BMI. Unraveling these complex relationships can allow for the development of more patient specific treatment protocols towards the goal of improving treatment outcomes and quality of life for patients with OA.

Redesigned KBCommons – v2.0 framework for enhanced multi-omics data integration and visualization for diverse organisms

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KBCommons v2.0 represents an upgraded iteration of its precursor, providing a robust platform for the storage, sharing, analysis, and visualization of genomics and integrative multi-omics data across diverse organisms. Its four modules encompass data storage, processing, access, and a user-friendly web interface. Prominent functionalities comprise the ability to generate new knowledge bases (KBs) for any organism, contribute multi-omics data, and update genome versions.

KBCommons v2.0 comes with the modern new design and interactive user interference with several new tools integrated into it to support multi-omics data integration. The 3D Omics Studio tool includes a Differential Expression Tool that augments data analysis capabilities, enabling users to discern subtle gene/protein/metabolite expression patterns across various experimental conditions with enhanced accuracy and efficiency. The Comparative and Cross-species Multi-Omics Translation (CCMT) tool allows for comparative analysis of similar or different multi-omics data between organisms and within the same organism. It offers insights into transcriptomics, proteomics, metabolomics, and gene regulatory network comparisons.

Furthermore, the Allele Catalog tool available for certain plant species facilitates efficient exploration and analysis of large-scale resequencing data for discovering new alleles and phenotypic changes based on accession categories. Lastly, the GenVarX tool focuses on transcription factor binding sequences, copy number variations, SNPs, Indels, and their impact on phenotypes. These aid in understanding phenotypic variations, particularly for precision agriculture.
With the increasing rate of generated genomics and multi-omics data, KBCommons is an essential framework for all organisms. It is publicly available at https://kbcommons.org/

Pediatric healthcare community needs assessment in eastern India

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Introduction
Odisha and West Bengal are two Eastern states ranking within the ten largest and most-populated states of India. The tea garden community in Siliguri, West Bengal, is a protected indigenous population with “Scheduled Tribe” status, recognized as one of India’s most disadvantaged socio-economic groups. Odisha’s overall healthcare has an index score of 40 and ranks 14th in its overall outcomes based on health outcomes, health data monitoring, and health systems’ care-delivery.

Methods
A needs assessment survey was designed to assess the healthcare landscape adequately by asking about: perceived strengths/weaknesses of child health, health literacy, and access to healthcare. Data was collected in Bhubaneswar, Odisha, and tea garden villages in Siliguri, West Bengal. Survey responses were denoted by location and responders’ role in the community. Analysis was conducted to determine the most pertinent issues for child health in these regions.

Results
The most prevalent pediatric concerns include employment (30%), education/financial stability (20% each), access to care (15%), and nutrition (15%; from Siliguri). In Odisha, a common issue is continuity of care; vaccinations are included by governmental coverage, but regular visits past age two are uncommon unless the child is sick or hurt. Current trends show improvements in nutritional disease during infancy; infectious diseases remain but are improving due to governmental sanitization efforts. In West Bengal, providers note higher rates of autism, neuro-development syndromes, and speech delay. Trends show reduced TB, measles, malaria, and death due to bacterial causes. Nutrition and education access remains a big concern, especially for the tribal population.

Conclusion
Child health is a priority, even above the cost burden. There is greater emphasis on healthcare during infancy and vaccinations. Health literacy was hard to assert in rural populations. Further studies should analyze the impact of governmental aid programs, medical insurance (BSKY card in Odisha), and education initiatives.

Elucidating risk factors for craniosynostosis

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Introduction
Cranial sutures are fibrous joints between skull bones that remain flexible during infancy, allowing for further growth and development of the brain. Craniosynostosis is the premature closure of these sutures and can result in atypical shaped skulls associated with developmental delays, sensory, neurological, and respiratory dysfunction if left untreated. This study aims to elucidate risk factors for craniosynostosis.

Methods
This is a retrospective review of electronic medical records from craniosynostosis patients at the University of Missouri Hospital (UMH) between 1/1/22-7/1/24. Control data is from the Missouri Department of Health and the UMH Maternal Fetal Medicine Clinic. Analysis was completed using VassarStats. Comparisons were by Chi square and Fisher's Exact testing. Data is presented as odds ratios with 95% confidence intervals.

Results
27 patients were identified. 48.1% involved the metopic suture, 29.6% sagittal, 22.2% coronal, and 7.4% lambdoid. All patients presented as non-syndromic.
Craniosynostosis patients were 2.71 times more likely to be male (CI: 1.15, 6.42), 4.93 times more likely to be preterm (CI: 2.24, 10.86), 2.9 times more likely to be delivered via cesarean section (CI: 1.36, 6.2), and 5.02 times more likely to be multiple gestation (CI: 1.73, 14.52). Mothers of craniosynostosis patients were 4.99 times more likely to have BMI over 30 (CI: 1.54, 16.2), 6.13 times more likely to have hypertension (CI: 2.21, 16.99) and 28.34 times more likely to have oligohydramnios in pregnancy (CI: 5.89, 136.47).

Conclusion
The study results reveal associations between males, multiple gestation, preterm delivery, cesarean section, maternal obesity, hypertension, and oligohydramnios and the development of craniosynostosis. These findings can help clarify the risk factors for craniosynostosis, allowing for timely diagnosis and intervention.

Retrospective study of initial symptom presentation of epithelial ovarian cancer

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Introduction
Epithelial ovarian cancer (EOC) is the second most common cause of gynecological cancer death. 75% of EOC is detected in an advanced stage, largely due to the lack of specific symptoms and biomarkers. Early detection is crucial for improving outcomes. This study aims to identify the most common presenting symptoms of EOC, stratified by type and stage. Additionally, associations between presenting symptoms and survival rate were investigated.

Methods
This is a retrospective review of electronic medical records from patients with EOC treated at the University of Missouri (UM) and Ellis Fischel Cancer Center between 2008 and 2023. Data on symptom presentation, staging, and disease outcome were collected utilizing REDCap. Analysis was completed using the Logistics and Freq Procedure from SAS OnDemand. Data from the EOC type, symptom, stage of cancer at initial diagnosis and recurrence frequencies were analyzed by chi-square test (FREQ Procedure).

Results
219 patients were identified. 107 patients were diagnosed with serous carcinoma, 30 with endometrioid adenocarcinoma, 19 with mixed cell adenocarcinoma, 20 with clear cell cystadenocarcinoma, 23 with mucinous cystadenocarcinoma, and 20 with unspecified cystadenocarcinoma of ovarian origin. 38.68% were diagnosed with stage I/II and 59.36% stage III/IV disease. The most common presenting symptoms were abdominal pain, abdominal bloating, nausea, loss of appetite, and unintended weight loss. Multivariate analysis showed that abdominal bloating affected the probability of EOC patient survival ($p < 0.05$). Patients without abdominal bloating were 3.238 times more likely to survive than patients who presented with bloating. Other symptoms did not affect the probability of patient survival.

Conclusion
The most common initial symptoms, stratified by stage and type of EOC were identified. Abdominal bloating was the only initial presenting symptom associated with survival rate. Information can be used to assist in timely detection and diagnosis for improved outcomes.

Puff of smoke: A rare case of moyamoya disease

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Background
Moyamoya disease (MMD) is a chronic vasculopathy that is characterized by progressive, idiopathic stenosis of the terminal internal carotid arteries (ICAs) in the brain. This narrowing of the ICAs and the resulting ischemia leads to the development of many small, fragile collateral vessels that have increased risk of bleeding. Moyamoya incidence classically has a bimodal distribution between age 5-9 years and age 45-49 years, but it is an extremely rare condition at any age, occurring in 0.86 per million people.

Case
A 3-year-old previously healthy female presented to the ED with one week of headaches, vomiting, and gait abnormalities. The patient also appeared to have left-sided vision changes, as she had a couple episodes of "running into objects" and "looking past" her parents when speaking to them. CT head in the ED found vasogenic edema in the right occipital lobe, and non-contrast MRI/MRA on admission showed acute and chronic infarcts with findings suggesting possible MMD. CTA brain confirmed bilateral stenosis of the terminal ICAs, and MRA with contrast with vessel wall imaging revealed numerous intracranial collateral vessels in the classic "puff of smoke" pattern seen with MMD. The patient was started on aspirin 81 mg daily for stroke prevention, and workup for hypercoagulable, infectious, and autoimmune disorders was negative. Genetic testing for genes associated with MMD is pending. If no medical targets for therapy are found on pending tests, the patient will likely require revascularization surgery.

Conclusion
MMD is difficult to manage, as the risk of cerebral ischemia from bilateral ICA stenosis must be weighed against the risk of bleeding from the fragile collateral vessels. Progression of vascular stenosis occurs in all patients, with two-thirds experiencing significant symptomatic progression over five years. Although prognosis is poor, early surgical revascularization has shown improved outcomes and may benefit this patient.

Toddler refusing to walk: A case of *Kingella kingae* spondylodiscitis

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Background
Discitis or spondylodiscitis is a rare infectious inflammation of the intervertebral discs and end plates of adjacent vertebrae. Most children with discitis are under 3 years of age and have symptoms for several weeks before recognition of the underlying etiology. While *Staphylococcus aureus* is the most common cause of discitis across all ages, *Kingella kingae* is increasingly recognized as a cause in children younger than 2 years of age.

Case
An 18-month-old toddler presented to the hospital with a 1-week history of refusal to walk and bear weight on his left side. Initial laboratory work was unremarkable except for elevated erythrocyte sedimentation rate. Magnetic resonance imaging (MRI) of the left hip showed trace joint effusion, resulting in a clinical diagnosis of transient synovitis, a condition that usually resolves in 1-2 weeks. With caregiver concern for lack of improvement, he was seen again 1 and 3 weeks later in orthopedic clinic, resulting in readmission to the hospital. Repeat MRI of the left lower extremity and lumbar spine was performed with concern for discitis that is known to occur in this age group. MRI showed discitis of the L5-S1 space with focal fluid collection measuring 1.8 x 1.9 x 0.9 cm. Diagnostic aspiration of this area was performed by interventional radiology. There was no bacterial growth on culture, however a dedicated *Kingella* PCR was positive. Patient was discharged home on empiric cephalexin with a plan to treat for 6-8 weeks with follow-up imaging. At one-week follow up, there was already improvement in ambulation and weight bearing.

Conclusion
Discitis is an uncommon but important differential to consider in the evaluation of a young child refusing to walk or bear weight. *Kingella kingae* is difficult to isolate in culture, and dedicated molecular diagnostics can facilitate increased recognition of this etiology of skeletal infections, including discitis in young children.

Identifying biomarkers for assessing ovarian status in ovary-specific senescence-associated secretory phenotypes

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Introduction

Premature ovarian insufficiency (POI) is a condition marked by a decreased ovarian function in women under 40 years, affecting approximately 1% of the global population. This disorder results from the premature loss of primordial follicles and can arise from genetic factors as well as environmental influences and treatments such as chemotherapy. The mild clinical symptoms and the absence of reliable biomarkers often lead to delayed diagnosis, jeopardizing effective treatment, compromising a woman's quality of life. This study aims to identify potential biomarkers to assess ovarian status based on our recent finding of primary oocyte senescence and its role in ovarian aging.

Methods

To identify secretory proteins and cytokines that are potentially associated with ovary senescence specifically, we established an in vitro mouse ovary culture model with doxorubicin-induced cellular senescence. This model allows us to enrich senescence-associated secretory phenotypes (SASPs) proteins produced by ovaries containing senescent primary oocytes, without interference from other tissues. Postnatal day 4 ovaries were treated with doxorubicin (0.04 ug/mL) for 24 hrs and cultured for an additional 4 days. Media from the ovarian cultures were collected at 72 and 96 hrs for profiling by Mass SPEC at the Gehrke Proteomics Center at the University of Missouri.

Results

18% of primary oocytes became senescent by 72 hrs of culture in Dox-treated ovaries, compared with 8% in control ovaries. Proteomic analysis identified 18 differentially expressed proteins at 72 hours and 47 at 96 hours between control and treated ovaries. Notably, treated ovaries showed a downregulation of metabolic pathways and an upregulation of IL-12 signaling and macrophage production at 96 hours.

Conclusion

In conclusion, quiescent primary oocytes can undergo cellular senescence followed by cell death. Further research is needed to validate the secretome of senescent primary oocytes and identify potential biomarkers for early detection and treatment of POI.

Bilateral congenital stapes footplate fixation with absence of the stapedial tendon: A case report

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Introduction

Congenital stapes footplate fixation (CSFF) is a rare cause of nonprogressive conductive hearing loss (CHL) that typically presents without characteristic radiographic findings. Congenital absence of the stapes tendon is rarer with few reported cases. Here we describe a case of bilateral CSFF with absence of the stapedial tendon as well as abnormal ossicle structure, where CHL was drastically improved after stapedotomy.

Case

A 15-year-old male with left hemifacial microsomia, microtia, complex congenital heart disease, and constitutional growth delay presents to neurotology clinic with bilateral CHL. Audiograms demonstrated severe rising to moderate CHL bilaterally with a pure tone average air-bone gaps (ABG) of 58 / 64 dB on the left and right respectively, with left sided type Ad tympanogram. CT of the temporal bones showed bilateral dysmorphic ossicles with sclerosis of the incudomalleolar joint and superior malleolar ligament.

Results

The patient underwent a right stapedotomy followed by subsequent left stapedotomy. Operative findings and surgical procedure were video recorded. The bilateral stapes footplates were found to be small and fixed, with weak anterior crura connected by a fibrous union to the base. The bilateral stapedial tendons were absent and the bilateral stapes suprastructure were abnormal. The long process of the right incus was shortened and thin, ending in a fibrous nonunion to a malformed stapedes suprastructure. The left incus was malformed and had a weak fibrous union to the stapes capitulum. Postoperative audiograms improved to mild CHL with ABG of 15 / 19 dB on the left and right respectively.

Conclusion

CSFF with absent stapedial tendon is a very rare otologic presentation, with bilateral cases unreported. Stapedotomy can significantly improve hearing in these patients.

Electrolyte estimations in the NICU: Safely optimizing testing, cost-effectiveness and reducing pain: A retrospective cohort study in the NICU

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Introduction

Electrolyte measurements are performed in the NICU when infants are on total parenteral nutrition (TPN) to prescribe daily TPN. The standard of care for electrolyte testing in the NICU is ordering a Comprehensive Metabolic Panel (CMP). Elevated transaminase is a marker of TPN-induced liver injury. The costs for a CMP, Basal Metabolic Panel (BMP), Renal Panel (RP), and Electrolyte Panel (EP) are $130, $80, $60, and $40 respectively.

Methods

A retrospective electronic chart analysis was conducted on 139 infants less than 33 weeks gestational age admitted to the NICU at UMHC born between March 1, 2022 and February 28, 2023. Excluded from the study were infants who died, were transferred, or had genetic anomalies. Demographic data and the hospital course were collected for the mother-infant dyad. Electrolyte estimations (EEs) on TPN, and when on full enteral feeds (FEFs; when electrolyte changes do not mandate any other therapeutic interventions) were collected.

Results

Mothers with a median (IQR) age of 28 (24,33) years with comorbidities such as diabetes, obesity, and hypertension had infants who were admitted to the NICU for 55 days (32, 80). Of these infants, 96.8% were on TPN for a week with a peak ALT at 9U/L (7,12), which is normal. The EEs the baby received on TPN were 5 (2,9) with 4 (2,8) CMPs. The EEs after the baby was on FEFs were 5 (2,10) with 3 (1,5) CMPs.

Conclusion

This study demonstrates that infants have normal transaminases while on TPN for a week and hence expensive CMP can be safely replaced with a cheaper EP. Infants on FEF may not need protocol-based EEs. Both these strategies will achieve the objectives of safe, optimized testing, cost-effectiveness, and a reduction in unnecessary pain.

Reliability of the Multicenter Orthopaedic Outcome Network calculator for predicting anterior cruciate ligament re-tear and contralateral tear risk in clinical patients

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Introduction
Anterior cruciate ligament reconstruction (ACLR) is a known risk factor for ipsilateral and contralateral ACL tear, influenced by patient age, activity level, and graft choice. The Multicenter Orthopaedic Outcome Network (MOON) calculator predicts risks post-ACLR, aiding in graft selection and prognosis. However, the MOON calculator's limitations with age (<22 years) and graft options restrict its applicability. This study assessed the MOON calculator's accuracy in predicting re-tear risk in diverse ACLR patients including quadriceps tendon (QT) recipients.

Methods
With IRB approval, registry data were reviewed for patients who had undergone primary ACLR at MU Orthopaedics over the past 10 years. Patient information was entered into the MOON calculator, adjusting ages over the calculator's maximum to "22 years" for entry. Graft types not listed were entered as patellar bone-tendon-bone (BTB). MOON re-tear and contralateral tear risk calculations were recorded. Actual outcomes (success, re-tear, contralateral tear) were extracted from medical records. Model calibration was assessed with the Brier score, and discrimination was evaluated using area under the curve (AUC) from receiver operating characteristic (ROC) curves.

Results
Seventy-eight patients (36 female, 12-47 years, sd 8) met inclusion criteria (64QT, 14BTB). Predicted re-tear risk rates by MOON were 4.2% (sd 3.1) for "BTB" (BTB and QT) patients. Actual re-tear rates were 7.1% for BTB and 3.1% for QT. For QT patients, the Brier score was .89 and AUC .78; for BTB patients, the Brier score was .84 and AUC .85, indicating ineffectiveness for re-tear risk prediction. For contralateral tear risk, the Brier score was .07 and AUC .72, indicating acceptable performance.

Conclusion
The MOON calculator was not effective in predicting ipsilateral ACL re-tear risk for a population including individuals older than 22 years and QT grafts. Validating the MOON calculator for a broader age range and QT grafts could enhance its clinical applicability.

Investigating the malignant transformation of mature cystic teratomas through case series

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Introduction

Mature cystic teratomas (MCT) of the ovary are overall common neoplasms seen in women, making up about 20% of all ovarian tumors. They are most often associated with reproductive aged women. While usually considered benign, these tumors have the potential for malignant transformation with an incidence reported between 0.2-2% of cases. 80% of these malignancies are squamous cell carcinomas, with the other 20% encompassing a variety of histologic types such as carcinoid tumor, adenocarcinomas, sarcomas, and melanomas.

Case Presentation and Results

Case Presentation and Results: This case report examines two cases of malignant transformation of an MCT. The first being a 44-year-old female who was transferred to our health system from an outside hospital after concerns of right leg swelling started two days prior and imaging that raised concern for a mature cystic teratoma. On pathologic review, it was found that her tumor underwent malignant transformation into a squamous cell carcinoma. While the second is a 43-year-old female who initially presented with ovarian torsion. She woke up with severe abdominal pain and nausea with vomiting. On imaging she was noted to have an ovarian torsion and was transferred for surgical assessment. The patient underwent a laparoscopic left oophorectomy at an outside hospital. Final pathology was significant for a teratoma with malignant transformation, papillary thyroid carcinoma, follicular variant, hemorrhage consistent with torsion.

Conclusion

Little is known about the management and surveillance of these rare tumors. A review of the literature is included to help further understand best practices in the identification, treatment, and follow-up of patients with these malignancies.

Systemic amyloidosis presenting as unilateral breast edema

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Introduction

Systemic amyloidosis is a rare disorder characterized by the abnormal deposition of amyloid proteins in tissues and organs, leading to progressive organ dysfunction. The most common form, AL amyloidosis, arises from the overproduction of monoclonal light chains by plasma cells, which misfold and deposit as amyloid fibrils. The following case report highlights a unique presenting symptoms of unilateral breast edema which may provide new insight into earlier diagnosis for future patient populations.

Case Presentation

A 69-year-old female who presented to the dermatology clinic with three-month history of unilateral left breast edema, “tongue swelling” associated with dysphagia and dysphasia, lower extremity edema, weight loss of 20 lbs, and fatigue. Her primary care physician had ordered a mammogram and ultrasound of the breast which both showed diffuse skin thickening. Outside records showed a barium swallow study with no significant abnormalities besides a small hiatal hernia, a CT of abdomen and pelvis showed small bowel enteritis and mild diffuse anasarca, and an echocardiogram showed an ejection fraction of 45%.

Results

A punch biopsy was completed of her left breast in the dermatology clinic which showed focal amyloid deposition highlighted by Congo Red stain. Amyloid typing and liquid chromatography tandem mass spectrometry was consistent with AL (kappa)-type amyloid deposition. Patient was urgently referred to the amyloidosis team at an academic center for further evaluation and management including a bone barrow biopsy, PET/CT, and tentative plan for treatment with daratumumab and cyclophosphamide, bortezomib, and dexamethasone.

Conclusion

The presentation of localized breast edema and macroglossia in this patient, along with biopsy-proven amyloid deposits in the breast and tongue, underscores the importance of recognizing such symptoms for timely diagnosis. Early identification is crucial in managing amyloidosis, as delayed treatment can result in irreversible organ damage and significantly impact patient outcomes.

Real-time CMR in atrial fibrillation

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Introduction

Studies show that 15% of strokes are attributable to atrial fibrillation (AF) while 6-21% of patients with a myocardial infarction also had AF. Because of this increased risk, it is essential these patients have access to accurate diagnostic imaging. Unfortunately, cardiac MRI (CMR) is prone to artifacts in patients with arrhythmias. However, real-time CMR has emerged as a potential future diagnostic tool for AF. This study aims to evaluate the reliability of real-time CMR in identifying atrial fibrillation through variation in heartbeat lengths (HBLs). This study sought also to find persistent and severe forms of atrial fibrillation through the detection of left atrial enlargement (LAE). This is done since AF is correlated with LAE.

Methods

Variation in HBL was measured from real-time CMR footage by utilizing a program written by our research group. This software calculated HBLs by automatically calculating the distance between end systole to end systole. These values were compared to the CV of HBL generated from the EKG data. EKG data ranged from around 300-1400 sec for some subjects. For subjects whose CV was drastically different from the CMR values, their full EKGs were analyzed for signs of arrhythmia. Additionally, Image J was used to calculate left atrial areas during diastole. Left atrial area was then normalized to body surface area (BSA). Any value over 15 cm^2/m^2 was considered LAE.

Results

Pearson's correlation coefficient was calculated between the CMR HBL CV data and EKG HBL CV data (r=0.57). Four subjects were found to have LAE. They each had a history of atrial fibrillation.

Conclusion

Real-time CMR shows promise in identifying HBL variations. This indicates that real-time CMR can potentially be utilized for temporal data where we had previously been unable to. Additionally, real-time CMR appears useful in identifying LAE in AF patients.

Endogenous surfactant protein A promotes vascular smooth muscle cell phenotype-switch during abdominal aortic aneurysm

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Introduction

Abdominal aortic aneurysm (AAA) is characterized by stretching and weakening of the vascular wall that is driven, in part, by vascular smooth muscle cell (VSMC) phenotype switch. We previously demonstrated that in response to inflammation or injury, VSMCs will express surfactant protein A (SPA), an inflammatory collectin found in multiple tissues. Using global and VSMC-specific SPA knockout (SPA-/-) mouse models, we reveal a link between SPA expression and VSMC phenotype switch during AAA.

Methods

Global knockout experiments were completed with 8-week-old male SPA-/- ApoE-/- mice (SPA-/-). VSMC-specific knockout experiments were completed with 8-week-old male ApoE-/- MyhIICre+ SPAfl/fl mice ($SPA^{VSMC-/-}$) subject to tamoxifen injection at 6 weeks of age. AAA was induced via 4-week angiotensin II (AngII) infusion, and AAA development was assessed via ultrasound at D0 and at D28. Aortas were analyzed via immunofluorescent staining, H&E staining, and elastin staining.

Results

After 4-week AngII infusion, SPA-/- mice demonstrate reduced diameter change, dissection incidence, and elastin fragmentation compared to controls. Immunofluorescence staining reveals decreased inflammatory cytokine expression and decreased expression of VSMC phenotype switch markers. Consistently, $SPA^{VSMC-/-}$ mice demonstrate similar attenuation of aneurysm and decreased VSMC phenotype switch. These data suggest a role for endogenous SPA during VSMC inflammatory response.

Conclusion

Our data suggest a role for endogenous SPA during AAA-induced VSMC phenotype switch. As VSMC phenotype switch is a major driver of inflammation and weakening in the aortic wall, SPA may provide a potent target for future therapeutics. In vitro studies are underway to elucidate a potential mechanism through which SPA might promote VSMC phenotype switch.

The influence of occult nodal regional metastasis on patients with cutaneous squamous cell carcinoma in recurrence and oncologic outcomes compared to the absence of occult nodal metastasis

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Introduction

Cutaneous squamous cell carcinoma (cSCC) is the second most common cutaneous cancer, and its incidence has only been increasing. Most cases of cSCC are found in the head and neck region, and while prognosis is generally favorable, patients with nodal metastasis have much worse outcomes. Additional occult nodal metastasis in the setting of known nodal metastasis is poorly understood and understudied. Here, we investigated the rate of occult metastasis to regional lymph nodes among patients undergoing lymphadenectomy for known regional metastatic cSCC, identified factors that could be associated with occult positive nodes, and examined relationships between occult metastasis and oncologic outcomes.

Methods

Retrospective cohort study of UM patients undergoing regional lymphadenectomy for cSCC with regional metastasis. Information on age, prior treatment, comorbidities, extent of surgery, post-op treatment, pathologic details, recurrence, and survival were collected. Occult metastasis was defined as metastatic SCC in a lymph node not clinically detected on preoperative examination or imaging. Groups were compared by Chi-square and T-test. Logistic regression for factors associated with occult metastasis. Cox proportional hazard analysis of survival.

Results

Our study included 60 patients with average follow-up of 17.8 months. 29 patients had occult metastasis at the time of lymphadenectomy. 28 patients had recurrence over the study period; the rate of recurrence among patients without occult metastasis was 42.9%, and the rate among patients with occult metastasis was 57.1%.

Conclusion

UM patients with metastatic cSCC have 48.3% risk of occult metastatic regional metastasis. Elective nodal dissection for nearby nodal drainage basis should be considered at the time of lymphadenectomy. Future study may help to define levels at risk, as well as options for treatment escalation.

What communication do physicians want from the physical therapists to which they refer?

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Introduction
Physicians often refer to physical therapists, yet communication between professions is limited. Determining preferences of referring physicians may identify avenues for improved communication.

Methods
Descriptive electronic REDCap survey. Subjects recruited through word-of-mouth and Instagram flyers posted by author.

Results
Respondents (n=6) consisted of 66.7% PM&R physicians, 16.7% neurologists, and 16.7% other physician. When asked "how often do you refer patients to PT," 50% selected daily, 33.3% weekly, and 16.7% monthly. When asked how frequently they "communicate with the PTs to which you refer," 33.3% reported "no direct communication," 33.3% one communication per episode of care, and 33.3% 3+ communications per episode. When asked "how frequently would you ideally communicate," 50% reported one communication per episode of care, 33.3% two communications, and 16.7% 3+ communication. Of those who communicate with PT, 50% do so over e-mail, 50% in person. 66.7% of respondents refer to PTs within the same health system who utilize EMR which the physician can also access, while 33.3% of referrals go to PTs in a different health system. Regarding current communication, 83.3% of respondents look for patient level of therapy participation, 100% PT goals, 50% outcome measures, 50% patient goals, and under half look for ROM, MMT measures. When asked for ideal communication, 100% of respondents would like PTs to communicate patient participation level, PT specific goals, 83.3% would like PT diagnostic impression, patient goals, and 33.3% would like ROM, MMT, and functional outcome measures.

Conclusion
Physical therapists may benefit from adjusting their communication with referring physicians. Therapists often place high importance on ROM, MMT, and functional outcome measures, yet a minority of referring physicians look for or desire these metrics. Therapists may benefit from aiming to communicate once per episode of care and should consider providing additional detail regarding PT goals and patient tolerance of therapy.

Qualitative survey: How would physical therapists structure a physician therapy prescription?

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Introduction
Physicians often refer to physical therapists, yet communication between professions is frequently limited to the initial prescription. Surveying therapists to determine how they would change physician prescriptions may identify opportunities for improved communication.

Methods
Descriptive electronic REDCap survey. Subjects recruited through Facebook and Instagram flyers posted by author.

Results
Of 320 total survey respondents, 189 (n=189) completed the free-text section asking how respondents would modify physician prescriptions. Recurring themes included a desire for physicians to include their most recent note with the prescription, inclusion of specific details of what was done in surgery, inclusion of other procedures performed or planned, and consideration for inclusion of a differential diagnosis rather than singular diagnosis. Numerous respondents also expressed a desire to exclude specific frequency/duration guidelines and specific treatment instructions.

Conclusion
Physician physical therapy prescriptions have numerous areas for improvement. Overall, physicians should consider the addition of information physical therapists may otherwise not have access to, such as the physician's assessment and plan, while excluding rigid instructions revolving around treatment.

Packed red cell transfusions in the NICU

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Introduction

Management of extremely low birth weight (ELBW) infants in the Neonatal Intensive Care Unit (NICU) often involves repeated red blood cell (RBC) transfusions to treat anemia. Although necessary, these transfusions carry risks such as infection, lung injury, and neurodevelopmental complications. The Transfusion of Premature (TOP) trial compared liberal and restrictive hemoglobin thresholds and reported no differences in neonatal outcomes. This study aims to evaluate current transfusion practices in the MU NICU and assess adherence to TOP guidelines.

Methods

After obtaining IRB approval, we conducted a retrospective review of 100 charts of ELBW infants, less than 34 weeks gestational age, in the MU NICU from 2022-2023. Infant non-survivors and those transferred to other institutions were excluded from analysis. Data collection included chronological age, hematocrit, and respiratory support at the time of each transfusion. Transfusions were compared to established TOP thresholds and classified as liberal or restrictive.

Results

A total of 84 infants received 156 transfusions. Of these transfusions, 93 (60.4%) were liberal, and 63 (40%) were restrictive. Transfusions were more likely to be liberal in infants over three weeks old (62.8%), those requiring respiratory support (61.1%), and those born before 28 weeks' gestation (94.1%).

Conclusion

Overall, we noted that current transfusion practices in the MU NICU tend to favor liberal transfusions, particularly in older infants, those on respiratory support, and infants below 28 weeks of gestation. Reducing the frequency of transfusions using restrictive thresholds could potentially decrease the risks of infection, transfusion-related complications, and long-term neurodevelopmental consequences while also lowering healthcare costs.

A rare intracortical schwannoma of the distal tibia: A case report

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Background

Schwannomas are benign neoplasms of peripheral nerve sheaths, most commonly affecting peripheral nerves of the head and neck. Schwannomas are typically asymptomatic but may result in pain or sensory deficits consistent with nerve involvement. The incidence of osseous schwannomas is uncommon (<0.2% of primary bone tumors), and the incidence of cortical involvement of long bones is even more rarely reported in current literature.

Case Presentation

A 28-year-old male presented to a tertiary referral academic institution for a painful lower extremity mass of two years duration. Diagnosis was unable to be made solely on clinical exam and imaging, which revealed a non-specific, poorly defined lucent lesion in the left distal tibial cortex with scalloping. The diagnosis of intracortical schwannoma was made after open biopsy revealed positive S-100 immunohistochemical staining and characteristic spindled cells. Definitive management was achieved via curettage and bone grafting. Six months post-operatively, the patient's pain had improved, allowing him to weight-bear without restrictions, and repeat imaging showed complete radiographic healing.

Conclusion

An intracortical schwannoma is an exceedingly rare, benign lesion which may have atypical radiological findings and non-specific presentations, often leading to delays in diagnosis and management. Definitive diagnosis is made with permanent histology and S-100 immunohistochemical staining. Surgical management includes local resection with curettage and bone grafting. Emphasis should be placed on maintaining a wide cache of differential diagnoses when working up unknown osseous lesions to avoid delays in diagnosis and management that may lead to adverse patient outcomes.

Tranexamic acid for treatment of angiotensin-converting enzyme inhibitor-induced angioedema in the emergency department

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Introduction

Angiotensin-converting-enzyme inhibitors (ACEi) are one of the most common medications prescribed for the management of hypertension in the United States. A life-threatening side-effect of this medication class is ACEi induced angioedema (ACEi-AE), affecting and accounting for 20% to 40% of all patients treated for AE each year. The purpose of this study is to evaluate the role of tranexamic acid (TXA) administration on reducing the rates of intubation in patients presenting with suspected ACEi-AE in the emergency department.

Methods

Data was collected via the ICD-10 code for AE, "T78.3XXA." Researchers collected data via EMR chart review, omitting any patients who experienced AE for reasons other than ACEi use. Inclusion criteria included presentation between Jan 1, 2014 and Jan 1, 2024, age greater than 18 years, and ACEi use in the prior 10 days. Data was analyzed via comparative statistical analysis.

Results

White patients were significantly more likely to receive TXA than others (RR=1.947, 95% CI (1.2366, 3.066)). Males were more likely to receive TXA than females, but this finding was not statistically significant (RR=1.298, 95% CI (0.8057, 2.0918)). There were no significant differences in intubation rate between patients receiving TXA greater than 5 hours from admission or not at all (n=40) and patients receiving TXA within 5 hours of admission (n=16, p=0.48). TXA administration did not have a significant effect on intubation rate (0.22 intubations/pt in no TXA group, 0.11 intubations/pt in TXA group, p=0.47).

Conclusion

The use of tranexamic acid did not have a significant effect on intubation rates for patients with ACEi-angioedema. However, white patients were more likely to receive TXA. Due to this difference, different racial groups may experience the effect of TXA administration in a longitudinal setting that was not assessed in this study. Further study of the longitudinal effect of TXA administration in ACEi-angioedema is warranted.

Congenital cholesteatoma of the mastoid in adult

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Introduction

Present a rare case of an incidental finding of right-sided congenital cholesteatoma with a true mastoid origin in a 61-year-old female patient who presented to clinic with muffled hearing, a previous history of chronic otitis media, and a left sided tympanic membrane perforation.

Methods

Right mastoidectomy through a posterior auricular approach and harvest of temporoparietal fascia. The tegmen was identified and followed into the antrum. The dissection was extended inferiorly into the mastoid tip and posteriorly to identify the sigmoid sinus. A diamond drill was then used to thin the bone around the sigmoid sinus to expose a white pearly mass within the mastoid/tip. The bone was thinned until a freer or duckbill was used to remove the mass from the mastoid. The mass abutted the sigmoid and did not extend into the posterior cranial fossa.

Results

Patient made a full recovery after right mastoidectomy.

Conclusion

Congenital cholesteatomas originating in the mastoid is an atypical presentation in adults. Despite its rarity, a high index of suspicion should be maintained in patients who present with incidental soft-tissue masses on CT imaging. The asymptomatic nature of CCs of the mastoid, along with its generally late presentation, are some of the challenges associated with its diagnosis and management.

Factors that influence the quality of letters of recommendation for orthopaedic trauma fellowship applicants: A survey of fellowship directors

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Introduction

Letters of recommendation (LoR) have been identified as one of the most important factors for interview selection and ranking applicants in the orthopaedic trauma fellowship match. There have been no previous investigations into what specific factors orthopaedic trauma fellowship program directors (PD) use to characterize an applicant unqualified for fellowship training and how this affects an applicant's LoR.

Methods

A survey was sent to all 66 orthopaedic trauma fellowship PDs. PDs were asked how they would respond to an applicant requesting a LoR who they deem unqualified for orthopaedic trauma fellowship training. PDs were then presented with a list of 10 factors that may deem an applicant unqualified for orthopaedic trauma fellowship, which they ranked in order of importance. A weighted score was calculated for each factor. PDs were also given the opportunity to provide additional factors in a free response.

Results

The five-question survey yielded 42 responses from PDs (42/66 PDs; 64%). When faced with a request for a LoR from an 'unqualified' applicant, 22 PDs suggested they would not write a LoR for the applicant (52%), 19 PDs indicated they would write an underwhelming LoR (45%), and a single PD stated they would write a supportive LoR (2%). The highest-rated factors when deeming an applicant unqualified were lack of professionalism and personal responsibility. Low Orthopaedic In-Training Examination scores, lack of published research in specialty/subspecialty, and low total number of publications were ranked as the least important factors.

Conclusion

Orthopaedic trauma fellowship PDs specifically identified lack of personal responsibility and professionalism as the most important factors when deeming an applicant 'unqualified' for fellowship training. Prior to requesting LoR, applicants should prioritize personal responsibility and make every effort to display professionalism when building relationships with orthopaedic trauma faculty.

Recent trends in quadriceps tendon and patellar tendon injuries in the National Football League

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Introduction

While quadriceps tendon and patellar tendon tears are relatively rare in the NFL, the impact they can have on a player's season and career are significant. Despite the importance of extensor tendon injuries within the NFL, there is a lack of recent literature describing their risk factors, incidence, and impact on performance. The purpose of this study is to determine the incidence and impact of quadriceps tendon and patellar tendon injuries in the NFL from the 2009-10 to the 2022-23 seasons. Further, we will explore the impact that player and injury characteristics have on injury risk, return-to-play, and player performance.

Methods

Publicly available data were reviewed to capture all patellar and quadriceps tendon tears reported in the NFL from the 2009-10 season to the 2022-23 season. Return-to-play and performance metrics were recorded for each player during the season before and first two post-injury seasons. Data were analyzed to determine statistically significant differences in proportions using chi-square, Fisher's exact, or McNemar tests.

Results

A total of 80 extensor tendon tears (24 QT tears, 56 PT tears) were identified between the 2009-2010 and 2022-2023 NFL seasons. Risk factors for QT injury included BMI > 31, age > 26, and > 4 years of NFL experience. 96.3% of extensor tendon injuries were season-ending. Overall RTP for QT injuries was higher (58.3%) than for PT injuries (55.4%). QT injuries resulted in a higher rate of return to prior performance level and quicker return to performance compared to PT injuries.

Conclusion

The rates of QT and PT injury were higher in this study compared to those found in prior NFL studies. This study found similar RTP rates following QT injury, but significant lower RTP

Missed adjuvant therapy after resection of intermediate and high-risk oral cavity cancer: A multi-institutional study

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Introduction
Patients who have intermediate or high-risk features after resection of oral cavity squamous cell carcinoma (SCCa) should be treated with guideline-recommended adjuvant therapy to reduce the risk of disease recurrence, however many patients do not receive the indicated therapy.

Methods
A retrospective, multi-institutional cohort study investigating patients treated from November 2008 to November 2022 was completed. Study population included patients undergoing oncologic resection for previously untreated oral cavity SCCa. Primary outcome was receipt of guideline-recommended adjuvant radiation or chemoradiation therapy. Secondary objective was to evaluate associations between missed adjuvant therapy and survival. Univariable and multivariable logistic regression was used to identify patient, tumor, and treatment factors associated with receipt of adjuvant therapy. Cox proportional hazard analysis was used to identify associations between patient, tumor, and treatment factors and survival.

Results
A total of 342 patients were included; 197 had intermediate-risk disease and 145 had high-risk disease. Among all patients, 269 (78.7%) completed at least adjuvant radiation therapy. Among high-risk patients, 80 (55%) received adjuvant chemoradiation. On multivariable analysis, older patients were less likely to complete adjuvant therapy (OR 0.92, 95% CI 0.89-0.95, p<0.001), as were patients who drove greater than 50 miles to their site of surgery (OR 0.36, 95% CI 0.19-0.66, p=0.001). Among all 342 patients, receipt of adjuvant radiation (HR 0.21, 95% CI 0.10-0.45, p<0.001) and receipt of adjuvant chemoradiation (HR 0.25, 95% CI 0.13-0.49, p<0.001) were associated with improved overall survival.

Conclusion
After resection of intermediate and high-risk oral cavity SCCa, a significant proportion of patients do not receive appropriate adjuvant therapy. Older patients who travel farther for treatment may be at higher risk of missing adjuvant therapy after oral cavity resection, and missed adjuvant therapy is associated with worse overall survival.

Can county health rankings help predict epithelial ovarian cancer outcomes?

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Introduction

Ovarian cancer remains a leading cause of death among gynecological malignancies. Key factors influencing survival outcomes include race, socioeconomic status, and access to healthcare. This study aimed to investigate how a patient's area of residence affects outcomes in epithelial ovarian cancer among those treated at the University of Missouri, utilizing the Missouri County Health Rankings to help target early detection efforts in areas with greater need. The County Health Rankings evaluate critical health factors such as high school graduation rates, obesity, smoking, unemployment, access to healthy foods, air and water quality, income inequality, and teen birth rates. The ranking value ranges from 1-934, with a lower value indicating optimal health factors at a ZIP code level.

Methods

We retrospectively reviewed charts of 219 epithelial ovarian cancer patients treated at the University of Missouri and Ellis Fischel Cancer Center between 2008 and 2023. Fifty-seven cases were excluded due to missing values, resulting in a final dataset of 162 subjects. The counties were grouped into four categories based on rankings: Group 1 (ranks 1-235), Group 2 (ranks 236-470), Group 3 (ranks 471-705), and Group 4 (ranks 706 and above). Group sizes were 46, 66, 39, and 11 patients, respectively.

Results

Our analysis revealed no significant differences in presenting Ca-125 levels (p=0.6268), stage at diagnosis (p=0.1626), cancer recurrence (p=0.1540), or survival rate (p=0.5902) across the county rankings. However, patients with a higher stage at diagnosis were 6.6106 times more likely to experience cancer recurrence (p=0.0101), and patients with cancer recurrence were 10.1135 times more likely to experience poorer survival (p=0.0015).

Conclusion

In conclusion, Missouri County Health Rankings did not significantly impact patient outcomes in this cohort.

Bipotent differentiation of endometrial epithelial stem cells

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Introduction

Cyclical regression and regeneration of the uterine endometrium is the foundation of female reproductive function and health. Our group for the first time identified the adult endometrial epithelial stem cells in the mouse uterus using single-cell lineage tracing. These stem cells undergo bipotent differentiation to generate both luminal and glandular epithelium, by which homeostasis and regeneration of uterine endometrium is maintained through reproductive cycles. Adult stem cells with self-renewal and differentiation capacities can self-organize in three-dimensional (3D) culture to form a miniaturized and simplified version of an organ termed an organoid. Organoids have significant potential applications in personalized and regenerative medicine. In this study, we reveal the differentiation mechanism of endometrial epithelial stem cells using organoids to develop stem-cell-based therapy for endometrial regeneration.

Methods

Our lab has established a stable endometrial epithelial organoid (EEO) growth system from isolated mouse endometrial epithelial cells using the published methods. Under a fluorescent scope we micro-dissected out the red-color-labeled epithelial stem cells which are located in the intersectional epithelium in the adult *Foxa2(iCre);Rosa26mTmG* uteri for organoid formation to trace the differentiation of endometrial epithelial stem cells *in vitro*. Foxa2 is a marker of uterine glandular epithelial cells.

Results

The isolated red-color-labeled epithelial stem cells can survive, proliferate, and differentiate to form organoids in the defined 3D Matrigel system. Luminal and glandular epithelia are derived from stem cells through bipotent differentiation in the organoids, which replicates their *in vivo* properties being identified by us using single-cell lineage tracing.

Conclusion

The endometrial epithelial stem cells maintain their bipotent differentiative capacity in the defined 3D Matrigel system to form multi-cellular organoids, offering an exciting prospect for endometrial regeneration therapy.

Reducing cesarean surgical site infection rates within the OB/GYN operating room

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Introduction
Cesarean section infection rates are a measure of quality in obstetrics and cause significant morbidity in the postpartum period. The cesarean section infection rate at the University of Missouri has increased during the fiscal years of 2019-2023. Modifiable factors significantly contribute to infection rates and are targets for countermeasures. We aim to decrease the cesarean section infection rate by 5% by FY2025.

Methods
A retrospective case-control analysis was performed from hospital-based data through chart review from January 2023 – December 2024. Prospective observation of 12 cesarean deliveries was conducted to evaluate modifiable and non-modifiable factors. They were broken into the following domains: 1) People, 2) Technology, tools, and training, 3) Task, 4) Organization, and 5) Environment.

Results
Chart review from 1/2023-6/2023 showed 6 infections following cesarean delivery with 5.179 expected infections (SIR=1.16). Among the 12 deliveries observed, 4 were urgent, 1 was emergent, and 7 were planned. Surgical attire varied between hospital-laundered scrubs and surgically sterile scrubs. Additional modifiable behaviors included inadequate hair removal, non-standardized abdominal preparation, lack of vaginal cleansing, non-sterile personnel <50 cm away from sterile field, number of sterile door openings after incision, change of gloves for skin closure, and inadequate processing of contaminated instruments.

Conclusion
The increasing cesarean section infection rate at the University of Missouri-Columbia is attributable to modifiable and non-modifiable factors. Notable non-modifiable factors contributing to the infection rate include the obesity and smoking rates of the patient population. Significant modifiable factors included proper surgical instrument handling, surgical attire, and sterilization of the abdomen and vagina. When identifying the root cause of these issues, it was determined that there were varied levels of education surrounding the sterile technique policy. There were 8 infections documented between 07/2023 - 03/2024 with an expected infection rate of 8.505 (SIR=0.96) after the implementation of several countermeasures. Additional changes are currently underway.

A retrospective comparison of XEN Ab Interno versus XEN Ab Externo procedures in the evaluation of post-operative outcomes at six and twelve months

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Introduction

This study aims to analyze long term outcomes of XEN45 implantation via Ab Interno or Ab Externo approaches at postoperative months (POM) six and twelve.

Methods

This is a single center retrospective cohort study. Patients were assigned into Ab Externo or Ab Interno. Outcomes of interests are intraocular pressure (IOP), number of glaucoma medications, and surgical success rate. Patient's IOP, number of glaucoma medications, and surgical complications were recorded at postoperative days (POD) 1 and 7 and POM 1, 3, 6, and 12. Patient demographics were included. Comparative analysis for IOP and glaucoma medications were assessed with unpaired two-tailed t-tests. Surgical success rates of both approaches combined were assessed with Kaplan-Meier curve throughout the twelve-month period.

Results

In total, 31 patients were followed up to POM6 (8 Ab Interno and 23 Ab Externo) and 16 patients were followed up to POM12 (7 Ab Interno and 9 Ab Externo). Overall success of the surgeries at POM12 was 84.375%. In aggregate, the surgery reduced IOP by 50% at POM12 (21.94 vs. 12.81 mmHg; $p < 0.0001$). Furthermore, the average number of glaucoma medications for all patients dropped 90% from baseline at POM12 (3.63 vs. 0.38; $p < 0.0001$). Average IOP of patients in the Ab Interno and Ab Externo groups were not significantly different [POM6: 12.63 vs. 12.52 mmHg, respectively ($p = 0.92$); POM12: 12.86 vs.12.78 mmHg, respectively ($p = 0.93$)]. The average number of glaucoma medications were also similar in both groups [POM6: 0.25 vs. 0.04, respectively ($p = 0.21$); POM12: 0.43 vs. 0.33, respectively ($p = 0.84$)]. There was no difference in adverse events between both approaches at POM6 and POM12.

Conclusion

Both Ab Interno and Ab Externo approaches to XEN45 implantation are effective in reducing post-operative IOP and glaucoma medications at six and twelve months. However, surgical approach seems to offer similar long-term outcomes.

Facial spasms and COVID-19 infection: A retrospective analysis

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Introduction

COVID-19 has been shown to cause neurological manifestations in 45.5% of patients; however, its role in facial spasms is sparsely reported. A recent rise in incidence of cases in neuro-ophthalmology patients may indicate an association between fasial spasms and COVID-19. We aim to investigate the relationship between confirmed COVID-19 infection and new-onset facial spasms.

Methods

Retrospective cohort study. Patients' information, such as demographics, characteristics, comorbidities, and information detailing the timing of their COVID-19 diagnosis and neuro-ophthalmology diagnosis, were collected and recorded in an IRB-approved University of Missouri database. Average age, time between COVID-19 positive test and diagnosis, and associated risk factors were reported for a total of 6 patients with confirmed diagnosis of facial spasms.

Results

The average age for diagnosis was 62.5±13.9 years. Average BMI was 29.9±5.1. All 6/6 patients were female. We observed facial spasms in COVID-19 patients with neuro-ophthalmic complications, and the types observed were blepharospasms (n=3OU/1OD), hemifacial spasms (n=1OD), and unspecified (n=1). Hypertension was a confirmed diagnosis in 4/6 patients (67%). Diabetes was confirmed in 3/6 (50%). The number of patients with hyperlipdemia and sleep apnea were 2/6 (33%) and 3/6 (50%), respectively. A total of 2/6 (33%) patients were active smokers. Of the 6-patient cohort, 5/6 (83%) patients had received their COVID-19 vaccination.

Conclusion

Our data suggests that there may be an association between COVID-19 infection and new-onset of facial spasms. The cohort was too small to extrapolate any association between the risk of developing facial spasms and COVID-19 vaccination. Finally, female patients with hypertension appear to be at increased risk of complications. Further studies with larger cohorts are needed to establish the relationship.

Does getting COVID-19 put you at risk for developing Bell's palsy?

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Introduction

Bell's palsy is the leading cause of sudden unilateral facial paralysis, often associated to viral infectious diseases. Scientific investigation has indicated a potential correlation between viral diseases, such as COVID-19, and a higher prevalence of Bell's palsy. This retrospective study aims to explore the association between COVID-19 and the onset of Bell's palsy, focusing on gender distribution, smoking prevalence, and the frequency of ophthalmologic assessments in individuals diagnosed with Bell's palsy following a confirmed COVID-19 diagnosis.

Methods

We conducted an analysis on a cohort of nine patients diagnosed with Bell's palsy who also had a confirmed COVID-19 infection. Collected data included information on gender, smoking status, and the timing of ophthalmologic assessments relative to their COVID-19 diagnosis. The study examined the patterns of Bell's palsy diagnosis post-COVID infection, and the correlation between smoking status and gender among these patients.

Results

Within the nine patients included in the study, 44.4% (4 out of 9) were male and 55.6% (5 out of 9) were female. A significant correlation was found between male gender and smoking status, with 75% (3/4) of males being smokers compared to 20% (1/5) of females. Prior to the COVID-19 diagnosis, only 33.3% (3/9) of patients had undergone an ophthalmologic assessment, leading to the diagnosis of Bell's palsy in just one patient. After the onset of COVID-19, all patients (9/9) received ophthalmologic assessments, during which Bell's palsy was considered in all cases.

Conclusion

This study suggests a potential correlation between COVID-19 and the increased diagnosis of Bell's palsy. Additionally, there is a significant association between male gender and smoking prevalence, which may contribute to the increased risk of developing Bell's palsy following COVID-19. Further research is warranted to explore the relationship between COVID-19, smoking status, and the risk of Bell's palsy.

Surgical outcomes of ClearPath 250 mm² vs. Baerveldt 250 mm² glaucoma drainage device: A retrospective comparative study

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Introduction

Glaucoma drainage devices (GDDs) are essential in managing intraocular pressure (IOP), the primary modifiable risk factor for glaucoma progression. Among these, the Ahmed ClearPath (ACP) 250 mm² and the Baerveldt glaucoma implant (BGI) 250 mm² are two widely used non-valved GDDs with distinct design features aimed at optimizing IOP control and minimizing complications. Despite their common use, direct comparative studies focusing on the 250 mm² models of these devices are lacking. This study aims to compare the efficacy and safety of ACP and BGI in patients undergoing glaucoma surgery.

Methods

A retrospective review was conducted on 51 patients who received either ACP (n=18) or BGI (n=33) implants. The primary outcome was IOP reduction, measured at key postoperative intervals: 1 day, 7 days, 3 months, 6 months, and 1 year. Secondary outcomes included the number of postoperative medications, the need for additional surgical interventions, and adverse events. Data collection included surgical dates, follow-up records, histories of prior treatments, patient demographics (age, sex, and ethnicity), and types of glaucoma diagnosed.

Results

Both ACP and BGI implants demonstrated significant IOP reduction from baseline across all time points, with no statistically significant differences between the two devices at any interval ($p > 0.05$). The number of medications required postoperatively and the incidence of adverse events, including the need for additional surgical procedures, were similar between groups. Demographic and baseline characteristics were also comparable.

Conclusion

The Ahmed ClearPath and Baerveldt glaucoma implants 250 mm² offer similar efficacy in lowering IOP and have comparable safety profiles over a 24-month period. These findings suggest that either device can be effectively utilized in clinical practice, allowing for personalized treatment decisions based on individual patient needs and surgical preferences. Further research could provide deeper insights into optimizing GDD selection to enhance patient outcomes in glaucoma management.

Identifying demographic and diagnostic characteristics of high-risk patients in emergency departments

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Introduction

Patient aggression and workplace violence in healthcare settings are a well-documented problem. Emergency departments (EDs) are one of the settings in which this is a particularly salient issue (Phillips, 2016). ED nurses reported the highest rates of victimization, with 100% reporting verbal assault and 82.1% reporting physical assault within the year of survey (May, 2002). Although EDs have been identified as high-risk settings, little has been written about these patients, descriptively or diagnostically.

Methods

In this simple descriptive study, we examined hospital security reports at a large Midwestern university-affiliated hospital over 3 years. Fourteen patients with the highest levels of aggression were selected for description.

Results

These 14 patients, while making up 0.0093% of the ED patient population, accounted for 0.28% of total patient presentations, and 12% of patient aggression incidents that resulted in security involvement. With a risk index of 46.3781 ($P < 0.0001$), the high-risk group is 46 times more likely to engage in aggressive behavior than the non-high-risk patients within this population. Upon comparison, common traits were identified. Patients were found to have common demographics: male, with an average age of 38, single, unstable housing, a history of drug use (primarily amphetamines), and diagnosed psychiatric disorder(s). These patients were also found to have previous incidents of aggression and restraint use within the hospital, as well as a recorded history of law enforcement involvement per medical record documentation. Social work records indicate these patients also have a history of abuse (physical, sexual, or unspecified).

Conclusion

This information may assist in development of staff training programs tailored to respond to these high-risk patients in a specialized, trauma-informed manner. Using this information, hospitals may be able to greatly reduce violence and aggression within the emergency department, and better protect our patients, employees, and visitors.

Meniscal versus labral geometry: Optimal parameters to consider when performing labral reconstruction with fresh meniscal allograft

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Introduction

Utilizing fresh meniscus allograft for labral reconstruction has been explored due to the meniscus' histologic and biomechanical properties being potentially more similar to the acetabular labrum than tendinous allografts. We aim to provide geometric analyses of the lateral and medial meniscus, as compared to hip labrum, which will provide insight into parameters to consider for labral reconstruction with meniscal allograft.

Methods

Computed tomography scans were obtained of donor-matched meniscus specimens and separate labrums. Scans were loaded into 3D Slicer, a DICOM (Digital Imaging and Communications in Medicine) viewer that creates 3D models via its Segment Editor feature. Models were loaded into Autodesk Meshmixer for post-processing. Solidworks® was used to measure the height and width at multiple points along the acetabular arc, inner and outer arc diameter, and total sweep of the arc in degrees. Average cross-sectional area and circumferential length of each specimen were calculated.

Results

7 labrum specimens and 3 meniscus specimens were analyzed. Average circumferential length (mm) was 82.11 (SD = 5.62) for labrum, 55.20 (SD = 4.71) for medial meniscus (MM), and 36.90 (SD = 7.65) for lateral meniscus (LM). Average inner arc diameter (mm) was 24.23 (SD = 1.92) for labrum, 13.16 (SD = 1.48) for MM, and 6.76 (SD = 1.85) for LM. Average outer arc diameter (mm) was 28.07 (SD = 1.76) for labrum, 22.00 (SD = 1.52) for MM, and 16.74 (SD = 3.07) for LM. Average cross-section (mm2) was 10.16 (SD = 2.71) for labrum, 24.18 (SD = 3.92) for MM, and 29.49 (SD = 5.35) for LM.

Conclusion

MM provides more circumferential length than LM. MM matches the labrum better in regard to metrics of curvature, such as inner and outer arc diameter. Both menisci provide more cross-sectional area than native labrum, which is an important consideration for reconstruction.

Risk of quadriceps tendon and patella tendon tears in National Football League players by short, normal, or long rest weeks

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Introduction

Players in the National Football League (NFL) are at risk of rupturing the knee extensor mechanism, specifically at the quadriceps tendon or patellar tendon. Furthermore, injury risk factors are important to identify, as policy changes can be implemented to increase player safety. One risk factor for NFL injuries that has not been explored enough is time between games. The normal time between games is 7 days, with some rest periods being longer or shorter. We aimed to determine the risk of knee extensor mechanism tears based on short, normal, or long game weeks.

Methods

Using publicly accessible resources (NFL injury reports, Pro-Football-Reference.com, and ESPN.com), an online search was conducted to identify NFL players who tore their quadriceps tendon or patellar tendon between the 2009-2010 and 2022-2023 seasons. Only regular season injuries were included. The date of injury and prior game date were collected in order to calculate the length of rest. Next, each injury was categorized as a short (<7 days), normal (7 days), or long (>7 days) week injury. Other factors, such as player age, football position, and playing surface (grass or artificial turf) were collected as well.

Results

Between the 2009-2010 and 2022-2023 seasons, 58 players tore their extensor mechanism. Players were 4.7 times more likely to tear their extensor mechanism during normal weeks than long weeks ($p = 0.0039$). Additionally, players were 3.7 times more likely to tear their extensor mechanism during short weeks than long weeks ($p = 0.0385$). Regarding playing surface, extensor mechanism tears were more likely to occur on artificial turf than grass ($p = 0.0324$).

Conclusion

NFL players were found to have higher rates of knee extensor mechanism tears during short (<7 days) and normal (7 days) weeks between games, when compared to long (>7 days) weeks.

Do patients from disadvantaged neighborhoods experience lower return to practice and return to sport rates following anterior cruciate ligament reconstruction?

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Introduction

Following anterior cruciate ligament reconstruction (ACLR), younger patient age, early cutting activity, and the use of allografts instead of autografts are associated with increased retear risk. Social determinants of health measures, like the Area Deprivation Index (ADI), have been associated with higher rates of reinjury, readmission, and pain in other surgical populations. As such, the goal of this study was to evaluate correlations between socioeconomic factors, demographic factors, surgical factors, and successful return to activity. It was hypothesized that ACLR patients with lower socioeconomic status as measured by the ADI would report lower return to activity rates.

Methods

Upon IRB approval, surgical and post-operative details (graft type, concurrent procedures, involved limb, primary vs. secondary surgery, infection status, post operative complications, graft failure), demographic details (sex, age, marital status, mental health history, tobacco use) and socioeconomic factors (income, education level, insurance status) were extracted from the medical record for ACLR patients at a single academic medical center. ADI was calculated from the patient's home address. Return to practice (RTP) was defined as participation in activities completed before surgery, but not in competition and return to sport (RTS) was defined as successful return to competitive activities. Significance was set *a priori* ($p<0.05$).

Results

148 patients were included for analysis. ADI scores were significantly higher (more disadvantaged) for patients that did not successfully RTP ($p=0.025$) or RTS ($p=0.023$). Patients with less education ($p=0.016$), patients with lower income ($p=0.042$), and patients that were younger ($p=0.030$) were significantly more likely to RTS, but age, income, and education level indicated no differences between groups for RTP.

Conclusion

Patients from disadvantaged neighborhoods are less likely to RTP and RTS following ACLR. Healthcare teams should seek to identify patients at-risk for socioeconomic-related disparity pre-operatively to determine if additional support can be provided to enable successful return to activity.

Relationship between patient reported outcomes scores and the protein content of infrapatellar fat pad tissue recovered from osteoarthritic knees

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Introduction

Osteoarthritis (OA) is an irreversible disease that affects the entire "joint organ." The infrapatellar fat pad (IPFP) may have a significant role in the progression of OA. This study was designed to identify potential relationships between patient reported outcome measures (PROMS), KOOS JR, PROMIS global physical health and pain scores, before and after surgery and the concentration of inflammatory and degradative proteins in the tissue. It was hypothesized that patients with higher PROMIS pain scores, and lower global physical health and KOOS JR scores, measured before and 6 months after surgery will be associated with significantly higher IPFP pro-inflammatory and pro-degradative tissue protein concentrations.

Methods

With IRB approval and informed patient consent, IPFP tissues were recovered from OA patients undergoing TKA. The protein content of an IPFP explant was extracted and tested for protein biomarkers using commercially available assays. Significant ($p<0.05$) differences in IPFP tissue biomarker concentration between patient reported outcome measures groups were determined using one-way ANOVA with Tukey post-hoc test or T-test.

Results

Tissue MMP-2, MMP-9, TIMP-1, TIMP-2, TIMP-3, TIMP-4, GRO-α, and MIP-1α were significantly higher before surgery in patients with higher KOOS JR score. Tissue TIMP-3, Leptin, and CRP were significantly higher in patients with higher KOOS JR score after surgery. Tissue MCP-1, IL-6, and MIP-1β were significantly higher in patients with lower PROMIS physical global health score. Tissue MMP-3, Resistin, MCP-1, and MIP-1β were significantly higher in patients with lower PROMIS physical health score after surgery. Tissue MCP-3, PDGF-AA, and TNF-α were significantly higher in patients with lower PROMIS pain score.

Discussion

The data from this study indicates that there may be a relationship between patient PROMs before and after surgery and the concentration of proteins in the IPFP of the OA joint.

Relationship between patient reported outcomes scores and the protein content of synovial tissue recovered from osteoarthritic knees

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Introduction

Osteoarthritis (OA) is an irreversible disease that affects the entire "joint organ." Synovium (SYN) has been associated with increased joint inflammation and OA severity. This study was designed to identify potential relationships between patient reported outcome measures (PROMS), KOOS JR, PROMIS global physical health and pain scores, before and after surgery and the concentration of inflammatory and degradative proteins in the tissue. It was hypothesized that patients with higher PROMIS pain scores, lower global physical health and KOOS-JR scores, measured before and 6 months after surgery will be associated with significantly higher IPFP pro-inflammatory and pro-degradative tissue protein concentrations.

Methods

With IRB approval and informed patient consent, SYN tissues were recovered from OA patients undergoing TKA. The protein content of a SYN explant was extracted and tested for protein biomarkers using Lumix assays. Significant ($p<0.05$) differences in SYN tissue biomarker concentration between patient reported outcome measures groups were determined using one-way ANOVA with Tukey post-hoc test or T-test.

Results

Tissue adiponectin was significantly higher in patients with higher KOOS JR score before surgery. Tissue adipsin was significantly higher in patients with higher KOOS JR score after surgery and in patients with lower PROMIS physical global health score before surgery. Tissue RANTES was significantly higher in patients with lower PROMIS physical global score after surgery. Tissue TNF-α was significantly higher in patients with a PROMIS pain score of 5-6. Tissue leptin was significantly higher in patients with a PROMIS pain score of ≤4. Tissue MMP-1, MMP-2, TIMP-1, and adipsin were significantly higher in patients with a higher PROMIS pain score after surgery.

Discussion

The data from this study indicates that there may be a relationship between patient PROMs before and after surgery and the concentration of proteins in the SYN of the OA joint.

A cohort study highlighting the need for pediatric dermatologic care and the impact of telemedicine in Missouri

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Introduction

Only one in three patients with skin disease is seen by a dermatologist due to workforce maldistribution and shortage presenting unique challenges for rural community clinicians, especially when faced with pediatric dermatologic concerns. Extension for Community Healthcare Outcomes (ECHO) is a global telehealth platform for bridging healthcare gaps through tele-mentoring and education of primary care clinicians (PCPs) to increase their capacity to care for patients with skin disease. The objective of this project was to study diagnoses and treatment approaches for the more common pediatric dermatologic conditions in Missouri through the Missouri-based Dermatology ECHO.

Methods

This was a retrospective cohort study of Dermatology ECHO case-based data with pediatric patients ranging from birth-18 years old. The cases were presented from 2015 to 2021. ECHO sessions, conducted through live-interactive sessions, allow for dermatologist experts to facilitate case-based learning to PCPs. During these sessions, PCPs seek guidance on diagnosis and treatment plans by presenting patient cases to the dermatology expert hub team.

Results

Among the 111 pediatric cases presented to ECHO during the study period various forms of dermatitis, hemangioma, nevus, urticaria, tinea, and vitiligo emerged as the most common diagnoses.

Conclusion

This study emphasizes the role of telehealth and virtual learning networks, in addressing pediatric dermatological needs. Utilizing platforms like ECHO enables healthcare professionals to enhance patient outcomes and minimize healthcare disparities. The authors acknowledge there is limited generalizability of this study's results, as the available data was from one site/state (Missouri).

Darier disease: A case report highlighting the complexities of diagnosing dermatologic concerns in primary care

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Introduction

Darier disease is an autosomal dominant condition characterized by hyperkeratotic, scaly papules and plaques, primarily affecting the trunk. Previous studies have reported an association between mood disorders and Darier disease. These neurologic manifestations help differentiate Darier disease from similar conditions, such as Hailey-Hailey disease. It is important to note any chronic disease can have a negative psychosocial impact on the patient. Other key differences between Darier disease and Hailey-Hailey disease are the pattern of skin involvement and management of the condition. The aim of this case review is to highlight the importance of providing the necessary education and mentorship to primary care providers (PCPs), so they can provide appropriate management and care to patient's presenting with dermatologic concerns.

Methods

This case of Darier disease was discussed through the Dermatology Extension for Community Healthcare Outcomes (ECHO) program in 2017. Data reviewed included the deidentified Dermatology ECHO case ID, date of presentation, initial diagnosis and treatment, final diagnosis and treatment, and ECHO session recording notes. ECHO provides PCPs the opportunity to consult with a hub team of dermatologists for various complex cases.

Results

The case involves a 31-year-old female with a previous diagnosis of Hailey-Hailey disease. The rash presented on her chest, back, and armpits, and had failed to respond to topical and oral steroid treatment. The PCP decided to consult ECHO due to the rash not improving. The dermatology hub team believed, due to the truncal presentation and mood symptoms present in this patient, a diagnosis of Darier disease was more likely and recommended treatment with retinoids.

Conclusion

This case highlights the importance of providing PCPs with continuing education on complex skin conditions. The dermatology hub team's mentorship and guidance for this patient was crucial for providing an accurate diagnosis and appropriate management, which prevented further complications of the condition.

Demographic and nerve distribution patterns of nerve-related groin pain in Missouri

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Introduction
Groin pain due to nerve injury or entrapment is an underreported cause of treatment-resistant pain, with limited knowledge of the demographic and nerve distribution patterns in Missouri. Identifying these patterns within the local population can enhance clinical decision-making and access to care for patients with groin pain.

Methods
We performed an IRB-approved descriptive retrospective cohort study of 120 patients treated by a single surgeon for nerve-related groin pain. Collected data included sex, age, body mass index (BMI), surgical history, use of pain medications, duration and laterality of pain. Anatomic distributions of affected nerves were assessed by physical exams and diagnostic nerve blocks.

Results
Of 120 patients, 77 were male (64%) and 43 (36%) female. Mean±standard deviation (SD) BMI was 27.58±5.32. Average age was 47.26±12.39. Pain medication use was reported by 72% (n=80). Surgical histories included inguinal hernia repair (n=42), vasectomy/orchiectomy (n=15), ventral hernia repair (n=9), and cesarian section (n=7). Multiple abdominal surgeries occurred in 24 patients (20%). Pain duration ranged from 0.07 to 13 years (mean 2.10±2.36). Groin pain was right-sided in 55 patients (48%), left-sided in 34 (30%), and bilateral in 22 (19%). The lateral femoral cutaneous nerve (LFCN) was involved in 57 patients (48%), ilioinguinal nerve (IIN) in 63 (53%), iliohypogastric nerve (IHN) in 52 (43%), and genital branch of the genitofemoral (GFN) in 27 (23%). Of the 57 with LFCN involvement, 31 (54%) had isolated LFCN involvement. Multi-nerve involvement was common with IHN, IIN, and GFN, occurring in 49 (94%) of IHN cases, 57 (90%) of IIN cases, and 23 (85%) of GFN cases. Common combinations were IIN+IHN (n=20), LFCN+IIN+IHN+GFN (n=12), LFCN+IIN+IHN (n=10), and IIN+IHN+GFN (n=7).

Conclusion
Demographic and nerve distribution patterns of nerve-related groin pain were reported from the population of Missouri to aid in diagnosis and development of targeted treatment approaches to groin pain.

Circulating DNA analysis of xenograft models of melanoma cells exposed to intermittent hypoxia

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Introduction
Obstructive Sleep Apnea (OSA) promotes malignant behaviors in tumor cells, with different responses among cellular clones. This project investigates the effects of exposing melanoma cells to intermittent hypoxia, a hallmark of OSA, by assessing differences in human circulating tumor DNA (ctDNA) for aggressive human tumor behavior in xenografted mice inoculated with melanoma cells that have been exposed to intermittent hypoxia and control conditions

Methods
Melanoma cells were exposed to room air (RA) or intermittent hypoxia (IH). In addition, a third group emerged from IH melanoma cells that detached and were isolated separately (IH-NA). Melanoma cells from each of these groups were injected into mice. Once tumor grew animals were sacrificed, ctDNA was isolated from mouse blood and quantified and evaluated for fragmentation, mitochondrial DNA, and methylation using specific qPCR assays.

Results
There was a trend towards an increase in ctDNA in the blood of both groups (IH and IH-NA) of mice injected with melanoma cells that were exposed to intermittent hypoxia, yet differences did not reach statistical significance ($p > 0.05$, Kruskal-Wallis Test). Fragmentation and mitochondrial DNA of the ctDNA was significantly increased in the IH-NA group when compared to RA and IH ($p < 0.05$, Kruskal-Wallis Test). Methylation in three genes regulating tumor growth (i.e. RASSF1, IGF2, and IGF2R), showed no significant differences between groups.

Conclusion
Our results suggest that tumor cells acquiring an aggressive phenotype upon IH have an elevated rate of apoptosis and mitochondrial turnover. Further research is warranted to understand the mechanisms leading to clonal differences in response to IH and its relation to tumor aggressiveness.

Can pre-visit education on the purpose of bone health screenings improve visit adherence?

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Introduction

Osteoporosis is one of the leading causes of mortality as people age, often going undetected until patients experience a fragility fracture or are screened. The goal of treatment by bone health professionals is to minimize fracture risk, however half of referred patients fail to attend their initial screening. The purpose of this quality improvement project was to determine if pre-visit patient phone calls discussing the importance of osteoporosis screening could effectively improve visit adherence rates.

Methods

Between 1/17/2023 and 5/1/2023, standard of care (SOC cohort, n=309) was followed. Between 1/17/2024 and 5/1/2024, the new protocol (NP cohort, n=330) was initiated, with new patients called 3-7 days prior to their appointment with a script discussing the impact of aging on bones and importance of screening. Updated appointment status was noted after calls. Groups were compared based on pre- vs. post-protocol and based on no-show status. Demographics pulled included age, ethnicity/race, sex, and marital status. Significant ($p<0.05$) differences in categorical variables were determined using Chi square or Fisher's exact tests, and differences in continuous variables using rank sum.

Results

In the SOC cohort, 34 patients (11.0%) no-showed, and 35 patients (11.3%) cancelled. In the NP cohort, 23 patients (7.0%) no-showed, and 57 (17.3%) cancelled/rescheduled. NP cohort patients were 1.6 times more likely to cancel/reschedule than SOC cohort. Significant differences were found in age for patients who no-showed vs. those that did not (64.4 years (sd 12.6) vs. 68.2 years (sd 12.5)). Under-represented minorities were more likely to no-show (p=.005). When patients answered a pre-visit education call prior to screenings, no-show rates were reduced from 11% to 2.7%.

Conclusion

A pre-visit phone script can effectively reduce no-show rates in a bone health population. Future research should seek to understand the impact of age and ethnicity/race on failure to attend evaluation appointments.

Effect of time from injury to surgery on the secretome of joint tissues after ACL injury

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Introduction

Anterior cruciate ligament (ACL) reconstruction (ACLR) surgery using tendon autografts is one treatment option after ACL rupture. While activation of the inflammatory cascade is necessary to promote healing, a persistent inflammatory environment can be detrimental to the healing process after ACLR. Therefore, ACLR is often performed after the initial inflammatory response has subsided. The synovium (SYN) and injured ACL contribute to increased joint inflammation. Understanding how the time between injury to surgery affects inflammation of these tissues could be beneficial in determining optimal surgical timing. This study aimed to determine if time from injury to surgery is associated with the concentration of protein biomarkers released by the ACL and SYN. It was hypothesized that as time from injury to surgery increases, the concentration of pro-inflammatory and pro-degradative biomarkers released by the ACL and SYN recovered during ACLR will decrease significantly.

Methods

With IRB approval and informed patient consent, ACL and SYN were recovered from patients undergoing ACLR (n=92) and cultured for 3 days. Culture media was collected for protein biomarker analysis. Significant ($p<0.05$) differences between time from injury to surgery groups (T1: ≤30 days, T2: 31-60 days, T3: 61-119 days, T4: 120-364 days, T5: ≥365 days) were determined using a Kruskal-Wallis test with Bonferroni correction.

Results

ACL of patients in the T1 group released higher levels of MCP-3 and MMP-13, and the T2 group released higher MCP-3, RANTES, and MIP-1α, compared to patients in T3 and T4 groups. SYN of patients in the T2 group released higher GRO-α, IL-6, and IL-8, and the T4 group released lower MMP-8 and MMP-9, compared to all other groups.

Conclusion

This data suggests an increase in release of pro-inflammatory and pro-degradative proteins by the ACL and SYN in the first 60 days after rupture, providing insight into determining optimal timing for ACLR.

Factors associated with lost to follow-up after anterior cruciate ligament reconstruction

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Introduction

ACL injuries impact nearly 254,000 people in the United States annually. Research shows patients who fail to complete full rehabilitation after ACL reconstruction (ACLR) are less likely to achieve optimal functional or return to sport metrics. Social determinants of health (SDOH) and healthcare team scheduling protocols may impact adherence to postoperative treatment plans which are integral to successful outcomes after ACLR. We hypothesize SDOH including sex, income, education, and rural status are associated with lower rates of 1-year follow-up post-ACLR.

Methods

Patients who underwent ACLR between 01/01/2018 and 12/31/2021, ages 16+, and who completed intake SDOH surveys were included for analysis. Patients were categorized into complete or limited follow-up cohorts based on their length of follow-up. The limited cohort was defined as patients who lacked patient reported outcomes, in-person appointments within the EMR, and patient registry. Statistical analysis was conducted to determine factors associated with successful outcomes and follow-up rates.

Results

181 patients met inclusion criteria. Appointment no-shows, cancellations, released from follow-up early, and missed schedules resulted in a mean in-person follow-up of 4.6 months for the limited cohort, with 7.4% of patients completing 1-year patient reported outcome forms. Of patients in the limited cohort, 18 (19.1%) no-showed, 9 (9.6%) cancelled and did not reschedule, 31 (33.0%) were listed as PRN and did not schedule, and 36 (38.3%) were deemed as a “missed schedule” for follow-up appointments. The complete cohort included a short-term success rate of 90.8%, with significant improvements observed for pain and function from pre-operative to 1-year postoperative and final follow-up.

Conclusion

Complete 1-year follow-up after ACLR is impacted by patient and healthcare system factors, with healthcare system factors being the primary reason patients did not return for at least 1-year. Healthcare teams should seek to implement standardized scheduling and follow-up protocols to achieve successful 1-year follow-up.

Disparities among low income patients undergoing open lower extremity bypass

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Introduction

Socioeconomic deprivation plays a critical role in adverse health outcomes of peripheral vascular disease. Few reports have assessed recent trends regarding the association of income on vascular surgical outcomes. We sought to investigate disparities in mortality and readmission among low-income adults undergoing open lower extremity (LE) bypass procedures.

Methods

Retrospective cohort study of patients undergoing open LE bypass procedures from 2018 to 2020 from the Nationwide Readmissions Database were queried using ICD-10 procedure and diagnosis codes. Patients were stratified as below or above the median household income (MHI) based on residential ZIP codes. Categorical variables were analyzed using the Chi-squared or Fisher's exact test, and t-tests were used for continuous variables.

Results

58,082 patients underwent open LE bypass, of which 34544 (59.5%) were below the MHI and 22790 (39.2%) were above the MHI. Patients below the MHI were more likely to be younger, female, have fewer overall diagnoses, and undergo fewer procedures ($p<0.01$). A higher rate of patients below the MHI had multiple injuries ($p<0.01$). Among comorbidities, lower income patients experience higher rates of congestive heart failure and lower rates of chronic obstructive pulmonary disease, cancer, and renal disease ($p<0.05$). Patients above the MHI had higher illness severity and total charges ($p<0.01$). No significant differences were found in amputation rates, inpatient mortality, length of stay, and 30-day readmission (p=NS).

Conclusion

Lower-income patients undergoing open LE bypass presented with decreased disease severity compared to higher income patients. Patients below and above the MHI had similar amputation rates, inpatient mortality, length of stay, and 30-day readmission. Higher income patients received a greater intensity of care represented by an increased number of interventions. While the additional procedures added to healthcare costs, a higher level of intervention did not necessarily lead to better health outcomes.

Disparities among homeless patients undergoing open lower extremity bypass

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Introduction
Patients experiencing homelessness face a multitude of health-related challenges that increase risk of morbidity and mortality. Few reports have assessed the impact of housing status on vascular surgical outcomes. We sought to investigate disparities in mortality and readmission among homeless adults undergoing open lower extremity (LE) bypass procedures.

Methods
Retrospective cohort study of patients undergoing open LE bypass procedures from 2018 to 2020 from the Nationwide Readmissions Database were queried using ICD-10 procedure and diagnosis codes. Categorical variables were analyzed using the Chi-squared or Fisher's exact test, and t-tests were used for continuous variables.

Results
58,082 patients underwent open LE bypass, of which 269 were homeless. Homeless patients were more likely to be younger, male, presented in a non-elective setting, and presented with an increased likelihood of injuries ($p<0.01$). Homeless patients had a higher 30-day readmission rate and amputation rate ($p<0.01$). Homeless patients had higher rates of chronic pulmonary disease but lower rates of congestive heart failure, diabetes, and renal disease. Homeless patients additionally had increased procedures performed, longer length of stay, and greater total charges compared to non-homeless patients ($p <0.01$). Severity of vascular disease was greater within the homeless population with 49.4% of patients experiencing major or extreme loss of function, while non-homeless patients were more likely to present with minor or moderate loss of function ($p<0.01$). We found no significant difference in inpatient mortality between the two groups ($p=0.20$).

Conclusion
Homeless patients undergoing open LE bypass presented often in a non-elective setting with increased disease severity and greater number of interventions, thus utilizing significantly greater hospital resources. While mortality rates were similar among the cohorts, homeless patients experienced a higher 30-day readmission rate and amputation rate. Thus, housing instability may be associated with increased morbidity and financial burden to the healthcare system.

CCMT: A web-based platform for comparative multi-omics data analysis across organisms

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Introduction

The Comparative Computational Multi-Omics Tool (CCMT) is an innovative web-based platform developed to facilitate the integration and analysis of multi-omics data across various organisms. CCMT enables researchers to compare genomic, transcriptomic, proteomic, and metabolomic data, fostering new insights into biological processes and molecular mechanisms. This tool plays a crucial role in identifying key biomarkers and pathways linked to diseases and treatments.

Methods

CCMT integrates data from multiple omics sources, harmonizing them using advanced computational pipelines. The platform supports user-friendly data uploads, comprehensive data visualization, and flexible analysis tools. By employing a graph-based approach and statistical algorithms, the tool compares datasets and generates comparative reports. It supports multi-layered integration using custom-built algorithms for normalization, filtering, and statistical significance analysis, with options for pathway enrichment and clustering.

Results

CCMT has been successfully applied in several case studies, including agricultural genomics. In these instances, the tool enabled the identification of novel biomarkers, uncovering crucial pathways and gene regulatory networks associated with disease resistance and treatment responses. Data analyses produced statistically significant findings, correlating multi-omics data with clinical outcomes and phenotypic traits, offering insights into both human health and crop resilience.

Conclusion

The CCMT platform offers a robust solution for researchers aiming to explore multi-omics data across species. By providing comprehensive, integrated datasets, it supports enhanced data-driven discoveries. Future developments will expand the tool's capabilities, increasing the scope of comparative analysis by implementing Gene Explorer and integrating new omics data types, further advancing research in precision medicine and agricultural genomics.

Sleep disturbances and comorbidities in patients with rheumatoid arthritis

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Introduction

Rheumatoid arthritis (RA) is a chronic inflammatory disease frequently associated with comorbidities and sleep disturbances. This study aims to evaluate the relationship between the number of comorbidities and the severity of sleep disturbances in RA patients.

Methods

This analysis utilizes data from the Sleep, Pain and Autonomic function in RA (SPAN-RA) study, which enrolled adults with RA from a single academic medical center in the U.S. Participants completed questionnaires, including a questionnaire assessing 20 different common comorbidities and the Patient-Reported Outcomes Measurement Information System (PROMIS) sleep disturbance computerized adaptive test (CAT). Associations between number of comorbidities and sleep disturbance were evaluated using unadjusted and adjusted linear regression models. Adjusted models included age, body mass index (BMI), and the Clinical Disease Activity Index (CDAI) as covariates. Number of comorbidities were categorized into none, 1-2, or 3+ levels.

Results

Our sample included 48 participants (96% female) with mean age 53.8 years and low disease activity (mean of Clinical Disease Activity Index (CDAI) = 9.4). In the unadjusted regression analysis, compared to adults with no comorbidity, those with more comorbidities were associated with worse sleep disturbances (b and 95% confidence interval (CI) for 1-2 comorbidities: 7.1 [1.9, 12]; for 3+ comorbidities: 10.0 [4.9, 15]). These associations remained similar after adjustment for age, body mass index, and CDAI (6.9 [2.1, 12] and 8.6 [3.3, 14] for 1-2 and 3+ comorbidities, respectively).

Conclusion

The findings suggest that the burden of multiple comorbidities contributes to exacerbated sleep disturbances in RA patients. These results underscore the importance of addressing comorbid conditions in RA management to mitigate sleep-related issues and enhance overall patient well-being.

Evidence of occlusive myocardial infarction in patients with a primary diagnosis of non ST-elevation myocardial infarction

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Introduction

The ability of conventional ECG findings (STEMI vs NSTEMI) to adequately identify all patients with coronary artery occlusions remains controversial. Occlusion myocardial infarction (OMI) may better describe underlying pathology after several NSTEMI patients had similarly adverse outcomes to STEMIs are found to have significant occlusive disease. We sought to identify prevalence of occlusive disease and adverse outcomes in NSTEMI in an academic and community midwestern population.

Methods

Retrospective review studying patients presenting to the ED with diagnosis (including 5 ICD 10 codes akin to) of NSTEMI. The primary outcome was the presence of a culprit artery on angiogram which would suggest significant coronary occlusion. Secondary outcomes were mortality, need for CABG, echocardiographic wall motion abnormalities, and troponin delta. Mann-Whitney and frequency analyses were performed.

Results

Among the 200 charts reviewed 192 patients had non-diagnostic (NSTEMI) ECG findings. 131 patients received angiograms, and 94 had one or more culprit arteries identified. Median (and mode) occlusion, when identified, was 90% with the upper quartile being 99.25% occlusion. 23 patients had 100% and 13 had 99% occlusion identified in the culprit lesion (11.5% and 6.5% of all patients). The median time to angiogram was 20.1 hours. PCI was performed on 69 and CABG on 9 patients. 5 patients died prior to intervention. 67 had regional wall motion abnormality on echocardiography, 58% of which had a culprit artery identified. Patients with troponin changes had a 280% median increase. Significantly higher delta troponins occurred with culprit arteries identified ($p<0.01$). 46.7% of these arteries were occluded by at least 95%.

Conclusion

Based on the results we conclude there may be a need to reevaluate the STEMI/NSTEMI paradigm. The severity of the disease was greater than previously expected. We suggest further studies to identify ECG patterns that could herald OMI.

Segmental Darier disease: A case study of diagnosis and management through the ECHO program

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Introduction
Darier disease is a rare autosomal dominant condition marked by hyperkeratotic, scaly papules and plaques, primarily affecting the trunk. This disease can cause complications like fissures and infections if left untreated. A subset of patients have an uncommon segmental form of Darier disease, which presents with localized involvement rather than a widespread rash. Diagnosing the segmental variant of Darier disease can be challenging due to its variation from the classic form of the condition. This is particularly evident given the highly penetrant yet variably expressive nature of the disease, as the condition can vary widely between family members.

Methods
This case of segmental Darier disease was discussed through the Dermatology Extension for Community Healthcare Outcomes (ECHO) program. ECHO provides primary care physicians (PCPs) the opportunity to consult with a team of dermatologists for complex cases. This is particularly valuable for PCPs in rural areas who may not specialize in dermatology and need guidance in diagnosing and managing rare conditions like Darier disease.

Results
The case involves a 62-year-old female with a lesion on her chest, initially diagnosed as Grover's disease. After topical steroids failed to improve her condition, her PCP performed a biopsy, which showed findings suggestive of either Grover's disease or Darier disease. The PCP then believed that the clinical picture of either of the conditions did not match the pathology report and presented the case to ECHO. The dermatology hub team identified the lesion as the segmental variant of Darier disease.

Conclusion
This case highlights the importance of recognizing all variants of Darier disease in patients before secondary complications arise. This case also highlights the importance of the ECHO program's collaboration between PCPs and dermatologists. ECHO was crucial in this case to providing an accurate diagnosis and appropriate management, which prevented further complications of the patient's condition.

A single surgeon experience of robotic-assisted inferior vena cava thrombectomy at the University of Missouri

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Introduction

Inferior vena cava (IVC) tumor thrombus secondary to renal cell carcinoma (RCC) is a complex surgical problem. Currently, open surgical approach is the current gold standard in the management . Advances in robotic-assisted surgery have made it possible to perform robotic IVC thrombectomy via the minimally invasive approach in select patients.

Methods

Participants: 16 adults with RCC with IVC tumor thrombus who underwent RA -IVC thrombectomy from 2015-2023. Study: Retrospective observational study was preformed via char review on the electronic health record (EHR), PowerChart Data Collected: Patient demographics, operative technique, pathologic tumor classification, perioperative outcomes, and disease

Results

Mean (SD) N (%) Peri-Op Mortality 1 (5.9)
Length of Stay (days) 7.8 (5.1)

Conclusion

Adds to the existing literature regarding robotic-assisted IVC thrombectomy in the setting of RCC is feasible. Data demonstrate the feasibility and safety of robotic-assisted IVC thrombectomy for this complex surgical disease. Continued need for comparative data in the context of IVC thrombectomy

IRnet: Immunotherapy response prediction using pathway knowledge-informed graph neural network

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Introduction

Immune checkpoint inhibitors (ICIs) are potent and precise therapies for various cancer types, significantly improving survival rates in patients who respond positively to them. However, only a minority of patients benefit from ICI treatments. Identifying ICI responders before treatment could greatly conserve medical resources, minimize potential drug side effects, and expedite the search for alternative therapies. Our goal is to introduce a novel deep-learning method to predict ICI treatment responses in cancer patients.

Methods

The proposed deep-learning framework leverages graph neural network and biological pathway knowledge. We trained and tested our method using ICI-treated patients' data from several clinical trials covering melanoma, gastric cancer, and bladder cancer.

Results

Our results demonstrate that this predictive model outperforms current state-of-the-art methods and tumor microenvironment-based predictors. Additionally, the model quantifies the importance of pathways, pathway interactions, and genes in its predictions. A web server for IRnet has been developed and deployed, providing broad accessibility to users at https://irnet.missouri.edu.

Conclusion

IRnet is a competitive tool for predicting patient responses to immunotherapy, specifically ICIs. Its interpretability also offers valuable insights into the mechanisms underlying ICI treatments.

Frequency and delivery modality of current cannabis user, comparing SGM and cis-gender heterosexuals

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Introduction
Use of cannabis has significantly increased due to state-level legalization initiatives. Understanding individual choices about cannabis use, both delivery modality and prevalence is vital towards providing evidence-based information to the public. This study aims to investigate prevalence of delivery modalities and frequency of cannabis use, comparing sexual and gender minority (SGM) population to cis-gender heterosexual population.

Methods
A 50-question cross-sectional survey assessed health-related behaviors including cannabis use among participants at seven Pride festivals in Missouri (June – August 2024). Participants indicated SGM identity (i.e., gay, lesbian, bisexual, transgender, genderqueer/nonbinary, heterosexual, use a different term). Among current users, demographics, frequency of cannabis use (every day or some days) and delivery modality (smoking, drinking/tinctures (THC seltzer), oils/waxes/shatter ('dabbing'), mouth sprays/lozenges/drops/strips, eating, vaping/vaporizers, topical creams/lotions/patches) were analyzed using SAS 9.4.

Results
Among the 2230 current cannabis users (54% of participants), aged 18-40 years, 891 (40%) identified as everyday users. Compared to someday users, everyday users are more likely to be older, self-identify as SGM, have less than 4 years of college or post-graduate degree, have health access barriers, and smoke cigarettes or use e-cigarettes every day (vs not at all). The everyday users are also significantly more likely to use other types of delivery modalities, smoke/dab only and vaping only compared to eating only.

Conclusion
Smoking cigarettes in the early 20th century was considered safe, but over time we determined that it has significant negative health outcomes. This pattern may be repeating with cannabis use. Further exploration of the influence of cannabis use by delivery modality on short-term and long-term health is vitally needed.

Viability and expression of chondrocytes harvested during arthroscopic treatment of femoroacetabular impingement

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Introduction

Cell-based techniques involving chondrocyte implantation show promise as a treatment for chondral lesions of the hip. Surgery for femoroacetabular impingement (FAI) often results in resection of an osteochondral CAM lesion, which may contain viable chondrocytes for cell-based cartilage restoration techniques. This study aimed to collect resected CAM lesion tissues for cell culture as a proof of concept.

Methods

IRB approval (#2016684) was obtained for collection of otherwise-discarded tissues from patients undergoing surgical management of labral tears and/or FAI. Up to 300 mg of collected tissue was exposed to collagenase type II for 16-24 hours for chondrocyte isolation. Isolated cells were counted and seeded onto T-25 flasks in DMEM supplemented with 10% FBS. Media was changed every 3 days until >90% confluency. At confluency, cells were counted and seeded onto a T-175 flask representing passage 1. At second confluency, cells were counted again; if the total didn't surpass 20,000,000 cells based on the minimum number needed for cell-based treatments, they were seeded onto two T-175 flasks representing passage 2. Cells were not expanded beyond passage 2 based on maintenance of phenotype.

Results

Mean weight of the collected tissues was 209.69 ± 78.09 mg (median = 202 mg). 41 of 55 samples reached >20,000,000 cells at a mean of 34.0 ± 13.0 days (median = 30 days). Mean initial cell seeding of successful expansions was 1,116,871.79 ± 2,271,995.77 cells (median = 340,000 cells). Of samples that failed to reach threshold, 5 didn't have sufficient cells following chondrocyte isolation to establish culture, and 9 didn't progress toward confluency for passage 1. There were not significant differences in patient age (p=.987), BMI (p=.244), or sex (p=.537) between successful versus unsuccessful expansions.

Conclusion

This study supports the feasibility of using otherwise-discarded tissue from CAM lesions for cell culture expansion and subsequent autologous chondrocyte implantation procedures.

Characterization of biceps tendon and triceps tendon injuries in National Football League players from 2009-2022

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Introduction
Upper extremity injuries are common among NFL players. This study aimed to determine the incidence and impact of distal biceps and triceps tendon injuries in the NFL from the 2009-2010 to the 2022-2023 seasons. We explored the impact that player/injury characteristics have on injury risk, return-to-play, and performance.

Methods
Publicly available data were reviewed to capture all distal biceps and triceps tendon tears reported in the NFL from the 2009-10 to the 2022-23 season. Return-to-play and performance metrics were recorded for each player during the season before and first two post-injury seasons. Data were analyzed to determine statistically significant differences in proportions using chi-square, Fisher's exact, or McNemar tests ($p < 0.05$).

Results
A total of 26 biceps tendon tears and 24 triceps tendon tears were identified in 50 NFL players between the 2009-10 and 2022-23 NFL seasons. Biceps tendon tears were significantly more likely to occur in NFL players with a BMI>31, >4 seasons of experience, and during NFL games. Triceps tendon tears were significantly more likely to occur in NFL players with a BMI>31, age > 26, >4 seasons of experience, and during NFL games. Biceps tendon tears with age >26 and >4 seasons of experience were significantly less likely to return to prior levels of performance. Triceps tendon tears with age >26, >4 seasons of experience, >31 BMI were significantly less likely to return to prior levels of performance. Players with triceps tendon tears were significantly less likely to return to start as many games as players with biceps tendon tears.

Conclusion
Biceps and triceps tendon injuries are often season ending in NFL players. This study identifies risk factors for biceps and triceps tendon injuries. Further work should be aimed to mitigate the impact of these risk factors on the biceps and triceps tendons.

Pharmacological inhibition of Galectin-3 suppressed aortic stiffness in smooth muscle cell specific Beclin-1 deficient mice

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Introduction
Aortic stiffness, a hallmark of aging, is a significant risk factor for cardiovascular diseases like hypertension and atherosclerosis. Reduced levels of Beclin-1, a key autophagy induction gene, have been observed in aging-associated diseases. In our preliminary studies, smooth muscle cell-specific Beclin-1 deficiency accelerated aortic stiffness in mice, associated with a significant increase in Galectin-3. Increased level of Galectin-3, a galactoside binding lectin is shown to be associated with arterial stiffness in cardiovascular patients. In this present study, we examine the potential contribution of increased galectin-3 to accelerated aortic stiffness in SMC-Beclin-1 deficient mice.

Methods
Tamoxifen injected 8-12 weeks old SMC Beclin-1 deficient wildtype (WT) or deficient (KO) (n=7-8/group) mice were administered with either vehicle or galectin inhibitor (1000 mg/kg/day) in drinking water as follows: Group1: WT-Vehicle; group 2: WT-Galectin inhibitor; group 3: KO-Vehicle; group 4: KO-galectin inhibitor for 7 weeks. Aortic stiffness was measured in-vivo by pulse-wave velocity and vascular function measured in aortic rings ex vivo by pin myography.

Results
Prior tamoxifen injection, at baseline, all 4 groups of mice showed comparable aortic PWV. Post tamoxifen injection, SMC-Beclin-1 deficiency accelerated aortic PWV compared to WT controls ($P<0.001$). Interestingly, administration of galectin inhibitor significantly suppressed aortic PWV in SMC-beclin-1 KO mice compared to the vehicle control group ($P<0.001$). Ex-vivo pin myography studies in response to contractile and relaxation agents, showed a significant increase in contractility only in WT not in KO group of mice. Furthermore, acetylcholine showed a strong and complete relaxation in WT groups of mice whereas sodium nitroprusside showed a strong and significant aortic relaxation in KO groups of mice independent of galectin inhibitor.

Conclusion
These findings suggest that pharmacological inhibition of galectin partially suppressed aortic stiffness as evidenced by decreased PWV in SMC-Beclin-1 deficient mice.

Enhanced recovery after complex spinal surgery – A retrospective review

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Introduction

Enhanced Recovery After Surgery (ERAS) is a set of multidisciplinary perioperative protocols that seek to improve patient outcomes through improving patient satisfaction, decreasing complications, and decreasing overall costs. It has been used in multiple surgical subspecialties but has been limited in spinal surgery. The goal of this study is to examine patient outcomes, such as length of stay and postoperative complications, as well as anesthesia-related outcomes, such as intraoperative blood loss and blood product administration. By examining theses outcomes, we hope to better understand what can be improved with ERAS implementation.

Methods

A retrospective chart review was completed examining patients at MU Health Care who underwent complex spinal surgery involving 3 or more levels or more than 4 hours of operative time between January and December 2023. Data was collected examining intraoperative and postoperative interventions along with postoperative outcomes under the current standards of care.

Results

Of the 193 patients examined, 115 were male and 78 were female. The patient mean age and weight were 58 ± 14 years and 93.4 ± 24.7kg, respectively. Of the patients examined, 15% patients were in the ICU on POD1 and 44% of patients remained in the hospital on POD4. With respect to patient outcomes, 2% experienced GI complications ($p<0.05$) and 2% experienced postoperative pneumonia ($p<0.001$). Anesthesia and surgical outcomes showed that 5.6% of patients required intraoperative blood transfusions and 4.6% required postoperative blood transfusions ($p<0.001$). Additionally, time to walking was found to be related to intraoperative blood loss ($p<0.001$), length of surgery ($p<0.01$), and preoperative hemoglobin ($p<0.05$).

Conclusion

The data suggests that an ERAS protocol could be helpful in improving outcomes regarding ICU days, overall length of stay as well as minimizing perioperative blood transfusions. More data is needed surrounding postoperative pain and intraoperative hypotension regarding ERAS protocol implementation.

Low average deprivation index scores are associated with increased survivorship following proximal femur fractures in geriatric patients

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Introduction
Socioeconomic status (SES) is linked to worse health outcomes and higher all-cause mortality. Geriatric patients with proximal femur fractures face a 1-year mortality, but the effect of SES on these outcomes is unclear. This study aimed to assess how neighborhood SES, measured by the area deprivation index (ADI), impacts outcomes in proximal femur fracture patients. We hypothesized that patients with a lower ADI score (better SES) would have better short-term and one-year survivorship after injury.

Methods
Geriatric patients (age (≥) 65 years) undergoing proximal femur fixation were categorized into rural, suburban, and urban populations based on zip code. State and US ADI scores were calculated based on home address. Demographic, injury, treatment, and outcome data were gathered from electronic medical records. Comparisons across ADI scores were made using Chi Square, Wilcoxon, and Fisher tests. Significance was set at a priori <0.05.

Results
Of the 605 geriatric proximal femur fracture patient (32.9% male), older patients (90.6 vs. 79.8 years) were significantly ($p<.001$) more likely to die during initial hospitalization and the subsequent year ($p<.001$, 84.2 vs. 79.1 years). Patients who survived the initial hospitalization had lower state and US ADI ($p<.001$), but did not differ based on gender, race, tobacco use, marital status, rural, or insurance status. Patients who survived one year post injury were more likely to be female ($p=.045$), and had better American Society of Anesthesiologists (ASA) classification scores ($p<.001$) compared to those who did not survive. Race, marital status, insurance status, tobacco use, or rural status were not different between those who did vs. did not survive 1-year following fracture.

Conclusion
Higher SES status measured by ADI is associated with short-term and one-year survival higher survival following geriatric hip fracture. Female patients and those with better ASA classification are more likely to survive one-year following fracture.

Effect of osteoarthritic cartilage biomechanical and structural properties on tissue protein content

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Introduction

Osteoarthritis (OA) is characterized by the loss of cartilage tissue across the surface of a joint. Inflammatory and degradative processes contribute to structural and biomechanical changes in the cartilage tissue during OA. The complex relationship between these changes during OA is poorly understood. Therefore, this study was designed to characterize differences in biomarkers in OA cartilage based on the aggregate modulus (Ha), permeability (K), and OARSI histological severity scores of tissues recovered from patients undergoing total knee arthroplasty (TKA) for OA. It was hypothesized that the interaction between OARSI scores and biomechanical properties would identify significant differences in the concentration of pro-inflammatory and pro-degradative biomarkers.

Methods

With IRB approval and informed patient consent, articular cartilage tissue was recovered from patients undergoing TKA for OA. Osteochondral explants were created and the explants underwent confined compression, and the stress relaxation curve was used to calculate the Ha and K of the tissue. One blinded pathologist scored each explant histologically based on a modified OARSI system. Protein extracted from each explant was assessed for clinically relevant biomarkers. Samples were grouped based on biomechanical properties and histology score. Significant differences in biomarker concentration between biomechanical property groups and histology score groups were determined using a Kruskal-Wallis Test and post-Hoc analysis, or a two-way ANOVA.

Results

Significant differences in biomarker concentrations were found when samples were grouped based on biomechanical properties alone. Further, significant differences in biomarker concentrations were found based on the interaction of biomechanical properties and histology score groups.

Conclusion

The data from this study indicates that significant changes in OA cartilage tissue protein content can be identified based on the interaction of cartilage structural and function changes during OA. Determining how cartilage tissue pathophysiology is associated with this interaction has the potential to identify treatment options for patients with OA.

The protective effect of myeloid beta-2-adrenergic receptor knock out in sepsis

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Introduction

Sepsis is a critical condition that occurs when the immune system fails to fight a severe infection, leading to the increase of proinflammatory cytokines that can damage organs followed by sudden immunosuppression, which can cause death. Due to the risk of death, it is important to study potential therapeutics to stop this severe infection in early stages. Adrenergic receptors mediate the cellular effects of the sympathetic nervous system and are known to influence a number of physiological outcomes including immune responses. β2-adrenergic receptors (β2AR) are members of the G protein-coupled receptor family and are the main adrenergic receptor subtype found on both innate and adaptive immune cells, where they can modulate a number of different responses in a cell-type dependent manner. How myeloid β2AR influences the outcome in sepsis is unknown. The myeloid β2AR has negative effects on the immune system in sepsis, and mKO will thus cause a protective effect.

Methods

Adrb2flox/flox and LysM-cre mice were bred to create a myeloid specific β2AR knockout mouse (mKO). Cecal ligation puncture procedure (CLP) was used as a pathological model used to mimic sepsis. Sham or CLP surgeries were performed on wild-type (WT) and mKO mice and pathological parameters including survival, blood pressure and body temperature were examined.

Results

mKO had improved survival compared to WT mice with no difference in body temperature, arterial pressure or immune cell recruitment. There was a significantly lower number of bacteria in mKO and less circulating IL-1β than in WT animals.

Conclusion

Myeloid β2AR deletion provides protective effects in an experimental sepsis model. These findings implicate immune cell β2AR in the pathological progression of sepsis and identify a novel therapeutic target for the treatment of sepsis.

Cholinergic interneurons in the shell region of the nucleus accumbens regulates binge alcohol consumption

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Introduction

Alcohol use disorder (AUD) is a chronic condition, often driven by binge drinking. The nucleus accumbens (NAc), particularly its shell region (NAcSh), is known to be involved in binge drinking, though the exact neuronal mechanisms remain unclear. The NAc contains medium spiny GABAergic neurons (MSNs) and cholinergic interneurons (CINs). While CINs comprise only 2-3% of NAc neurons, they provide extensive local innervation and are increasingly recognized for their role in modulating reward and addiction. Despite extensive research on MSNs, the role of CINs in binge drinking and AUD development is poorly understood. Given prior studies on the dynamic responses of CINs in reward-related processes, we hypothesized that binge drinking would induce distinct changes in CIN activity.

Methods

To test this, we used viral-mediated gene transfer to express a fluorescent sensor, GCaMP, in CINs of the NAcSh in male ChAT-cre mice. A small integrated microscope was attached to capture CIN fluorescence signals. Mice were exposed to alcohol (N=3) or sucrose (N=3) using a 4-day DID paradigm. CIN activity was recorded on Day 4 during consumption, with fluorescence signals indicating changes in calcium levels relative to action potentials. The consumed amount was measured, and histology confirmed GCaMP expression in CINs and the correct placement of the GRIN lens in the NAcSh.

Results

A total of 131 individual neurons were imaged. Z-score was calculated using 6.F/FO values of individual neurons in mice exposed to sucrose (N = 67) or alcohol (N = 64) which showed that there was a significant ($t = 12.96$, $df = 129$, $p < 0.001$) increase in the activity of the CIN in the NAcSh during alcohol consumption as compared to sucrose.

Conclusion

Our results provide compelling evidence that CINs in the NAcSh regulate binge alcohol consumption and suggest their potential as a therapeutic target for addressing AUD.

Exploring medication adherence among uninsured and underserved residents in Central Missouri: A study at MedZou

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Introduction
Medication adherence is critical for managing chronic conditions, yet uninsured and underserved populations often face significant challenges in adhering to prescribed regimens, even when medications are provided free of charge. This study aims to assess medication adherence among patients receiving prescriptions through the MedZou Community Health Clinic and to identify the barriers contributing to non-adherence.

Methods
This ongoing study utilizes a mixed-methods approach, combining a retrospective analysis of prescription fill data with patient surveys. We are reviewing pharmacy records from the past two years for MedZou patients to assess adherence rates. Additionally, uninsured and underserved patients aged 18 and older who receive medications from MedZou are invited to participate in a survey. The survey incorporates the Medication Adherence Report Scale (MARS), a validated tool designed to assess self-reported adherence behaviors. The survey, available in multiple languages, captures demographic data, medication regimens, adherence behaviors, and reasons for compliance or non-compliance. Factors such as socio-economic status, access to healthcare, medication side effects, and beliefs about medication efficacy are explored. Quantitative analysis will correlate survey responses with adherence rates, while qualitative analysis will involve thematic coding of open-ended responses.

Results
Preliminary findings suggest that socio-economic factors, such as financial constraints and limited healthcare access, along with individual factors like forgetfulness and concerns about side effects, are prominent barriers to medication adherence. The MARS questionnaire is expected to provide detailed insights into patients' adherence behaviors. Full results will offer a more comprehensive understanding of these factors and their impact on adherence.

Conclusion
This study aims to identify key challenges to medication adherence among uninsured and underserved patients in Central Missouri. The findings will inform the development of targeted interventions at MedZou to improve adherence rates and overall health outcomes in this vulnerable population. By addressing these barriers, the study seeks to contribute to enhancing healthcare delivery and reducing health disparities.

Role of impaired mitophagy and mitochondrial dysfunction in glaucomatous neurodegeneration

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Introduction

Glaucoma is a condition characterized by the progressive loss of retinal ganglion cells and degeneration of optic nerve (ON) axons. Elevated intraocular pressure (IOP) is the main risk factor, but vision loss can persist in some patients despite adequate IOP control. This study investigates if abnormal mitochondrial accumulation due to impaired mitophagy is linked to glaucomatous neurodegeneration.

Methods

Using mouse models of steroid and myocilin glaucoma as well as age-matched human normal and glaucomatous donor tissues, we examined whether dysfunctional mitochondrial accumulation (CoxIV), oxidative DNA damage (8OHdG), and mitophagy/ autophagy (PINK1/ Parkin) in RGCs precede glaucomatous neurodegeneration. Transmission electron microscopy (TEM) was used to examine the gross morphology of mitochondria in cross sections of glaucomatous mouse ON. We elevated IOP in mitophagy reporter mt-Keima mice for 5 weeks via periocular administration of Dexamethasone and measured the ex-vivo mitophagy flux. We further investigated whether enhancing mitophagy/autophagy with a pharmacological agent (Torin-2) or RGC-specific parkin overexpression can mitigate glaucomatous neurodegeneration in steroid-induced glaucoma mice.

Results

We observed significantly decreased PINK1/Parkin colocalization with an increased p62, CoxIV and 8OHdG expression in retina and ON of both mouse and human glaucomatous tissues compared to controls, suggesting that impaired mitophagy is associated with glaucoma pathology. The mt-Keima mice's chronic IOP elevation decreased the mitophagy flux before to RGC loss, indicating that mitophagy impairment occurs before glaucomatous neurodegeneration. RGC soma and axons sustained oxidative DNA damage because of dysfunctional mitochondrial accumulation. The TEM confirmed that the glaucomatous mouse ON had defective mitochondria. In mice models of glaucoma, enhancing mitophagy by Torin-2 and Parkin overexpression resulted in better PERG amplitudes, avoided oxidative DNA damage, and restored RGC structural integrity.

Conclusion

Our results suggest that glaucomatous neurodegeneration is assoicated with impaired mitophagy and mitophagy enhancement can provide an attractive therapeutic strategy to prevent dysfunction in gluacoma.

Epigenetic profile trajectories in fetal growth disorders correlated with antenatal metrics

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Introduction

Fetal growth disorders (FGD) are classified by evaluating fetal weight in relation to gestational age. The fetus is appropriate for gestational age (AGA, 10-90th percentile) in 80.9% pregnancies, while small (SGA, <10th percentile) or large (LGA, >90th percentile) in 8.6% and 10.5% of pregnancies, respectively. Circulating DNA in maternal blood carries fetoplacental epigenetic profiles representing a source of biomarkers for fetal growth.

Methods

Participants (n=23) were recruited during first obstetric visit. Maternal blood samples were collected at each trimester and placenta samples were collected at birth. After birth, participants' pregnancies were retrospectively classified into SGA (n=5), AGA (n=13), or LGA (n=5). DNA methylation in 10 candidate genes related to placental homeostasis and fetal growth was quantified using a qPCR-based method. DNA methylation differences between SGA, AGA, and LGA groups were calculated and evaluated considering with antenatal metrics.

Results

Gene-specific trajectory analysis revealed changes in DNA methylation during the first and second trimesters but not in the placenta at birth, indicating the plasticity of the epigenome throughout gestation and further stabilization before birth. Antenatal ultrasound diagnosis of FGD showed 7/10 cases were undiagnosed using this conventional method, with SGA having a lower rate of 1/5 diagnoses predicted. All participants who used marijuana during pregnancy had an SGA baby, and half of the participants who used tobacco had an SGA baby. Mean maternal BMI for all participants was 27.3 kg/m2, while the mean BMI for women with an SGA baby was higher at 30.5 kg/m2.

Conclusion

Trajectory analysis of epigenetic profiles in circulating DNA isolated from maternal blood can be clinically useful enabling monitoring fetal growth and FGD early detection. Antenatal epigenetic-based interventions may assist in limiting the FGD development. The environmental associations are critical components to address alongside epigenetics to assess phenotype plasticity during gestation impacting fetal growth.

Disseminated blastomycosis in Missouri with multi-organ involvement

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Introduction

Blastomycosis, caused by the dimorphic fungus Blastomycosis dermatitidis, is endemic to the Ohio and Mississippi River Valleys, Great Lakes region, and the southeastern United States. There has also been some prevalence in Eastern Canadian regions with a growing increase in severity of disease. High winds and activities which disturb soil, such as forestry work, camping and gardening, release spores into the air increasing the risk of infection. The skin, bones, and genitourinary system are the most frequently affected sites in extrapulmonary infections.

Methods

In this study we analyzed imaging, laboratory findings, and pathology specimens of patient with suspected disseminated fungal infection. Collected data was obtained through various specialty physician's clinical notes, pathology reports, and radiology reports.

Results

Disseminated blastomycosis was suspected given multi-organ involvement, positive laboratory markers, and broad-based budding yeast seen various biopsies. Treatment with liposomal Amphotericin B and voriconazole had positive response, demonstrating significant decrease in size of intracranial lesions on follow up MRI.

Conclusion

It can be challenging to distinguish between metastatic malignancy and disseminated infections. In a patient with already underlying cancer, complex presentation may obscure other possible etiologies. In another case, a patient presented with continued urinary pain and unintentional weight loss; Blastomycosis was considered, and later confirmed, based on concurrent dermatologic findings. Dermatologic presentations of Blastomycosis in various cases, including ours, describe widespread lesions of scabbing with crusted appearance. The presence of classic Blastomycosis cutaneous lesions has been a supportive finding and frequently advances this condition as a top differential. Even if immunocompetent, cumulative analysis of multi-organ damage should raise suspicion of disseminated fungal infections.

Adaptive radiation therapy in prostate cancer patients

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Introduction

Adaptive radiation therapy (ART) uses novel technology that can allow for a more precise radiation administration. It adjusts treatment, depending on the person's anatomy and response at time of treatment. With ART, treatment is more tailored and customized. The purpose is to concentrate radiation doses to specifically target tumors. Artificial intelligence technology is transforming the ability to optimize the planning of cancer treatment. This enhancement aims to avoid harmful radiation to non-cancerous areas. ART has been applied to various cancers including prostate cancer (PC). This study explores clinical follow-up, particularly regarding PSA response, urinary, and gastrointestinal symptoms.

Methods

In this retrospective study we treated a total of 11 patients with ART for PC. Of these, 7 patients were treated with definitive radiation therapy (60 Gy in 20 fractions). One patient was treated with adaptive Stereotactic body radiation therapy (SBRT) for low risk prostate, and 3 patients received adaptive boost as part of salvage radiation therapy for rising PSA after surgery. Collected data included PSA checks, reported urinary symptoms and any changes in bowel movements.

Results

All 7 patients treated with definitive radiation therapy have had excellent biochemical response based upon the PSA. Most patients had grade 2-3 urinary symptoms during treatment and mostly symptoms have improved. Mostly grade 1-2 gastrointestinal symptoms which will return to baseline after treatment. Additionally, the doses to the rectum and bladder were improved with ART compared to a control group of patients who received standard intensity-modulated radiation therapy (IMRT) who received their treatment during the same time period.

Conclusion

ADT did prove to be effective in PSA decline and suppression. It showed to still have various gastrointestinal and urinary clinical side effects. Notably, urinary symptoms were most prevalent.

The effect of statins on distant metastasis and recurrence of endometrial cancer

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Introduction
Endometrial cancer (EC) is the most common gynecologic malignancy, and the most common histological type of EC is endometrioid endometrial cancer (EEC). While most patients present with early-stage and low-grade EEC and have an excellent prognosis, a subset develops distant recurrence derived from EEC after initial treatment of the primary. However, the exact mechanism of distant metastasis and recurrence from EEC is still unclear.

Methods
We performed transcriptomic analysis with Ptend/d (Pgrcre/+Ptenf/f) and Mig-6d/dPtend/d (Pgrcre/+Mig-6f/fPtenf/f) mice to identify target genes of Mig-6 in distant metastasis and recurrence of EEC. To evaluate the effect of statin on distant metastasis, we treated atorvastatin (10 mg/kg/day oral administration), a HMG-CoA reductase inhibitors, or vehicle to 4-weeks-old Mig-6d/dPtend/d mice with stage I EEC for 1 month (n=6). To evaluate the effect of statin on recurrence EEC, we conducted hysterectomy in 4-week-old Mig-6d/dPtend/d mice (n=23/group) with stage I EEC, and then mice were treated with atorvastatin (10 mg/kg/day oral administration) or vehicle for 2 months. After treatment, recurrent EEC was examined.

Results
Transcriptomic analysis identified 727 and 431 genes significantly increased or decreased transcripts in Mig-6d/dPtend/d mice compared to Ptend/d mice. Pathway analysis of differentially expressed genes revealed that cholesterol synthesis related genes were significantly increased in Mig-6d/dPtend/d mice compared to Ptend/d mice. The Mig-6d/dPtend/d mice treated with atorvastatin showed a significant ($p < 0.01$) reduction of ECC tumor size (average 0.57±0.06g) compared to vehicle group (1.08±0.05g). Histopathological analysis revealed stage 4 EEC for vehicle-treated group, but stage 1 EEC for atorvastatin-treated group. Furthermore, atorvastatin treatment remarkably reduced recurrent rates (6/23; 26%) in hysterectomized Mig-6d/dPtend/d mice treated compared to vehicle-treated group (13/23; 56%).

Conclusion
Our results demonstrate that statins suppress development of distant metastatic and recurrent EEC with Pten and Mig-6 deficiency by inhibiting cholesterol biosynthesis.

Dysregulation of estrogen receptor alpha in the endometrium from infertile women with endometriosis

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Introduction
Estrogen receptors (ESRs) and progesterone receptors (PGR) are nuclear receptors that regulate critical signaling pathways for endometrial receptivity and pregnancy. Endometriosis, a chronic condition characterized by the growth of endometrial tissue outside the uterine cavity, often leads to infertility and pelvic pain. primarily due to disrupted steroid hormone signaling. Abnormal expression of ESR1 and PGR has been suggested to contribute to aberrant steroid hormone responsiveness in endometriosis.

Methods
We assessed expression levels of ESR1 and PGR in the endometrium from mid-secretory phase infertile women with endometriosis and control women without endometriosis. We performed immunohistochemistry, multiplex immunostaining analysis and quantitative analysis to determine the expression levels of ESR1 and PGR in human endometrial stromal and epithelial cells.

Results
The levels of ESR1 were significantly reduced in human endometrial stromal cells of infertile women with endometriosis compared to controls. This attenuation of ESR1 was closely associated with PGR expression in endometrial stromal cells. Although the levels of ESR1 in endometrial epithelial cells showed no significant difference between control and infertile women with endometriosis, a positive correlation between ESR1 and PGR was observed in human endometrial epithelial cells. Furthermore, a notable aberrant overexpression of PGR was tightly associated with ESR1 levels in epithelial cells of infertile women with endometriosis. Multiplex immunostaining analysis and quantitative analysis further revealed that ESR1 expression positively correlated with PGR expression in the human endometrium.

Conclusion
Our results underscore the critical role of ESR1 and PGR in maintaining a receptive endometrium and demonstrate aberrant dysregulation of these receptors in the human endometrium from infertile women with endometriosis. The findings suggest that ESR1 regulates PGR expression, providing a potential mechanism for the aberrant PGR overexpression in epithelial cells of the non-receptive endometrium, contributing to endometriosis-associated infertility.

Determining the optimal cessation time of enteral nutrition in patients prior to undergoing tracheostomy and/or PEG placement

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Introduction

Critically ill patients are at a significant risk for malnutrition-associated complications, and enteral nutrition (EN) is often provided to minimize their risk. These patients often require surgery for tracheostomy and/or percutaneous endoscopic gastrostomy (PEG) placement under general anesthesia during their hospital stay. Current American Society of Anesthesiologists (ASA) guidelines and hospital policy require halting nutrition 8 hours prior to undergoing general anesthesia, and do not make provisions for patients receiving EN. The aim of this study was to determine the most appropriate time to halt EN in critically ill patients before undergoing a tracheostomy and/or PEG placement.

Methods

Adult patients receiving EN before undergoing a tracheostomy and PEG placement (n=5) or PEG placement only (n=9) were randomized among two groups with differing EN cessation times –at the time the patient was called to the operating room (OR) (group 1), and 2 hours prior to the procedure (group 2). Any remaining residual feeds (if present) were suctioned out, and the volume was recorded.

Results

Of the 5 tracheostomy and PEG placement patients, 3 patients in group 1 did not have any residual feeds, with 1 patient in group 1 having 100mL of residual feeds in their stomach (45 mL) and esophagus (55 mL); 1 patient in group 2 had no residual feeds. Of the 9 PEG-only patients, 5 patients in group 1 did not have any residual feeds, with one patient in group 1 having 100mL residual feeds in their esophagus. Four patients in group 2 did not have any residual feeds.

Conclusion

Considering the important role of optimal nutrition for critically ill patients, this preliminary data positively suggests that EN does not require an 8-hour hold time prior to undergoing general anesthesia. More data is needed, and the study is in progress.

Association between achilles tendon tears and anterior cruciate ligament tears in National Football League and National Basketball Association players

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Introduction
ACL and Achilles tendon tears in National Football League (NFL) and National Basketball Association (NBA) athletes are often season-ending injuries. There seems to be a rise in Achilles tendon tears in professional athletics. Upon further investigation, some athletes had a prior ACL reconstruction. The purpose of this study was to find associations between Achilles tendon tears and ACL tears in professional athletes.

Methods
An online search was aimed at identifying NFL and NBA athletes from 2015 to 2023 who tore both their ACL and Achilles tendon using publicly available data. Player injury data and return to sport data were identified using official injury reports and official team statements. Data were compiled in a Microsoft Excel database and analyzed looking at injury laterality, Achilles tendon recovery/return to sport time, ACL recovery time, time between tears, height, weight, and basal metabolic index (BMI).

Results
Nine instances of players experiencing an ACL tear and an Achilles tendon tear occurred between 2015 and 2023. All but one player tore their ACL prior to tearing their Achilles tendon. Eight players tore both their ACL and Achilles tendon on the same side. The average recovery time from a player's ACL tear, if they returned to sport, was 480.4 days (SD=190.8). The average recovery time from a player's Achilles tear, if they returned to sport, was 402.6 days (SD=67.4). The average time between an ACL tear followed by an Achilles tendon tear was 626 days (SD=183.9).

Conclusion
Based on the trend that we have identified in NFL and NBA athletes, we propose a possible mechanism for this higher-than-expected rate of ipsilateral ACL and Achilles tendon tears. It may be worthwhile to incorporate focused Achilles tendon strengthening exercises into players' rehabilitation regimens prior to returning to sport following an ACL reconstruction to prevent another season- and often career-ending injury.

Understanding the associations between somatic mutations and outcomes of ovarian cancer

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Introduction

Despite its much lower occurrence, ovarian cancer has the highest mortality rate of any gynecological cancer in the US. Insidious in nature with nonspecific symptoms, ovarian cancer is often only caught at later stages. Due to its correlation to breast cancer 1/2 (BRCA1/BRCA2) and DNA mismatch repair (MMR) gene mutations, this study aims to investigate the role of somatic mutations in ovarian cancer through a retrospective investigation of patients treated at University of Missouri Hospital. Understanding how mutations impact carcinogenesis and cancer progression will help determine whether individuals should be screened for earlier diagnosis and treatment of ovarian cancer.

Methods

A non-randomized, retrospective analysis of patients with primary epithelial ovarian cancer who received treatment at University of Missouri between 2008 and 2023 was conducted. Patients with non-primary epithelial cancers, minimal records of treatment, or multiple primary cancers were excluded from the study, resulting in 219 total patients. Demographic and clinical data were collected using RedCap, a multivariate logistic regression analysis was performed on 82 patients with genetic testing. The variables analyzed include family history, genetic mutation, CA125 level, cancer stage, and age.

Results

Through the analysis, the probabilities of the explanatory variables (lsmeans) were calculated and compared using a Tukey test. In one model, the stage, BRCA1 mutation status, and CA125 proved to have a significant effect on predictive probability of mortality. In another model, there was an inverse correlation between the age of diagnosis probability of survival. There was no statistical significance found between presence of mutations family history and prognosis of ovarian cancer. Univariate logistic regression showed that genetic mutations did not have an effect on the CA-125 levels and the age of diagnosis.

Conclusion

This analysis suggests that variables such as stage at diagnosis and age at diagnosis remain the major factor affecting ovarian cancer prognosis.

Investigating pain outcomes of robot-assisted and laparoscopic roux-en-y bypasses

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Introduction

With the increasing applications of robot-assisted approaches in bariatric and general surgery, there have been questions arising about the outcomes of using each approach. One such outcome of interest is postoperative pain, especially as many bariatric surgeries at the University of Missouri are moving away from using narcotics for postoperative pain control. Previous studies have shown that robot-assisted surgeries have been associated with less postoperative pain. This study aims to investigate the pain outcomes of robot-assisted and laparoscopic Roux-en-Y bypasses to shed light on how to improve pain outcomes for patients in Missouri undergoing Roux-en-Y bypasses.

Methods

A non-randomized, retrospective analysis of patients who received either robot-assisted or laparoscopic Roux-en-Y bypasses from Dr. Milot Thaqi over the course of 1 year was conducted. Demographic and clinical data were collected using RedCap, and the pain scores were further analyzed with ANOVA with a $p < 0.05$ for significance.

Results

The data showed a significant difference in self-reported and behavioral report pain scores with a fold change of 41.731 and a p-value of 2.55E-9. This discrepancy in pain reports indicate that behavioral report is not the most accurate method to record pain scores. Using only the self-reported pain scores, the mean score was slightly higher in the laparoscopic group compared to the robot-assisted with a fold change of 0.052, but was not statistically significant. Similarly, the earliest onset of maximum pain did not yield statistically significant differences, and neither did operative time.

Conclusion

The results suggest that robot-assisted and laparoscopic surgeries are very comparable in terms of post-operative pain. However, it must be noted that almost all laparoscopic bypasses received a trans-abdominal plane block, while none of the robot-assisted group did. Therefore, the addition of a TAP block to robot-assisted approaches could improve post-operative pain.

Effect of intraoperative vagal nerve stimulation on functional recovery in a rat model of iatrogenic RLN transection and repair

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Introduction

Injury to the recurrent laryngeal nerve (RLN), a branch of the vagus, is a serious potential complication of anterior neck surgeries. Sequelae of RLN injury include dyspnea, dysphagia, and dysphonia, which can increase patient morbidity. In this study, we investigate the effects of intraoperative vagal nerve stimulation (iVNS) on functional outcomes in a surgical rat model of RLN transection and repair.

Methods

A total of 16 rats were randomly allocated into 2 experimental groups: iVNS (n=8) and sham-iVNS (n=8). Under surgical plane anesthesia, both groups underwent anterior neck incision, followed by RLN isolation, transection, and repair with a silastic conduit filled with hydrogel. Next, the vagus nerve was isolated and draped over a bipolar electrode for 15 minutes of either iVNS (40 Hz) or sham-iVNS (0 Hz), followed by surgical wound closure and anesthesia recovery. Functional outcomes were assessed at 3 time points (1-2 weeks pre-operatively for baseline function, 1-month post-surgery, and 2 months post-surgery) using a translational test battery (videofluoroscopic swallow study, vocalization, plethysmography, and laryngoscopy) for objective quantification of treatment effects.

Results

One of the 16 rats died due to post-surgical complications (asphyxiation from ingested bedding), while all others (n=15) survived. In all rats, transection of the RLN produced immediate ipsilateral laryngeal paralysis confirmed by laryngoscopy. Vagal nerve stimulation evoked repetitive swallowing in all “stim” rats, confirmed by visible jaw/tongue movement and tongue EMG activity. Our surgical and recovery protocols were optimized throughout the study to mitigate the presented challenges, particularly anesthesia/drug dosing (to maintain surgical plane), secretion management (to prevent short-circuiting of the iVNS electrode), and anesthesia recovery regimen (to prevent mortality).

Conclusion

We have optimized our RLN-transection and repair procedure and iVNS treatment application in rats. The treatment effect will be elucidated when rats complete their 1- and 2-month post-operative testing battery.

The impact of BMI, smoking history, cancer stage, parity, and age at diagnosis on ovarian cancer survival outcomes

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Introduction
Ovarian cancer (OC) causes more deaths than any other female reproductive cancer, with a 5-year survival rate of only 50%. While significant, yet contradictory, research has been done to characterize the lifestyle risk factors contributing to the pathogenesis of OC, their impact on survival is less understood. This study examines the relationship between OC survival and obesity, smoking, and pregnancy, with stage and age used in analysis as previously supported survival predictors.

Methods
A retrospective chart review was conducted on 219 patients treated for primary epithelial ovarian cancer at the University of Missouri and Ellis Fischel Cancer from 2008 to 2023. Data on age at diagnosis, BMI, smoking, pregnancy, cancer stage, and survival were recorded. After exclusions, 162 patients were included and analyzed using multivariate logistic regression.

Results
Of the 162 included patients, 67 had a smoking history, 124 had at least one prior pregnancy, 100 were Stage III or IV, and 101 were alive at time of data collection. The mean age and BMI of patients alive were 54.26 years and 32.04 kg/m2 respectively, compared to 60.66 years and 30.90 kg/m2 of patients who have died. Multivariate logistic regression demonstrated that age at diagnosis ($p=0.1201$) and cancer stage ($p<0.0001$) were significant explanatory variables on survival outcome, while smoking history, parity, and BMI were not significant.

Conclusion
This study reinforces the critical role of cancer stage and age at diagnosis in determining survival outcomes for patients with primary epithelial OC. While lifestyle factors such as smoking history, BMI, and past pregnancy have been previously implicated in cancer development, this analysis found no significant association between these factors and survival in this cohort. The lack of significance highlights how early detection and accurate staging remain paramount in improving survival rates.

Autonomic function after subacute spinal cord injury in real-world settings

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Introduction

Dysautonomia after traumatic spinal cord injury (SCI) results in severe cardiac complications and death. Reliable measures of dysautonomia in real-world settings are lacking. Through advances in portable biosensors, it is now possible to address this issue. A prospective, longitudinal study was performed to quantify the heart rate variability (HRV), a measure of the physiological interaction between the heart and the autonomic nervous system, during a hospital-based rehabilitation program. We hypothesized that HRV at admission would be altered compared to matched controls (data reported here) and hinder rehabilitation after SCI (ongoing study).

Methods

Photoplethysmography data were collected for 48 hours via the Empatica Health Monitoring Platform (biosensor wristband and mobile application). Root mean square of successive differences (RMSSD, a marker of parasympathetic activity), pulse, and respiratory rates were calculated. Neurological and mental functioning were also assessed.

Results

Compared to age-matched controls (n=11), patients (n=5, C3 to T5 injury, 42.3(mean)±17.9(SD) days post-SCI) exhibited increased RMSSD (by 60.2%), pulse rate (5.1%), and respiratory rate (32.5%), all without reaching statistical significance ($p>0.05$). On clinical testing, patients reported moderate anxiety (Beck Anxiety Inventory), mild depression (PHQ-9), and moderate-to-severe dysautonomia (COMPASS 31). The small sample size, analysis of the entire 48-hour data (although between-group HRV differences have mostly been reported during active conditions), and the significant between-group difference in male participation (19% in controls vs. 60% in patients, $p<0.05$; when sex differences have been shown in healthy HRV) may explain our failure to detect significant statistical changes in RMSSD.

Conclusion

Our preliminary clinical testing and Empatica data provide evidence for dysautonomia at admission to SCI rehabilitation. Work is underway to decipher cardiac dysautonomia in active conditions using a sex-matched control group, and its six-month evolution in relationship to neurological recovery.

Utilizing 7T MRI for the detection and characterization of brain lesions In epilepsy patients

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Introduction

Drug resistant epilepsy (DRE) is the persistence of seizures despite the use of at least two antiseizure medications. About one third of patients with epilepsy have DRE and may require surgical intervention to resect the area generating seizures, known as the 'seizure onset zone'. Pre-surgical evaluation of seizure onset zones includes 3T MRI to identify brain lesions based on morphological differences. However, a notable proportion of cases involve lesions that are challenging to detect due to their size, location, or similarity to surrounding tissues. Research by Bien CG, et al. (2009) found patients experienced better post-surgical outcomes when presurgical scans identified brain lesions compared to patients classified as 'MRI-negative'. 7T MRI has shown improved sensitivity and has the potential to be used in conjunction with 3T MRI to improve surgical mapping techniques. The objective of this study was to determine whether 7T MRI detects hippocampal abnormalities and focal cortical dysplasia (FCD) more often than 3T or 1.5T MRI.

Methods

We performed a retrospective analysis on patients seen at the University of Missouri with DRE who had 7T scans performed. The radiologic results from 7T imaging were compared with those from lower-magnitude imaging to assess whether hippocampal abnormalities and FCD are more commonly detected with one type of scan.

Results

Fourteen patients who underwent a 7T MRI for medically refractory epilepsy were identified. The presence of FCD and hippocampal abnormalities were noted on scans as "yes, no, possible." 7T MRI detected 9 patients with hippocampal abnormalities and 2 patients with FCD while 1.5/3T detected 4 and 2 patients, respectively (chi test, p=0.228 and p=0.075, respectively).

Conclusion

While utilizing 7T MRI alone may not be sufficient for the diagnosis or monitoring of DRE, 7T can be used alongside lower-resolution scans to provide the optimal clinically relevant picture for surgical resection.

Differential gene expression and pathway analysis of quiescent and proliferating human corneal stromal fibroblasts

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Introduction
This study investigates the transcriptional changes in primary human corneal stromal fibroblasts (hCSFs) cultured under quiescent (serum-free) and proliferative (serum-supplemented) conditions. The goal was to identify genes, pathways, and protein-protein interaction networks involved in corneal repair and regeneration.

Methods
Primary hCSFs were isolated from donor corneas and cultured in serum-free (quiescent) or serum-supplemented (proliferating) environments. RNA was extracted using the Qiagen kit and analyzed via RNA sequencing (RNA-seq). Differential gene expression analysis was performed using DESeq2, and pathway enrichment analysis using Gene Set Enrichment Analysis (GSEA). Protein-protein interaction networks were constructed using the STRING database and analyzed with Cytoscape and the cytoHubba plugin to identify central hub genes.

Results
RNA-seq uncovered 5,181 significantly differentially expressed genes from the 18,812 annotated genes ($p < 0.05$). A log2-fold change of ±1.5 identified 674 upregulated and 771 downregulated genes between quiescent and proliferating hCSFs. Pathway enrichment analysis highlighted changes in cell cycle regulation, inflammation, and oxidative stress pathways, including E2F Targets, G2M Checkpoint, MYC Targets, TNFa signaling via NF-kB, and oxidative phosphorylation. Key upregulated genes included FGF22, CD34, ASPN, DPT, LUM, FGF10, PDGFRB, ECM2, DCN, VEGFD, and PRELP. Downregulated genes correlated with cell cycle regulation, such as BUB1, TTK, KIF23, KIF11, BIRC5, and CDK1.

Conclusion
This study provides a detailed analysis of transcriptional and molecular differences in hCSFs under quiescent and proliferative conditions, highlighting key pathways involved in cell cycle regulation, inflammation, and oxidative stress. Critical hub genes for corneal repair and regeneration were identified. RNA sequences and gene counts from this study are available in the Gene Expression Omnibus (accession # GSE260476) for further research.

Impact of stimulant shortage on children & adolescents with ADHD

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Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by persistent inattention, hyperactivity, and impulsivity that can impact daily functioning. Stimulant medications are the most widely prescribed treatments for children with ADHD, and are considered first-line interventions for managing ADHD. Shortages of stimulant medications can severely affect children with ADHD. Information from this study may influence ADHD pharmacotherapy in areas where shortages are commonplace.

Methods

52 ADHD patients taking stimulant medications were selected to answer a questionnaire. Participants were asked about their experiences with the stimulant shortage. Details on patient medications were obtained, including dosage and any other concomitant medications. Demographic information was also collected.

Results

52 patients participated in the questionnaire, 36 male and 16 female. 24 patients were in elementary school, 15 were in middle school, and 13 were in high school. 34 patients experienced issues with the availability of stimulant medications within the past year. Of these 34, 21 (62%*) stated that their well-being had been negatively affected by the stimulant shortage. 31 patients (91%*) reported changing medications, skipping doses, or otherwise altering their prescription in response to stimulant shortages. 32 patients (62%) said medications were frequently out of stock or on backorder, with 14 patients (27%) repeatedly switching pharmacies to obtain their medication. When generic stimulants were unavailable, 3 patients (6%) resorted to purchasing the name brand, which was not covered by insurance. *Of those that experienced shortages Difficulties obtaining stimulant medication also led to poor performance in school, worsened mood, and increases in anxiety and irritability in 19 patients (56%*). 7 patients (21%*) reported attention and concentration deficits regardless of the setting, and 3 patients (9%*) reported sleep disturbances. *Of those that experienced shortages.

Conclusion

Skipping or altering doses due to stimulant shortages has a demonstrable negative impact on a child's wellbeing, leading to problems in school and at home.

A rare contributor to cardiac causes of maternal mortality

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Introduction

Postpartum cardiomyopathy (PPCM) and Takotsubo cardiomyopathy (TCM) are cardiac conditions that can occur in the peripartum period. They have distinct characteristics and incidence rates, although rare, both contribute to a leading cause of maternal mortality—cardiac disease.

Case Presentation

A 25-year-old female at 10 months post-partum arrived by EMS after becoming unresponsive at home. Resuscitation efforts and intubation resulted in return of spontaneous circulation. After transfer to the Neurology ICU, she was found to be unresponsive to all stimuli. No pupillary light, corneal, ocular, gag or cough reflexes were present. Two days prior she visited the ED for a concerning headache, she received workup and was discharged with a migraine. In the ICU a bedside ECHO suggested dilated cardiomyopathy. Shortly after she went into cardiac arrest requiring several minutes of resuscitation.

At this time the team was strongly suspicious of anoxic brain injury secondary to cardiac arrest. Further testing was initiated to confirm brain death. Final radiology results proved Takotsubo cardiomyopathy and EEG was consistent with brain death. The next day her heart arrested again, at that time the family asked for all life-saving measures to be withdrawn, and she was shortly pronounced dead.

Conclusion

Both PPCM and TCM can present with acute cardiac symptoms in the peripartum period. It was recommended that this case be reported to the Missouri Maternal Mortality Review Committee and a hospital autopsy be performed for further investigation and contribute to our understanding of high maternal deaths in the state.

Biomechanical properties of osteoarthritic cartilage and its effects on the tissue's metabolic response to load

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Introduction

Osteoarthritis (OA) is a multifactorial disease resulting in changes to the structure and biomechanical properties of articular cartilage. The effect of changes in cartilage tissue biomechanical properties on the tissue's response to compressive load remains poorly understood. It was hypothesized that application of compressive load would increase the number of significant moderate to strong correlations between the biomechanical properties of the tissue and the production of protein biomarkers, and affect the significant differences in protein biomarker production between tissue biomechanical property groups.

Methods

With IRB approval and informed patient consent, cartilage was recovered from who underwent total knee and hip arthroplasty for symptomatic OA. Cartilage explants were with or without compressive load for 3 days, and the biomechanical properties of the tissue explants were determined before and after culture. Media was collected and stored at -20°C for protein biomarker analysis. A Pearson's correlation was performed to determine significant ($p<0.05$) moderate to strong correlations between tissue biomechanical properties and protein biomarker production, and differences between biomechanical property groups were determined using a Kruskal Wallis test and post-hoc pairwise comparison for loaded and unloaded samples.

Results

Only one moderate positive correlation was identified in unloaded samples, but numerous moderate to strong positive significant correlations identified in loaded samples. Additionally, the application of compressive load during culture significantly affected the differences in biomarker production between samples based on tissue biomechanical property.

Conclusion

The data from this study indicates that the relationships among OA cartilage tissue biomechanical properties (Ha, K) and inflammatory and degradative biomarker content when loaded are multifaceted and complex. Determining how changes in OA cartilage biomechanical properties are related to differences in the pathophysiology of cartilage tissue will help determine how the development and progression of OA effects the cartilage tissue.

Can disc cell proteomes correlate with surgical outcomes?

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Introduction

Spinal fusion surgery has seen rapid growth, yet variability in outcomes remains a concern. Inflammatory cytokines such as TNF-α, IL-1β, and IL-6 have been associated with increased pain and adverse outcomes in previous studies. This study aimed to explore the correlation between baseline production of cytokines and chemokines in the intervertebral disc cells themselves at fusion levels and surgical outcomes.

Methods

A prospective cohort of surgical patients was evaluated, with tissue samples collected intraoperatively and cells cultured for cytokine production. Patient-reported outcomes were measured pre- and postoperatively including pain levels, Oswestry Disability Index (ODI) scores, and Patient Reported Outcomes Measurement Information System® (PROMIS®) scores. The primary objective was to determine whether production of certain cytokines correlated with greater pain, worse functional outcomes, or slower recovery.

Results

Contrary to expectations, our findings did not support a significant association between cytokine production of the disc cells themselves and patient outcomes, including pain, functional disability, or the need for reoperation. Statistical analysis revealed no meaningful correlations, leading to the acceptance of the null hypothesis.

Conclusion

The production of inflammatory cytokines by the disc cells themselves does not appear to correlate with postoperative outcomes in lumbar spinal surgeries.

Functional carbon dots for enhanced miR218 delivery and accelerated osteogenesis

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Introduction

MicroRNAs (miRNAs) play a crucial role in regulating gene expression and have emerged as promising molecular targets in bone tissue engineering. However, the safe and effective delivery of miRNAs to target cells has remained a significant challenge, limiting their practical applications. In this work, a functional carbon dots named CPCDs-RGI was designed and synthesized as a non-viral gene vector for the efficient transfection of miR218 (an osteogenic miRNA regulator) to bone marrow-derived mesenchymal stem cells (BMSCs) for accelerated osteogenic differentiation.

Methods

The CPCDs-RGI was synthesized via conjugating a functional R9-G4-IKVAVW (RGI) peptide onto chitosan-polyethylenimine carbon dots (CPCDs). The CPCDs' absorption bands were measured using UV-Vis. Size and zeta potential were measured by Malvern Zetasizer. The CPCDs-RGI strongly condensed miR-218 to prevent its RNase degradation. MTT was used to evaluate the cytotoxicity of CPCDs-RGI and CPCDs-RGI/miR218. PCR were used to evaluate the expressions of miR218 and osteogenic relative markers of the transfected cells at mRNA level, separately. In vitro mineralization was performed by ALP staining at day 7 and ARS staining at day 14.

Results

CPCDs showed an intense absorption peak at 230 nm and a small broad peak at 320 nm. The emission was evaluated at the different excitation wavelengths, showing to be wavelength dependent. When excited at 360 nm, the emission intensity of CPCDs showed concentration dependent. The average diameter of the CPCDs is around 4.2 nm. Owing to the positive charge of chitosan, PEI and cationic R9, CPCDs-RGI effectively condensed miR218 and formed positive charged complexes. More calcium deposition in CPCDs-RGI4/miR218 group was observed compared with other groups.

Conclusion

The multifunctional CPCDs-RGI is an efficient miR218 delivery vector for accelerated osteogenesis.

Incorporation of bone formation peptide into surfaced-modified nanofibrous microsphere matrix for periodontal bone regeneration

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Introduction

Periodontal bone regeneration is important in dentistry because periodontal bone defects are common in oral health. Biomimetic microspheres are attractive biomaterials for periodontal bone regeneration. In this study, we developed multifunctional injectable ECM-like nanofibrous hollow gelatin-based microspheres for periodontal bone regeneration. Specifically, bone formation peptide (BFP) was incorporated into the hollow microspheres, and E7 peptide that selectively binds bone marrow stem cells was coupled onto the surfaces of the microspheres. Furthermore, the multifunctional microspheres were injected into the defect and photo-crosslinked to form a 3D nanofibrous matrix that provides selective cell adhesion and sustained release of BFP from the microspheres.

Methods

BFP was encapsulated into calcium phosphate (CaP) nanoparticles and added to a 50% ethanol solution of gelatin methacryloyl (GelMA). Hollow microspheres (MS) were prepared using a double emulsion method, followed by a thermally induced phase separation process to form nanofibrous microspheres. The mechanical properties, encapsulation efficiency, BFP release, biocompatibility, and degradation were evaluated. In vitro biological assessments include cell attachment, adhesion, migration, proliferation, differentiation, and mineralization. Periodontal bone regeneration was tested in vivo.

Results

The mechanical strength of the MS 3D matrix increased as the MA concentration increased from 5% to 10%. Further increasing the amount of MA did not significantly affect the mechanical property of the MS 3D matrix. Crosslinking MS significantly increased the degradation time of the MS 3D matrix. After initial cell adhesion, the cells migrated into the porous MS 3D matrix at a rate of approximately 20.9 μm/h from 2 h to 12 h. In vivo experiment further showed that the MS 3D matrix significantly improved periodontal bone regeneration.

Conclusion

The biomimetic multifunctional MS 3D matrix serves as a promising cell carrier and drug delivery vehicle for periodontal bone regeneration.

Effect of concurrent meniscal and chondral injury on the secretome of joint tissues after anterior cruciate ligament rupture

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Introduction

Anterior cruciate ligament (ACL) rupture (ACLR) is a common injury in patients due to high energy pivoting activities and often presents with concurrent meniscal and chondral injuries. This study was designed to determine if the presence of concurrent meniscal and chondral lesions at the time of ACLR surgery is associated with increased concentrations of pro-inflammatory and pro-degradative proteins in the secretome of the ACL remnant and the synovium (SYN). It was hypothesized that the presence of a concurrent meniscal or chondral injury, and greater severity of chondral injury scores, would be associated with significantly higher levels of pro-inflammatory and pro-degradative proteins secreted by the ACL and SYN tissues during in vitro culture.

Methods

With IRB approval and informed patient consent, ACL remnant and SYN tissues normally discarded after surgery were recovered from patients undergoing ACLR (n=92, mean age=24.4 y/o, 47F, 43M). A 4 mm explant of each tissue was created and cultured for 3 days in supplemented DMEM, and on day 3 the media was stored at -20˚C for protein biomarker analysis using commercially available assays. Significant ($p<0.05$) differences between groups were determined using a Mann-Whitney Rank Sum test or Kruskal-Wallis test with Bonferroni correction depending on the number of groups in the analysis.

Results

Concurrent meniscal injury is associated with significantly higher concentrations of pro-inflammatory and pro-degradative proteins in the secretome of the ACL and SYN of the ACL injured knee. While concurrent chondral injury was less consistently associated with changes in pro-inflammatory and pro-degradative biomarkers in the tissues.

Conclusion

The data from this study indicates that concurrent meniscal injury, and not chondral injury, is consistently associated with increased concentrations of pro-inflammatory and pro-degradative biomarkers in the secretome of the ACL and synovium at the time of ACLR surgery.

Nursing students are making a difference in colorectal cancer screening through colonoscopy navigator program

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Introduction

The Missouri Partnership to Increase Colorectal Cancer Screening (MPICCS) is working to improve colorectal cancer (CRC) screening rates in rural Missouri primary care clinics through implementation of evidence-based interventions. Completing a colonoscopy requires access to a procedural center and multiple other behavioral steps by patients. Patient navigators facilitate the successful completion of this medical procedure by assisting patients every step along the way. MPICCS goal is to facilitate patient completion of colonoscopy by having nursing students work as patient navigators.

Methods

MPICCS designed a patient navigator program as an option for Sinclair School of Nursing (SSON) students completing a one-semester long community health course---Nursing in Communities, as a requirement for graduation. MPICCS has facilitated a partnership between the SSON and two of Federally Qualified Healthcare System (FQHC) since Spring of 2023. Nursing students received training from MPICCS staff on engaging in patient interactions, understanding clinical workflow and EHR utilization, confirming procedure center appointments and colonoscopy preparation requirements, as well as improving communication and organization skills.

Results

A total of 15 nursing students enrolled in this community health course and each student is assigned up to 5 patients to navigate for successful colonoscopy completion. All but one patient who never answered any phone calls received assistance from this program. The nursing students, patients and the FQHC staff viewed the navigation program favorably; although the training program required additional structured MPICCS supervision and clinic resources of a community health worker and a clinical manager to meet patient contact goals.

Conclusion

Patient navigator program using nursing students is an effective strategy to alleviate barriers to completing colonoscopies. The training provided real-world professional development opportunities for nursing students. The patients were assisted to complete their CRC successfully with no additional financial costs to the FQHC.

Improving mouse cell type annotation for SCRNA-SEQ data by utilizing foundation model and LLM model

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Mouse data is crucial in scRNA-seq analysis due to the role of mice as model organisms in studying human biology, genetics, disease, and development. The findings from mouse scRNA-seq studies often provide insights that are applicable to human health and disease. Cell type annotation based on scRNA-seq data is a fundamental task in mouse research. It provides the foundation for understanding tissue composition, developmental processes, disease mechanisms, and therapeutic responses in mouse models.

Conventional cell type annotation methods include reference-based method such as SingleR[1], marker gene-based method such as SCSA[2], and deep learning model-based methods such as scDeepSort[3] and scTub[4]. Inspired by huge success of foundation model in natural language processing (e.g. ChatGPT), many foundation models for scRNA-seq data such as scBERT[5], scGPT[6], and scFoundation[7], all for human data, have been proposed and demonstrated superior performance in cell type annotations. Similar effort is needed for mouse data; therefore, we are going to train a single cell foundation model such as scBERT, scGPT for mouse data.

LLMs are trained on extensive text corpora containing rich biological information, and they can be mined as a biological knowledge database. A recent study [8] used ChatGPT to annotate cell types based on provided DEGs and achieved higher accuracy than conventional methods like GPTCelltype. Another study [9] proved that using Retrieval Augmented Generation (RAG) to improve LLM is effective for human gene-related tasks, significantly increasing accuracy for cell type annotations over vanilla LLM. However, the dataset is small and only for humans. We will leverage the latest comprehensive literature and resources on mouse to build RAG-enhanced LLMs for mouse cell type annotation. The Mouse Cell Atlas[10, 11, 12] will be used for this research. It includes four versions encompassing over 126 tissues across 14 different stages and containing data on more than 2 million cells.

An exceptionally rare case of primary yolk sac tumor arising in the liver: Case report

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Introduction
Germ cell tumors are neoplasms arising in gonads, with extragonadal manifestations being notably rare. Among these, primary yolk sac tumors of the liver are exceptionally rare, with fewer than 15 adult cases documented globally.

Methods
We report a case involving a 47-year-old female who experienced subacute right upper quadrant abdominal pain and weight loss. Diagnostic investigations revealed an elevated alkaline phosphatase level and an alpha-fetoprotein (AFP) level of 45,000 ng/mL. Magnetic resonance imaging (MRI) showed widespread hepatic involvement, particularly in the left hepatic and caudate lobes, with a mixed enhancement pattern, and multiple enlarged upper abdominal lymph nodes suggestive of metastatic lymphadenopathy. Differential diagnoses considered included multifocal hepatocellular carcinoma, cholangiocarcinoma, and metastatic disease.

Results
Histopathological analysis of a liver biopsy demonstrated sheets of poorly differentiated small round blue cells, which stained positive for pan-cytokeratin and glypican-3, but negative for an extensive-panel of immunohistochemistry including CK7, CK20, CDX2, LCA, Moc31, CD117, DOG-1, PAX-8, GATA3, synaptophysin, chromogranin, P40, and A103. The lack of HepPar-1and arginase-1 reactivity provided evidence against hepatic differentiation, steering the diagnostic focus away from hepatocellular carcinoma. Subsequent confirmation of an extragonadal germ cell tumor was achieved through the tumor's immunoreactivity for the pan-germ cell tumor marker SALL-4.

Conclusion
This case contributes to the scant literature on extragonadal yolk sac tumors of the liver, expanding understanding of their clinical and pathological spectrum. It underscores the necessity of considering rare tumor types in the differential diagnosis of liver masses. Employing a comprehensive immunohistochemical strategy is pivotal for confirming such rare diagnoses, thereby facilitating prompt and optimal clinical management.

Cross-Modality Translation Between Multimodal Single-Cell Data via Deep Neural Network

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Introduction

The integration of multiomic modalities, like combining scRNA-seq with scATAC-seq, offers a more comprehensive understanding of cellular functions. However, generating such data is challenging and costly, leading to limited availability. To address this, we propose CrossMP, a deep neural network model that predicts one modality from another, bridging the gap between scRNA-seq and scATAC-seq profiles.

Methods

We propose a model for cross-modal prediction between the transcriptome and chromatin profiles in single cells. Our model is based on a deep neural network architecture that learns the latent representations from the source modality and then predicts the target modality. It demonstrates reliable performance in accurately translating between these modalities across multiple, human, paired scATAC-seq and scRNA-seq datasets. Additionally, we have developed CrossMP, a web-based portal allowing researchers to upload their single-cell modality data through an interactive web interface and predict the other type of modality data, using high-performance computing resources plugged at the backend.

Results

CrossMP demonstrated strong cross-modality inference, achieving a Pearson correlation of 0.680 and a Spearman's correlation of 0.616 when inferring RNA expression from ATAC accessibility in the human COLO320DMHSR dataset. Additionally, CrossMP significantly outperformed state-of-the-art methods BABEL and scButterfly in recapitulating gene expression and peak differences across cells.

Conclusion

We introduced CrossMP, a machine learning model designed to bridge the gap between scRNA-seq and scATAC-seq profiles. Our model demonstrated robust performance across diverse datasets. Accompanied by a user-friendly web portal, CrossMP allows researchers to predict single-cell modalities with ease. Future work will focus on improving the model's accuracy, expanding its capabilities to other organisms and modalities, and enhancing the web portal to enable users to train their own models using custom datasets.

Empowering COVID (SARS-CoV-2) virus genomics surveillance for Missouri using data analytics and integration portals

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Introduction

To enhance understanding of SARS-CoV-2 prevalence in Missouri, we collaborated with the MO Department of Health and Senior Services and MO State Public Health Laboratory. our project aimed to deepen understanding of SARS-CoV-2 prevalence in Missouri. Through a sophisticated bioinformatics analytics pipeline and the Covid-19 Genomics Surveillance Portal, we provided real-time, detailed information to local authorities. The portal integrates sequenced samples, offering insights into variant trends, county-specific data, and top mutations. Our outcomes empower proactive monitoring and fortifying public health management.

Methods

The analytics pipeline incorporates sequence and variant effect annotations, phylogenetic and cluster analyses, and geospatial mapping. Using SARS-CoV-2 genome sequencing data from patient specimens, the pipeline aims to identify genetic variations, assess demographic trends, and determine similarities to other variants.

Results

The Covid-19 Genomics Surveillance Portal (https://dataportals.missouri.edu/SARSCoV2) integrates information of all sequenced samples from MSPHL with analyzed results for other samples from commercial labs. It provides details about variant proportions, trends of variants of concern (VOC) over period, variants by county, and frequency of top 10 mutations in S gene. The portal is updated weekly, and data is submitted to GISAID. Additional data analytics are underway for studying mutation patterns and hotspots observed in the different variants for understanding future trends.

Conclusion

By leveraging data analytics and integration portals, Missouri can proactively monitor and respond to the evolving dynamics of the COVID-19 virus. The project's outcomes enhance public health management and preparedness for future infectious disease challenges.

The role of negative affect in the association between right inferior frontal gyrus morphometry and inhibitory control in individuals with nicotine dependence

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Introduction

Impaired inhibitory control (IC) is a key feature of nicotine dependence, particularly involving the right inferior frontal gyrus (rIFG). This region, comprising the pars opercularis, triangularis, and orbitalis, undergoes functional and structural changes associated with IC deficits. Our previous research identified a link between IC impairments and reduced cortical thickness and volume in the rIFG pars triangularis. This study aims to expand on these findings by exploring how negative affect, which has shown to influence IC, further governs the IC-rIFG relationship and explore how these factors collectively impact smoking motives.

Methods

127 nicotine-dependent individuals (age=42.9±11.1) underwent magnetic resonance brain imaging (MRI). Brain morphometry was assessed from T1-weighted MRIs using Freesurfer. IC was assessed with a response-inhibition Go/Go/No-Go (GGNG) task, negative affect with the Positive and Negative Affect Schedule (PANAS) questionnaire, and smoking motives using the 68-item Wisconsin Inventory of Smoking Dependence Motives (WISDM-68).

Results

Moderation analysis revealed a significant interaction between IC and negative affect on rIFG thickness (ß = -0.0008, t[122] = -2.2407, p = 0.0269). The effect of IC on rIFG thickness was strongest at lower levels of negative affect (e.g., at 10th percentile: ß = 0.0048, p < 0.001) and weakened as negative affect increased, becoming non-significant at higher levels (e.g., at 14th percentile: ß = 0.0017, p = 0.097). Mediation analysis revealed that average rIFG cortical thickness partially mediates the relationship between negative affect and smoking behavior for negative reinforcement (ß = 0.0321, BootSE = 0.0192, BootLLCI = 0.0057, BootULCI = 0.0796).

Conclusion

These findings suggest that negative affect weakens the direct relationship between IC and rIFG morphology. Moreover, rIFG cortical thickness mediates the effect of negative affect on smoking behavior related to negative reinforcement. These findings underscore the complex interplay between cognitive control and smoking behavior, suggesting areas for further research into smoking cessation.

The use of digital health and wearable technologies for the diagnosis and management of suicidality in adolescents and young adults: A scoping review

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Introduction
Suicide is a leading cause of mortality for children and adolescents in the United States, and better prediction models for early detection of suicidal ideation are needed. Advancements in technology have allowed for the development of wearable devices to assess suicidal ideations and potential risk factors in real time. This scoping review, sought to explore recent efforts focused on wearable devices for the measurement of different physiological variables used to predict and manage suicidal ideation in adolescents.

Methods
A comprehensive search was performed on January 18, 2023 and papers were included from 2000 onwards. Databases included Ovid MEDLINE(R), Ovid Embase, among others. Studies which incorporated the use of a wearable device to measure a physiological variable to predict or manage suicidal ideation were included. 2,255 articles were retrieved. Studies of participants under the age of 18 years were included. Studies that only included adults were broadly examined for comparison. 9 studies were evaluated, and 3 studies were included in the final review. Quality was assessed using the Newcastle-Ottawa Quality Assessment.

Results
We found 3 studies in the pediatric suicide ideation setting that showed a moderate level of success. Variables studied included heart rate variability, heart rate frequency, and a variety of sleep measures. Additionally, 7 studies in the adult setting studied a larger range of sleep, heart rate, skin, and movement variables. Although heart frequency, REM sleep measures, and sleep onset latency sleep measures showed promise in the pediatric setting, it was always in addition to self-reported questionnaire data. To our knowledge, this is the first scoping review to analyze physiological data in the setting of the prediction and management of suicide ideation.

Conclusion
further research is needed to explore variables that have been successful in adults, such as electrodermal activity and geographic location in combination with activity levels.

Motor cortex MR spectroscopy detects specific metabolic profiles in various nervous system pathologies

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Introduction

Damage to the motor cortex (M1) outcome results in hand motor impairments, reducing the capacity to carry out daily activities. Remodeling of M1 is crucial for recovering such impairments, yet the cellular substrate is still unknown. We employed MR spectroscopy (MRS) to explore in-vivo M1 metabolic profiles, consisting of certain biomarkers related to a cell or a system, in three conditions affecting M1 output and assess their sensitivity to each condition.

Methods

Twenty-six subcortical stroke survivors (mean ± standard deviation, 59.2±10.5 years old, 65% male, 77% right hand impaired), 21 preoperative cervical myelopathy-CM patients (56.7±9.2 years, 65% male, 62% right hand impaired), and 19 amputees (45.6±15.7 years, 58% male, 72% right hand lost, 80% prosthesis users) underwent MRS and clinical testing (hand impairment in stroke and CM; phantom and residual limb pain in amputees). Biomarkers of neuronal integrity (N-acetylaspartate), glial status (myoinositol), cell membrane formation & degradation (choline), and cortical excitability (glutamate-glutamine complex) were calculated in each condition and compared to those from matched controls (n=16 for stroke, 14 for CM, and 28 for amputees).

Results

Relative to the M1 metabolic profile in controls, stroke survivors showed significantly ($p<0.05$) altered levels of the biomarkers related to neuronal-glial status and cortical excitability (lower N-acetylaspartate by 15%, higher myoInositol by 16%, and lower glutamate-glutamine by 14%), CM patients showed higher levels of cell membrane formation/degradation biomarker (choline, by 14%), while amputees exhibited lower levels of the neuronal biomarker (N-acetylaspartate, by 12%). These alterations were functionally relevant in stroke (N-acetylaspartate, $p=0.01$; Glutamate-Glutamine, $p=0.04$) and CM ($p=0.04$) but not in amputees ($p=0.06$ for phantom, $p=0.2$ for residual limb pain).

Conclusion

These findings suggest the sensitivity of the M1 MRS-detected metabolic profile to pathology. Identifying condition-linked biomarkers is critical to finding new and better ways to treat hand impairments after M1 outcome damage.

Effect of anatomic location on the metabolic responses of osteoarthritic cartilage to compressive load

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Introduction

Osteoarthritis (OA) is a multifactorial disease often progressing from an initial injury to whole-joint inflammation and degeneration causing pain and dysfunction. The variability of OA development between joints is not well established. Because OA is a whole-joint disease, with all the tissues in the joint contributing to the development and progression of the disease, it is possible that there are significant differences in the pathophysiology of OA in the knee and the hip. Because the mechanical forces experienced by joint movement in the knee and hip are significantly different, it is possible that OA cartilage tissue from these two joints have significant differences in their responses to compressive load.

Methods

Cartilage explants were recovered from the femoral condyle, tibial plateau, or femoral head of patients who underwent total knee and hip arthroplasty for symptomatic OA. Half of the explants were cultured under compressive load and the other half were cultured without load for 3 days. Media was collected and stored at -20°C for protein biomarker analysis. A Mann-Whitney U Test was performed. Significant ($p<0.05$) differences between groups in the loaded or unloaded samples for each biomarker were determined.

Results

Biomarkers COX-2, MMP-3, and MMP-13 increased and MIP-1α and TIMP-1 decreased in response to load. Without load, significant differences in concentrations of OPG, CRP, MCP-1, adiponectin, adipsin, and leptin were observed between THA and TKA patients. After loading, biomarkers CRP, MMP-3, adiponectin, and adipsin were significantly different between THA and TKA patients.

Conclusion

The data from this study indicates potentially important and clinically relevant differences in the relative expression and production of proteins in cartilage recovered from patients with knee OA compared to patients with hip OA. Unraveling these complex relationships can allow for the development of more patient specific treatment protocols towards the goal of improving treatment outcomes and quality of life for patients with OA.

Examining cannabis use during pregnancy among Missouri PRIDE festival female attendees

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Introduction

Understanding the multiple individual, social, and structural factors related to cannabis use during pregnancy can provide valuable information to guide the communications and decisions of healthcare providers, public health officials, and policymakers, especially as recreational cannabis legalization expands across the United States. Missouri legalized adult recreational cannabis use in late 2022, thus understanding its effects on pregnant women is critical for improving public health interventions and clinical practices.

Methods

Between June and August 2024, an anonymous survey was distributed at nine PRIDE festivals in Missouri to examine demographics, substance use behaviors, access to health care, and other health-related habits, capturing information from the sexual and gender minority population as well as cisgender heterosexual attendees. Basic descriptive statistics were used to characterize the sample of women aged 18 years and older, who responded to ever being pregnant and using cannabis at some point. Logistic regression models were used to examine the association among participants' pregnancy-related cannabis use behaviors.

Results

Of the 694 women, 18% reported using cannabis during their most recent pregnancy. Cannabis use was highest in the first trimester (93%), followed by the 2nd trimester (46%) and 3rd trimester (42%). The most common reasons for using cannabis during pregnancy were to relieve nausea/vomiting (65%), and stress/ anxiety (16%). Those who were younger and worked part-time (versus full-time) were more likely to use cannabis during pregnancy. Compared to those aged 18-24 years, those who used cannabis at 25 years or older were less likely to use cannabis during pregnancy.

Conclusion

Cannabis use during pregnancy in Missouri is greater than the national average. More research into why women opt to use cannabis rather than other pharmacological treatments to relieve nausea/vomiting or anxiety/ stress during pregnancy is needed.

The role of exosomes derived from Müller cells in the retina

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Introduction

Exosomes mediate intercellular communication within the retina, influencing retinal health and disease. We explored Müller cell-derived exosomes' role in diabetic retinopathy. Investigating Müller cell-derived exosomes for delivering therapeutic molecules (e.g., siRNA, small compounds).

Methods

Exosomes from human retinal Müller cells (MGC) were isolated by ultracentrifugation or ultrafiltration, characterized by nanoparticle tracking analysis, western blot (WB), and transmission electron microscopy (TEM). Proteomic analysis via tandem mass spectrometry identified exosome protein contents under normal (NG) and high (HG) glucose conditions. We developed a Müller-specific exosome reporter mouse model (Müller-Tiger) by crossing transgenic Muller-Cre recombinase mice with an EGFP reporter gene driven by the CD9 promoter; enabling in vivo tracking of Müller cell-derived exosomes. Exosomes labeled with the green PKH-67 monitored the uptake into retinal cells.

Results

Proteomic analysis revealed differentially expressed proteins (DEPs) in MGC exosomes under NG and HG conditions. Exosome concentrations derived from MGCs after two days of cultures showed no significant difference: 1.98E+09 ± 2.12E+08 particles/ml for HG and 2.18E+09 ± 3.43E+08 particles/ml for NG ($p=0.17$, $n=11$). TEM confirmed similar exosome morphology. 901 DEPs were found in HG exosomes, 92 upregulated and 809 downregulated. WB confirmed these changes in diabetic vs. WT mouse retina and exosomes. Intravitreally injected exosomes visualized by confocal microscopy revealed distribution and interactions within the retinal vasculature, demonstrating targeted drug delivery. Immunohistochemistry of retinal cross-sections revealed MGC exosome interactions with the retinal pigment epithelium, photoreceptors, bipolar cells, and ganglion cells. The labeled exosomes were taken up in vivo by retinal ganglion cell precursors, MGC, pericytes, and endothelial cells.

Conclusion

Our findings suggest Müller cell exosomes mediate retinal communication under pathological conditions and are promising for drug delivery. Further, other pathologies will be explored. Focusing on quantifying exosome distribution in our Müller-Tiger model using flow cytometry. Likewise, exosomes' intravitreal delivery efficiency compared to other systems.

Motor vehicle versus pedestrian crashes: A ten-year retrospective review to explore incidence and risk factors

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Introduction

In 2021, 8,000 pedestrians (peds) were killed by motor vehicles (MV) in the United States, with higher rates of accidents occurring in more densely populated, low-income areas. No studies have examined MV vs. ped accident incidence and risk factors in suburban and rural communities. Therefore, this study aimed to understand the incidence and factors associated with ped vs. MV accidents to inform future interventions. We hypothesize that significantly more MVA vs. ped accidents will occur in low-income neighborhoods, with increased density around public transportation hubs.

Methods

With IRB approval, ICD10 codes were utilized to identify patients who experienced an MV vs. Ped accident between 01/01/2014 and 12/31/2023. Patients were included when they were bipedal pedestrians vs. MVs. Patients were excluded if they were hit by their own car, using a non-motorized or motorized vehicle, or delayed presentation to the hospital. Data extracted from the electronic medical record included date of birth, area deprivation indexes (ADI), race, sex, home and accident addresses, and proximity to the nearest bus stop.

Results

316 patients met inclusion criteria and were included for analysis (male n=183, 57.9%). Patients were 72.8% White (n=230) and 19.9% Black or African American (n=63). The average national ADI was 70.6, and state ADI was 5.8. Of the 154 patients (48.7%) with injury locations available, 41 (26.6%) were injured outside Columbia city limits, and 68 (44.1%) were injured within ½ mile of a bus stop.

Conclusion

While one-quarter of MV vs. ped accidents occurred in rural communities, our findings highlight that even in more suburban hospitals, proximity to public transportation and patient socioeconomic status remains a critical factor in pedestrian safety. Future studies should focus on preventive strategies tailored to these communities, potentially reducing the incidence of pedestrian injuries and fatalities.

Sequential direct bilirubin values and yield of evaluation in pre-term infants

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Introduction

Studies have detailed the diagnostic yield of newborn screening for biliary atresia using direct bilirubin (Harpavat S et al, Kastenberg Z et al). However, data is limited to term infants and less is known about preterm infants. We aim to describe sequential values of direct bilirubin in preterm infants and the utility of evaluation of direct hyperbilirubinemia.

Methods

Retrospective chart analysis of preterm infants surviving the neonatal intensive care unit stay was performed.

Results

127 preterm infants had 665 bilirubin evaluations (333 direct; 332 total) during their first NICU stay, with a median of 2 measurements per infant (IQR 1, 3). In the first 5 days of life (DOL), the median direct bilirubin value was 0.3 mg/dL (IQR 0.3, 0.4). After 14 DOL, the median direct bilirubin value was 0.4 mg/dL (IQR 0.3, 0.6). Before 5 DOL, twenty-seven infants (27/127=21%) had abnormal direct bilirubin estimations (greater than 0.4 mg/dL or greater than 10% of total bilirubin, Feldman et al). They had a median of 3 bilirubin estimations per infant (IQR 2,7). After fourteen DOL, three of these infants (3/27 = 11%) had abnormal direct bilirubin values (greater than 1 mg/dL for total bilirubin < 5mg/dL or >20% of total bilirubin >5 mg/dL, Feldman et al). These infants had even more direct bilirubin evaluations (median of 10 (IQR 9, 12)). All infants with elevated bilirubin had more diagnostic evaluations, but none were found to have identifiable cholestatic conditions.

Conclusion

All preterm infants with elevated direct bilirubin had normal values by discharge. These infants had numerous bilirubin estimations and further diagnostic testing. None were diagnosed with a significant cholestatic condition. Due to the low yield and potential harm, it may be prudent to avoid routine evaluations for direct bilirubinemia in preterm infants.

A rare case of photodistributed toxic epidermal necrolysis following ultraviolet radiation exposure

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Introduction

Toxic epidermal necrolysis (TEN) is a severe, life-threatening condition characterized by detachment of the epidermis and mucosal surfaces affecting 30% or more of the total body surface area. It is most commonly caused by adverse drug reactions, though autoimmune and infectious causes have been documented. We present a case of a 36-year-old woman who developed TEN with a photodistributed distribution covering 34% of her total body surface area. Recent solar radiation exposure highlights an unusual trigger, with only 13 other cases of photodistributed TEN reported in the literature

Methods

A 36-year-old female presented to the emergency department with diffuse skin sloughing 4 days after sun exposure at the beach. Physical exam revealed sharply photodistributed confluent hyperemia on the upper chest, back, and neck, with numerous flaccid bullae with serous yellow fluid across the thighs, neck and ears. A positive Nikolsky sign was elicited. There was hyperemia and hemorrhagic crusting of the oral and nasal mucosae. She was admitted to the medical intensive care unit (MICU) for wound care and fluid balance management. A thorough medication history, including over-the-counter agents and supplements, was obtained. A skin biopsy was performed.

Results

Medication history was negative for other inciting factors aside from recent sun exposure. Skin biopsy showed cytotoxic interface dermatitis, confirming the diagnosis of TEN. Literature review identified 13 additional cases reported with a similar photodistributed pattern linked to UV radiation exposure. The patient received Etanercept within 24 hours of diagnosis and was discharged from the MICU several days later in stable condition.

Conclusion

This case demonstrates UV radiation as a potential cause of TEN, especially with a photodistributed rash. Clinicians should consider this rare etiology and obtain a history of UV exposure when evaluating suspected SJS/TEN cases. Early identification of such triggers can expedite diagnosis and ensure timely specialized care.

Assessment and characterization of perivascular adipose tissue in mice infected with *Clostridium innocuum*

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Introduction

Inflammatory bowel diseases (IBD) are characterized by chronic inflammation, aberrant immune responses and intestinal hypoperfusion. Our focus is understanding the nature of vascular dysfunction. Previous studies using IL10-/- + H. hepaticus IBD mice showed impaired mesenteric artery dilation and pro-contractile remodeling of perivascular adipose tissue (PVAT). PVAT is unstudied in IBD; however, mesenteric adipose remodeling (i.e., creeping fat formation) is well-documented in Crohn's and linked to disease severity. Creeping fat formation was recently linked to translocation of Clostridium innocuum (CI) but potential impacts on PVAT are unknown. Therefore, we hypothesize that using CI to induce IBD in IL10-/- mice will lead to PVAT adipogenesis and immune cell influx.

Methods

C57BL/6 (WT) and IL10-/- (IBD) mice drank an antibiotic cocktail for 4 days; half of each group then received anaerobically-cultured CI via oral gavage. Tissues were harvested 14 or 56 days post-gavage. PVAT samples were sectioned for Masson's trichrome staining or immunolabeled for leukocytes (CD45), macrophages (F4/80), and T-cells (CD3). Fecal samples were collected to verify CI colonization.

Results

Fecal PCR revealed colonization of CI in all gavaged mice. In trichrome-labeled PVAT, CI induced non-uniform adipocyte hyperplasia in gavaged but not non-gavaged WT and IBD mice by day 14. Hyperplasia extent was greater at day 56 in both groups and more severe in IBD vs WT. Confocal imaging and analysis of PVAT immune cell populations is ongoing but shows a trend toward increased immune cell populations in IBD. Quantitative analysis will reveal whether adipocyte hyperplasia occurs in parallel with or precedes PVAT immune cell influx.

Conclusion

These data suggest that induction of IBD in IL10-/- mice with CI recapitulates an important feature of human Crohn's – adipose inflammation and remodeling. Future studies can utilize this clinically relevant model to study and ultimately prevent PVAT dysfunction to preserve intestinal perfusion.

Tigers connect: Bridging the gap of social determinants of health for families

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Introduction

The introduction of Pediatrics Collection: Social Determinants of Health emphasizes the disproportionate impact social determinants of health have on the health and well-being of marginalized populations. As recommendations and reimbursement increase for social determinants of health screening, it is imperative that we are thoughtful about how we best utilize this information to support families. Our clinical model can serve as a framework for other clinics in addressing these concerns.

Methods

Tigers Connect aims to address disparities that children and families face in accessing resources in mid-Missouri. Modeled after the original Health Leads national program, Tigers Connect acts as a bridge between children and families at our primary care clinic, MU Pediatrics, through trained volunteers. These volunteers connect families with needed resources.

Each family coming in for a well child visit receives an anonymous screener to identify families both in need of resources and wanting assistance. Trained volunteers, known as Family Resource Specialists (FRS), are present in clinic to briefly meet with families and arrange time for follow-up. The FRSs have a tiered support system, including clinic Healthy Steps coordinators and the state-wide Parent Link Warm Line, to aid in finding resources. They then work with families over time to overcome barriers, such as lack of transportation or filling out applications, to address these needs.

Results

We have learned a great deal since Tigers Connect began in February 2021. In that time, we have administered over 9,500 screens, assisted 339 families and trained over 100 volunteers. The program supports a variety of learners and their growth. In surveys, volunteers have stated that it has changed their understanding of families in our community and the impact SDOH have on health.

We were purposeful in creating a universal screener, based on the validated Health Leads survey, which has allowed us to face inherent biases in who we would think would need assistance. The screener is anonymous from the EMR in order to protect families and provide a safe space for discussion. Also, volunteers are trained to emphasize family goals and existing strengths in their conversations to empower families. Finally, this work is only possible in conjunction with multiple partnerships. In clinic, we team with Healthy Steps coordinators, a nationally recognized program of Zero To Three and ParentLink, a non-profit community organization with a database of state-wide resources.

Conclusion

How we support families in addressing identified health needs, including social determinants of health, is even more important than whether we screen for them. For clinical settings that do not have access to an institutionally funded social worker, innovative models are needed to assist families. The Tigers Connect program is a sustainable, fiscally efficient model for addressing some of the barriers families face.

Methamphetamine use and craniofacial fractures: A case series

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Introduction

Methamphetamine is a stimulant drug with high reported use in Missouri (Missouri Department of Mental Health). Currently, little literature exists on methamphetamine use, craniofacial fractures, and their reported outcomes. Our study hopes to explore demographics, fracture patterns, and their outcomes of patients that tested positive for methamphetamine. Understanding the common fractures, their mechanisms, and complications associated with methamphetamine use may prove useful for better clinical outcomes.

Methods

We performed an IRB-approved, retrospective case-series of patients with craniofacial fractures who tested positive for methamphetamines at the time of injury. Descriptive statistics were used to aggregate patient data. Summary tables we created of baseline characteristics, fracture injury patterns, surgeries, outcomes, and complications.

Results

Twelve patients (n=12) tested positive for methamphetamines at the time of craniofacial fractures. Of the 12 patients identified, 11 were male (92%), and 1 was female (8%), with a median age of 38 years (range: 27-52). Nicotine use was reported in 9 patients (75%) and alcohol use disorder was reported in 1 patient (8%). Comorbidities (CAD, Hypertension, Type II Diabetes, Hyperlipidemia, COPD, and Hypothyroidism) were reported in 6 patients (50%). Fracture injury patterns included 35 fractures, with 6 patients (50%) sustaining fractures from direct assault. Common fractures included nasal bone in 7 patients (58%), maxillary sinus in 4 patients (33%), and mandible fractures in 3 patients (25%). Surgery was performed for 5 patients. Complications were reported in 5 patients (Infection, Reoperation, Cranial Nerve Injuries (V1, V2, and V3) and diplopia). Only 8 patients presented for follow up evaluations at a median time of 1 month (range: 1-6).

Conclusion

Meth use was most associated with facial fractures secondary to direct assault injuries. Evaluating the impact of methamphetamines on facial trauma may provide educational opportunities for cessation in the outpatient setting.

Exploring recruitment and enrollment adaptations for a multisite trial of COACH using model for adaptation design and impact

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Introduction
Balancing fidelity and adaptation in implementation science is a relatively new but evolving focus, emphasizing the impact of adaptations on outcomes. Adaptations are essential for tailoring interventions to specific populations or organizations, and ongoing evaluation is necessary to align interventions with their contexts. The Model for Adaptation Design and Impact (MADI) framework facilitates systematic assessment of both intended and unintended effects of these adaptations. This study aims to explore changes to recruitment and enrollment protocols to boost participation in the multisite RCT COACH (Collaboration Oriented Approach to Controlling High blood pressure). COACH, integrated into electronic health records, aims to enhance patient care and hypertension management.

Methods
The MADI model will be applied to data from participating Pacific northwest clinics and will allow the study team to improve the fit of the COACH intervention to the Midwest and Southeast organizations. Using a deductive qualitative method guided by the MADI framework, 4 data sources will be used: 1) weekly site meeting notes, 2) monthly clinic check-in notes, 3) pre-implementation evaluation summaries and 4) contact logs. Populations of interest are clinic champions, care teams, and patients of participating sites. Data collection is in-progress.

Results
Initial findings suggest that changes made to the recruitment process will increase penetration due to the streamlined patient onboarding process but will have an unintended outcome of a decrease in fidelity due to protocol changes. The monthly clinic check-ins resulted in increased clinic training and support which suggests an intended effect on adoption and feasibility within clinics.

Conclusion
Insights from recruitment and enrollment successes and challenges at Pacific northwest clinics will forecast site specific adaptations for intended and unintended outcomes such as greater clinic engagement and increased trial participation for long-term adoption and sustainability.

Aged garlic extract attenuates age-associated cognitive and memory decline through altered multi-functional clusters in cortex and hippocampus

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Garlic (Allium sativum) is one of the widely used medicinal plants dubbed as a "superfood" and aged garlic extracts (AGEs)—a well-recognized nutraceutical for health maintenance. Age-related increases in cytokines, free radicals, and innate immunity; as well as reduced vascular perfusion, synaptic plasticity, and neuron population, all have deleterious effects on behavior and quality of life. With the increase in aged population, the prevalence of cognitive decline and dementia worldwide is estimated to double every 20 years demanding a special attention. AGE supplementation has been shown to display beneficial outcomes on cardiovascular and neuropsychological functions. Our previous studies found AGE and its bioactive components on suppressing microglial activation and neuroinflammation and enhancing antioxidant ability. Given these insights, we sought to investigate dietary supplement of AGE in aged mice to confer cellular resilience for brain health and to elucidate its underlying mechanisms on cognition-related molecular networks and functions. C57BL/6 male mice at the age of 42 weeks were fed AGE diet for 40 weeks (10 months) and performed a behavior test battery to examine the AGE effects on various aspects of cognition and learning domains; followed by label-free global proteomics and machine-learning driven bioinformatics focusing on molecular alternations in cortex and hippocampus to identify signaling drivers in dietary AGE fed mice for altered behavioral phenomes. AGE diet shown improvements cognitive and learning abilities including short-term memory and spatial learning ability, remaining no change in body weight. Among close to 6,000 identified proteins by 4D label-free quantitative proteomics and gene ontology enrichment analysis revealed multi-functional clusters from over 200 proteins with statistically significant changes in the AGE-fed aging mice. Taken together, these findings demonstrate dietary AGE conferring beneficial effects to improve cognitive and memory function in the aging brain, suggesting that AGE serves as a valuable supplement for preventing aging-related neurological comorbidities.

Giving a boost to disadvantaged premeds: Utility of a student-run medical school application advising service at Mizzou Med

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Introduction

The process of applying to medical school can be financially challenging. Unfortunately, this financial burden disproportionately affects those with fewer resources. Giving A Boost (GAB) was founded in response to this disparity as an initiative offering free consulting services to underprivileged medical school applicants. GAB aims to provide medical school application support that can rival the services offered by paid consulting businesses, addressing financial barriers and increasing diversity in the medical field. This preliminary study analyzes the utility of GAB.

Methods

41 medical students volunteered to mentor 39 disadvantaged applicants, including those underrepresented in medicine, first-generation, economically disadvantaged, LGBTQIA+, and from medically underserved areas. Applicants were provided with an anonymous survey to evaluate the utility of essay editing and mock interview services in comparison to alternative support options.

Results

12 applicants responded to the essay survey. GAB had an average rating of 8.2 ± 1.9 out of 10. GAB's rating was the highest out of all of the categories. Premedical advisors had the lowest rating, with a score of 4.6 ± 2.5. There was a significant difference in the means of these groups (p=0.013). 15 applicants responded to the interview survey. GAB had an average rating of 8.6± 1.8 out of 10. GAB's rating was the highest out of all of the categories. Other counseling services had the lowest rating, with a rating of 5.7± 3.7. There was not a significant difference in the means of these groups (p=0.206). In one-tailed T-test comparisons, GAB vs family/friends, GAB vs other counseling services, and GAB vs faculty showed significance (p=0.0499, 0.045, 0.043, respectively).

Conclusion

GAB's services were rated highly by premedical students and considered the most valuable resource when compared to other commonly used resources. GAB can help increase diversity in the physician workforce.

Motor cortex GABA-mediated tonic inhibition and hand impairment in subacute stroke

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Introduction

Stroke is the leading cause of long-term disability; hand function is affected in 82% of survivors early after stroke. Patients exhibit some recovery, but for some unknown reasons, the extent of recovery is highly variable between patients. Preclinical findings reported an association between increased levels of γ-aminobutyric acid (GABA)-mediated tonic inhibition (GTI) in the motor cortex (M1) controlling the affected limb and poor recovery. Such relationships in patients are not well understood. This study investigated the GTI levels in M1 and hand impairment during rehabilitation; considering preclinical results, GTI levels at admission were expected to be higher (Hypothesis 1) and associated with greater hand impairment (Hypothesis 2) and poor recovery (Hypothesis 3, ongoing study).

Methods

We proposed a prospective study of 38 patients suffering from a subcortical stroke, sparing M1; data collected in five patients were reported here (67.6±10.0 years old, 40% females, 12.8±3.6 days post-stroke). M1 GABA levels (MR Spectroscopy) and motor impairment (elbow & wrist strength 4.0±0.5 for both, 5=normal) were assessed at admission to the rehabilitation ward. For comparison, seven age/sex-matched healthy controls were included. The results from ongoing data analyses of six new patients will be included in the poster.

Results

As expected, patients exhibited higher GABA in M1 controlling the affected hand (or ipsilesional) (by 32%, p=0.03) and a trend to higher GABA in the contralesional M1 (by 22%, p=0.06, Hypothesis 1). Contrary to Hypothesis 2, there were no significant correlations between M1 GABA levels and hand impairment (p>0.05 for all); a small sample size (n=5) and high clinical homogeneity (scores varied between 4 and 5) could explain this failure.

Conclusion

If our hypotheses are confirmed, the results of this project will enhance our understanding of the neural substrates subserving hand recovery and provide the foundation for augmenting recovery through GTI-targeted therapies, i.e., neurostimulation.

High protein diet and atherosclerosis

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Introduction

Atherosclerosis is the leading cause of mortality in developed countries. A Western-type diet is a major risk factor for atherosclerosis, presumably because it contains excess saturated fat, cholesterol, and refined carbohydrates. Results from animal studies and our human studies demonstrate high protein intake, which is gaining popularity, is also atherogenic. The adverse vascular effect of high protein intake is partially due to leucine-mediated activation of mTOR and subsequent inhibition of autophagy/mitophagy in macrophages. Here, we test the hypothesis that dietary proteins from animal sources lead to more pronounced mTOR activation in monocytes/macrophages than plant-sourced proteins, because animal proteins contain more leucine than plant proteins.

Methods

We studied 2 men and 4 women (age: 56.9±3.9 years) on four different occasions. Once, they consumed a standard-protein meal (STD) which contained 11% of energy as protein. Other times, they consumed an isocaloric high-protein meal (22% of energy as protein) that contained additional protein sourced from animal protein isolates (API), plant protein isolates (PPI), or plant protein isolates with additional leucine (PPIL) to match the leucine content of the API meal. Serial blood samples were collected before and after the meal to measure plasma amino acid concentrations, mTORC1 signaling, and downstream sequelae in circulating monocytes by using Western blotting, flow cytometry, and confocal imaging.

Results

Compared to basal (pre-meal) values, phospho-S6, a marker of mTOR activation, increased at one and three hours after the API and PPIL meals but not the PPI meal. LC3, an autophagy marker, decreased and colocalization of mTOR with LAMP2 (lysosomal marker) was noted after all three meals.

Conclusion

The preliminary results suggest the leucine content of protein, not the source of protein is an important determinant of mTOR signaling in monocytes/macrophages, but high protein intake from both animal and plant sources causes the ultimate adverse effects on autophagy/mitophagy.

The role of HRPC-derived exosomes on diabetic retinopathy pathogenesis through permeability of HREC

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Introduction

Diabetic retinopathy (DR) is a leading cause of vision loss and blindness in individuals with diabetes mellitus. Diabetic macular edema (DME) and retinal neovascularization (NV) are key drivers of DR progression. The retinal vasculature is composed of human retinal pericytes (HRPs) and human retinal endothelial cells (HREC), which work together to prevent blood leakage and abnormal blood vessel growth, thereby mitigating DME and proliferative DR (PDR). HRPs regulate blood vessel dilation, contraction, and remodeling, while HRECs form a barrier between the bloodstream and retinal tissue. HRPs affect HREC barrier function and proliferation in DR, but the mechanisms remain unclear. This study examines the impact of exosomes released by HRPs on HREC permeability, metabolic function, trans-endothelial resistance, and cell migration.

Methods/Results

Exosomes were isolated from HRP-conditioned media under normal (mannitol) and diabetic stress (high glucose + hypoxia) conditions using size-based ultrafiltration. Nanoparticle tracking analysis (NTA) showed no significant differences in exosome size or concentration between the two conditions. However, HRP exosomes from diabetic stress significantly reduced HREC trans-endothelial resistance (TEER) and increased HREC permeability compared to the control. This indicates enhanced leakage in retinal blood vessels. Metabolic assays showed higher HREC viability when treated with mannitol HRP exosomes compared to high-glucose exosomes at lower doses. Cell migration assays revealed that HRECs treated with diabetic stress HRP exosomes exhibited faster growth, consistent with angiogenesis and neovascularization in DR.

Conclusion

These findings suggest that exosomes from HRPs under diabetic stress promote retinal vascular permeability and endothelial dysfunction, contributing to DR pathogenesis. Targeting exosome release could provide a novel therapeutic approach for preventing or treating DR. Further research is needed to elucidate the mechanisms involved and potential clinical benefits.

TMIG-6 negatively regulates HDAC1 as a tumor suppressor to suppress angiogenesis in endometrial cancer associated with PTEN deficiency

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Introduction

Endometrioid endometrial cancer (EEC) is the most prevalent gynecological malignancy. Metastatic and recurrent endometrial cancer is incurable with currently available standard therapies. While Mig-6 mutation develops distant metastasis and recurrence of EEC with Pten deficiency, Mig-6 overexpression (Ptend/dMig-6over mice) suppresses tumor development. Therefore, there is an urgent need to explore the mechanisms of tumor metastasis and recurrence to further elucidate the progression of EEC.

Methods

We performed RNA-seq analysis to identify targets of Mig-6 in $Pten^{d/d}$ and P^{tend}/$dMig\text{-}6^{over}$ mice. Immunohistochemical analysis for HIF1A and PECAM1 was performed to examine angiogenesis in EEC. Interactome analysis was conducted to identify MIG-6 binding proteins in $Pten^{d/d}$ and $Pten^{d/d}Mig\text{-}6^{over}$ mice. Next, double immunofluorescence and immunoprecipitation analysis were used to evaluate inter-relationship between MIG-6 and HDAC1 proteins. Furthermore, the targeting effect of HDAC proteins was evaluated in EEC of $Pten^{d/d}$ mice by Panobinostat, a histone deacetylase (HDAC) inhibitor.

Results

The transcriptomic analysis identified 104 and 518 genes significantly increased or decreased transcripts in $Pten^{d/d}Mig\text{-}6^{over}$ mice compared to $Pten^{d/d}$mice. The pathway analysis of these dysregulated genes showed significant inhibition of immune, inflammatory, and angiogenesis pathways in $Pten^{d/d}Mig\text{-}6^{over}$ compared to Ptend/d mice group, where the key regulator was hypoxia-inducible factor-1 (HIF1A). Immunohistochemical analysis of HIF1A and PECAM1 validated a significant reduction of angiogenesis in $Pten^{d/d}Mig\text{-}6^{over}$r mice. Moreover, combined interactome and immunoprecipitation analyses revealed that MIG-6 directly binds with HDAC1 in the EEC of $Pten^{d/d}Mig\text{-}6^{over}$ mice. Our double immunofluorescence results confirmed colocalization of two proteins in EEC. Finally, we evaluated the therapeutic effect of Panobinostat in EEC of $Pten^{d/d}$ mice.

Conclusion

Our results demonstrate the tumor suppressor role of MIG-6 as an HDAC1 interacting protein in angiogenesis of EEC. Our findings highlight potential molecular targets of EEC that could significantly enhance therapeutic strategies for endometrial cancer.

Role of CD4+ β2-adrenergic receptor signaling in cardiac remodeling in a pressure-overload model of heart failure

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Introduction
Pathological cardiac remodeling is a hallmark of heart failure and significantly influenced by immune mechanisms. In particular, T cell populations are known to contribute to fibrosis in heart failure due to multiple etiologies. Chronic sympathetic activation occurs in heart failure, and it is known to modulate many aspects of cardiac function including immune responses. However, the role of the sympathetic nervous system in regulating T cell responses is unknown. Adrenergic receptors (AR) mediate the cellular responses to sympathetic activation. The β2AR subtype is highly expressed on CD4+ T cells, but the impact of β2AR signaling in CD4+ T cells on cardiac remodeling and fibrosis in heart failure conditions remains to be fully elucidated. Thus, we hypothesized that CD4+ T cell β2AR expression plays a crucial role cardiac remodeling during heart failure.

Methods
We utilized a murine model of heart failure induced by transverse aortic constriction (TAC) to study the effects of β2AR signaling in CD4+ T cells using a novel CD4+ T cell-specific β2AR knockout (tKO) mouse model. Cardiac function was assessed via echocardiography and pathological remodeling was evaluated through histological, molecular and biochemical analysis. The influence of β2AR on inflammatory responses were measured using molecular and immunological assays.

Results
Deletion of β2AR in CD4+ T cells significantly reduced cardiac remodeling and fibrosis, emphasizing the critical role of β2AR signaling in driving pathological changes in heart failure. tKO mice exhibited significantly less, a reduced inflammatory response, lower ICAM-1 gene expression, and decreased T cell/fibroblast interactions compared to wild-type controls.

Conclusion
β2AR signaling in CD4+ T cells plays a significant role in cardiac remodeling and fibrosis during heart failure. The absence of this signaling dampens these processes, suggesting that targeting β2AR in CD4+ T cells could offer a novel therapeutic approach to mitigating adverse cardiac remodeling in heart failure.

Lice infestation & severe anemia in pediatric populations

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Introduction

Pediculus humanus capitis is an ectoparasitic infection of the head caused by obligate parasitic insects that feed solely on human blood. While there is no established causative relationship between head lice and iron deficiency anemia (IDA), several reports in both children and adults have outlined their co-occurrence without an otherwise identified cause of anemia. The blood transferred from a single adult louse is estimated at 9.5×10^{-4} mL/day, however the full burden of an untreated prolonged infestation on host hemoglobin is not fully understood. In this study, we investigate IDA secondary to pediculus humanus capitis.

Methods

This was an exploratory research study of an isolated case at University of Missouri Pediatric Emergency Department. We aimed to identify and explain nontraditional causes of IDA in pediatric patients, specifically the presence of chronic and severe head lice. Data was collected through patient interviews and chart review, accompanied by review of literature of other reported cases. This case was published with written parental consent.

Results

An adolescent male presented with fatigue and pallor and was found to have microcytic anemia (hemoglobin 3.4 g/dL) in the setting of stable vitals. His diet was not consistent with iron deficiency, he had no reported bleeding history, and hemoccult testing was negative. Extensive workup failed to identify an underlying cause. There was complete resolution of anemia and symptoms with long-term maintenance of blood counts and ferritin levels following blood transfusions and permethrin 1% topical lotion applied to the affected area.

Conclusion

In conclusion, prolonged pediculus humanus capitis with high lice burden should be considered a possible etiology of IDA in patients with an otherwise negative first-line IDA workup. The treatment approach should include a thorough assessment of other possible contributors, including both medical and socioeconomic factors such as nutritional sufficiency and hygienic practices.

A case of traumatic spigelian hernia in a pediatric patient

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Introduction

Traumatic abdominal wall hernias are an uncommon result of blunt abdominal wall trauma characterized by the appearance of a hernia defect immediately following trauma without signs of skin penetration. We present a case of a Spigelian hernia resulting from a jet ski accident in which the lower abdomen was struck by the handlebar in a pediatric male.

Case Description

A previously healthy 15 year-old M presented following a jet ski accident in which he was thrown from the water craft and struck in the lower abdomen by the handlebar. Upon presentation to the ED, he noted abdominal pain in the left lower quadrant with an associated bulge over his abdominal wall. He had a small reducible hernia on exam without peritonitis. Initial trauma evaluation with computed tomography of the abdomen and pelvis revealed a left sided Spigelian hernia without any evidence of other intraabdominal organ injury. Additional evaluation revealed no other traumatic injury. He underwent an out-patient delayed open herniorrhaphy with tissue repair of the hernia defect six days post-trauma. He had an uneventful postoperative course with no recurrence of the defect at two week postoperative follow up.

Discussion

Spigelian hernias resulting from blunt abdominal wall trauma are a rare occurrence, especially in the pediatric population. Given its rarity, there is a paucity of well-established standards of care for their management. The operative surgeon must consider when surgical or non-surgical management, early or delayed repair, and repair with or without the use of mesh is appropriate. This case presents delayed open herniorrhaphy with tissue repair as a viable approach to the management of traumatic spigelian hernia in the pediatric patient

Establishment of a pre-clinical porcine model for endometriosis research

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Introduction

Endometriosis is a benign gynecological condition characterized by the growth of endometrial-like tissue outside of uterus. However, the exact cause and pathogenesis of endometriosis is elusive. Pigs are an ideal animal model for human health and disease studies due to their anatomical and physiological similarities to humans, as well as their highly conserved genetics. Developing a swine model mimicking pathophysiology of endometriosis and being able to easily distinguish endometriotic lesions from surrounding tissues will offer a novel large animal model that assist designing an effective cure.

Methods

The swine model of endometriosis was generated by using ex vivo labeling of endometrial tissues with fluorescein isothiocyanate dye-doped silica nanoparticles (FITC). FITC-labeled endometrial fragments were examined to identify endometriotic lesions. Histological and immunobiological analysis were performed to confirm the development of endometriosis.

Results

Six weeks post-transplantation, the pigs were euthanized to assess the development of endometriotic lesions. We observed ± 20 FITC-positive ectopic lesions in peritoneal wall, outside of the uterus, intestine, and the bladder. Histological analysis of ectopic lesions from the pig revealed that they had endometrial-like epithelial and stromal cells, confirming their morphological similarity to human endometriotic lesions. Immunohistochemistry analysis for E-cadherin, a marker of epithelial cells, and vimentin, a marker of stromal cells, validated the expression of endometrial like epithelial and stromal cells, respectively, of ectopic lesions.

Conclusion

Our results demonstrate the successful induction of endometriosis in swine, mirroring human conditions. Coming up with a swine endometriosis model may help improve not only in the discovery of pathogenesis but also in the development of a non-invasive diagnostic tool.

Disrupted circadian gene expression in fear circuitry following predator odor trauma

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Introduction

post-traumatic stress disorder (PTSD) is a severe mental health condition marked by persistent fear and anxiety following traumatic experiences. The predator odor trauma (POT) model is frequently used to study PTSD-like symptoms in rodents, including exaggerated fear responses and disturbed sleep patterns. Circadian rhythms, which govern various physiological and behavioral processes, are integral to memory consolidation and emotional regulation. This study examines the impact of POT on circadian gene expression within critical fear circuitry regions—namely the amygdala, hippocampus, and prefrontal cortex—and explores the implications for fear memory and sleep disturbances associated with PTSD.

Methods

Adult male C57BL/6J mice were subjected to predator odor exposure for 5 min novel context and 15 minutes to cat litter to induce trauma. Control mice were exposed to no odor control. On Day 2 at Light mid onset, animals were euthanized and brain tissues from the amygdala, hippocampus, and prefrontal cortex were collected, and RT-PCR was performed to assess the expression levels of key circadian genes: Per1, Bmal1. B-actin served as the reference gene for normalization. Additionally, elevated plus maze behavior paradigm was employed to measure the anxiety before and after the treatment.

Results

The results demonstrated a significant downregulation of circadian genes in the amygdala and hippocampus of POT-exposed mice compared to controls. The fear paradigm tests showed that POT-exposed mice exhibited increased anxiety behavior, reflecting possibility of sleep problems.

Conclusion

These findings indicate that predator odor trauma leads to a significant downregulation of circadian genes in brain regions involved in fear memory process, leads to impaired fear memory consolidation. This study providing a basis for future research into circadian rhythm-focused treatments for PTSD.

Impact of tongue exercise on tongue force/strength during swallowing in a rodent model of hypoglossal (XII) motor neuron loss

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Introduction

Neuromuscular diseases like spinobulbar muscular atrophy, progressive bulbar palsy, and amyotrophic lateral sclerosis (ALS) involve the degeneration of hypoglossal (XII) motor neurons resulting in progressive tongue weakness and upper airway dysfunction (i.e., swallowing and breathing deficits). Despite the life-threatening consequences of XII degeneration, effective therapeutic strategies are lacking. To address this unmet clinical need, we developed an inducible rodent model via intralingual injections of cholera toxin B conjugated to saporin (CTB-SAP) to selectively eliminate XII motor neurons and mimic the associated swallowing deficits observed in neuromuscular diseases. Using this model, we have demonstrated that tongue exercise mitigates deficits in lick rate (tongue motility) and lick force (tongue strength), although its impact on tongue strength during swallowing remains unexplored.

Methods

The goal of this study was to use acute superior laryngeal nerve (SLN) electrical stimulation to specifically evoke swallowing while using a tongue strain gauge to measure tongue force/strength in anesthetized rats +/- tongue exercise. We hypothesize that tongue exercise will enhance tongue force/strength during swallowing in CTB-SAP rats. To test this, we intralingually injected adult male rats with CTB-SAP or control (CTB unconjugated to SAP), subsequently treated these rats with tongue exercise or sham exercise (n=9-10/group), and finally studied tongue force/strength during swallowing via tongue strain gauge recordings during acute SLN electrical stimulation in all rats.

Results

We expect that: 1) sham exercise-treated CTB-SAP rats will exhibit behavioral evidence of dysphagia (i.e., reduced tongue force/strength during swallowing); and 2) these behavioral deficits in tongue force/strength will be attenuated by tongue exercise in CTB-SAP rats.

Conclusion

If our hypotheses are correct, findings from this study would provide additional evidence that our high repetition/low force tongue exercise paradigm may provide a viable dysphagia treatment/therapeutic approach to enhance the quality of life and nutritional status of patients with neuromuscular diseases.

Botulinum toxin for treatment of post-menopausal craniofacial hyperhidrosis

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Introduction
Postmenopausal craniofacial hyperhidrosis describes a unique subset of primary focal hyperhidrosis in menopausal woman. This condition can be challenging to treat and may require multiple treatment modalities before patients express satisfaction with the results. We review the literature describing targeted intradermal injection of botulinum neurotoxin as an alternative to medical therapy for craniofacial hyperhidrosis.

Methods
We present the case of a 68 year-old female with craniofacial hyperhidrosis who did not respond to topical agents and did not tolerate an oral antimuscarinic agent. The patient was successfully treated with 100 units of onabotulinumtoxinA along the forehead, frontal hairline, and periauricular scalp.

Results
The patient reported significant improvement in symptoms and quality of life as a result. She returend for multiple follow-up treatments to maintain results.

Conclusion
Overall, botulinum toxin has been demonstrated to be an effective treatment for postmenopausal craniofacial hyperhidrosis that is refractory to oral or topical agents. Multiple pieces of literature reinforce the efficacy of botulinum toxin for this condition.

Demographics of patients presented at ECHO autism learning community

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Introduction
Early diagnosis of autism spectrum disorder is crucial to connect patients with necessary resources. However, children with suspected autism often wait years before evaluation due to shortages of healthcare providers, limited capacity at autism centers, and geographic and socioeconomic barriers. The ECHO Autism STAT model aimed to train primary care providers in rural Missouri to diagnose autism, mitigating delays in diagnosis and treatment. This program linked rural primary care providers with autism experts to collaborate on evaluation of patients with suspected autism. This project analyzes the demographics of patients assessed for autism by primary care providers in the ECHO Autism STAT project and presented at the ECHO learning community bimonthly meetings.

Methods
PCPs participated in bimonthly 90-min ECHO Autism STAT virtual learning sessions for 12 months, where additional training in autism diagnosis and management was provided through didactics and case-based learning. Participating PCPs presented each patient they were evaluating for potential autism. Each presented case was documented along with demographics about that patient which has totaled 593 patients since 2017. The presented cases were documented in RedCap.

Results
Of the cases presented to the ECHO autism community, 73.2% of patients were male, and 26.8% were female. The most represented age group was 24-30 months, comprising 32% of cases. Most patients (69.3%) were covered by Missouri Medicaid for health insurance. The majority of patients were Caucasian.

Conclusion
The cases presented through the ECHO Autism STAT model were primarily Caucasian male patients covered by Medicaid in the 14-42 month age group.

MRI-PET neuroimaging of brain remodeling in western diet induced obese female mice

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Introduction

Non-invasive Magnetic Resonance Imaging (MRI) and 18F-FDG-Positron Emission Tomography (PET) neuroimaging provide insights into brain health and disease. We employed ultrahigh-resolution MRI and PET neuroimaging to study brain remodeling in a Western-diet (WD)-induced obese mouse model.

Methods

MRI was performed on 7T/20MRI equipped with CryoProbe. Six-week-old C57BL/6 wildtype (WT) and endothelial cell-specific mineralocorticoid receptor (ECMR) knockout (KO) mice were fed a high-fat WD or a control-diet (CD) for 12-week. Mice (n=6–10/group) were anesthetized under 1.5% isoflurane, maintaining 80-100 breaths/minute and temperature. T2-weighted MRI was used for tissue segmentation. Continuous arterial spin labeling (CASL) and 1H spectroscopy (MRS) were conducted to assess cerebral blood flow (CBF) and metabolite concentration, respectively. Data were analyzed using Paravision-7 (Bruker), Segment Medviso and LCModel. For PET, mice (n=4/group) were fasted overnight with water only. Awake mice received 300μCi of 18F-FDG via tail vein injection, then kept under dark and heat lamp for 45-minute. A static 30-min PET scan and a 4.5-min CT scan were then performed on the mice under 2-3% isoflurane anesthesia on an MILabs VECTor6CTUHROI imaging system. PET/CT images were processed using PMOD 4.2 and Inveon software for image fusion and volume-of-interest analysis.

Results

WT female mice on WD exhibited significantly reduced CBF perfusion in the cortex, hippocampus and thalamus compared to CD and ECMRKO mice on WD or CD. The WT-WD group showed increased GABA/Cr+PCr ratio and decreased GSH/Cr+PCr in the hippocampus, and decreased taurine, NAA, Cr+PCr, and Glu+Gln in the thalamus, compared to the WT-CD group. PET analysis revealed that the WT-WD group had significantly decreased glucose utilization in the brain compared to the WT-CD and ECMRKO-WD group after 20-week of feeding.

Conclusion

High-fat diet induced CBF hypo-perfusion, hypo-metabolism, and decreased glucose utilization in the brain. ECMR deletion had a neuroprotective effect on the cerebral blood flow and metabolism.

Diagnostic and therapeutic insights into alpha-gal syndrome

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Introduction

Alpha-gal Syndrome (AGS) is a tick bite-associated condition wherein affected individuals have an IgE-mediated allergic reaction to galactose-alpha-1,3-galactose (alpha-gal), an oligosaccharide found in mammalian meat and mammal-derived products such as milk or gelatin. The symptoms of such reactions follow exposure by 2-8 hours and vary from mild rashes and gastrointestinal discomfort to anaphylaxis; however, because some patients experience symptoms outside this timeframe or experience reactions inconsistently, prompt diagnosis and treatment of AGS is difficult.

Methods

In this study, we analyzed laboratory findings, diagnostic workup, and treatment of 8 patients with titer-confirmed AGS. Collected data was obtained through various specialty physician's clinical notes, laboratory studies, and pathology reports.

Results

AGS was confirmed by positive antibody titers following presentation with chronic and recurrent pruritic rashes without obvious cause, often after exploring a different preliminary diagnosis. Antihistamines and topical steroids were the most common first-line treatment, but neither were sufficient for any patients; escalation to Xolair (omalizumab) resulted in temporary reduction of symptoms, but also lessened in efficacy over time. Education and avoidance of mammalian products was most effective.

Conclusion

It can be challenging to distinguish between AGS and other causes of urticaria. Patients wait a median 10 months following presentation until diagnosis. Dermal hypersensitivity is the most common symptom at presentation, noted in all but one patient; only one patient presented with associated gastrointestinal symptoms. Absence of a confirmed history of tick bites is insufficient to rule out AGS in patients that present with chronic urticaria without clear etiology. AGS may be responsive to antihistamines, corticosteroids, or biologic medications, but without dietary exclusion of mammalian products, symptoms will likely recur.

Impact of hamstring injuries on fantasy football performance in NFL offensive skill players

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Introduction

Hamstring injuries are among the most common injuries in the National Football League (NFL). While these injuries are not typically season ending, they result in missed practice and game time. Players that return to sport may have worse overall performance compared to pre-hamstring injury. The main objective of the current study was to evaluate offensive player performance before and after a hamstring injury.

Methods

Hamstring injury data of offensive NFL players from the 2012-2019 seasons were gathered from publicly available sources. Player demographics, date of injury, date of return to play, and performance metrics were gathered. Performance metrics included, number of catches, yards gained, points scored and were collected the season prior, one season after, and two seasons after injury. Players with no playing time prior to or after injury were excluded. Paired student T-tests and one-way ANOVA tests were used to compare performance metrics pre- and post-injury.

Results

A total of 69 players (n=52 wide receivers, n=17 tight ends) were included. No significant changes were observed among tight ends in total fantasy points ($p = 0.988$) or average points per game ($p = 0.896$). For wide receivers, average points per game significantly decreased following injury ($p = 0.0004$). ANCOVA results indicated that wide receiver hamstring injuries are negatively correlated with both total points scored and average points per game (e.g., strain correlation with total points = -0.5560; average points = -0.4911).

Conclusion

Hamstring injuries significantly impact the performance of wide receivers. Tight ends, however, showed minimal performance decline post-injury. This difference in post-injury performance may be due to different physical demands required for each position.

Retrospective analysis of gun violence injuries at University of Missouri Hospital (2003-2023): Impact of relaxed gun laws

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Introduction
Gun violence, a pressing public health issue in the United States, significantly contributes to morbidity and mortality. The legislative changes in Missouri, such as the repeal of the permit-to-purchase law in 2007 and the implementation of permitless concealed carry in 2016, may have influenced the incidence of gun-related injuries. This study aims to analyze gun violence injury trends at the University of Missouri Hospital from 2003 to 2023 and assess the impact of these legislative changes.

Methods
This retrospective cohort study examined patient records at the University of Missouri Hospital involving gunshot wounds (GSWs) from January 1, 2003, to December 31, 2023. Data were extracted using ICD-10-CM codes related to accidental firearm discharge and assault by firearm. The final dataset comprised 1,140 patients, excluding those with diseases of the nervous system (G00-G99) and unspecified spinal cord diseases (G95). Descriptive statistics summarized patient demographics and time series, and regression analyses evaluated trends and correlations with legislative changes.

Results
Preliminary analysis of the 1,140 patients revealed a noticeable upward trend in gun violence injuries, particularly after the 2007 repeal of the permit-to-purchase law and the 2016 introduction of permitless concealed carry. The analysis suggests that the relaxation of gun laws may correlate with an increase in gun-related injuries. Initial findings show a rise in both accidental firearm discharges and assaults involving firearms. The results will seek to quantify the extent to which legislative changes directly contributed to the rise in gun violence injuries.

Conclusion
This study highlights the potential influence of relaxed gun laws on gun violence injuries in Missouri. The findings may help healthcare providers and policymakers design interventions, such as stricter firearm regulations and community prevention programs, to reduce gun violence. This research could shape future local and national gun policies aimed at reducing firearm-related injuries.

Role of NF-κB signaling in establishing protective immunity in the lung

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Introduction

The NF-κB pathway is crucial for forming and maintaining tissue-resident memory T cells (TRM), which are essential for long-term immunity against respiratory pathogens. We previously demonstrated that increasing NF-κB signaling in CD8+ T cells late in the immune response results in a loss of influenza-specific lung CD8+ TRM cells and impaired protective immunity against re-infection. Conversely, decreasing NF-κB signaling during the same phase of the immune response enhances the generation of influenza-specific CD8+ TRM in the lungs. In this study, we investigated whether decreasing NF-κB signaling improves protective immunity against re-infection. Understanding NF-κB's role in protective immunity is significant, as it could aid in developing new therapies to improve lung immunity against rapidly mutating viruses like influenza and SARS-CoV-2.

Methods

We generated novel T cell-restricted inducible tetON IKK2 mouse models, allowing for the controlled reduction of IKK2/NF-κB signaling in T cells during specific phases of the immune response via doxycycline exposure. Using different influenza A virus (IAV) strains, we assessed the level of heterosubtypic protective immunity conferred by inhibiting NF-κB signaling 10-30 days post-infection (dpi). Transgenic tetON mice carrying a dead IKK2 kinase inducible transgene and control littermates were infected with IAV/X31 and treated with doxycycline chow from 10-30dpi to decrease NF-κB signaling. At 30dpi, the cohorts were divided: one group was sacrificed to assess influenza-specific lung TRM levels, while the other was re-infected with a lethal dose of heterosubtypic IAV/PR8, with weight loss monitored for 15 days.

Results

Inhibition of NF-κB during memory T cell formation significantly improved TRM-mediated protection, as shown by reduced weight loss after IAV/PR8 challenge, indicating enhanced heterosubtypic immunity.

Conclusion

Inhibiting NF-κB signaling late in the response enhances TRM-mediated immunity against heterosubtypic influenza infection. These results suggest that targeting NF-κB could improve vaccine-induced immunity and reduce disease severity upon re-infection.

A case report of TNF-alpha-inhibitor induced pustular psoriasis

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Introduction

Pustular psoriasis is a rare and severe form of psoriasis, characterized by the presence of desquamative plaques with pustules on an erythematous base. Psoriasis is thought to result from plasmacytoid dendritic cell (PDC)-mediated T-cell activation, which stimulates keratinocyte proliferation via type 1 interferon signaling. Studies suggest that TNF-alpha and interferon-alpha have a complex regulatory relationship, where TNF-alpha inhibition can paradoxically enhance interferon-alpha activity, leading to the development of pustular psoriasis in some cases. We present a patient who was taking adalimumab, a TNF-alpha inhibitor, and developed a case of pustular psoriasis.

Case Report

A 50-year-old female with a history of hidradenitis suppurativa (HS) presented to our clinic for worsening symptoms. She was started on adalimumab (Humira) but experienced worsening symptoms, leading to an increased dose of 40 mg weekly. One month later, she developed a widespread pustular rash. A punch biopsy revealed subcorneal pustular dermatosis with negative direct immunofluorescence (DIF). Additionally, Periodic Acid-Schiff (PAS) stain was negative for dermatophytes. Despite treatment with topical steroids, the rash worsened. After confirming the diagnosis with a second punch biopsy, her treatment was switched to Guselkumab (Tremfya), alongside continued topical steroids. This resulted in significant improvement within a week, with continued resolution at a one-month follow-up.

Discussion

Psoriasis and HS are driven by chronic inflammation involving TNF-alpha and the IL-23/IL-17 axis. While TNF-alpha inhibitors like adalimumab reduce inflammation, paradoxical reactions like pustular psoriasis can occur due to enhanced interferon-alpha activity. In patients on this therapy who develop a new onset diffuse pustular rash, an index of suspicion for this condition should be maintained. Guselkumab targets the IL-23/IL-17 axis, reducing keratinocyte proliferation and inflammation, making it a more effective treatment for our patient. TNF-alpha inhibitors should be discontinued if pustular psoriasis develops, with IL-23 inhibitors providing a viable alternative.

Examination of factors associated with tuberculosis incidence in Missouri from 2020 until 2024

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Tuberculosis (TB) is caused by Mycobacterium tuberculosis and is a chronic, life-threatening granulomatous disease with pulmonary and extrapulmonary manifestations. TB is curable, but its treatment regimen notoriously has a high cost burden to the patient and is lengthy. Though the United States (US) has one of the lowest TB rates in the world, TB prevalence has been steadily increasing from 2020, with a reported 9,556 cases in 2023, the highest since 2013. In 1993 there was a notable decline in the rate of TB which was attributed to the re-establishment of strong control programs. From 2007 until 2012 the annual decline rate was approximately 6.5%. However, more cases started to emerge between 2012 and 2019, followed by a rapid increase in incidence from 2020 to 2023.

Classifying these cases as primary, latent, and reactivation TB and understanding their associations with patient-related factors is critical to meet the US goal of reducing the rate to one per one million by 2035. Examination of patient related factors that contribute to increased exposures and disease was done via retrospective chart review. Data on positive TB cases from the University of Missouri-Columbia from 2020 until 2024 demonstrated an average of three health visits before TB was added to each patient's differential diagnosis. Additionally, there were an average of two misdiagnoses prior to making a TB diagnosis. All but one case had Type II Diabetes, another known risk. Additionally, all but one case were patients with origins from TB endemic areas. There was an average of 13 days of inpatient time for all those who were admitted to the hospital. This increased prevalence of TB can function as a measure of the effectiveness of TB control programs, further restructuring and reimplementation of these programs is essential to appropriate management of TB in our state.

Comparison of biologic hip preservation versus total hip arthroplasty in a preclinical canine model

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Introduction
Hip joint disorders can be highly debilitating in young individuals and progress to hip osteoarthritis (OA). While total hip arthroplasty (THA) is an effective treatment option for end stage OA in older patients, young individuals are not ideal candidates. Biologic hip preservation (BHP) using osteochondral and meniscus allograft transplantation to restore femoral head and acetabular integrity has potential as an alternative to THA in younger patients. Our hypothesis was that BHP consisting of femoral head osteochondral and acetabular meniscus allograft transplantation would result in superior hip joint function when compared to THA in a preclinical canine model.

Methods
With Institutional Animal Care and Use Committee (IACUC) approval, femoral heads and menisci were recovered from hounds humanely euthanized. Femoral heads and menisci were stored using the Missouri Osteochondral Preservation System (MOPS). On the day of surgery, hounds (n = 10) were prepared for surgery of one hip. Each dog was randomly assigned to undergo either BHP or THA. Post-operatively, the dogs were monitored for pain, general health, and complications. Before surgery and at 1, 3, and 6 months post-operatively, a veterinary surgeon assessed each dog for comfortable hip range of motion (CROM), visual analog scale (VAS) function, and VAS hip pain. Dogs were humanely euthanatized 6 months after surgery for radiologic, gross, and histologic assessment.

Results
Both postoperative and endpoint radiographs showed appropriate allograft/implant size and positioning for all operated hips. By 6 months, operated hindlimb function returned to >91% of unoperated control limbs and hip pain decreased to minimal levels in both groups. CROM was significantly higher in the BHP group. Endpoint gross and histologic assessments showed consistent maintenance of allograft/implant positioning and integration with native bone in both groups.

Conclusion
These results suggest that BHP may serve as a safe and effective alternative to THA in indicated patients.

Comparison of graft types for acetabular labrum reconstruction in a preclinical canine model

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Introduction
Acetabular labrum pathology is a rapidly growing concern in young patients. Trauma, overuse injuries, and femoracetabular impingement (FAI) often result in labral deficiency, and ultimately hip osteoarthritis if left untreated. A fully functioning labrum is critical to maintaining hip joint health. Many hip labrum defects require acetabular labrum reconstruction (ALR) to restore proper function, requiring a proper graft. This study aimed to determine if meniscus or anterior tibialis tendon is a more suitable graft for ALR.

Methods
With Institutional Animal Care and Use Committee (IACUC) approval, cranial (anterior) tibialis tendons and menisci were aseptically recovered from skeletally mature purpose-bred hounds. On the day of ALR surgery, twelve hounds underwent surgery on one randomly assigned hip with the contralateral hips serving as unoperated controls. The anterosuperior 2/3 of the acetabular labrum was resected to bleeding bone and then treated using either tibialis allograft transplantation (TAT) or meniscus allograft transplantation (MAT) (n=4 each). Additionally, four hounds remained untreated. Before surgery and at 1, 3, and 6 months post-operatively, a board-certified veterinary surgeon assessed each dog for comfortable hip range of motion (CROM), visual analog scale (VAS) function, and VAS hip pain. Dogs were humanely euthanatized 6 months after surgery to allow for MRI, gross, and histologic assessment by a board-certified veterinary surgeon.

Results
At 6 months following ALR, MAT was associated with the most normal functional outcomes (CROM, pain, function, %TPI), all of which were significantly better than the Resected group and not significantly different from Native. MAT had better MRI scores than TAT but were inferior to Native. Histologic results are pending.

Conclusion
The data from this preclinical canine model study support allograft-based ALR over labral resection and indicate better restoration of hip joint architecture, function, and health after ALR using MAT when compared to ALR using TAT.

Bacterial therapeutics - Addressing the affordability gap in cancer therapy

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Introduction

As the leading cause of death globally, cancer impacts diverse populations around the world. Currently, its global economic cost is enormous, at more than US$1 trillion, and is projected to reach US$25.2 trillion by 2050. This study aims to compare the costs of various therapeutic approaches, including conventional treatments and emerging bacterial therapies, to identify potentially more affordable and efficient solutions in healthcare.

Methods

We conducted a comprehensive analysis of the costs associated with five advanced cancer treatments—radiation therapy, chemotherapy, immunotherapy, cellular therapies (CAR-T), and bacterial therapies—across the four most prevalent cancer types: breast, lung, colorectal, and pancreatic cancer. Our study involved calculating the monthly cost of each treatment for every cancer type and determining a general average cost per treatment.

Results

Cellular therapies like CAR-T (chimeric antigen receptor T-cell) therapy costs between $373,000 to $475,000 per infusion. The cost of a single treatment with radiation, chemotherapy, or checkpoint inhibitors ranges from $4,500 to $50,000, depending on the cancer type, treatment regimen, and number of sessions required. In contrast, the manufacturing cost of the BCG vaccine, which has been established as a frontline treatment for bladder cancer, is only US $1-$3 per dose.

Conclusion

Bacterial therapeutics represent a promising frontier in treating solid tumors. Innovative platforms utilizing engineered strains of Clostridium, Escherichia coli, and Salmonella have shown encouraging results in preclinical studies. However, significant research and development challenges persist, including optimizing safety profiles, enhancing tumor targeting, and improving therapeutic efficacy. As a novel approach, bacterial therapies may face difficulties in patient acceptance therefore, appropriate patient outreach and education may be required for the successful deployment of this intervention. Despite these challenges, developing safe and effective bacterial therapies will provide a cost-effective alternative that could potentially revolutionize cancer care and improve outcomes worldwide.

Violence against healthcare workers: State legislative trends

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Introduction

Violence against healthcare workers has been an increasing trend for many years. In the past decade, there has been a notable increase in violent incidents in healthcare settings. This study compiles submitted state legislation on violence against healthcare workers, develops categorization of types of proposed legislation, and explores trends in proposed legislation. The data will inform efforts in the prevention of workplace violence across states.

Methods

Data was compiled via two resources—a database from the American College of Surgeons and a manual online search of state legislation via keywords and subject indexes. Data included state bills introduced between 2019-2024 regarding workplace violence and assault against healthcare workers. Each bill was reviewed for content and corresponded to four defined categories: penalties, coverage, prevention, and reaction.

Results

Proposed legislation addressing violence against healthcare workers was identified in 46 states (92%) from 2019 to 2024, a total of 282 bills. These were classified into three categories: Category 1: enhancing criminal penalties, Category 2 expanding protections for more demographics of healthcare workers, and Category 3: increasing requirements for healthcare systems on workplace violence. Category 1 consisted of 128 bills (45% of all WPV legislation), Category 2 contained 133 bills (47%), and Category 3 included 136 bills (48%). 45 of the total 282 (15.9%) have been signed into laws. Notably no bills were passed in 2020. However, numbers increased afterwards, peaking at 16 in 2023.

Conclusion

The vast majority of state legislatures have recognized the enormity of Healthcare Workplace Violence and have introduced legislation in three categories we defined. Thus far, 16% of all proposed legislation have been enacted in 30 states (60%), informing the ongoing need for healthcare advocacy. Further research is necessary to evaluate the effectiveness of these bills.

Identification of potential inhibitors targeting DNA replication of *Mycobacterium tuberculosis*

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Bacterial antimicrobial resistance (AMR) represents a major public health threat, with projections estimating ten million deaths by 2050 due to AMR. Contributing factors to AMR include the misuse and overuse of antimicrobials in humans, animals, and the environment, along with the global spread of multidrug-resistant (MDR) bacteria and resistance genes across these areas. This crisis has driven research into alternative treatments and better antimicrobial stewardship to combat MDR pathogens. Among the challenges is the rise of drug-resistant Mycobacterium tuberculosis (Mtb), which necessitates the continuous development of new drugs effective against both multi-drug-resistant (MDR) and extensively drug-resistant (XDR) Mtb strains. Recent research has highlighted nargenicin, a natural product, for its ability to inhibit Mtb growth by targeting the bacterial DNA replication polymerase DnaE1. Nargenicin binds to the active site of DnaE1 in the presence of a DNA substrate. This discovery has paved the way for drug discovery efforts focused on Mtb DnaE1. Using an in-house developed platform, we have identified ten compounds that interact with the nargenicin binding pocket. These 'hit' compounds are currently undergoing structure-activity relationship (SAR) studies and medicinal chemistry modifications to develop lead compounds targeting DnaE1.

miR-146a deficiency ablates thoracic aortic aneurysmal rupture in mice

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Introduction

Thoracic aortic aneurysm (TAA) is an asymptomatic, life-threatening disease with mortality greater than 80% after rupture. The assembly of cytoskeletal structural proteins,e.g. Filamin A (FLNA) with extracellular matrix(ECM), which helps in maintaining aortic structural integrity and function, is highly disrupted in TAA. Besides surgical interventions, no effective medical therapies are available to blunt TAA progression and rupture. miR-146a, a short non-coding microRNA, is well known to regulate inflammatory and auto-immune processes under cardiovascular diseases. Increased miR-146a has been observed in plasma and dissected aortic tissue of TAA patients. Our preliminary studies, by in-situ hybridization and qPCR analyses showed that miR-146a is highly upregulated in the aortic media of mouse TAAs.To examine the effect of miR-146a deficiency on TAA rupture in mice induced by Lysyl oxidase inhibitor,β-aminopropionitrile(BAPN).

Methods

Three-week-old male and female C57BL/6J miR146a wild type (WT) or deficient (KO) [n=12-18/group] mice were administered with either vehicle or BAPN (0.5% wt/vol) in drinking water for 28 days. TAA was examined by in vivo ultrasound aortic lumen measurements and ex vivo aortic external width measurements.

Results

BAPN administration promoted TAA development equivalently in both WT and KO male(WT=67%,12/18;KO=62%,8/13) and female(WT=75%,9/12;KO=50%,8/16) mice compared to vehicle control. miR-146a deficiency significantly protected mice from TAA rupture(Male WT=33%, 6/18; KO=0%, 0/13; FemaleWT=33%, 4/12; KO=0%, 0/16; $P<0.05$) and improved survival rate($P<0.05$). Histological and immunofluorescent analyses showed that BAPN-induced TAA is associated with increased elastin breaks, less ECM-collagen, and cytoskeletal disassembly as evidenced by decreased filamentous F-actin in the aortic media only in WT mice.In silico target prediction identified miR-146a binding sites in the cytoskeletal structural protein FLNA 3'UTR.Western blot and immunohistochemical analyses revealed a strong reduction of aortic FLNA in the SMC-rich aortic medial layer, whereas miR-146a deficiency prevented BAPN-induced loss of aortic FLNA protein.

Conclusion

These findings suggest that miR-146a plays a critical role in mediating TAA rupture by influencing aortic cytoskeletal-ECM structural assembly and integrity.

Establishment of translational luciferase-based cancer models to evaluate antitumoral therapies

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Introduction

Luciferase (Luc) bioluminescence (BL) is the most used light emitting protein that has been engineered to be expressed in multiple cancer cell lines, allowing the detection of tumor nodules in vivo as it can penetrate most tissues. The goal of this study was to develop an oncolytic adenovirus (OAd) resistant human triple-negative breast cancer (TNBC) expressing luciferase. Thus, when combined an OAd with chemotherapies or targeted therapies we will be able to monitor in a real-time the ability of these compounds to enhance OAd antitumor efficacy using BL.

Methods

The TNBC cell line HCC1937 was stable transfected with the plasmid pGL4.50[luc2/CMV/Hygro] (HCC1937/Luc2). Once established, we tested if the incorporation of the luc2 plasmid modified the cells' response to OAd infection in vitro. Later we implanted the HCC1937/Luc2 cell line orthotopically in the 4th mammary gland fat pad of NSG (NOD scid gamma) female mice to produce TNBC tumors that could be evaluated by bioluminescence imaging (BLI). Additionally, we tested other luc expressing cell lines for TNBC and lung cancer to explore the use of BLI as a tool to monitor growth and treatment response of these orthotopic tumoral models.

Results

BLI revealed that HCC1937/Luc2 cell line developed orthotopic breast tumor and lung metastasis overtime. However, integration of Luc plasmid modified the HCC1937 phenotype, making HCC1937/Luc2 more sensitive to OAdmCherry and blunting the interferon (IFN) antiviral response compared to the parental cell line. Testing two additional Luc cell lines revealed that this was not a universal response; however, proper controls need to be evaluated as the integration of luciferase can affect the cells' response to different treatments.

Conclusion

We successfully established BL reporting orthotopic cancer models from TNBC of human origin, HCC1937/luc2, and a mouse syngeneic TNBC model, 4T1/luc. For lung cancer model, we evaluated the cell line TC-1/luc. We could detect the development of tumors in the primary site of inoculation, and/or metastatic nodules at the lungs that were easily identified by the use of BLI and confirmed the presence of tumors by histological analysis of the tissue structure and proliferation marker Ki-67.

Outcomes of patients admitted with COVID undergoing carotid interventions

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Introduction
The incidence and outcomes of stroke associated carotid interventions in hospitalized patients with coronavirus disease (COVID) is not clearly defined. Patients admitted with COVID undergoing carotid interventions (carotid endarterectomy [CEA] and carotid stenting [CAS]) were evaluated.

Methods
A retrospective study of a COVID cohort in Cerner Real-World Data from December 2019-2023. CEA and CAS procedures during an inpatient COVID admission were evaluated. Disease severity was stratified using ICD-10 disease codes (admitted with COVID, COVID pneumonia [COVID-PNA], and severe COVID requiring mechanical ventilation [COVID-SD]). Post-procedural stroke and mortality rates were evaluated. Patients with an admission diagnosis of stroke were excluded.

Results
2,200,001 patients admitted with COVID were evaluated. 7,520 patients underwent carotid intervention (CEA: 4,631 and CAS: 2,889). Mean age was 71.0 years, men (60.9%), Whites (87.6%), and Blacks (4.7%). Stratified by severity, 92.2% with COVID, 0.3% with COVID-PNA, and 7.5% COVID-SD underwent intervention ($p<0.0001$). Patients with severe COVID were more likely to receive a stent. Whites were more likely to undergo CEA (62.7%) and Blacks (48.6%) more often received CAS ($p<0.05$). The highest mortality was found in patients undergoing a carotid intervention with COVID-SD (39.9%, $p<0.0001$). Overall mortality was 8.6% CAS vs. 7.2% CEA, $p=0.03$. COVID-SD patients were more likely to develop a stroke (1.77% vs. 0.62%, $p=0.0068$). Following carotid interventions stroke rates were similar (CAS=0.62% vs. CEA=0.76%, $p=0.5$).

Conclusion
92% of patients undergoing carotid intervention had uncomplicated COVID. Overall mortality after carotid intervention was 7.7%. No differences were found in postoperative stroke rates by procedure type, and stroke rates increased with COVID severity. CAS had a higher mortality rate but was more often utilized in patients with severe COVID. Performing carotid procedures in the COVID population may not have increase postoperative stroke rates, but increased mortality warrants delaying carotid procedures in patients with COVID, regardless of severity.

Rare presentation of *Mycobacterium fortuitum* pulmonary infection: A case report

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Case Report

Mycobacterium fortuitum is a rare cause of pulmonary infection, with a prevalence of 8.3% among nontuberculosis mycobacteria species in Missouri. We report a case of a rare M. fortuitum pulmonary infection in an 84-year-old male with a history of pulmonary fibrosis secondary to chronic infection, esophageal dysphagia, gastroesophageal reflux disease, and malnutrition. The patient, who was afebrile, presented two years after the initial M. fortuitum diagnosis with worsening dyspnea and cough productive of sputum. Due to intolerance to antibiotic treatment, the patient's chronic infection resulted in findings of pulmonary fibrosis. Computed tomography (CT) of the chest demonstrated progression of honeycombing and traction bronchiectasis compared to imaging from two years prior. Pulmonary function tests revealed a restrictive pattern with reduced diffusion capacity of carbon monoxide, and lung auscultation revealed diminished breath sounds.

The patient's clinical course was complicated by longstanding esophageal dysphagia, which resulted in difficulty swallowing both solid and liquid substances, leading to malnutrition and contributing to antibiotic intolerance with symptoms of nausea and emesis. A barium esophagram revealed an esophageal stricture requiring further evaluation. The patient gained seven pounds during his inpatient stay, and repeat cultures are pending with referral to gastroenterology for esophagogastroduodenoscopy (EGD). Social work communicated skilled nursing options to the patient to assist in follow-up treatment, and the patient was discharged to a skilled nursing facility following initial antibiotic treatment with Sulfamethoxazole/Trimethoprim, which he tolerated well during a ten-day inpatient stay.

This case highlights the importance of early treatment of M. fortuitum pulmonary infection and presents long-term complications when treatment is delayed. We anticipate esophageal dilation provided by outpatient gastroenterology referral, with the aim of improving the patient's nutritional status and enhancing tolerance of future antibiotic therapy.

Blockade of A2a receptor in the accumbal core region attenuated alcohol-induced sleep in C57BL/6J mice

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Introduction

Alcohol use disorder (AUD) is characterized by persistent alcohol consumption despite adverse consequences. Initial alcohol use is driven by its pleasurable effects, regulated by the brain's reward circuitry, including the nucleus accumbens core (NAcC) and dopamine. While alcohol can promote sleep, this "aversive effect" may limit alcohol use, explaining why caffeine, which promotes wakefulness by inhibiting A2a receptors (A2aR), is often consumed with alcohol. However, the role of A2aR in alcohol-induced sleep is unclear. The reward circuitry has two pathways from the NAc: the direct striatonigral pathway with D1R and A1R receptors and the indirect striatopallidal (SP) pathway with D2R and A2aR receptors. Recent research suggests that the A2aR-expressing SP pathway acts as the brain's antireward system and promotes sleep when activated. This leads to the hypothesis that alcohol induces sleep through A2aR activation in the NAcC.

Methods

To test this hypothesis, C57BL/6J mice were implanted with sleep-recording electrodes and cannulas above the NAcC. After recovery, mice received bilateral NAcC infusions of either ZM241385 (an A2aR antagonist) or saline, followed by 12 hours of access to 20% ethanol. Blood alcohol concentration (BAC) was measured, and brain tissue was processed for histology.

Results

All animals consumed similar amounts of alcohol and showed similar BAC. Intra-NAcC administration of ZM241385 prior to alcohol self-administration caused a significant ($p < 0.01$) reduction in the amount of time spent in NREM sleep as compared to saline treatment.

Conclusion

Our results suggest that A2aR in the NacC mediates alcohol-induced sleep. This is the first step towards understanding mechanistic insights into the interactions between the reward circuitry and sleep-wakefulness and provides an impetus for the development of novel sleep-focused therapeutics to treat AUD.

Effect of patient smoking status on the secretome of intervertebral disc tissues

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Introduction
Symptomatic intervertebral disc (IVD) degeneration (IVDD) is a significant cause of pain and disability in patients. While numerous modifiable patient factors have been associated with an increased risk for progression of symptomatic IVDD, the effect of these factors in IVD tissue pathophysiology are poorly understood. Therefore, this study was designed to determine the effect of smoking status on vivo secretome of IVD tissues. It was hypothesized that IVD tissues recovered from smokers will release significantly higher levels of pro-inflammatory and pro-degradative proteins during culture compared tissues recovered from non-smokers. Further, that the effect of smoking on the IVD secretome be significantly different for cervical and lumbar IVDs, and as grade of IVDD increases.

Methods
With IRB approval and informed patient consent, IVD tissues were recovered from patients undergoing surgery for IVDD. Tissue explants were created, cultured for 3 days and media was tested for protein biomarker concentration. Samples were grouped based on pre-surgical Pfirrmann grade of IVDD degradation, region of the spine, and/or patient smoking status. Significant ($p<0.05$) differences in the concentration of protein biomarkers in the ex vivo secretome of the IVD were determined using a Mann-Whitney Rank Sum or Kruskal-Wallis test.

Results
Smoking status alone was not associated with significant differences in the secretome of IVD tissues. However, significant differences in the secretome of the IVD based on smoking status were observed when samples were grouped based on Pfirrmann grade of IVDD and anatomic location.

Conclusion
The data from this study indicates that radiographic grade of IVDD and anatomic region of IVDD development are significant factors that contribute to the effect of patient smoking status on pathophysiology IVDD. Understanding how modifiable patient factors contribute to the development and progression of IVDD could lead to the development of novel patient specific treatment protocols to address symptomatic IVDD.

Demographic and injury patterns of craniofacial fractures in the state of Missouri

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Introduction

Craniofacial fractures are complex injuries that can result in long-term consequences for all patients, particularly those living in rural populations with limited healthcare access. Understanding the demographics and injury patterns of the population of Missouri may allow the discovery of preventative measures and interventions for the surrounding communities. This study aimed to identify the demographic and injury patterns from the population of Missouri sustaining craniofacial fractures.

Methods

We conducted an IRB-approved retrospective review of 330 patients from the state of Missouri who sustained craniofacial fractures at MU Health Care. Demographic and injury pattern variables were collected. Descriptive statistics were performed to determine the most prevalent variables associated with craniofacial fractures.

Results

Of the 330 included patients, 194 (58.8%) lived in a rural community, while 136 (41.2%) lived in the urban community. The average patient age at presentation was 44 years (SD = 24). There were 211 males (63.9%) and 117 females (35.5%). The average time between injury and clinical presentation for all patients was 47 hours (SD = 7). The most common causes of injuries were falls (114, 34.5%), assaults (75, 22.7%), and automobile accidents (43, 13.0%).

Conclusion

The most common causes of craniofacial fractures may be preventable through patient education and safety measures. These findings demonstrate an opportunity for both primary care and specialized physicians to focus on community-based preventative interventions within the state of Missouri.

Corneal fibrosis reversal via myofibroblast de-differentiation by sodium butyrate *in vitro*

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Introduction

Corneal fibrosis is a concerning complication leading to vision loss due to trauma, injury, or infection, characterized by excessive myofibroblast formation and extracellular matrix deposition. We hypothesized that myofibroblasts can be modulated by Sodium butyrate (NaBu), a histone deacetylase inhibitor (HDACi) to reverse corneal fibrosis via epigenetic reprogramming.

Methods

Healthy human donor corneas (n = 30) purchased from the Eye Banks were used in the study to generate primary human corneal stromal fibroblasts (hCSFs) in a humidified CO2 incubator at 37°C. The hCSFs were stimulated to generate human corneal myofibroblasts(hCMFs) using +TGFβ1 (5 ng/ml) treatment for 72h in serum-free condition. The hCMFs were treated with NaBu in a time (24h to 72h) and dose-dependent (1mM to 10mM) manner. Cell viability was assessed by MTT assay and a dose of 5mM NaBu was chosen for the treatment and to evaluate cell and molecular modulations in hCMFs. Phase-contrast microscopy, qRT-PCR, and immunofluorescence were used to study changes in cellular, and molecular parameters.

Results

We found that imaging live mice using the green channel to detect L. lactis-GFP results in a strong tissue autofluorescence. The signal from L. lactis-mCherry could not be detected in mice because the red wavelength lacks enough deep tissue penetrance to pass through the intestines and abdominal wall. Interestingly, L. lactis-iRFP can produce a strong well-localized signal, that can be detected in real-time in live animals for up to 48 h after oral gavage administration.

Conclusion

The current study suggests that corneal myofibroblasts can be de-differentiated to precursor fibroblasts via epigenetic reprogramming. More studies are warranted.

Advanced molecular imaging *in vivo* of the probiotic *L. lactis* expressing fluorescent proteins to monitor transit through the gastrointestinal tract

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Introduction
The ability to image in real-time the biodistribution of probiotic bacteria expressing a reporter protein represents an important area of investigation for gastrointestinal (GI) pathologies. Fluorescent probiotic bacteria could be useful to evaluate the interaction of probiotics with the gut microbiome, either under normal conditions or dysbiosis. Also, they could be employed to determine whether probiotic bacteria preferentially target the harsh hypoxic, and/or acidic microenvironment of digestive diseases such as inflammatory bowel diseases (IBD) or adenomatous polyps of the colon.

Methods
In this study, we evaluated the ability of Lactococcus lactis expressing different fluorescent reporter proteins to track their transit through the GI tract after oral gavage inoculation using the in vivo fluorescent imaging system Ami HTX.

Results
We found that imaging live mice using the green channel to detect L. lactis-GFP results in a strong tissue autofluorescence. The signal from L. lactis-mCherry could not be detected in mice because the red wavelength lacks enough deep tissue penetrance to pass through the intestines and abdominal wall. Interestingly, L. lactis-iRFP can produce a strong well-localized signal, that can be detected in real-time in live animals for up to 48 h after oral gavage administration.

Conclusion
These results suggest that L. lactis-iRFP has the desired features to serve as a fluorescent protein reporter for in vivo imaging that can be used to monitoring the bacterial presence, permanence and interactions with the anatomical structures while transiting through the GI tract.

Racial disparities in bystander CPR during public cardiac arrests in Missouri: Insights from the cardiac arrest registry to enhance survival (CARES)

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Introduction
Cardiac arrests occurring in public areas require immediate intervention to enhance chances of survival, with bystander cardiopulmonary resuscitation (CPR) being of critical use. Others have shown significant disparities in the delivery of bystander CPR, particularly among different racial groups. This study uses data from the Cardiac Arrest Registry to Enhance Survival (CARES) to highlight racial disparities in receiving bystander CPR during public cardiac arrest events in Missouri.

Methods
An analysis of data from the CARES registry as used to observe demographic trends in the receival of bystander CPR. Our study sample consisted of 1631 cases of public cardiac arrests from the years 2020 to 2023. Frequency analyses were conducted to compare the rates of bystander CPR received by different racial groups.

Results
Our findings reveal a significant disparity in receiving bystander CPR in public, however these differences fluctuated by year. White individuals were twice as likely to receive bystander CPR after a public arrest than Black/African American overall (OR 2.043, CI 1.6 – 2.7; $p<0.0001$). Other racial groups were excluded from the analysis due to small sample sizes ($n < 8$).

Conclusion
The significant underrepresentation of Black/African American individuals in the receipt of bystander CPR during public arrests underscores a critical area for intervention. These findings suggest the need for targeted public education campaigns, improved training for bystanders, and community-focused strategies to address and mitigate racial disparities in emergency responses. Addressing these gaps is crucial to enhancing survival rates and achieving equitable healthcare outcomes for all individuals experiencing cardiac arrest.

Infantile digital fibroma in independently walking toddler warranting surgical excision: Case study

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Introduction
Infantile Digital Fibroma (IDF) is a benign fibrotic tumor of infancy and early childhood. IDF occurs almost exclusively on the digits and presents as a firm, red or flesh-colored nodule. Typically, it is asymptomatic but may present with joint deformities depending on size and location. IDF often spontaneously regresses, thus surgical excision is only warranted in areas that may cause functional impairment.

Case Description
We describe a rare case of IDF presenting on the lateral heel. A 3-year-old male was referred to dermatology by his pediatrician concerning a soft tissue cyst on the lateral left heel. At time of presentation, the lesion had been present for about seven months and was enlarging. It measured 1.5 cm across and was a smooth flesh-colored nodule with a sharply defined collarette. It was not associated with pain, pruritus or bleeding. Based on clinical appearance a benign adnexal or histiocytic neoplasm was suspected. Due to a moderate risk of morbidity from possible obstruction of gait and normal bony development, the decision was made to excise the lesion. Dermatopathology revealed the lesion to be composed of fascicles of spindle cells with fusiform nuclei and perinuclear eosinophilic inclusion bodies highlighted by Masson's trichrome stain, consistent with IDF. At 2-week follow-up with pediatrics, the patient was doing well, and the wound was healing properly.

Conclusion
We presented a unique case of IDF on the lateral heel warranting surgical excision. While conservative treatment of watching and waiting is usually recommended, due to the location of the lesion and possible risk of gait obstruction, the decision was made to excise the lesion. This case highlights the importance of taking into consideration the location of the lesion and its possible effects on normal gait and bony development in young children.

Characteristics of spitz nevi

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Introduction

A spitz nevus is a rare melanocytic neoplasm that usually appears in childhood and is benign in nature. Clinical features of spitz nevi make them difficult to differentiate from melanomas, and the clinical relevance lies in its close histologic resemblance to melanoma. Congenital spitz nevi appear as symmetric, dome shaped papules or nodules in childhood that tend to rapidly grow within 6 months before remaining static. There is limited information describing patient characteristics as well as clinical characteristics specific to spitz tumors and there is no set of criteria predictive of biological behavior of atypical spitz nevi. Malignant transformation is rare, though atypical variants exist, so excision is recommended for histologically identified spitz nevus. We present 3 cases of children with spitz nevi diagnosed via histopathology with clinical characteristics concerning for malignant melanoma; this includes increase in size, variegation, and change in pigmentation. Histologic examination of the lesions revealed benign congenital spitz nevi.

Methods

Retrospective chart review of patients was performed using ICD codes for that of "melanocytic nevi" and "malignant neoplasms of the skin" at University of Missouri between 9/1/2022 – 5/1/2024. This yielded 5 cases of spitz nevus identified by histopathology report.

Results

Will be posted on poster in a table with demographic, clinical, and histopathologic characteristics of each patient and corresponding lesion.

Conclusion

Spitz nevi are rare, and there is little published about the epidemiology and distinguishing clinical characteristics. These cases emphasize the need for clinical and histologic correlation between benign or malignant nature of atypical, pigmented lesions in children.

Impact of hospital closures on sepsis outcomes in Missouri EMS transports

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Introduction

Hospital closures, particularly in rural areas, may affect patient outcomes for those arriving by EMS. Missouri, ranking among the top five states for hospital closures, faces potential impacts on sepsis outcomes due to increased transport times. Timely interventions for suspected sepsis are crucial.

Methods

A retrospective chart review of 2023 data was conducted, using descriptive statistics and frequency analyses. Data from ImageTrend, Missouri's state EMS bridge, was linked to Cerner Millennium for hospital outcomes.

Results

Among 16,740 transported patients, 1,145 incidents had "sepsis" as a primary or secondary impression. Additionally, 492 patients were diagnosed with sepsis in the hospital, with only 62 identified as such by EMS. Over 50% of patients showed improved acuity after EMS interventions before hospital arrival. Robson criteria were the most common sepsis predictor (60.8%). Transport time alone was not linked to negative hospital outcomes ($p>0.05$). Effective field recognition of hemodynamic instability resulted in improvements during transport. The sepsis impression in the field was lower than national rates.

Conclusion

Transport time alone does not adversely impact hospital outcomes for sepsis patients when field recognition and intervention are effective. The low sepsis impression rate in the field highlights the need for better identification protocols. EMS interventions enhance patient acuity, suggesting a need for protocols to alert hospitals about potential sepsis impressions.

Outcomes and risk factors for complications, readmissions, and reoperations following below-knee amputation: A comprehensive analysis beyond the 30-day window

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Introduction

Below-knee amputation (BKA) is commonly performed to treat complications from diabetes, peripheral artery disease, trauma, and infections. Identifying risk factors for post-BKA complications is essential for improving patient outcomes. While most studies focus on short-term outcomes, this study aims to analyze both short-term and long-term complications to provide a comprehensive understanding of BKA risks.

Methods

This retrospective study analyzed data from adult patients who underwent BKA at a Level 1 trauma center between 2005 and 2022. Patients under 18 or with prior lower extremity amputations were excluded. Outcomes measured included unplanned reoperations, readmissions, mortality, and complications at 30 days, 180 days, and one year. Chi-square and logistic regression analyses were used to assess risk factors, including demographic, procedural, and preoperative medical data.

Results

A total of 376 BKAs were performed on 367 patients, with an average age of 51.43 years and BMI of 32.67. Complications occurred in 28.19% of cases, with infections being the primary cause of unplanned reoperations (56.70%). Mortality rates increased from 2.65% at 30 days to 17.02% at one year. Key risk factors for increased mortality included ASA 4+, diabetes, cancer, and vascular diseases. Readmission rates were 10.11% at 30 days and 32.98% at one year, with heart failure and substance abuse significantly raising readmission risk. Gram-negative infections were linked to a higher likelihood of reoperation.

Conclusion

The study underscores the importance of extended follow-up beyond the standard 30 days, as many complications, including readmissions and mortality, occur later. Longer-term monitoring is critical for identifying late-emerging issues, improving patient outcomes, and reducing healthcare burdens. Comprehensive postoperative care can significantly improve the quality of life for BKA patients.

Risk of Anterior Cruciate Ligament Tears in National Football League Players By Short, Normal, or Long Rest Weeks

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Introduction

Anterior cruciate ligament (ACL) tears in National Football League (NFL) players are devastating injuries that take nearly a year to recover. Players that return to sport have worse overall performance compared to pre-ACL tear. NFL players typically play games once a week on Sunday allowing for 6 days between games. Deviation from the usual 6-day rest week has been proposed as a potential risk for injuries. The main objective of this study is to evaluate the risk of decreased or increased rest on ACL tear rates in NFL players.

Methods

ACL injury data of NFL players from the 2012-2013 to 2022-2023 seasons were gathered from publicly available sources. Player demographic data, position, age at time of injury, seasons played, injury mechanism, and playing surface type were recorded. Injuries were characterized as short, normal, or long week injuries. ACL tears that occurred during the preseason, postseason, or during week 1 were excluded. Descriptive statistics were calculated to report means, ranges, and percentages. Data was analyzed to determine statistically significant differences using Fisher's exact, chi-square, or one-way ANOVA tests.

Results

A total of 524 ACL tears were recorded during the study window. 304 ACL tears were excluded and 220 fit inclusion criteria. 24 ACL tears occurred during short weeks, 68 during long weeks, and 128 during normal weeks. Players were 1.8 times more likely to tear their ACL during a long week compared to a normal week($p<.001$), and 1.5 times more likely to tear their ACL during a short week compared to a normal week($p=.02$).

Conclusion

The findings from this study suggest that deviation from the normal 7-day NFL week increases the risk of an ACL tear in NFL players when increasing or decreasing rest time. Further research exploring the impact short and long rest times on player injury risk should be conducted to prevent injuries.

From limited use to standard practice: Droperidol administration by EMS (2018-2023)

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Introduction
This retrospective observational study investigates the usage trends of droperidol by Emergency Medical Services (EMS) from 2018 to 2023, focusing on its evolving role in prehospital care and patient outcomes.

Methods
Using the ESO dataset, we analyzed 56,232,761 EMS cases over six years, examining the incidence and percentage of droperidol administration. We also assessed the impact on systolic blood pressure (SBP) and heart rate abnormalities, and usage across primary impressions, procedures, and airway interventions. The total database cases grew from 5,536,297 in 2018 to 13,957,073 in 2023, with participating agencies increasing from 1,234 to 3,068.

Results
Our findings show a notable increase in droperidol administration, with doses rising from one in 2018 to 42,915 by 2023. The fraction of doses per million cases increased from 0.18 in 2018 to 1,603 in 2023. Droperidol usage grew from 0.000018% of cases in 2018 to 0.1603% in 2023. The primary impressions most associated with droperidol use were Behavioral/Psychiatric (23.36%), Pain (16.12%), and Neurological (13.83%). Among procedures, 12-lead ECG (21.69%) and patient restraint (21.12%) were most frequent. For ECGs, the top impressions were Gastrointestinal (34.01%) and Neurological (26.01%), with common age ranges being 60-69 (16.68%) and 50-59 (16.55%). Within airway management, oxygen administration was used in 69.40% of cases, followed by ETCO2 capnography (16.11%). Post-administration, 77.37% of patients maintained normal SBP, while 10.21% experienced hypotension and 12.42% hypertension. Regarding heart rate, 69.67% exhibited normal rates, with bradycardia in 13.36% and tachycardia in 16.97%.

Conclusion
The increasing droperidol utilization by EMS reflects growing acceptance in clinical practice. This research highlights the need for ongoing emphasis on evidence-based practices in prehospital care, advocating for enhanced training, protocol development, and policy formulation within the EMS community. Limitations include potential underreporting and variability in protocol adherence, suggesting the need for further investigation into usage barriers and facilitators.

Patient reported outcomes following arthroscopic hip labral reconstruction via fresh meniscal allograft versus tibialis anterior allograft: A pilot study

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Introduction

The acetabular labrum is a dynamic ring of cartilage essential to hip joint stability. This fibrous cartilage creates a seal allowing for equal distribution of applied force, plus a means of nutrition delivery to the joint. Thus, labral tears have detrimental effects on overall function, stability, and joint health. While surgical repair is the treatment of choice, some patients require reconstruction, either due to failed 1° repair, or labral insufficiency with failure to improve by non-operative methods. There are many approaches to reconstruction with regards to graft selection. The purpose of this study was to compare using fresh meniscus allografts(FMA) versus tibialis anterior(TA) allograft.

Methods

Institutional IRB was obtained to prospectively enroll patients for retrospective review. Patients were indicated for labral reconstruction by 2 fellowship trained hip preservation surgeons. Graft selection was at surgeon discretion and graft availability. Standard hip arthroscopy was performed and the labrum was reconstructed utilizing "other allograft" (TA allograft n=6, capsular autograft n=1), or FMA via previously described techniques. Patient-reported outcomes were collected pre/post-operatively.

Results

The groups, meniscus(n=6) and other(n=7) were controlled for confounding variables. The groups didn't differ significantly in preoperative PROMS (VAS (p=.67), HOOSJr (p=.31), PROMIS-Physcial Health(p=.29), PROMIS-Mental Health(p=.94), PROMIS-Physical Function(p=.47) PROMIS-Pain Interference(p=.75)). The groups also didn't differ in postoperative PROMS (VAS and HOOS Jr) at 6-week, 6-month follow-ups. Comparing pre and 6-month postoperative PROMS, the meniscus group had significantly decreased VAS score(p=.006) while the "other" group didn't(p=.18). Neither group showed significant change in the same time period for HOOS Jr score; meniscus(p=.94) and other(p=.4).

Conclusion

The study shows meniscus allografts are non-inferior to other allografts for labral reconstruction. The meniscus group demonstrated statistically significant change in the VAS score from pre-op to 6-month post-op. Due to limited sample size and follow-up, further study will determine long term outcomes of this graft type.

Paving the way for oncology clinical trials navigation

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Introduction
Latino Americans and African Americans, who each constitute approximately 18% of the U.S. population, are significantly underrepresented in oncology clinical trials, with participation rates of only 4.4% and 4.2%, respectively. This underrepresentation poses a critical challenge to the generalizability of cancer research outcomes. This paper examines the efforts of the University of Arizona Cancer Center (UACC) to address these disparities, particularly through the development and implementation of a clinical trials navigator program aimed at increasing Latino participation in oncology trials.

Methods
Drawing on data from the ROSA (Research Outreach for Southern Arizona) and CASA (Community Assessment of Southern Arizona) surveys, the paper highlights the existing gaps in awareness and participation among Latino communities. The ROSA survey revealed that while 67% of Latino respondents were aware of clinical trials, there remains a significant need for targeted educational and support initiatives. In response, UACC has introduced a clinical trials navigator position designed to work in collaboration with nurse oncology navigators and the clinical trials research coordinator team. This role aims to bridge the gap between clinical research and the Latino community, ensuring that patients are well-informed and supported throughout the trial process.

Results
The poster discusses the outcomes of these initiatives, including the development of culturally appropriate educational materials and the integration of new patient intake forms to assess clinical trial awareness. It also provides recommendations for further improving Latino participation in clinical trials, emphasizing the importance of continued community engagement, program expansion, and impact measurement.

Conclusion
The findings suggest that the implementation of a clinical trials navigator, alongside other targeted interventions, holds significant promise for increasing Latino participation in oncology clinical trials. These efforts are crucial for enhancing the diversity and applicability of clinical research outcomes, ultimately contributing to more equitable healthcare solutions.

Comparative visual outcomes of intraocular lens models for distance, intermediate, and near acuity post-cataract surgery

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Introduction

This study compares visual acuity (LogMAR) at distance, intermediate, and near levels in post-cataract surgery patients with four intraocular lens models: Clareon, Tecnis, Envista, and Acrysof. The goal is to determine which lens offers superior visual outcomes across different distances.

Methods

A prospective study was conducted with 129 patients who underwent cataract surgery. Patients were selected based on a plano refractive target and uncorrected distance acuity of 20/25 or better. Post-operative uncorrected intermediate (24") and near vision (16") were assessed at least one month after surgery. LogMAR values for distance, intermediate, and near vision were analyzed using ANOVA for statistical comparison.

Results

The study found no significant differences in distance visual acuity among the four lens models ($p = 0.127$). The average LogMAR scores were 0.054 for Clareon, 0.072 for Tecnis, 0.038 for Envista, and 0.075 for Acrysof. However, for intermediate visual acuity, significant differences were observed between lens models ($p = 0.038$). Envista had the best performance with an average LogMAR of 0.222, followed by Tecnis at 0.277, Clareon at 0.321, and Acrysof at 0.353. Near visual acuity did not show significant variation between lenses ($p = 0.405$), with Clareon averaging 0.488, Tecnis 0.494, Envista 0.420, and Acrysof 0.461.

Conclusion

Intermediate visual acuity varied significantly among the lens models, with Envista showing the best outcomes. In contrast, distance and near visual acuity did not differ significantly. These findings suggest that lens selection should focus on optimizing intermediate vision for improved patient functionality.

Perioperative bleeding risk after blepharoplasty in patients on antithrombotic medications

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Introduction

Prevention of surgical bleeding complications is a primary healthcare goal; however, efforts are hindered by conflicting research studies and guidelines in respect to antithrombotic use. This study aims to define the risk of peri-operative hemorrhagic complications in patients undergoing elective eyelid surgery whose antithrombotic medications were not discontinued for surgery.

Methods

A retrospective investigation was conducted with patients who underwent elective functional and cosmetic blepharoplasties, entropion and ectropion repair, and ptosis repair within Mercy Health Care System from 2014 to 2019. Patient charts were reviewed for antithrombotic medications and bleeding/coagulation comorbid conditions.

Results

702 eyelid procedures were performed during 2014-2019. Antithrombotic medication was continued perioperatively in 55.7% of procedures. The overall prevalence of bleeding or coagulation disorders was low, 1.2%. Only one patient had a major or minor bleeding complication, representing an incidence of 0.14%. Overall, there was no significant association between bleeding complications and patients' antithrombotic medication status ($p=.372$). There was no incidence of post operative bleeding in patients who had bleeding or clotting disorders. While male gender is associated with an increased bleeding risk in other cosmetic face procedures such as facelift, there was no significant association between gender and bleeding complication in our population ($p=.380$).

Conclusion

This study demonstrates that antithrombic therapy in patients undergoing cosmetic and functional eyelid surgery may be continued with minimal adverse bleeding complications.

Facial feminization surgery: A Google analytics study

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Introduction

The prevalence and demand for gender-affirming surgeries (GAS) in the US have seen a dramatic rise in recent years. Between 2016 and 2019, the number of GAS procedures nearly tripled, growing from approximately 4,552 to 13,011 with facial surgery accounting for 13.9% of total procedures. However, there remains a gap in the literature on the information-seeking behaviors of individuals considering facial-feminization surgery (FFS). This study aims to identify the most frequently asked online questions and the online sources of information for FFS to better address patient concerns.

Methods

A Google search engine observational study was performed using a Search Engine Optimization Keyword Research tool. Specifically, we utilized the "People Also Ask" (PAA) feature related to the search term "facial feminization surgery." The top 50 PAA questions were extracted and grouped based on similar questions and then classified categorically based on fact, policy, or value-based questions using Rothwell's classification of questions. The top 50 websites under the search term were classified by type of information source.

Results

The PAA questions were most often fact-based regarding cost (58%) and technical details (24%), followed by policy-based including the indications (12%) for FFS. Sourced websites were most commonly from academic medical institutions (30%) followed by single-medical providers (26%).

Conclusion

The most searched questions were regarding cost, technical details, and insurance coverage of FFS. These results reflect the large variation in FFS insurance coverage nationally. Limited coverage, resulting in self-paying surgeries, and easily accessible information regarding policies are potential barriers for patients seeking access to FFS.

Understanding human leukocyte antigens (HLA) in vascularized composite allotransplantation (VCA)

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Vascularized composite allotransplantation (VCA) has all the immunogenic risks of solid organ transplantation, while including the complexity and immunogenicity of the skin. This review provides an overview of the Human leukocyte antigens (HLA) system and its current role in VCA. HLA are cell surface glycoproteins critical for immune system surveillance. Their physiologic function is to present self-recognized and foreign peptides to inhibit or initiate an immune response through induction, regulation of immune responses and the selection of T-cells. The HLA system provides targets for stimulation during graft versus host disease (GVHD), donor-specific HLA antibodies (DSA), and allograft rejection. HLA matching, identifying and using acceptable mismatches, and desensitization strategies may increase the immunologic compatibility of the HLA system between a donor and recipient in VCA.

Comparison of prehospital needle and finger thoracostomy

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Introduction

Finger thoracostomy has recently been introduced as an alternative to pleural decompression in the prehospital setting. The University of Missouri added finger thoracostomy to their EMS protocol 18 months ago and research has not been performed since this implementation. Evidence involving the differences between the procedures is limited and therefore further research is needed. We analyzed 8 cases of patients that received a prehospital needle or finger thoracostomy to determine these differences.

Methods

A retrospective case series of 8 patients who underwent a prehospital needle or finger thoracostomy was collected from the University of Missouri Emergency Medical Software (ESO) over an 18-month time frame. Collected demographic data included age, race, ethnicity, sex, height, and weight. Data involving procedure and incident included dispatch complaint, GCS, needle or finger thoracostomy, procedure location, procedure outcome, patient response, procedure complications, and time from on scene to thoracostomy procedure.

Results

The most common dispatch complaint was traffic accidents (37.5%). The average age of patients was 41.5 years, and the average GCS was 6. The average time from on-scene to thoracostomy procedure was 8.4 minutes. Needle thoracostomy success rate was 83.3% compared to finger thoracostomy at 71.43%. Patient improvement response was 50% in needle thoracostomy compared to finger at 28.57%. Both procedures had a success rate of 100% on the right side of the patient. Needle thoracostomy on the left side of the patient showed an 80% success rate compared to finger of 33.3%. Neither procedure showed complications.

Conclusion

Needle thoracostomy shows a higher success rate and patient improvement response compared to finger thoracostomy. Needle thoracostomy on the left side of the patient also showed a higher success rate compared to finger. However, both procedures had identical success rates when performed on the patient's right side.

An in vitro modeling system to evaluate the role of neurons and glia in neuromuscular and neurodegenerative disorders

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The study of neurological diseases is inherently challenging due to the limited availability of patient-derived tissues, which are often only accessible post-mortem, and the complexity of disease phenotypes, which do not always correlate with known genotypes. In vitro modeling offers a powerful tool to overcome these barriers, providing insights into the physiological pathways and cellular interactions that underlie the pathophysiology of various neurological disorders. Despite the identification of numerous disease-associated mutations, the cellular mechanisms through which these mutations contribute to disease remain poorly understood. While significant attention has been given to neuronal function in disease, the contributions of glial cells—particularly astrocytes—remain underexplored. To address these gaps, we utilized direct reprogramming techniques to generate induced Neural Progenitor Cells (iNPCs) from primary fibroblasts obtained from patients with neurological diseases. These iNPCs were subsequently differentiated into induced astrocytes (iAs) to investigate key stress markers, such as mitochondrial and endoplasmic reticulum stress, which are commonly implicated in neurological disorders. In parallel, induced neurons (iNs) were derived from patient fibroblasts to assess the impact of disease-related mutations on neuronal morphology and function. These in vitro systems are also being employed as platforms for the testing of novel therapeutic interventions, accelerating the development of potential treatments for neuromuscular and neurodegenerative diseases. This approach facilitates a deeper understanding of the contributions of both neurons and glial cells to disease progression, providing a more comprehensive framework for future studies on disease mechanisms and therapeutic strategies

Medical student confidence in caring for and understanding issues facing LGBTQ+ patients increases with patient-centered series

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Introduction

The prevalence of individuals identifying as LGBTQ+ is increasing, with some estimating that 28% of Gen Z falls within this community 1. Distressingly, many LGBTQ+ individuals experience anxiety seeking healthcare from fear of discrimination, mistreatment, or past medical trauma2,3. The authors underscore the importance of curricula that educates rising providers on LGBTQ+ patient-centered care. This project aimed to assess attitudes and competency in LGBTQ+ care pre- and post-intervention across two cohorts in two consecutive years (2022-2023, 2023-2024).

Methods

Pre-series and post-series surveys assessed shifts regarding attitudes and competency in LGBTQ+ care. Questions were categorized as "clinical" (LGBTQ+ medical competency of participant) or "non-clinical" (personal beliefs regarding LGBTQ+ individuals). Permitted responses assessing agreeableness included "strongly disagree", "disagree", "agree", or "strongly agree" - to which a numerical value of 1-4, respectively, was assigned. Six questions with negative connotation were reverse-scored to mitigate response bias and ensure consistent measurement of concepts. Weighted measures were calculated to compare pre-series and post-series responses. Two-way ANOVA and post-hoc tests for both cohorts were run to determine significance.

Results

114 and 69 participants combined answered the pre-series and post-series survey, respectively, across both years. Both cohorts showed significant positive shifts regarding both clinical (p-value = <0.001) and non-clinical questions (p-value = <0.001).

Conclusion

Student-led, faculty-taught initiatives represent an important avenue by which clinical skills and personal perspectives regarding marginalized communities can be developed. Participants expressed confidence in their ability to care for, and understand issues impacting, LGBTQ+ patients. Limitations included attrition and survey anonymity, which precluded tracking individual respondents.

Pesticide ocular exposure affects corneal clarity and leads to compromised vision

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Introduction

Pesticides are widely used in agriculture, horticulture, forestry, and gardens, and are a major concern for public and animal health. Pesticide exposure to the eyes is a major source of ocular morbidities in adults and children. Carbofuran (CF; a carbamate pesticide), graded as Category 1 with "High Toxicity" by the Environmental Protection Agency (EPA) is a major threat pesticide used all over the world. More than one million people are exposed to CF and show various ocular pathologies. This study sought to explore the CF toxicological impact on ocular toxicity associated with corneal disorders that affect vision and uncover the underlying mechanism.

Methods

For in-vitro studies, the human corneal stromal fibroblast (h-CSF) cultures; and in-vivo, C57/BL6J mice were used. Live dead- and MTT- assays were used to determine the CF toxicity dose. The standard clinical imaging, histology diagnosis, and molecular level analysis were performed using immunofluorescence staining, qRT-PCR analysis, and commercially available kits to investigate the CF toxicity to the eye.

Results

The results of in-vitro studies showed that CF exposure to h-CSF showed cellular toxicity in a dose-dependent manner ($p<0.01$). The CF dose of 10 µm showed mild toxicity (5.2±0.2 %; $p<0.01$). The autophagy markers LC3, Beclin1, and SQSTM1 levels were noticeably increased in the CF indued h-CSF cells as compared to the non-treated cells ($p<0.001$). In-vivo (C57/BL6J) mice corneal imaging data showed mild opacity as compared to non-exposed control cornea. The molecular levels in-vivo studies showed that CF exposure to corneal tissue upregulates the LC3, Beclin1, and SQSTM1 levels as compared to the non-exposed corneal tissue ($p<0.001$) and may result the opacity. The in-vivo study data were aligned with the in-vitro results indicating that CF exposure to the corneal tissue impaired autophagy.

Conclusion

Pesticide (CF) exposure to the ocular tissue dysregulates the normal autophagy process which may lead to cellular toxicity and result in corneal opacity.

Investigating the role of the autophagy pathway in C9orf72-linked ALS/FTD

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Abstract

A G4C2 expansion mutation in a non-coding region of the C9ORF72 gene accounts for 40% of familial and 10% of sporadic ALS and over 50% of FTD cases worldwide. Currently, no effective treatments or cures exist for these devastating neurodegenerative disorders, and the identification of viable therapeutic targets has been hindered by an incomplete understanding of the underlying pathogenic mechanisms. Two broad disease mechanisms have been proposed: (1) the loss of function (LOF) of the C9ORF72 gene (C9 hereafter) and (2) the gain of function (GOF) mediated by the repeat RNA and toxic dipeptide repeats (DPRs) generated from the G4C2 repeat expansion itself.

Dysfunction of lysosomes – acidic organelles that serve as the terminal degradation point for autophagic cargo – appears to be a key pathological mechanism linked to both C9 LOF and G4C2 GOF. In Drosophila models of G4C2 toxicity, we observed decreased nuclear localization of TFEB, a regulator of lysosome biogenesis, along with age-associated accumulation of the autophagy receptor p62, reflecting autophagy disruptions seen in patients. Importantly, downregulating key lysosomal genes exacerbates G4C2 toxicity in the adult fly eye.

A growing body of evidence suggests that lysosome dysfunction may be a trigger for secretory autophagy (SA), whereby autophagic vesicles fuse with the plasma membrane (PM), leading to the extracellular release of autophagic cargo. Strikingly, we observe that downregulation of genes involved in autophagosome biogenesis and autophagosome-to-PM fusion leads to a strong suppression G4C2 toxicity. Indeed, G4C2 toxicity appears to promote the secretion of p62 at the larval neuromuscular junction, suggesting that SA may contribute to disease pathogenesis. We are currently investigating whether SA contributes to the spread of C9-associated DPRs in the fly brain. Importantly, we are collaborating with Dr Saxena to assess lysosome-associated degrative autophagy as well as the secretory autophagy pathway in human preclinical in vitro model systems.

Broadening access to dermatology: the role of teledermatology in primary care: A systematic literature review

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Introduction

The 2017 American Academy of Dermatology report on the burden of skin disease analyzed prevalence, cost, and mortality attributable to 24 skin disease categories in the US population. One in four Americans sought medical attention for at least one skin disease in 2013, but only one-third were seen by dermatologists, with the remaining two-thirds treated by non-dermatologists, such as primary care providers (PCPs). The COVID-19 pandemic accelerated the adoption of teledermatology, significantly improving access to specialty care, particularly in rural and underserved areas. This systematic literature review aims to evaluate the applications and utility of teledermatology when employed by PCPs.

Methods

A comprehensive literature search was conducted in July 2024. All relevant literature published prior to the search was obtained using two databases, PubMed and Medline OVID. The search and selection of literature was restricted to publications written in English. PRISMA reporting guidelines were used to evaluate and report the findings.

Results

A total of 233 studies were identified. After removing duplicates, 173 abstracts were screened using inclusion and exclusion criteria. 81 studies were excluded due to ineligibility, and the final 92 studies were analyzed.

Conclusion

Seven studies focused on teledermatology in pediatric populations, while one study explored its benefits for geriatric patients. Nine studies assessed the accuracy and reliability of teledermatology, and four examined its cost benefit. Notably, 15 studies emphasized improved access to specialty care, particularly in underserved populations across both rural and urban settings globally. Additionally, two studies highlighted the role of teledermatology as a tool to enhance PCPs' dermatological knowledge. While most studies focus on logistical benefits and barriers, four addressed preferences, satisfaction, and quality of life from a patient perspective.

Impact of tongue exercise on vocalization in a rat model of hypoglossal (XII) motor neuron loss

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Introduction

Neuromuscular diseases (e.g., amyotrophic lateral sclerosis and spinobulbar muscular atrophy) involve the degeneration of hypoglossal (XII) motor neurons which leads to progressive tongue weakness and upper airway dysfunction (e.g., swallowing and speech deficits). Despite the detrimental impact on physical and mental health, effective therapeutic strategies are lacking. To address this clinical gap, we developed an inducible rodent model via intralingual injections of cholera toxin B conjugated to saporin (CTB-SAP) to selectively eliminate XII motor neurons and mimic the associated swallowing deficits observed in neuromuscular diseases. Using this model, we have demonstrated that tongue exercise mitigates deficits in swallowing. It remains unknown if our CTB-SAP model develops speech-related deficits (i.e., dysarthria) that may be impacted by tongue exercise.

Methods

The goal of this study was to invoke and record rodent vocalizations (audible and ultrasonic) by mimicking normal rat play behavior in a sound-attenuated chamber. We hypothesize that CTB-SAP treated rats will have features of dysarthria that mimic human motor neuron diseases, and that tongue exercise will attenuate these deficits. Here, we intralingually injected adult male rats with CTB-SAP or control (CTB unconjugated to SAP), subsequently treated these rats with sham exercise or exercise (n=12-21/group), and finally studied vocalizations (kHz) and duration (ms) of calls across groups.

Results

We expect that: 1) sham exercise-treated CTB-SAP rats will exhibit altered call type and vocal duration; and 2) vocalization deficits will be mitigated by tongue exercise in CTB-SAP rats.

Conclusion

If our hypotheses are correct, findings from this study would provide evidence that measuring vocalization is an effective way to study disease-specific symptoms, such as dysarthria, in our CTB-SAP model. Findings from this study would also provide additional evidence that our tongue exercise paradigm may provide a viable therapeutic approach for dysarthria to improve the quality of life of patients with neuromuscular diseases.

A case of acute pancreatitis in the setting of echinococcal cystic liver disease

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Case Report

A 35-year-old male with no significant medical history presented with four days of worsening nausea, vomiting, chills, constipation, and sharp epigastric pain with band-like radiation across his abdomen. He denied smoking, significant alcohol consumption, or history of gallstones. CBC, CMP, urinalysis, and triglycerides were within normal limits, but serum lipase was elevated at 2,066 units/L. CT abdomen showed peripancreatic fat stranding suggestive of pancreatitis and multiple well-circumscribed hepatic cysts. On further history, he was a hunter, fishing guide, and animal shelter volunteer who had moved to the U.S. from Zimbabwe 14 months prior. Exposures included cattle, dogs, pigs, goats, snakes, tortoises, birds, and zebras. He was admitted for acute pancreatitis and echinococcal liver disease work-up.

His symptoms resolved within 24 hours with intravenous fluids, hydromorphone, ondansetron, and polyethylene glycol. Infectious disease recommended blood cultures, echinococcus IgG, and MRI abdomen to better understand the relationship of his cysts to the pancreas. MRI revealed four liver cysts, the largest measuring 5.0x6.1 cm with intrinsic "daughter cysts," which is classified as CE2 according to World Health Organization classification. On hospital day 4 he began albendazole, IR determined the cysts were not drainable, and surgery recommended outside hepatobiliary surgery follow-up. With negative blood cultures and positive echinococcus IgG, he was cleared for discharge on day 5.

The patient had significant transaminitis on hepatobiliary surgery follow-up, so albendazole was discontinued. This improved the following week. He started praziquantel for two days before hepatic lobectomy 22 days post-discharge. He is continuing praziquantel following surgery.

Without typical risk factors, echinococcus is the likely cause of the patient's pancreatitis. While rare, acute pancreatitis secondary to echinococcus can be caused by compression of ductal structures, cysto-biliary communication following cyst rupture, and primary pancreatic hydatid cyts. Pathological analysis of the excised cyst is pending, which may further elucidate the mechanism.

20-year survivorship managing breast cancer-related lymphedema: How are we doing?

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Introduction

As a sequelae of breast cancer treatment, survivors incur a lifetime risk of developing lymphedema. Lymphedema requires daily self-management activities to maximize quality of life. Sustainment of these activities over a lifetime can be challenging. The impact of these challenges on quality of life beyond 20 years of survivorship has not been widely explored. The purpose of this study was to: 1) explore long-term survivorship challenges of self-managing lymphedema; and 2) explore quality of life issues in living with breast cancer-related lymphedema (BCRL) beyond 20 years of survivorship

Methods

A qualitative descriptive study was piloted. Four interviews were conducted with survivors of 20+ years. We used in-vivo and second-level coding to identify common themes across the narratives. A final code list was created through consensus. Analytic memoing was completed after each coding session.

Results

Several themes emerged illustrating the long-term issues of living with BCRL: “live your life,” barriers, comfort, fear, impact on work, knowledge over time, emotions with lymphedema diagnosis, self-care, support, and the treatment continuum. Participants reported fear of recurrence never subsided. Participants continually tried to live their lives to the fullest potential. Support from family, friends, and health care professionals changed over time, driven by the needs of the survivor. The treatment continuum changed over time, with participants tailoring management activities that worked best for them. Self-management activities were adjusted based on their lymphedema status and activity comfort level. Participants experienced a range of emotions along with challenges in occupational requirements and activities of daily living requiring adaptive changes. Lymphedema knowledge was an issue, with increased knowledge coming from different people over time.

Conclusion

Consistent family, friends, and professional support can help maximize quality of life. Routine reinforcement of lymphedema knowledge and self-management activities can prevent complications and minimize impact on work and daily activities.

Medical cannabis use among pride festival attendees aged 40 years and younger

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Introduction

With legalization and high prevalence of cannabis use, medical use has proliferated without corresponding evidence-based therapeutic benefits. This study investigates the differences in medical cannabis use among young adults, 40 years and younger, comparing sexual and gender minority (SGM) participants to their cis-gender heterosexual counterparts.

Methods

An anonymous 50 question survey gathered information about health-related behaviors of participants at 7 PRIDE festivals throughout Missouri (June – August 2024). Three questions focused on medicinal cannabis use: "What do you use cannabis for (recreation/social use only; physician-prescribed medical use; self-prescribed medical use), "What medical condition(s) do you use cannabis for (open text), and "for the above listed medical condition(s), I use cannabis based on (my own experience, advice from: my medical care provider, my marijuana dispensary, from other individual(s); another source of information. The top 5 reported medical conditions (anxiety, depression, other mental health issues, pain and sleep issues) were analyzed using SAS 9.4.

Results

Among the 2603 participants, over 150 medical conditions were reported. Compared to cis-gender heterosexuals, SGM individuals were significantly more likely to report self-prescription of cannabis for treating anxiety, depression, and other mental health issues, but not for pain or sleep issues. The SGM population was significantly more likely to base their medicinal cannabis use on their own experiences, and the advice of other individuals, but not medical providers.

Conclusion

The high use of cannabis to treat health conditions without medical advice and guidance, especially among the SGM population is concerning. As the political landscape and community behaviors around cannabis use continue to evolve, the medical community will need to rely on evidence-based recommendations to help facilitate productive conversations with patients for the improvement of their health and wellbeing.

Rebalancing neuroendocrine regulation of hemodynamics for cardiovascular recovery after spinal cord injury

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Introduction

Cardiovascular dysfunction is a significant cause of morbidity and mortality among patients with spinal cord injury (SCI). Manifestations include low resting blood pressure, orthostatic hypotension, and autonomic dysreflexia. While it is understood that these symptoms arise from interruption of autonomic nervous system control post-SCI, it has been found that upregulation of the hormonal control of hemodynamics through the Renin-Angiotensin System (RAS) may also be involved in pathogenesis with temporal shifting of cardiovascular regulation. Therefore, the objective of this study was to evaluate the effects of pharmacologic RAS inhibition on cardiovascular dysfunction after SCI in an animal model.

Methods

Adult female F344 rats (n=4) underwent complete spinal cord crush at the T4 level. Rats were then implanted with a telemetric transmitter to record and analyze cardiovascular parameters. To study potential temporal alterations of hormonal regulation, cardiovascular function will be assessed during pharmacological inhibition of RAS 8 weeks after SCI, including examination of 1) resting hemodynamics, 2) autonomic dysreflexia, and 3) the baroreflex. Colorectal distension (CRD) induces autonomic dysreflexia by mimicking visceral pain.

Results

The results may show whether and how hormonal mechanisms are involved in hemodynamic control after SCI. We expect that RAS inhibition will reduce the severity of autonomic dysreflexia and improve baroreflex function in rats with SCI.

Conclusion

The therapeutic strategy that re-establishes neuroendocrine balance holds strong translational potential for improving cardiovascular function in patients with SCI.

Facial fracture fixation: Before or after 72 hours?

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Introduction

Debate exists on whether it is more beneficial for definitive fixation of facial fractures before or after the first 72 hours following injury. Our study aimed to assess the timing of definitive fixation of facial fractures and determine how timing impacted patient outcomes and complications. We hypothesized that early definitive fixation (<72 hours) following facial fractures improves patient outcomes and decreases complications compared to delayed definitive fixation following facial fractures.

Methods

We conducted an IRB-approved retrospective chart review of patients treated by University of Missouri Health Care for traumatic facial fractures. Each patient was followed for 24 months. Patients were excluded if they did not sustain a traumatic facial fracture and did not receive operative management. As an exploratory study, 60 patients were stratified into two cohorts by early fixation (<72 hours) or delayed fixation (>72 hours). Descriptive statistics were used for comparisons between cohorts. Outcomes of interest included hospital length of stay (LOS), ICU LOS, mortality, complications, and reoperation rates.

Results

Of the 60 included patients, 22 had early fixation (37%) and 38 had delayed fixation (63%). Patients with early fixation spent fewer days in the hospital (median: 0 [range: 0-19] vs median: 0 [range: 0-34]) and ICU (median: 4.5 [range: 0-12] vs median: 9.5 [range: 0-34]), had less deaths (n=0 vs n=2), and had more reoperations (n=10 vs n=6). Early fixation had lower rates of malocclusion (18.2% vs 18.4%), soft tissue infections (18.2% vs 21.1%), pneumonia (0% vs 2.6%), sepsis (0% vs 5.3%), wound dehiscence (0% vs 7.9%), and hardware failure (0% vs 2.6%).

Conclusion

Preliminary data suggests that there are risks and benefits associated with receiving early or delayed fixation that must be weighed by the patient and provider before any intervention is delivered.

Effects of elderberries and soybean polyphenols on responses of meniscal cells to inflammatory stimulation

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Introduction

Meniscal injury often leads to an increase in both localized tissue and whole joint inflammation. American elderberry (*Sambucus nigra* L. subsp. *canadensis* (L.) Bolli) and *Glycine max* - Williams 82 soybeans possess potential anti-inflammatory properties. This study evaluated the effects of different concentrations of berry and soybean extracts on the inflammatory responses of human meniscal cells (MEN). It was hypothesized that treatment with the elderberry and soybean extracts would significantly decrease the inflammatory responses of MEN compared to the untreated control group.

Methods

Elderberry berries and soybean cotyledons had their metabolites extracted using 80%ethanol:20%water. MEN cells (n=6/group) were cultured for 3 days in media supplemented with 1 ng/ml IL-1β and five concentrations of elderberry extract (E1-E5) or three concentrations of a non-elicited (S1-S3) and elicited for daidzein and genistein (S+1-S+3) soybean extract. After culture media was assessed for inflammatory biomarkers.

Results

The elderberry extracts significantly reduced the production level of PGE2 in the E1 and E2 groups, and MCP-1, IL-8, and IL-6 in the E1 group, compared to the POS control. E5 produced significantly higher levels of MCP-1, IL-8, and IL-6 than E1. The soybean extracts significantly reduced the production of PGE2 in all S and S+ groups compared to the POS control. S1 produced significantly lower PGE2 compared to S3, which produced significantly higher levels of PGE2 compared to S+3.

Conclusion

Metabolites extracted can reduce the production of PGE2 by MEN cells in response to inflammatory stimulation. E1 reduced the production of inflammatory cytokines compared to E5, indicating a potential dose response by the MEN cells. Elicitation of the soybean to increase daidzein and genistein content may improve the anti-inflammatory properties of the soybean extract, supported by the S3 group's higher levels of PGE2 compared to S+3.

Effect of osteoarthritic infrapatellar fat pad on cartilage tissue using an *ex vivo* co-culture model

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Introduction

Osteoarthritis (OA) is a degenerative joint disease and a major cause of disability. The infrapatellar fat pad (IPFP) may play a key role in OA progression. This study investigates the impact of co-culturing OA IPFP with cartilage (CART) on the expression of extracellular matrix (ECM), pro-inflammatory, and pro-degradative genes. It is hypothesized that co-culturing will decrease ECM gene expression and increase pro-inflammatory and pro-degradative gene expression, with significant correlations between media protein biomarkers and cartilage gene expression.

Methods

With IRB approval and patient consent, IPFP and cartilage tissues were obtained from patients undergoing total knee arthroplasty. Tissue explants were halved, and one half was cultured alone (MONO) and the other half of the IPFP and cartilage explant were co-cultured (CO) together for 3 days. After culture, RNA was extracted from the tissue, and relative gene expression level was determined using real time RT-PCR. Media protein concentration was determined using commercially available assays. Significant ($p<0.05$) differences between MONO and CO groups were determined using a Kruskal-Wallis test. A Pearson's correlation was used to determine moderate to strong correlations between gene expression and media protein concentration in each group.

Results

The data indicated that cart in the CO group had significantly higher expression of COX-2 and PRG4 compared to the MONO group. Numerous moderate to strong correlations were observed between cart and IPFP gene expression and media biomarker concentration for both MONO and CO groups. However, the correlations observed in the cartilage MONO group were not the same correlations observed in the cartilage CO group.

Conclusion

The data indicates potentially novel regulatory pathways for both CART and IPFP associated with OA pathobiology, that may allow for the identification of therapeutic targets to improve outcomes for patients with OA.

Mustard gas exposure causes aberrant corneal extracellular matrix via phosphoinositide 3-kinase

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Introduction

Alkylating and vesicating agents such as sulfur mustard gas (SM) have been used as chemical weapons in many mass-casualty incidents since World War I. SM exposure results in corneal scar formation. The mechanism of action of alkylating/SM toxicity to the cornea causing fibrosis is poorly understood. After any insult/injury to the eye, corneal wound repair leads to the synthesis/secretion of aberrant extracellular matrix components (ECM) responsible for the formation of a corneal scar, such as collagen (COL) and lysyl oxidase (LOX). This study aims to identify Phosphoinositide 3-kinase (PI3K) as a mechanism that is activated after mustard gas exposure to cause changes in corneal stroma extracellular matrix.

Methods

Primary human corneal stromal fibroblasts (hCSF) were generated from donor corneas. hCSFs were treated with nitrogen mustard (NM) or NM+LY294002 (PI3K specific inhibitor) and collected at 30min, 8h, 24h, 48h, and 72h. LOX and LOX-like protein transcripts were detected using rPCR. mRNA and protein expression of PI3K, AKT, COL I, COL III, and LOX were obtained and analyzed using qRT-PCR, Western Blot, and ELISA.

Results

LOX, LOX1, LOX2, LOX3, and LOX4 were expressed in hCSF. NM significantly increased PI3K at 8h, 24h, 48h, AKT at 8h, 24h, 48h, COL I at 8h, 24h, 48h, COL III at 24h, 48h, and LOX at 8h, 12h, 24h, 48h. On the contrary, hCSF inhibition of PI3K signaling by LY294002 treatment significantly reduced PI3K at 8h, 24h, 48h, AKT at 8h, 24h, 48h, COL I at 8h, 24h, 48h, COL III at 24h, 48h, and LOX at 8h, 24h, 48h levels.

Conclusion

We conclude PI3K signaling mediates stromal collagen and LOX production following alkali/mustard gas injury.

Comparison of cervical and lumbar nucleus pulposus secretome related to radiographic grade of intervertebral disc degeneration

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Introduction

Chronic neck and back pain are a common cause of disability worldwide and is often associated with intervertebral disc (IVD) degeneration (IVDD). While the IVDs in both regions have the same tissue structure, the biomechanical forces the IVDs in the two regions experience are significantly different. Therefore, it is possible that there are significant differences in the responses of the tissues of the IVD during IVDD. This study was designed to determine if there are significant differences in the secretome of the nucleus pulposus recovered from the cervical and lumbar regions of the spine of patients with IVDD.

Methods

With IRB approval and informed patient consent, IVD tissues were recovered from symptomatic clinical IVDD patients (n=88). Explants were created and cultured for 3 days. Media were analyzed for inflammatory cytokines, degradative enzymes, degradation inhibitors, and growth factors. The Pfirrmann grading system was used to grade level of IVDD using pre-surgical MRI images. Samples were grouped based on grade of IVDD. Significant differences in the ex vivo protein secretome between cervical and lumbar nucleus pulposus was determined using T-Tests and multivariable linear models with adjustment for patient age, sex, and BMI, with significance set at $p \leq 0.05$.

Results

Significant differences in the secretome of the NP of lumbar and cervical IVDs were observed at lower grades of IVDD. At grade 3 the release of RANTES, MIP-1α, MIP-1β, MMP-7, MMP-8, and MMP-9 were significantly higher for lumbar compared to cervical tissues.

Conclusion

The data from this study indicates that development of symptomatic lumbar IVDD results in higher concentration of pro-inflammatory and pro-degradative biomarkers in the secretome of the NP compared to cervical IVDD.

Canonical and noncanonical Smad3 signaling impacting corneal wound healing and stromal extracellular matrix modulation using Smad3 null mice

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Introduction
Excessive proliferation and trans-differentiation of corneal stromal fibroblasts cause haze and fibrosis during ocular trauma. Transforming growth factor-β (TGF-β) plays a key role in corneal repair and fibrosis and relays its signal through the TGF-β/Smad (Suppressor of mothers against decapentaplegic) pathway. The aberrant activity of TGF-β during the ocular trauma viz. mechanical, chemical, or surgical alteration of TGF-β/Smad signaling leads to regulation of the predominant expression of myogenic proteins and extracellular matrix (ECM). We sought to study the essential role of Smad3 in corneal wound repair and stromal remodeling using Smad3+/+ and Smad3-/- null mice.

Methods
The corneal injury was perceived with an alkali-soaked 2-mm filter disc on the central cornea in the Smad3+/+ (C57BL/6J) and Smad3-/- (129-Smad3tm1Par/J) mice strains. Slit-lamp and stereo-microscopy were used for clinical assessment and corneal haze grading in live animals. H&E and Masson's Trichrome staining were used to study comparative morphological and collagen level alterations between the groups. Real-time qRT-PCR, western blot, and immunohistochemistry were used to measure changes in profibrotic genes at mRNA and protein levels.

Results
Slit-lamp clinical exams and stereo-microscopy detected notably reduced opacity in the corneas of Smad3-/- mice when compared to the Smad3+/+ mice at 3 weeks ($p<0.01$) in live animals. Corneal tissue sections of Smad3-/- showed significantly fewer α-smooth muscle actin (α-SMA) +cells compared to corneas of the Smad3+/+ ($p< 0.05$). Corneas of the Smad3-/- showed significantly lower mRNA levels of pro-fibrotic genes, α-SMA, fibronectin, and collagen I ($p<0.05$, $p<0.01$, $p<0.001$). Additionally, the MMPs and TIMP1 levels were significantly increased ($p < 0.001$) during the alkali injury in both Smad3+/+ and Smad3-/- mice corneal tissue.

Conclusion
The significant changes in profibrotic genes and ECM matrix protein reveal the direct role of Smad3 in wound healing and stromal remodeling.

Effects of whole-body electrical muscle stimulation exercise on adults with myasthenia gravis: A preliminary analysis

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Introduction

Generalized Myasthenia Gravis (gMG) is an autoimmune neuromuscular disorder characterized by fatigability and muscle weakness due to antibodies against the acetylcholine receptor at the neuromuscular junction (NMJ). Previous studies using traditional exercise interventions in individuals with gMG show improvements in strength, function, and endurance, but can be difficult for patients to tolerate. The purpose of this study is to investigate the effects of whole-body electrical muscle stimulation plus exercise (WB-EMS Exercise) on measures of fatigue and NMJ transmission in adults with gMG.

Methods

Individuals with gMG were enrolled in a 4-week exercise intervention using a commercially available WB-EMS system (10-12 exercises performed in 20 minutes at mild to moderate intensity, 2x/week, stimulation levels are customized). Pre-test and post-test measures were taken 2-4 days before and after the intervention period using the following tests: Fatigue Severity Scale (FSS), Six-minute Walk Test (6MWT), Arm Movement Test (AMT), Quantitative Myasthenia Gravis (QMG), and Single Fiber Electromyography of the vastus lateralis (SFEMG). A subset of participants also completed decomposition EMG (dEMG) and isometric strength testing of the deltoid and vastus. Paired and unpaired t-tests were used to analyze differences between pre-test and post-test measures.

Results

Four participants have completed the study (age range 21-76, 2M/2F). Trends toward improvement were observed in perceived fatigue (FSS), fatigability (6MWT, AMT), strength, and neuromuscular junction transmission (SFEMG). QMG scores were confounded by testing order differences between pre-test and post-test. Small sample size (n=2) limited interpretation of dEMG data.

Conclusion

WB-EMS Exercise may modify fatigue and NMJ function in gMG. Data collection is ongoing. A larger sample size will improve the power of future analyses to determine effectiveness of WB-EMS Exercise as an adjunct therapy for adults with gMG.

Once versus twice daily iron supplementation in pregnancy

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Introduction
Iron-deficiency anemia in pregnancy is defined by hemoglobin <11 g/dL, and affects up to 25% of pregnancies in the US. Pregnant women typically take iron supplements, but increasing supplement frequency can decrease absorption and increase gastrointestinal side effects. This study examined the effectiveness of once- versus twice-daily iron supplementation and its impact on gastrointestinal side effects in anemic pregnant women.

Methods
Anemic pregnant women participated in a randomized controlled study at the University of Missouri, comparing once- versus twice-daily iron supplementation. Between 14- and 28-weeks' gestation, blood was drawn to confirm anemia. Participants were randomly assigned to either receive two 325mg ferrous sulfate pills daily or one 325mg ferrous sulfate pill plus a placebo. Blood samples were collected at enrollment, delivery, and from the umbilical cord. Participants completed validated questionnaires regarding gastrointestinal symptoms (nausea, heartburn, abdominal pain) and their impact on daily activities. Sample size calculations suggested seventeen participants per group, but only twenty were enrolled before accrual halted prematurely due to the PI's relocation. One participant did not complete the symptom questionnaire, and delivery data was missing for another participant who delivered elsewhere.

Results
The twice-daily iron group had significantly higher hemoglobin and hematocrit values at delivery. However, this group also had higher baseline levels ($p<0.1$). Changes in hemoglobin and hematocrit from baseline to delivery were similar between groups. Estimated blood loss at delivery and 24-hour postpartum hematocrit were comparable. Only one participant, who received once-daily supplementation, required a transfusion. This incidence was too small to detect a difference between the treatment groups. Gastrointestinal side effects were more frequent with once-daily iron, but intensity and inconvenience showed no significant differences across both groups.

Conclusion
This study suggests twice-daily iron supplementation may be more effective for improving iron status in anemic pregnant women compared to once-daily supplementation, without increasing gastrointestinal side effects.

Contrasting department chair leadership styles concerning clinical faculty burnout and well-being in an academic health care system

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Introduction
This study examines how two Department Chair leadership styles impact physician burnout and wellness following a chair change within an Academic Health Care Organization (AHCO).

Methods
This retrospective study utilizes University of Missouri School of Medicine (UM-SOM) physician wellness surveys to examine the impact of two Department Chair leadership styles – production-based (focuses on revenue generation) and servant-based (emphasizes patient care quality, cost reduction, and provider well-being) – on physician wellness and burnout within the Department of Obstetrics and Gynecology (OB-GYN). Metrics were collected after one year of leadership change, with consistent survey questions ensuring reliable comparisons. Key outcomes included basics (poor sleep, physical stressors, sadness), safety, respect (civility, accountability), appreciation/ connection (feeling appreciated, shared values with supervisor), and joy. Results quantified individual burnout and turnover intent.

Results
The SOM wellness survey for OB-GYN showed significant improvements with a servant-based chair compared to a productivity-based one within twelve months. Burnout rates decreased by 32%, turnover intent by 56%, and feeling unappreciated by 55%. Poor sleep, physical stressors, and sadness improved by 59%, 41%, and 59%, respectively. Civility increased by 21%, accountability by 53%, and shared supervisor values by 82%. Joy at work reached 100%. While these metrics improved within OB-GYN, other UM-SOM departments showed minimal improvement or worsening conditions. The overall UM-SOM burnout rate increased by 7%, while OB-GYN's rate decreased by 32%.

Conclusion
Department chair leadership styles within AHCO significantly affect physician burnout and wellness. This study shows that transitioning from a nineteen-year productivity-based chair to a servant-based leadership style improved physician wellness and reduced burnout, as evidenced by UM-SOM surveys. Servant leadership integrated with a value-based delivery model enhances patient care, reduces costs, and improves work lives. Conversely, productivity-based leadership fosters burnout due to its volume-driven approach. The study shows a 75% burnout rate under productivity-based leadership within OB-GYN, which decreased by 32% within 12 months of adopting servant-based leadership. This suggests that adopting servant-based leadership could effectively reduce burnout in AHCO.

Transformed clinician experience from a produce prescription program

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Introduction
In 2023, 12.8% of Greene County residents were food insecure. To increase access to healthy food, two family medicine clinics partnered with Springfield Community Gardens via HealthScripts. This program combined a weekly produce distribution with interdisciplinary shared medical visits about food-related issues. While many studies have shown the benefits of these programs for patients, fewer have analyzed the impacts on personnel involved. Our study sought to explore the motivations of and impact upon team members who participated in HealthScripts.

Methods
We conducted 10 semi-structured interviews at two CoxHealth family medicine clinics from May to July 2024. The participants were chosen by purposive sampling and included 3 physicians and a nurse practitioner, dietitian, medical assistant, clinic manager, care coordinator, patient service agent, and research assistant. Three researchers analyzed the data using an inductive thematic analysis approach and an iterative process to reach consensus.

Results
We identified three key themes. First, we saw the importance of building a community through deepened relationships, mutual teaching, mutual care, and increased engagement brought about by trust. Second, we observed the intrinsic driving forces of those involved, including providing meaning to practice, showing investment through action, matching personal and program interests, and advocating for food justice. Finally, we noted benefits to program personnel such as personal growth and satisfaction, transformation of clinician perspective, and mitigation of burnout

Conclusion
In this study, we successfully explored the motivations of and impacts upon personnel participating in a community partnership around food insecurity. We identified that such a partnership could have unexpected benefits to those conducting it. We also noted the importance of having intrinsic driving forces and the power of building a community. Our findings suggest that food insecurity programs may be a way to build community, provide meaning to practice, and mitigate burnout.

Does preoperative CT scan increase rate of identification of correctable hip deformities?

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Introduction

Hip osteoarthritis is a degenerative condition often linked to anatomic or biomechanical abnormalities, leading to early joint damage. Hip preservation techniques, such as arthroscopy and osteotomies, aim to address these issues. Currently, many orthopaedic physicians defer to X-ray imaging and physical exam to determine patient eligibility for hip arthroscopy. At the University of Missouri, preoperative CT imaging is used to identify correctable deformities before primary hip arthroscopy. This study evaluates whether CT imaging increases the detection of patients eligible for hip-preservation procedures compared to X-ray alone, potentially improving preoperative decision-making for hip-preservation surgeons.

Methods

This retrospective study identified patients treated with hip preserving surgical intervention at the Missouri Orthopaedic Institute from July 1, 2021 – January 1, 2024. Patients were identified using CPT/HCPCS codes for hip arthroscopy, periacetabular osteotomy (PAO), and derotational femoral osteotomy (DFO). Patient data was collected from perioperative clinic notes, radiology reports, and operative notes.

Results

214 patients were evaluated for hip deformities using CT scans. Of these, 205 underwent arthroscopy, and 16 required subsequent PAO or DFO. An additional 9 patients proceeded directly to PAO or DFO without prior arthroscopy. 66 patients presented to a sports-medicine trained orthopaedic surgeon. They had 64 arthroscopies and of those, 4 needed PAO or DFO. 130 patients presented initially to two orthopaedic surgeons trained in open-hip preservation. They had 124 arthroscopies and of those, 10 needed PAO or DFO. 9% of sports medicine patients needed PAO or DFO while 12% of patients presenting to an open-hip surgeon required PAO or DFO.

Conclusion

Of the 25 patients that underwent open hip surgery (PAO or DFO), 9 were determined to need open surgery without initial arthroscopy, indicating a 36% CT detection rate of deformities requiring open surgery. Patients presenting to an open-hip surgeon had a higher likelihood of needing a PAO or DFO, indicating greater applicability of CT screening in these patients.

Disparities in nutrition security among Missouri PRIDE festival attendees

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Introduction
Nutrition security is a subcategory of food security that characterizes accessibility of not only filling but also health-promoting foods that help prevent chronic diseases. Sexual and gender minorities (SGM) are at high risk of food insecurity, so further characterizing the prevalence of nutrition insecurity in these populations is important for directing future food policies and addressing health disparities.

Methods
Between June and August 2024, an anonymous survey was distributed at seven PRIDE festivals in Missouri to examine demographics, health-related information, and nutrition security using a four-question nutrition security screener, called Household Nutrition Security Measure with range of 0-16 points (0=never; 2=sometimes; 4=always). Basic descriptive statistics were used to characterize frequencies of male/female SGM status and other demographics. Nutrition security level was defined using mean measure scores of low (2 or less points) or high (more than 2 points). Logistic regression models examined the associations between SGM status and nutrition security level using SAS 9.4.

Results
Of 4095 participants, 24% (n=993) self-identified as male SGM, 53% (n=2160) female SGM, 8% (n=336) male cisgender heterosexuals, and 15% (n=606) female cisgender heterosexuals. In the total sample, 1076 participants (26%) reported experiencing low nutrition security. Less than 4-year educational degree, unemployed (vs full time employment), experiences healthcare barriers, and being male SGM or female SGM (compared to cisgender heterosexual males) were more likely to report low nutrition security.

Conclusion
SGM experienced nutrition insecurity more than cisgender heterosexuals, and female SGM were particularly at risk. Future research in this area should focus on the factors underlying reported poor nutritional security, including joblessness, time- or financial-constraints, and systematic discrimination.

Going without: Food pantry use among WIC participants in two midwestern states

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Introduction

In 2022, the USDA reports 12.8% of the general population were food insecure at some time during that year. In the same year, 17.3% of children were affected, most living in single mother households. Despite federal spending on food nutritional assistance programs (SNAP, WIC), many families must access other food distribution centers. While food insecurity is associated with negative health outcomes, increasing evidence also associates food insecurity with psychological stress and poor mental health outcomes for both adults and children. The purpose of this presentation is to examine WIC clients' food insecurities compared to a general population in two predominantly rural Midwestern states.

Methods

Between May and August of 2021, surveys from The Food Assistance and Hunger in the Heartland 2021 study were distributed at food pantries throughout 212 food pantry locations to a total of 5049 people. Of this sample, 256 utilized WIC services.

Results

Data will be presented describing WIC participants' risk for moderate food insecurities compared to the general population completing the surveys, including barriers they faced in accessing adequate nutrition for themselves and their families.

Conclusion

Consequences of moderate food insecurity in young families will be discussed with possible nursing interventions to be delivered.

Machine learning-driven prediction of brain age for Alzheimer's risk: APOE4 genotype and gender effects

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Introduction

Alzheimer's disease (AD) is a leading cause of dementia, significantly influenced by the Apolipoprotein E4 (APOE4) gene and gender. This study aims to use machine learning (ML) algorithms to predict brain age and assess AD risk by considering the effects of APOE4 genotype and gender. lzheimer's disease (AD) is a leading cause of dementia, significantly influenced by the Apolipoprotein E4 (APOE4) gene and gender. This study aims to use machine learning (ML) algorithms to predict brain age and assess AD risk by considering the effects of APOE4 genotype and gender.

Methods

We collected brain volumetric MRI data and medical records from 1100 cognitively unimpaired individuals and 602 AD patients. We applied three ML regression models—XGBoost, Random Forest (RF), and Linear Regression (LR)—to predict brain age. Additionally, we introduced two novel metrics, Brain Age Difference (BAD) and Integrated Difference (ID), to evaluate model performance and analyze the influence of APOE4 genotype and gender on brain aging.

Results

AD patients displayed significantly older brain ages compared to their chronological ages, with BADs ranging from 6.5 to 10 years. The RF model outperformed both XGBoost and LR in terms of accuracy, delivering higher ID values and more precise predictions. Comparing APOE4 carriers with non-carriers, the models showed enhanced ID values and consistent brain age predictions, improving overall performance. Gender-specific analyses indicated slight enhancements, with models performing equally well on both genders. It indicates that APOE4 may be a more robust predictor of brain age than gender.

Conclusion

Robust ML models for brain age prediction can be pivotal in the early detection of AD risk via MRI brain structural imaging, especially for APOE4 carriers. Such early identification may facilitate timely preventive interventions for AD.

Understanding differential cell fate determination during fetal gametogenesis using single cell RNA-sequencing

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During mammalian fetal gametogenesis, both male and female germ cells are connected via intercellular bridges yet face major differences in cell fate determination. In mouse fetal testes, male germ cells arrest in G0/G1 after embryonic day (E)14.5 and differentiate into prospermatogonia postnatally. In contrast mouse female germ cells enter meiosis after E14.5 and initiate oocyte differentiation. During oocyte differentiation, two fates are possible, ~80% of the germ cells donate organelles and undergo cell death; ~20% of the germ cells collect organelles from sister germ cells and become primary oocytes. To investigate the differences in cell fates between female and male germ cells we performed single cell RNA sequencing of the cells isolated from mouse ovaries and testes at E14.5 and P0. Our analysis identified three germ cell clusters in both fetal ovaries and testes. Further, we conducted gene ontology analysis of the germ cell clusters using g profiler and ingenuity pathway analysis platforms to get a comprehensive view of the transcriptomic profile of the germ cell clusters. Notably, we found that female germ cells have recognizably different defining characteristics compared to male germ cells. The male germ cell clusters share molecular features in pathways of pluripotency, mitotic processes and transcriptional and translational characteristics. Comparatively, female germ cells have a variety of upregulated pathways containing mitochondrial features, autophagy, and meiotic processes. When comparing the female germ cells, we found one cluster highlights pathways in meiotic processes and transcriptional regulation indicating collection of organelles and preferential selection to become the primary oocyte. The other two clusters show an upregulation in mitochondrial dysfunction, mitotic processes and oxidative stress, collectively this could indicate the donation of organelles to sister cells. Our findings highlight key features in female and male germ cell transcriptomics. This data helps us understand cellular differences in female and male germ cell populations and how it relates to different cell fates. Overall, our work provides new insights into the differential fates of germ cells during fetal gametogenesis.

Meckel's diverticulum in a 7-year-old boy after two negative Meckel scans

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Introduction

Meckel's diverticulum is the most common congenital gastrointestinal abnormality affecting approximately 2% of people that can present with lower gastrointestinal bleeding, abdominal pain, and vomiting. Although most instances of Meckel's diverticulum are asymptomatic, prompt diagnosis in symptomatic patients should be prioritized to mitigate risks of hemorrhage, intestinal obstruction, and bowel ischemia. A Meckel Scintigraphy Scan (MSS) is a noninvasive nuclear medicine scan used to detect heterotopic gastric mucosa, found in 90% of bleeding Meckel's diverticula, through intravenous administration of radiolabeled technetium (99mTc), preferentially absorbed by gastric mucosa.

Methods

We describe a 7-year-old male patient who was admitted to the pediatric intensive care unit with acute onset bloody diarrhea, lightheadedness, and syncopal episodes. A thorough work-up including esophagogastroduodenoscopy, colonoscopy, capsule endoscopy, and push enteroscopy were done. MSS was done in two separate instances and were negative. Ultimately, the diverticulum was diagnosed and treated via CT angiography and laparoscopic resection, respectively.

Results

False negative MSS can be attributed to insufficient gastric tissue, poor technique, increased washout of pertechnetate due to bleeding or increased motility and secretions. Additionally, studies have found that low hemoglobin levels at the time of the MSS can lead to false negatives. Prior to his second scan, our patient had significant GI bleeding that required transfusion, which could have led to a washout of the technetium. Additionally, his hemoglobin levels dropped to 6.7 g/dL before the scan, which could have affected the sensitivity of the scan. However, he did not have significant GI bleeding or low hemoglobin levels prior to his first negative MSS.

Conclusion

In this report, we draw attention to the sensitivity of a Meckel Scintigraphy scan in the diagnosis of Meckel's diverticulum. Due to the life-threatening complications Meckel's diverticulum can lead to, it is important for clinicians to recognize potential causes of false negative Meckel scans.

Translational regulation in ovarian reserve activation

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Introduction

The ovarian reserve, a pool of primordial follicles that form during fetal ovarian development, serves to sustain adult ovarian function. The primordial follicle has two fates – activation and follicle growth or remaining in quiescence and undergoing cell death. The primordial follicle's activation is an irreversible process that prepares the follicle for ovulation. The follicle activation and depletion rates determine the number of remaining follicles in the ovarian reserve and underlies female fertility and reproductive longevity. This study investigates the role of translational regulation in quiescence maintenance and activation of primordial follicles.

Methods

Quiescent primordial follicles and newly activated primary follicles were isolated mechanically from postnatal day 8 mouse ovaries. Follicles isolated from five mice were pooled as one biological replicate. Total RNAs and proteins from three biological replicates were submitted for RNA-seq and Mass SPEC, respectively. Gene ontology analysis was conducted on mRNAs and proteins that showed significantly different expression in primordial follicles vs primary follicles using gProfiler. Top molecular functions and biological pathways of these genes were identified.

Results

1036 mRNAs and 628 proteins showed significant upregulation in primordial follicles. Top molecular functions (MF) were extracellular matrix constituents for mRNAs and cell adhesion molecule binding for proteins. 1071 mRNAs and 837 proteins showed significant upregulation in primary follicles. Top MFs were purine nucleotide binding for mRNAs and nucleoside phosphate binding for proteins.187 and 120 genes had significant upregulation in both mRNA and protein in primordial follicles and primary follicles, respectively. There were 22 and 14 mRNAs with differential expression with upregulated mRNA and downregulated proteins in primordial follicles and primary follicles, respectively.

Conclusion

The upregulation of specific mRNAs and proteins in each group signifies the importance of translational regulation, and through deciphering the pathways involved in follicle activation, fertility disorders such as premature ovarian failure can be better understood.

Progesterone receptor cooperates with HDAC3 to establish endometrial receptivity

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Introduction

HDAC3 is essential for successful pregnancies and impacts uterine receptivity, implantation, and decidualization for pregnancy establishment. Notably, HDAC3 is downregulated in the endometrium of infertile women with endometriosis, leadings to a non-receptive endometrium and progesterone resistance. However, the mechanism of progesterone resistance by HDAC3 remains unclear.

Methods

We performed transcriptomic and ChIP-seq analysis to identify direct targets of HDAC3 in uteri of control and uterine specific Hdac3 knock-out (Hdac3d/d) mice. HDAC3 ChIP-seq and transcriptome data were integrated into the ChIP-seq data from progesterone receptor (PGR) knock-out mice to identify common targets in uterus. The results of bioinformatic analysis were validated in mouse uteri by RT-qPCR, ChIP-qPCR and immunohistochemical analysis.

Results

Our transcriptomic and ChIP-seq analysis identified 1,136 genes as direct targets of HDAC3 in uterus. By integrating HDAC3 ChIP-seq with existing PGR ChIP-seq datasets, to identify co-regulated genes revealed an interesting overlap: 17,390 of the 23,035 peaks of HDAC3 ChIP-seq (75.5%) and 21,327 peaks of PGR ChIP-seq (81.5%) coincided, revealing 957 common target genes co-regulated by both HDAC3 and PGR. Our pathway and upstream analysis revealed that progesterone, estrogen, and STAT3 signaling pathways were regulated by HDAC3 and PGR. These bioinformatic results were validated using RT-qPCR and ChIP-qPCR. Furthermore, our co-immunoprecipitation assay revealed HDAC3 and PGR protein-protein interactions. Finally, HDAC3 and PGR proteins were strongly expressed in receptive endometrial epithelial and stromal cells of control mice, but non-receptive endometrium from Hdac3d/d and PRKO mice showed attenuation of PGR and HDAC3, respectively.

Conclusion

Our findings suggest that PGR cooperates with HDAC3 to establish endometrial receptivity by direct protein-protein interactions. The results underscore the importance of PGR-HDAC3 interactions in the pathophysiology of endometriosis-related infertility and will significantly advance our understanding of idiopathic female infertility and early pregnancy loss.

Accuracy of various IOL equations in female patients with short axial lengths

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Introduction

Axial length refers to the distance between the cornea and the retinal pigment epithelium and is typically 22 to 26 millimeters. Patients who fall outside of this range are considered to have extreme axial lengths. Though there are different risks and outcomes associated with long and short axial lengths, one complication these groups do share is poor refractive outcomes post cataract surgery. IOL calculations equations use ocular biometry, the anatomical dimensions of the eye, to predict the best IOL power to use for refractive cataract surgery. The biometric parameters used in these equations include the curvature of the cornea, axial length, and anterior chamber depth. This study evaluates outcome spherical equivalent (SE) 1-2 months postoperatively for patients with short axial lengths in comparison to SE as predicted by Barrett, Haigis, Kane, and Hoffer equations using both K and TK.

Methods

This study includes 12 eyes from 6 female patients between the ages of 64 and 88, with axial lengths less than 22mm who underwent cataract surgery. Their 4–8-week postoperative SE was compared to each IOL calculation's prediction SE. Mean difference between outcome SE and Predicted SE was calculated. Normality was assessed using Shapiro Wilk Teas using SAS, and verified with the Wilcoxon Signed test.

Results

Barret TK was not normally distributed ($p = 0.0174$), but was found to be not statistically significant using the Wilcoxon Signed test ($p > 0.05$). The Barret K, Kane K, Kane TK, Haggis K, Haigis TK, Hoffer K, and Hoffer TK resulted in no statistically significant changes in outcome vs predicted SE.

Conclusion

Our study found that no formula resulted in better refractive outcomes for female patients with short axial lengths, though more studies should be conducted to better understand the role of various IOL equations in patients with extreme axial lengths.