Potential of AKR1B10 inhibition in overcoming chemoimmunotherapy resistance in NSCLC patients

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Background

Non-small cell lung cancer (NSCLC) is the leading cause of cancer-related mortality due to recurrence and metastasis resulting from resistance to first-line standard-of-care adjuvant/neo-adjuvant therapies. The existing knowledge gap surrounding the mechanisms that elicit therapy resistance represents a critical barrier to improving NSCLC care. Findings from literature have described the role of aldo-keto reductase family 1 member B10 (AKR1B10) as a molecular target to overcome resistance to platinum-doublet chemotherapy, as determined in NSCLC patient-derived tumor organoids (PDTOs). The goal of this study is to provide preclinical evidence that targeting AKR1B10 has high potential to overcome the resistance to chemo-immunotherapeutic drugs in NSCLC using immunocompetent (ic)PDTOs.

Methods

We have developed immunocompetent (ic)PDTOs from treatment-naïve NSCLC patients at MU (IRB: 2010166). icPDTOs were cultured in the presence of cytokines and characterized for immune cell subtypes. PDTOs were treated with chemotherapy (carboplatin plus paclitaxel) with and without a non-toxic dose of an AKR1B10 inhibitor Epalrestat. Responses were determined by measuring organoid volume, number, and cytotoxicity. Frequency and phenotype of immune cells were evaluated.

Results

PDTOs retained histomorphology, pathological biomarker expression, mutational landscape, transcriptomic signatures, and cellular heterogeneity of the matched primary tumor tissues. PDTOs showed differential responses to chemotherapy drugs. Chemoresistant PDTOs and matched tumor tissues demonstrated overexpression of AKR1B10 and chemoresistance was effectively overcome using Epalrestat. These responses were mirrored to the responses in matched patients.

Conclusion

Epalrestat, an orally administered AKR1B10 inhibitor already in clinical use for diabetic polyneuropathy, was effectively repurposed to overcome drug resistance to carboplatin/paclitaxel in PDTOs. Future work involving lung-specific AKR1B10 knockout mice models will elaborate on the role of AKR1B10 in tumor initiation, progression, metastasis and therapy response in NSCLC.

Cerebral perfusion alterations in male mice following blast-induced mild traumatic brain injury: A preclinical model for veteran-related mTBI

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Introduction

Mild traumatic brain injury (mTBI) affects ~10% of U.S. veterans and is strongly linked to post-traumatic stress disorder. Blast-related mTBI is thought to disrupt neurovascular coupling and cerebral perfusion, processes critical for cognitive recovery. Perfusion abnormalities have been reported in both human and preclinical studies, often when structural MRI shows no injury. However, the temporal course of these changes, especially after repeated blasts, is not well defined. Characterizing cerebral blood flow (CBF) across time and brain regions may identify translational biomarkers and inform treatment strategies.

Methods

Male mice (N = 3 per group) were randomized

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into control, single-blast, or double-blast groups. Blast exposure was delivered using an open-field setup with 350 g C4 (peak overpressure 46.6 kPa). Perfusion was assessed at eight post-injury time points on a 7T/20 MRI system. T2-weighted imaging enabled brain segmentation, and continuous arterial spin labeling quantified CBF in cortex, hippocampus, and thalamus.

Results

No statistically significant perfusion differences were observed between groups at any time point (smallest $p = 0.13$ for thalamus at day 1; $p = 0.10$ for cortex at day 7). Perfusion values were consistent across regions and exposures, confirming measurement reliability. The greatest variability occurred at 1 month in cortex and hippocampus. Longitudinally, all groups, including controls, showed gradual perfusion decline across regions.

Conclusion

Blast-related mTBI in male mice did not produce robust perfusion changes detectable with this approach. This aligns with evidence that sex-specific factors shape mTBI responses, with females often showing greater vascular vulnerability. Variability in perfusion at the one-month time point suggests this period may be critical in the healing process. Additional biomarkers, such as metabolite changes in key regions, could provide context for sex-dependent recovery. Despite small sample size, this work establishes a reproducible framework for perfusion imaging and informs understanding of neurovascular coupling after mTBI.

c-Rel expression modulation within C9ORF72 Amyotrophic Lateral Sclerosis

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Introduction

As the global population ages, the prevalence of neurodegenerative diseases increases, necessitating new therapeutic targets that directly address disease mechanisms. C9ORF72-linked ALS accounts for 40% of familial and 10% of sporadic ALS cases and is characterized by hexanucleotide repeats resulting in loss of function of the C9ORF72 protein, toxic gain of functions, or dipeptide repeat (DPR) protein mediated neurodegeneration. ALS's impact on autophagy pathways is of particular interest with TBK1 expression correlating to autophagy of disease-causing protein aggregates. However, causes of decreased TBK1 expression within C9ORF72-linked ALS are poorly understood. Utilizing the TransFAC database, it was discovered that c-REL, an NFkB protein, may regulate transcription of TBK1 and thus link C9ORF72 and TBK1 expression levels. We hypothesized that C9ORF72-linked ALS motor neurons would exhibit altered C-Rel expression and localization compared to controls.

Methods

Human patient skin punch biopsies were collected and the fibroblasts cultured in vitro. Fibroblasts were directly stimulated via small chemical compounds into neuron-like cells and subsequently analyzed via qPCR and IHC looking at c-REL expression levels and localization.

Results

No consistent differences were found between ALS and control lines for c-REL expression or localization within this study. Within 3 ALS patient lines, c-REL expression via qPCR determined fold differences from controls of 2.43 (stdev:3.14, n:3), 0.14 (stdev:0.04, n:2), and 4.95 (stdev:7.09 n:3). The cell soma: nucleus mean signal ratio following IHC visualization with confocal microscopy 3 ALS lines was 1.02 (stdev:0.29, n:7, p:0.55), 1.13 (stdev:0.22, n:7, p:0.07), and 0.92 (stdev:0.12, n:6, p:0.64) compared to the control of 0.95 (stdev:0.12, n:7).

Conclusion

While no findings supported our hypothesis, the results should not dissuade further research into the role that c-REL may have in the signaling pathway of the C9ORF72 protein or cellular autophagy. Further investigation with improved differentiation and protein quantification protocol involving iPSCs is warranted.

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Modulation of corneal inflammation in human cornea in vitro by pirfenidone

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Objective

Corneal inflammation post trauma is a common clinical condition that affects over 4% American population. This study elucidated therapeutic potential of an FDA-approved drug, Pirfenidone (PFD), to treat corneal irritation and inflammation using an in vitro.

Methods

Healthy cadaver human corneas and an established in vitro model of corneal inflammation were used. Primary human corneal stromal fibroblasts (CSFs) generated from donor corneas were exposed to lipopolysaccharide (LPS; 50ng/ml for 48h) to induce inflammation. The concentration (0-500mg/mL) and time (0-48h) dependent assays were used for evaluating PFD's half-maximal inhibitory concentration (IC50). The qRT-PCR, immunofluorescence, western blotting and reactive oxygen species (ROS) commercial kit studied change in inflammatory response.

Results

The PFD's IC_{50} was 200 mg/mL for CSFs. Treatment of PFD significantly reduced LPS-induced gene transcripts levels of pro-inflammatory (TNFα, IL1α, IL1β, IL6, and COX2) and oxidative stress (GPX1, GPX4, and Catalase) markers in human cornea in vitro. Furthermore, PFD significantly inhibited LPS-induced increased ROS production. The results of western blotting of p-IκBα and p-p65 proteins are pending.

Conclusion

The present study demonstrates that PFD has potential to alleviate corneal inflammation in human cornea in vitro. Ongoing studies will uncover the mechanism if PFD's anti-inflammatory effects in cornea are through targeting of the NF-κB signaling pathway. Repurposing of PFD warrants detailed efficacy and safety investigations in an appropriate preclinical in vivo model.

Functional recovery following peripheral nerve reconstruction with MOPS-N preserved allografts

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Introduction

Peripheral nerve injuries (PNIs) often regenerate slowly and result in suboptimal outcomes. Autograft reconstructions are limited by size/function mismatch and donor site morbidity, while decellularized nerve allografts provide only a scaffold for regeneration. Use of viable, cellularized allografts has historically been limited by untoward host immune response; however, solutions that extend storage duration and limit cellular metabolism could mitigate this risk. It was hypothesized MOPS-N-stored allografts will be associated with superior functional outcomes compared to autografts, and no clinical signs of graft rejection, in a validated canine peroneal nerve injury model.

Methods

Common peroneal nerves were recovered from skeletally-mature purpose-bred hounds euthanized for reasons unrelated to this study and stored in MOPS-N at room temperature for 72 days, and used for later reconstruction (n=5) in a validate peroneal nerve injury model. Ipsilateral inverted autograft reconstructions served as controls (n=5). Dogs underwent gait analysis and neurological exams at baseline, 1, 2, and 3 months post-operatively.

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Results

At baseline, groups had similar total pressure index (TPI) values. Both groups declined after reconstruction, with MOPS-N reconstruction maintaining higher TPIs than autografts at 1 month and remaining higher at 2 months. By 3 months, TPI values converged. Neuroassessments at 3 months showed MOPS-N consistently trended closer to normal in most measures, suggesting stronger recovery in distal reflex pathways compared to autografts. No animals exhibited signs of graft rejection.

Conclusion

Although gait outcomes did not differ significantly between groups, sensory and reflex assessments suggest MOPS-N allografts promoted a broader and more balanced recovery profile compared to autografts. The absence of graft rejection supports the feasibility of storing viable cellularized allografts in MOPS-N for extended periods for later reconstruction. Longer follow-up will be needed to confirm durability of recovery and to explore mechanistic differences in immune response and regeneration between MOPS-N and autografts.

Daily caloric restriction suppresses ectopic lesion development in experimental endometriosis

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Introduction

Endometriosis is a chronic, estrogen-dependent inflammatory disorder affecting ~10% of reproductive-age women, often associated with infertility and pelvic pain. Unlike other estrogen-dependent conditions, studies report inconsistent associations between body mass index (BMI) and endometriosis. Caloric restriction diet (CRD), which reduces energy intake without malnutrition, has demonstrated anti-inflammatory and anti-proliferative effects in other diseases but remains underexplored in endometriosis.

Methods

Endometriosis was surgically induced in a GFP-reporter mouse model by inoculating endometrial fragments. Mice were randomized to ad libitum feeding (regular diet, RD) or CRD. After 90 days, body weight, fertility, lesion burden, cell proliferation, apoptosis, progesterone receptor expression, and activation of STAT3 and ERK1/2 signaling were evaluated.

Results

CRD mice showed a 28.1% reduction in body weight compared to RD mice without impairment of fertility. The number and weight of ectopic lesions were significantly reduced in the CRD group. Immunohistochemistry showed decreased epithelial and stromal proliferation, increased apoptosis, and elevated stromal progesterone receptor expression in lesions from CRD mice. Reduced phosphorylation of STAT3 and ERK1/2 indicated decreased inflammatory and proliferative signaling.

Conclusion

CRD reduces ectopic lesion burden and inflammation without compromising fertility, suggesting dietary interventions as a promising, non-invasive strategy for endometriosis management

Optimization of an immunocompetent orthotopic model of endometrial cancer with metastasis

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Introduction

Endometrial cancer (EC) is a type of cancer that begins in the endometrium, or the lining of the uterus, and is the most common gynecologic

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malignancy. Moreover, strategies in treatment for women with EC have long gone unchanged and unresearched due to the lack of an animal model that accurately replicates human EC (maintains its immune system and forms distant metastases upon developing cancer). To address this problem, we generated the immunocompetent orthotopic EC model. Our focus is to optimize this model in order to further facilitate EC research by modifying it to identify the progression of cancer development.

Methods

Mice were induced with orthotopic endometrial cancer through the treatment of mouse endometrial cancer Pten deleted K-ras activated with Green Fluorescence Protein-labeled (MECPK) cell line. We injected 50,000 MECPK cells/mouse into uterus following abrasion. Uterus tissue from the mice was collected from mice at 4, 5, 6, and 8 weeks after induction using the dissecting fluorescence microscope. Uterus samples were sectioned for hematoxylin and eosin and immunohistochemistry staining with E-cadherin. Stained tissues were imaged and analyzed with AI-based analysis program.

Results

The endometrial cancer induction model using the MECPK cell line was confirmed to start developing cancer at 5 weeks. 27% of mice (4/15) developed distant lung metastatic EC at 8 weeks post-induction. This induced model died before 10 weeks after cell transplantation. Quantitative analysis of immunohistochemistry-stained cells revealed an increased expression of E-cadherin in orthotopic primary cancer tumors (5weeks: 199.06 ±11.48, 6weeks: 215.30 ±12.91. 8weeks: 247.70 ±12.75) whereas E-cadherin expression was significantly down-regulated in distant metastatic EC in lung (91.22 ±24.43: $p < 0.01$).

Conclusion

These results may advance the study of primary and metastatic endometrial cancer and establish a model to evaluate anti-cancer therapies.

This work was supported by NCI R01 CA264944

Comparative evaluation of novel forms of the immune checkpoint stimulators SA-OX40L and SA-4-1BBL in cancer immunotherapy

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Introduction

T cell costimulation, a promising cancer immunotherapy, is essential for effective immune responses. The TNF superfamily members OX40 and 4-1BB and their ligands support T cell survival, activation, and suppress Treg activity. Although monoclonal antibodies targeting these pathways show efficacy, clinical trials reveal dose-limiting toxicities and moderate outcomes. Our lab hypothesizes that streptavidin (SA) linked costimulatory ligands, via oligomerization, will improve receptor binding, clustering, signaling, and safety. Here, we evaluated the binding and proliferative functions of SA-OX40L and SA-4-1BBL on CD4+ and CD8+ T cells.

Methods

To assess receptor binding affinity, C57BL/6 splenocytes were stimulated with Concanavalin A for 24 hours, followed by incubation with increasing concentrations of anti-OX40 Ab, SA-OX40L, or SA-4-1BBL. Binding affinity was quantified by median fluorescence intensity (MFI) utilizing flow cytometry. For proliferation, splenocytes were CFSE-labeled and stimulated with anti-CD3 and SA-OX40L or SA-4-1BBL at various concentrations for 72 hours. Decreasing CFSE intensity measured the proliferation of CD4+ and CD8+ T cells.

Results

SA-OX40L shows greater binding affinity to OX40 receptor compared to anti-OX40 Ab on both CD4+ and CD8+ T cells in a dose-dependent manner. SA-4-1BBL showed dose-dependent binding to both CD4+ and CD8+ T cells, with greater binding on CD8+ cells. SA-OX40L and SA-4-1BBL enhanced CD4+ and CD8+ T cell

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proliferation compared to anti-CD3 alone. Maximal dosing of SA-OX40L resulted in 2.5 times more CD4+ T cell proliferation. Equivalent dosing of SA-4-1BBL yielded 2 times more CD4+ T cell proliferation compared to controls.

Conclusion

Streptavidin-linked OX40L and 4-1BBL proteins effectively bind and stimulate their respective receptors on both CD4+ and CD8+ T cells. SA-OX40L preferentially enhances CD4+ T cells, while SA-4-1BBL preferentially enhances CD8+ T cells, suggesting their differential impact on T cells. Further investigation of differential cancer immunotherapeutic efficacies of SA-OX40L and SA-4-1BBL may have significant clinical implications.

Mitochondrial dysfunction in the trabecular meshwork drives glaucomatous neurodegeneration

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Introduction

Glaucoma, a leading cause of irreversible blindness, is characterized by progressive retinal ganglion cell (RGC) loss and optic nerve degeneration, frequently associated with elevated intraocular pressure (IOP). The trabecular meshwork (TM) is essential for regulating aqueous humor outflow, and its function relies on mitochondrial energy production to support cytoskeletal dynamics, cellular contractility, and extracellular matrix (ECM) remodeling. Mitochondrial dysfunction within the TM has been implicated in impaired outflow facility and IOP elevation, yet the specific structural and molecular alterations in glaucomatous TM mitochondria remain poorly characterized.

Methods

Primary human TM cells (HTMCs) at 50% confluency were treated with dexamethasone (Dex, 100 nM) or TGF-β2 (5 ng/mL) for seven days to model glaucomatous stress. Mitochondrial superoxide generation was assessed using MitoSOX assays. TM cross-sections from age-matched normal and glaucomatous donor tissues (FFPE) (n = 4 per group) were immunostained for MICOS subunits (Mic60, Mic26), CoxIV, mtUPR components (ATF5, HSP60), oxidative stress marker 8-hydroxy-2'-deoxyguanosine (8OHdG), antioxidant SOD2, and mitochondrial membrane markers (VDAC, cardiolipin). Statistical analyses were performed using Student's t-test, with $p < 0.05$ considered significant.

Results

Glaucomatous TM exhibited increased mitochondrial accumulation, evidenced by elevated CoxIV, with concurrent reduction of MICOS subunits Mic60 and Mic26, indicating structural mitochondrial damage ($p < 0.05$). mtUPR components ATF5 and HSP60 were upregulated, and 8OHdG levels were elevated ($p < 0.05$), consistent with oxidative stress. VDAC and cardiolipin expression were altered, suggesting compromised mitochondrial membrane integrity. Primary HTMCs treated with Dex or TGF-β2 displayed increased MitoSOX Red fluorescence, confirming enhanced mitochondrial oxidative stress ($p < 0.05$).

Conclusion

These findings indicate that mitochondrial accumulation, structural disruption, and oxidative stress are central features of glaucomatous TM pathology. Dysfunctional mitochondria compromise energy-dependent TM processes, impair aqueous humor outflow, elevate IOP, and contribute to RGC degeneration. Restoring mitochondrial integrity may represent a promising therapeutic strategy to preserve TM function and prevent glaucomatous neurodegeneration.

Exploring a novel form of OX40L as an immune checkpoint stimulator in cancer immunotherapy

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Introduction

Immunotherapy is an effective treatment for cancer. Our focus is to understand the effects of the immune checkpoint stimulator, OX40, on cancer immunotherapy. Previous studies have shown that using anti-OX40 monoclonal antibodies and OX40L-Fc fusion proteins can increase anti-tumor immunity and improve tumor-free survival. OX40 is a costimulatory transmembrane receptor expressed by activated CD4+ and CD8+ T cells. The receptor is activated by binding to its ligand, OX40L, leading to anti-tumor responses by inducing T cell proliferation and Treg inhibition. Since the soluble form of OX40L cannot trigger these effects, we propose using chimeric OX40L with streptavidin (SA-OX40L) to form tetrameric form to cross-link the receptor for effective anti-tumor response.

Methods

For binding capacity, mouse splenocytes were stimulated using concanavalin A for 24 and 48 hours. Increasing concentrations of SA-OX40L were added to the cells, and binding capacity was analyzed by flow cytometry. The proliferative function was analyzed using mouse splenocytes that were activated with anti-CD3 and increasing concentrations of SA-OX40L. Cells were incubated for 72 hours and pulsed with 3H-Thymidine.

Results

Flow data revealed that SA-OX40L bonded to CD4+ and CD8+ T cells. Preferential binding to CD4+ was demonstrated compared to CD8+ at both the 24- and 48-hour time points. 48-hour stimulation expressed more surface receptors as denoted by the increase in MFI for equivalent concentrations of SA-OX40L. When analyzing the concentration gradient of SA-OX40L, it showed relative increases in receptor binding with increased concentrations of SA-OX40L. Analysis of the proliferation revealed that SA-OX40L increased proliferation of CD3+ T cells, with 0.8 ug/mL SA-OX40L yielding the most proliferation as indicated by the 5-fold higher stimulation index.

Conclusion

These results suggest that SA-OX40L binds to receptors on activated CD4+ and CD8+ T cells. SA-OX40L has an impact on the proliferative function of T cells, and anti-tumor responses.

Mapping the co-transcriptional folding pathway of HIV-1

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Introduction

HIV-1 remains as a global health hazard due to its remarkable adaptability and its manipulative nature, despite having a genome of less than 10 kb. Its compact viral RNA can be processed into different species that subsequently produce the viral proteins necessary for viral replication. It remains unclear how the function of HIV-1's RNA is determined the instant it is synthesized, and how its co-transcriptional folding contributes to this. It has been reported that the 5'UTR of viral RNA adopts multiple distinct conformations that engage in interactions with different ribonucleoproteins based on its folding. These different structural features were obtained using biophysical assays where the thermodynamic structures of the RNA were characterized. Previous studies in the lab have revealed two HIV-1 mutants that display alterations to their RNA structures, and therefore their virion infectivity. This study will use these mutants in order to characterize the co-transcriptional folding pathway of HIV-1 RNA to reveal the kinetic structures forming along the nascent RNA elongation. These results will aim to address the hypothesis that the RNA's fate is determined at its birth.

Methods

We have developed a chemical probing-based high throughput sequencing method to analyze the RNA formed during transcription, which enables us to take snapshots of this nascent RNA's structures at various lengths.

Results

We have successfully collected data on wild-type HIV-1 with T7 Polymerase using this technique. The mutant experiments are in progress.

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Conclusion

Our results have validated the feasibility of our approach, which will be applied to characterize HIV 5'UTR wild-type and mutant RNAs synthesized by human Polymerase II. Our study will establish the connections among the structome, transcriptome, and proteome regulation of HIV-1.

Quantitative DTI analysis reveals microstructural damage following blast-induced mild TBI in male mice

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Introduction

Mild traumatic brain injury (mTBI) is a leading cause of disability in Veterans and results in subtle, persistent, neurological deficits undetectable with conventional imaging. Diffusion Tensor Imaging (DTI) provides insight into the microstructural changes linked to mTBI. This study uses DTI to identify microstructural injuries in an Open Field Blast (OFB)-induced mTBI male mouse model.

Methods

Adult male mice (n=3-5/group) received single (1x), or same day repetitive (2x or 3x) OFB exposures at 3-meter-distance from a 350g C-4 explosive detonated at 1-meter-height. Sham (0x) controls underwent identical handling without C-4 detonation. Mice (n=3-5/group) underwent in vivo 7T MRI using 1.5% isoflurane anesthesia. Field homogeneity was optimized with Bo-map shimming. Anatomical references were acquired via TurboRARE T2-weighted imaging. DTI with multi-shot EPI protocol (b = 1250 s/mm^2, 30 directions) assessed microstructural integrity. At 6-months, all but 3x blast mice were evaluated using Automated Cognitive Wall Testing to assess cognitive flexibility.

Results

DTI analyses revealed region/time-dependent microstructural changes following blast exposures. At 7 days, 2x blast mice showed reduced diffusivity in the thalamus, cortex, and corpus callosum genu compared to 1x and 0x mice ($p < .05$). At 1-month, blast groups exhibited persistent disruptions, particularly in anisotropy and diffusivity. Thalamic and callosal alterations were more severe in 2x blast mice. After 2-months, trace microstructural changes were observed. Cognitive flexibility was significantly reduced in 2x blast mice.

Conclusion

Blast-induced mTBI results in time/region-specific microstructural damage which worsened with repeated blasts, indicating a more severe variant of mTBI. Affected mice displayed significantly decreased cognitive flexibility at 6-months. Future work will examine sex differences, increase cohort size, and integrate molecular analyses to link imaging biomarkers with underlying pathology.

Reduced cortico-muscular excitability in TDP-43 ALS mice is associated with reduced persistent inward currents (PICs) in the motor cortex

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Introduction

Amyotrophic lateral sclerosis (ALS) is a fatal neurodegenerative disease marked by progressive loss of motor neurons in the primary motor cortex (PMC) and spinal cord. Previously, we showed that the motor cortex of TDP-43^{Q331K} mice, a model of sporadic ALS, displayed severely reduced

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excitability. Here, we investigated the underlying neurophysiological mechanisms.

Methods

Experiments were conducted on 4-month-old TDP-43^{Q331K} mice and age-matched wild-type littermate controls (N = 9 and N = 10 respectively, 50% female). Motor function was tested using grip strength, rotarod, and weighted-cart pull assays. Neuromuscular excitability was assessed via sciatic nerve stimulation and gastrocnemius recordings. Muscle contractility was evaluated through tibial nerve-stimulated plantarflexion. Cortical and spinal output to muscle was assessed by stimulating the motor area or at the level of the spinal cord and then recording motor evoked potentials from the gastrocnemius. Whole-cell patch-clamp recordings from PMC layer V pyramidal neurons (LVPNs) assessed intrinsic excitability and persistent inward currents (PICs). We also assessed pathology and excitability markers in PMC layer V using immunohistochemistry.

Results

TDP-43^{Q331K} mice showed reduced motor performance, decreased neuromuscular excitability, and impaired contractility. Cortical and spinal output to the gastrocnemius was also reduced. PMC LVPN patch clamp recordings showed decreased excitability and reduced PICs. Immunohistochemistry in PMC layer V showed reduced neuron count, increased TDP-43, and reduced expression of channels and receptors associated with PICs (Nav1.6 and 5-HT2C).

Conclusion

TDP-43^{Q331K} mice have impaired intrinsic excitability and diminished PICs in LVPNs, accompanied by decreased 5-HT2C receptor colocalization. These findings implicate serotonergic dysregulation as a driver of cortical motor deficits in ALS and point to 5-HT2C signaling as a potential therapeutic target.

The 50 most-cited clinical articles in cartilage research: An updated bibliometric analysis

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Introduction

Articular cartilage lesions remain a significant therapeutic challenge in orthopedics and sports medicine due to the tissue's poor intrinsic healing capacity and complex biomechanical properties. The purpose of this study was to identify and analyze the 50 most-cited clinical publications in cartilage surgery. By examining their citation characteristics, publication trends, and clinical focus, this review offers insights into the foundational research that has shaped modern cartilage repair and highlights the key contributions that continue to inform clinical decision-making today.

Methods

A bibliometric analysis of clinical studies on focal articular cartilage repair was conducted using a comprehensive Scopus search (July 2025). The 205 most-cited articles were screened for relevance, surgical intervention, and patient follow-up, yielding the top 50 for analysis. Citation metrics, study characteristics, and treatment details were extracted, with independent screening and agreement from multiple authors.

Results

From 13,008 initial search results, the 50 most-cited clinical articles on articular cartilage repair were identified, with citation counts ranging from 350 to 4,921 (mean 623.2) and a mean citation density of 30.9 per year. Prospective case series were most common, followed by randomized controlled trials, with regenerative chondrocyte-based techniques (ACI/ACT and MACI/MACT) and microfracture being the most frequently studied treatments. Most articles focused on the knee were published between 1990-2017, particularly 2001-2006, and originated primarily from the United States and Sweden.

Conclusion

This bibliometric analysis identified the 50 most-cited clinical articles in cartilage surgery and revealed that autologous chondrocyte implantation and mesenchymal stem cell-based therapies

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dominate the literature in terms of academic impact. The majority of influential studies originated from Europe, but growing contributions from North America and Asia underscore the global expansion of cartilage repair research. Despite advancements, most top-cited studies remain early-phase clinical series with modest methodological quality, reflecting the continued need for high-level, long-term comparative trials.

Increased transepithelial Muc2 in Peyer's Patches of the CFTR KO intestine

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Introduction

Cystic fibrosis (CF) is caused by mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene. Loss of CFTR function in the intestine results in thick mucus accumulation, dysbiosis, and obstruction. Previous studies demonstrated Muc2, the primary gel-forming mucin in the small intestine, transverses the dome epithelium of Peyer's patches (PP) and confers tolerance to CD11c+ dendritic cells (DCs). In CF, altered mucus may disrupt this process and contribute to intestinal immune dysregulation.

Methods

PP from 2–3 month old Cftr knockout (KO) mice and sex-matched wild-type (WT) littermates were collected. PPs were fixed, embedded in OCT, and sectioned at 11 μm. Muc2 was detected by indirect immunofluorescence and imaged using confocal microscopy. Fiji software was used to quantify Muc2 within each PP. Statistical comparisons of Muc2 content between Cftr KO and WT PP were performed using unpaired t-tests (SigmaPlot® 14.0), with significance set at $p < 0.05$. Results are reported as mean ± standard error.

Results

Analysis included 5 WT and 6 Cftr KO mice. Muc2 in the jejunal PP was assessed in the sub-dome region (0–50 μm from the epithelium) rich in DCs and in the interior (50–150 μm from the epithelium). Muc2 quantity was significantly greater in the sub-dome region in the Cftr KO PP (7.829 ± 1.859) than in the WT PP (1.485 ± 0.702; $p=0.0213$). No significant difference was identified in the interior region. Ongoing studies are isolating CD11c+ DCs from WT and Cftr KO PP via MAC sorting to assess transcriptional expression of inflammatory proteins.

Conclusion

Subepithelial Muc2 in Cftr KO PPs is increased compared to WT. If Cftr KO Muc2 replicates that of WT, we hypothesize that the CD11c+ DCs from Cftr KO PP are abnormally tolerant and have suppressed expression of pro-inflammatory cytokines relative to WT DCs.

Hepatocyte-specific deletion of LARP6 attenuates the progression of metabolic dysfunction-associated steatohepatitis

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Introduction

Metabolic dysfunction-associated steatohepatitis (MASH) is a progressive and chronic liver disease, affecting millions worldwide, and is characterized by hepatic lipid accumulation, inflammation, and escalating fibrosis. La-related protein 6 (LARP6) is an RNA binding protein that enhances collogen mRNA stability promoting extracellular matrix deposition and fibrosis. Given the central role of collagen dysregulation in MASH,

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we hypothesize that LARP6 protein acts a key regulator of fibrosis during MASH progression.

Methods

To determine the role of LARP6 in MASH, we performed adenovirus-mediated overexpression of LARP6 in primary hepatocytes and analyzed the effects on several fibrotic and inflammation related genes. Additionally, hepatocyte specific LARP6 Flox mice were fed a western diet [carbohydrate = 40.8% kCal (17.8% of total calories from high fructose corn syrup), protein = 16.2% kcal, fat = 42.9% kCal, and 2% cholesterol] for 4 weeks then underwent liver histological evaluation and molecular analysis of inflammation and fibrosis-related genes.

Results

Overexpression of the LARP6 gene ($p < 0.0001$) in primary hepatocytes significantly increased proinflammatory gene IL-1b ($p < 0.05$), as well as the fibrosis markers TGFb ($p < 0.0001$) and PDGFb ($p < 0.0001$). Furthermore we found hepatocyte-specific LARP6 depletion in mice fed a western diet ($p < 0.05$) significantly decreased inflammation ($p < 0.05$), ballooning ($p < 0.01$) , NAS ($p < 0.001$), and fibrosis ($p < 0.01$), while having little to no effect on steatosis. Furthermore, levels of the mitochondrial related genes, BNIP3 ($p < 0.05$) and TFAM ($p<0.05$) significantly increased with the deletion of the LARP6 protein, suggesting a link between LARP6 and mitochondrial function under the context of MASH.

Conclusion

These data strongly support our hypothesis that LARP6 protein may be a viable therapeutic target for MASH by suppressing fibrotic mRNAs in hepatocytes.

The expression of SerpinE2 is important to overcome progesterone resistance in endometrial hyperplasia

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Introduction

Progesterone (P4) therapy is the standard fertility-sparing treatment for complex atypical hyperplasia (CAH) and early-stage endometrial cancer (EC); however, response rates vary, and the mechanisms underlying P4 resistance remain poorly understood. Our lab previously developed two MIG-6 knockout mouse models that exhibit P4-responsive and P4-resistant endometrial hyperplasia, closely resembling human disease. RNA-sequencing identified SerpinE2 as significantly varied between these models. SerpinE2 is implicated in tumor progression across multiple cancers, including EC. Although its relationship to steroid hormone signaling remains unclear, endometrial SerpinE2 expression increases during the P4-dominant secretory phase, suggesting a potential link. Given its possible role in both tumorigenesis and P4 responsiveness, we used immunohistochemistry to confirm altered SerpinE2 expression between our mouse models.

Methods

We performed RNA-seq to identify candidate genes associated with P4 responsiveness in MIG-6 knockout mouse models: epithelial KO (Sprr2fcre/+ Mig-6f/f) and epithelial/stromal KO (PRcre/+ Mig-6f/f). Ingenuity Pathway Analysis (IPA) was used to identify the top 20 altered pathways of the vehicle-treated comparison. These pathways were then evaluated via targeted literature review for relevance to steroid hormone signaling and endometrial tumorigenesis. Immunohistochemistry analysis for SerpinE2 was conducted to validate differential expression between the two models.

Results

Immunohistochemical analysis revealed significantly higher epithelial SerpinE2 expression ($p = 0.001$) in P4-resistant mice (127.67 ± 17.72) compared to P4-responsive mice (55.33 ± 8.76), consistent with RNA-seq findings. However, stromal SerpinE2 expression was not different ($p = 0.1784$) between P4-resistant mice (40.00 ± 6.96) compared to P4-responsive mice (24.00 ± 8.59).

Conclusion

Elevated SerpinE2 expression in the P4-

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resistant hyperplasia model suggests it may contribute to progesterone resistance and disease progression. These findings provide a foundation for future studies to clarify SerpinE2's involvement in steroid hormone signaling and its role in treatment resistance.

Research supported by NIH R01HD112332

Sulfur mustard exposure induced alterations in rabbit limbal stem cells in vivo

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Introduction

Limbal stem cell (LSC) are transient cells that either reside dormant in the limbal crypt of the cornea or activate to replenish the epithelium after an injury. Sulfur mustard (SM), a chemical warfare agent, was used as the model of injury since it is known to cause debilitating eye injuries even 30 years after initial exposure. This study observes the functional changes in LSC in rabbit corneas up to 12 months post SM exposure.

Methods

Thirty New Zealand White rabbits were randomly assigned to two groups naïve or SM-exposed (200mg-min/m3 for 8 min). At the designated end timepoints (day 14, 2 months (m), 4m, 8m, and 12m), six SM-exposed rabbits were selected for imaging and tissue collections and one untreated rabbit was used as a control at each timepoint. Corneal tissues were collected and processed to make serial 8-µm sections and cDNA for immunofluorescence and qRT-PCR to measure the expression of early stem cell marker (ABCG2), progenitor cell marker (ABCB5), proliferative stem cell (p63α), and LSC cytokeratin marker (K15).

Results

At 14 days post-SM, a significant surge of LSC activation and proliferation was detected. Followed by a decrease in LSC activation but an increase in progenitor epithelial cells at 2m post-SM. Surprisingly, at 4m post-SM the corneal limbus had a mixed population of activated LSC, LSC undergoing proliferation, progenitor epithelial cells (PEC), and PEC that maintained stemlike properties. At 8m and 12m post-SM, the number of LSC undergoing proliferation decreased and the corneal limbus was interspaced with colonies of activated LSC enveloped by PEC with stemlike properties. LSC remained dormant in all naïve corneas at all tested timepoints.

Conclusion

Following SM exposure, LSCs enter a flux in which they undergo a dormant phase followed by an active proliferative phase, reflecting a complex, time-dependent response aimed at epithelial repair.

Investigation of effects of western diet and endothelial cell mineralocorticoid receptor on cerebral blood flow in male mice

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Introduction

The endothelial cell mineralocorticoid receptor (ECMR) is implicated in the inflammation-mediated pathogenesis of western diet-induced metabolic disorders. The resulting endothelial dysfunction plays a deteriorating role on the brain via blood brain barrier breakdown, chronic neuroinflammation, and impaired metabolic support, exacerbating neurovasculature-related

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cognitive decline. This study was designed to examine the effects of a western diet on wild type (WT) and ECMR knockout male mice on cerebral blood perfusion (CBF) of three regions of interest (ROI) in the brain: the cortex, hippocampus, and thalamus.

Methods

WT and ECMR KO C57Bl6/J mice were maintained on either a control or western diet. In vivo continuous arterial spin labeling MRI was performed to create perfusion-weighted images of key ROI in mice brains. Perfusion images were evaluated using the ITK-SNAP software and mean perfusion intensity was gathered for each segmentation and a group-to-group statistical comparison was made. In vivo magnetic resonance spectroscopy data in these mice were performed at 12 months of age in each mouse to compare metabolite levels between groups.

Results

Male mice showed no significant reductions of CBF between western diet and control diet groups. However, females in the western diet WT cohort exhibited lower thalamic perfusion compared to males in the same cohort ($p=0.0189$). ECMR KO preserved normal CBF levels despite a western diet across female groups and when comparing male to female groups.

Conclusion

Although male mice group comparisons showed no significance, this study suggests the presence of a compensatory mechanism of western diet-impacted CBF in male mice. The significant decrease of thalamic perfusion from male to female western diet WT mice demonstrates a sex-specific difference in the mechanisms of CBF regulation. Future steps include further evaluation of spectroscopy data to investigate male mice metabolic differences compared to females. DP-43^{Q331K} mice have impaired intrinsic excitability and diminished PICs in LVPNs, accompanied by decreased 5-HT2C receptor colocalization. These findings implicate serotonergic dysregulation as a driver of cortical motor deficits in ALS and point to 5-HT2C signaling as a potential therapeutic target.

Novel ex vivo corneal model to study the effects of mustard gas

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Introduction

Sulfur mustard (SM) is an alkylating and vesicating agent frequently used in warfare and terrorism, capable of inflicting devastating ocular injuries and blindness. Recently, we established SM induces corneal myofibroblast (CMF) formation, irregular extracellular matrix (ECM) remodeling, and ferroptosis in rabbit eyes in vivo and in corneal stroma fibroblasts (CSF) in vitro. This study aims to further our understanding of the effects of mustard gas exposure to human corneas by developing a human ex vivo cornea model.

Methods

Healthy cadaver human corneas were purchased from the Saving Sight Foundation. Corneas were maintained in corneal stromal fibroblast (CSF) media and exposed to 0nM, 100nM, or 500nM nitrogen mustard (NM, a SM analogue) via soaking an 8 mm filter paper disk and placing at the central cornea for 30 seconds. At five days post-exposure, corneas were sectioned, and cDNA was made to assess for structural and molecular changes. qRT-PCR analyzed for myofibroblast markers (α-SMA and SMAD2/3), ECM markers (LOX, and COLI/III), and ferroptosis markers (p38 MAPK, ACSL4, GPX4, SLC7A). Immunofluorescence evaluated phospho-SMAD, PI3K, Lipid peroxidation (LPO), and reactive oxygen species (ROS) and structural and collagen changes were measured with H&E staining, Mason Trichrome, and picrosirius red (PSR).

Results

NM exposed corneas had a significant dose-dependent increase in myofibroblast formation, ECM production, and ferroptosis.

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Immunofluorescence confirmed activation of SMAD, PI3K, LPO, and ROS pathways in corneas exposed to 100nM and 500nM of NM compared to 0nM group. Mason Trichrome and PSR showed a significant increase in COLI and COLIII production in 100nM and 500nM of NM compared to 0nM group.

Conclusion

NM exposure to human corneas ex vivo replicated SM toxicity identified in rabbit corneas in vivo and CSF in vitro. Thus, making this a potential model to delineate new mechanisms of mustard gas toxicity to human corneas.

House sparrow ACE2 supports entry of BANAL-20-52, a SARS-CoV-2-related bat coronavirus

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Introduction

Coronaviruses (CoVs) are classified into four genera, including Alphacoronavirus, Betacoronavirus, Gammacoronavirus, and Deltacoronavirus, and infect a wide range of vertebrate hosts. In birds, however, reported coronaviruses are restricted to the Gammacoronavirus and Deltacoronavirus genera, with no evidence of Betacoronavirus susceptibility. BANAL 20-52, a coronavirus isolated from Rhinolophus malayanus bats, shares 96.8% genome-wide and 98% spike protein identity with SARS-CoV-2 and has been reported to have a broad mammalian host range. Here, we investigated whether BANAL-20-52 can engage avian receptors.

Methods

We expressed and purified the receptor binding domain (RBD) of Wuhan and BANAL-20-52 CoV, along with angiotensin-converting enzyme 2 (ACE2) receptors from human and avian species and determined the equilibrium dissociation constant values (KD) by Bio-layer interferometry. We performed syncytia formation assay by mixing HEK293T ACE2 knock out (KO) cells expressing Wuhan or BANAL-20-52 spike with cells expressing human, starling, house sparrow ACE2 or empty vector. Images were taken 24 hr later. We transduced ACE2 KO cells stably expressing human, house sparrow or empty vector with pseudovirus carrying either Wuhan or BANAL-20-52 spike. Pseudovirus transduction efficiency was determined by luciferase activity.

Results

We found that both BANAL-20-52 and Wuhan SARS-CoV-2 RBD bound with high affinity to human ACE2 proteins, but not to starling or pigeon ACE2. Unexpectedly, BANAL-20-52, but not Wuhan SARS-CoV-2, bound to house sparrow ACE2. Functional assays further demonstrated that BANAL-20-52 spike, but not Wuhan spike, induced syncytia in cells expressing house sparrow ACE2, and BANAL-20-52 pseudoviruses were able to enter these cells, confirming receptor compatibility.

Conclusion

Our findings provide the first evidence that an avian ACE2 can support entry of a SARS-CoV-2-related Betacoronavirus, expanding known host boundaries and raising new considerations for coronavirus ecology and zoonotic potential.

Characterization of myocarditis induced by PD-1 and CTLA-4 inhibition with concurrent radiation

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Introduction

Dual immune checkpoint inhibitor (ICI) therapy combined with radiation is an emerging treatment strategy for cancers such as non-small cell lung cancer. While cardiotoxicity from PD-1 blockade with radiation has been described, the underlying mechanisms of myocarditis caused by dual ICI therapy with concurrent radiation remain poorly understood. This study investigated the incidence and immune profile of myocarditis resulting from anti-PD-1 and anti-CTLA-4 therapy with concurrent radiation.

Methods

Eight-to-twelve-week-old A/J mice were treated with dual ICI or control antibody via intraperitoneal injection on Day −1. Half of each group received 20 Gy thoracic radiation on Day 0. Dual ICI therapy was administered every 3 days until Day 21. Myocarditis was assayed by heart histology of inflammation. Immunoglobulin G (IgG) and complement deposition in the hearts were characterized by immunohistochemistry and immunofluorescence assay.

Results

Mice receiving dual ICI plus radiation developed a high incidence of myocarditis characterized by immune infiltration and fibrosis. The most severe pathology occurred in the combination group compared with dual ICI alone or radiation alone. Infiltrates were predominantly CD4+ and CD8+ T cells, neutrophils, and macrophages. Immunohistochemistry revealed extensive macrophage infiltration with complement and autoantibody deposition in cardiac tissue after ICI and radiation treatment. Circulating cardiac-specific autoantibodies were detected in affected mice.

Conclusion

These findings parallel prior evidence that PD-1 blockade with radiation induces autoantibody-mediated cardiotoxicity. However, myocarditis from dual ICI with radiation occurred with greater incidence and severity, suggesting amplification of a similar autoantibody-driven mechanism. Ongoing studies will further define the immune mechanisms underlying this toxicity and explore therapeutic strategies blocking autoantibody production and complement pathways to mitigate cardiovascular risk while preserving antitumor efficacy.

AI Clinical Synopsis: Leveraging Large Language Models for Context-Aware Summarization of ED Notes for Radiology

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Introduction

Reviewing electronic health records (EHR) for relevant information is a crucial step in radiologic interpretation. However, the process is time-consuming, using up to 20% of radiologist diagnostic effort, and contributes to delays in turnaround time (TAT). This burden is most evident in the emergency setting, where rapid and accurate imaging interpretation is essential. Large language models (LLMs) have demonstrated potential in text summarization and may help generate structured, concise, and clinically relevant summaries from emergency department (ED) notes, reducing radiologist workload.

Methods

We retrospectively collected 900 exam–note pairs for adult ED patients imaged between October-December 2024 (mean age 63.3 years, 561 females, 339 males). Imaging exams included 873 CT and 27 MRI studies across abdominal (n=355), neurologic (n=341), chest (n=163), and musculoskeletal (n=41) categories. Notes were deidentified and preprocessed by removing orders, reconciliations, disposition, and imaging results to simulate pre-interpretation context. Three radiologists annotated notes to create human-

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generated gold standard summaries. Nine open-source LLMs were evaluated using custom prompts, including Phi-4-14B, Qwen3-14B, LLaMA-3.2-3B, LLaMA-3.3-70B, Gemma-2-27B, Gemma-3-27B, MedGemma-27B, Granite-3.3-8B, and gpt-oss-20B. A hybrid method using cosine similarity (0.05–0.5) was tested to reduce irrelevant tokens. Summaries were compared to human reference using BLEU, ROUGE, METEOR, and BERTScore.

Results

Evaluated LLM showed variability in their performance of generating imaging relevant clinical summaries. Gemma-2-27B achieved the best performance (BERTScore-F1=0.939, BLEU=0.295, METEOR=0.466, ROUGE-Lsum=0.370), followed by MedGemma-27B and Qwen3-14B (BERTScore-F1≈0.934; METEOR 0.420–0.432; ROUGE-Lsum 0.337–0.342).

Conclusion

Open-source LLMs demonstrated a strong ability to generate clinically relevant imaging-oriented summaries of ED notes. Automated summarization may reduce radiologists' EHR review time, improve workflow efficiency, and support faster patient management. Further large-scale validation and alignment with human preference remain necessary.

A retrospective comparison of initial presentation, surgical outcomes, and follow-up adherence between West Bank, Palestine and Missouri, USA

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Introduction

Cataracts are the leading cause of preventable blindness, with significant disparities in access to early diagnosis and surgical intervention. This retrospective study compares patients who underwent cataract extraction and intraocular lens placement in the U.S. and Palestine, highlighting challenges in resource-limited settings and disparities in presentation and access to timely surgery.

Methods

De-identified patient data was collected from 400 patients (200 from Hugo Chavez Ophthalmic Hospital in the West Bank, Palestine [PAL], and 200 from Mason Eye Clinic in Columbia, MO [U.S.]). Inclusion criteria were age ≥30 years, a confirmed cataract diagnosis, and complete pre- and postoperative data. Patients with concurrent ocular pathologies that could affect visual outcomes were excluded. Phacoemulsification was the surgical technique used in both groups. Post-op, steroid and antibiotic eye drops were given. Data collected included demographics, comorbidities, cataract subtype, visual acuity, intraocular pressure, intraoperative complications, and post-op outcomes.

Results

Palestinian patients were younger on average but presented with more severe visual impairment (<20/200 compared to 20/80 in the U.S. , $p<0.0001$). Palestinian patients also had a higher prevalence of diabetes and hypertension, as well as a greater number of cortical cataracts. Despite these differences, post-operative visual acuity, intraocular pressure, and complication rates were similar. Long-term follow-up rates, however, were significantly lower in Palestine, and were 23% at 3 months and 38% beyond 6 months in the U.S., versus 58%, and 13.5% respectively in Palestine ($p<0.0001$).

Conclusion

Palestinian patients present with advanced cataracts, highlighting a need for earlier intervention to prevent prolonged visual deficits and improve quality of life. Lower follow-up rates in Palestine, especially among a population with higher rates of diabetes and hypertension, underscore a need for patient education to emphasize long-term follow-up for the early detection of silent complications and sustained visual health.

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Identifying gaps in American Heart Association-endorsed statements and guidelines: A topic modeling and gap analysis study

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Introduction

The American Heart Association shapes cardiovascular science and clinical care through its influential guidelines, statements, and advisories. However, the extent to which these publications align with evolving cardiovascular health priorities has not been systematically evaluated. Identifying underrepresented areas is essential for directing future funding and ensuring equitable and evidence-based care.

Methods

We conducted a meta-epidemiological study of AHA-endorsed research from 1995-2025. Eligible publications included official AHA documents authored by appointed writing groups or task forces. Excluded were commentaries, editorials, and non-official AHA documents. Screening was performed using Covidence, yielding 893 eligible publications. Topic modeling and evidence mapping were applied to characterize research focuses. Also, author demographic and journal distribution were assessed to identify trends in representation.

Results

Publication volume increased substantially after 2000, peaking in 2023 with 54 publications. The median number of authors per paper remained relatively stable at 10 though some publications exceeded 40 authors. Female authorship increased from less than 10% in the 1990s to over 50% by 2025, reflecting significant change in gender representation. The majority of publications originated in Circulation and Stroke journals with smaller contributions from other specialty journals. Topic analysis indicates that in early years (before 2005), publications clustered around foundations areas such as practice guidelines and cardiac arrest/CPR. After 2010, research expanded into women's health, genetics, and pediatric/adolescent cardiovascular disease. More recently (2017-2025), publications have become increasingly concentrated in epidemiology, stroke, and healthcare disparities.

Conclusion

AHA-endorsed publications have expanded in volume and diversity with significant increase in female authorship. Also, research is concentrated in leading cardiovascular journals. Topic modeling demonstrates a temporal shift from guideline-driven and resuscitation-focused publications toward broader population health and disparities publications. These trends provide important insight into the evolution of AHA-supported publication.

Veterans radiogenic diseases of bone marrow: Operation castle bravo

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Introduction

Ionizing radiation (IR) exposure, through purposeful detonations or accidental exposures, has long-term health consequences for both military veterans and civilians. The hematopoietic system is particularly radiosensitive due to its high cell turnover. This case study highlights the potential link between historic nuclear exposure and subsequent bone marrow malignancies.

Methods

A previously healthy, elderly veteran presented in July 2009 with neutropenia, thrombocytopenia, fatigue, and rash following a tick bite. His medical

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history revealed service in a Naval Construction Battalion stationed on Kwajalein Atoll during Operation Castle (Bravo) in 1954, the largest hydrogen bomb test in U.S. history. Department of Defense records confirmed his presence during the detonation.

Results

Laboratory studies showed: WBC 1.3×10^3/mL, hemoglobin 12.2 g/dL, hematocrit 35.1%, and platelets 80×10^3/mL. Bone marrow evaluation diagnosed Myelodysplastic Syndrome with Excess Blasts progressing to Acute Myeloid Leukemia (AML). Despite treatment with the demethylating agent azacitidine (Vidaza), his condition rapidly deteriorated, and he passed away approximately one month of presentation.

Conclusion

This case illustrates the potential delayed hematologic effects of IR exposure in military personnel. Bone marrow is highly radiosensitive due to its rapid cellular turnover. Age-related accumulation of somatic mutations can drive clonal expansion and progression to hematologic malignancy. While the carcinogenic effects of high dose ionizing radiation are well established, no safe lower threshold has been identified. Even low-level exposures, such as those on Kwajalein Atoll, may increase cancer risk. While the Department of Veterans Affairs recognizes many cancers and leukemias as service-related to radiation, pre-leukemic marrow disorders remain excluded despite their role as precursors to AML. These findings underscore the need for: Detailed service history when evaluating veterans with hematologic disease. Consideration of IR exposure in marrow disorders within VA policy. Further research into the long-term effects of low-dose IR exposures from historic nuclear testing.

Mediodorsal thalamic nucleus: A potential therapeutic target in drug-resistant epilepsy

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Background

There is strong evidence that deep-brain stimulation (DBS) of the anterior nucleus (ANT) can reduce seizures in patients with drug-resistant limbic network epilepsy. Yet, whether other thalamic nuclei could be involved in the propagation of seizures is unclear. Although the mediodorsal thalamic nucleus (MD) is likely to play a role in the propagation of focal epileptic activity in frontal or temporal lobe epilepsy, the MD is not an established DBS target. Here, we present preliminary results of a literature review focused on the role of MD in the propagation of seizures in patients with focal temporal lobe epilepsy.

Methods

We have searched the Cochrane Library, PubMed, and Embase from their inception to the present for the following words: MD, thalamus, neuromodulation, DBS, stereotactic EEG , TLE, and epilepsy (ongoing process).

Results

This search included 10 studies on 206 patients using thalamic stereotactic EEG, imaging, and DBS techniques. Anatomical connections of the MD support its potential role in seizure propagation: briefly, it has reciprocal connections to the i) limbic system, which is involved in alertness, memory, and emotion, and is frequently involved in focal epilepsy, and ii) dorsomedial prefrontal and medial temporal cortices, which play a significant role in memory and mental flexibility, and could contain seizure-generating areas, and iii) globus pallidus/substantia nigra, which play a key role in regulating voluntary movement and motor control. Stimulation of MD further supports this role by activating the ipsilateral orbitofrontal, mesial/lateral frontal, and mesial temporal structures in TLE patients with ANT-DBS.

Conclusion

Understanding the anatomical organization of canonical nodes of a seizure network aids surgical targeting for DBS surgery and ultimately may lead to improved clinical outcomes in this patient population.

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Craniofacial fractures: Time to surgical fixation and associated outcomes and complications

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Introduction

Some believe definitive facial fracture fixation within the first 72 hours following trauma provides better patient outcomes and reduces complication rates. Others believe definitive fracture fixation after 72 hours does not provide a significant difference. This study aims to assess timing of definitive facial fracture fixation and determine the impact on patient outcomes.

Methods

We conducted a retrospective chart review to identify patients who underwent surgical facial fracture fixation at the University of Missouri Health Care from 2015-2023. Patients were stratified into cohorts for early fixation (<72 hours) or delayed fixation (>72 hours), and each patient was followed for 24 months. Outcomes of interest included all-cause complication, infection, and reoperation rates.

Results

In total, 243 patients underwent surgical fixation with 66 classified as early and 177 classified as delayed. All-cause complication rates were comparable between the two groups (36.4% early, 36.2% delayed). Infection rate for early fixation was 10.6% compared to 14.1% for delayed fixation ($p > 0.05$), and soft tissue infection rate was 7.5% for early versus 11.2% for delayed ($p > 0.05$). Rates of wound dehiscence were 0% in the early cohort and 3.9% in the delayed cohort ($p > 0.05$). There was no significant difference in rates of chronic pain between the two groups (4.5% early, 5.0% delayed). The early cohort did experience higher rates of reoperation compared to the delayed cohort (18.2% versus 6.7%; $p < 0.05$).

Conclusion

Timing of definitive fracture fixation does not appear to have an impact on overall complication rates. Reoperation rates were higher in the early fixation cohort. Further analysis could provide insight to if these reoperations were medically necessary or cosmetic in nature. Due to the range of complexity of facial fractures, future research should investigate the timing of fixation and associated complications stratified by fracture pattern.

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Preliminary evaluation of the trial of propranolol in older adults with primary progressive aphasia

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Introduction

Primary progressive aphasia (PPA) is a neurodegenerative syndrome characterized by language impairment with three variants: progressive nonfluent aphasia (speech production), semantic dementia (naming/comprehension impairments), and logopenic progressive aphasia (word finding/language repetition impairments). There are no FDA-approved pharmacological treatments for PPA. We aim to evaluate the effects of serial doses of propranolol on language abilities, anxiety, and global cognition in PPA patients through an ongoing, double-blind placebo-controlled, crossover clinical trial (NCT06066710; PI: Beversdorf).

Methods

PPA patients aged 50+ are randomized to propranolol or placebo conditions for the first 9 weeks and receive the other treatment for 9 weeks after the 1-week taper/washout period. Participants complete a study visit every 4 weeks with measures of global cognition [Mini-Mental State Examination (MMSE)], clinical evaluation of symptom severity [Clinical Global Impression of Severity (CGI-S)], anxiety [State-Trait Anxiety Inventory (STAI)], language abilities for word retrieval [Neuropsychological Assessment Battery (NAB) – Naming Test)], and verbal letter fluency [Controlled Word Association Test (COWAT)]. Raw total scores are used for measures at each study visit.

Results

The total scores for each measure were visualized for the first completed participant (N=1). Given the need to remain blinded until completion of the study, it is speculated that after the washout period the participant received propranolol treatment based on changes in blood pressure and behavioral data. In the anticipated propranolol condition compared to the anticipated placebo-condition, linear trend results showed that NAB-Naming Test, STAI, and MMSE scores increased, while CGI-S and COWAT scores declined.

Conclusion

Overall, findings indicate a potential propranolol benefit. In the suspected propranolol treatment period, an improvement for global cognitive functioning, symptom severity, word retrieval, and letter fluency were observed. A second participant is completing their final visit and nine more are being screened. Future one-way ANOVA analyses will be run on the completed sample size.

Autograft versus allograft medial patellofemoral ligament reconstruction in adolescent patients: Comparable patient-reported outcomes but lower failure rates with autograft

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Introduction

The medial patellofemoral ligament (MPFL) is frequently injured during patella dislocation and commonly reconstructed to restore stability. While MPFL reconstruction (MPFLR) has been shown to improve outcomes, the influence of graft choice remains less well established.

Methods

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A PRISMA-compliant systematic review of PubMed and Scopus computerized databases identified clinical studies reporting outcomes and complications in patients under 19 years of age who underwent MPFLR with at least 2 years of follow-up. Outcomes were separated based on the use of allograft or autograft. Nonclinical, short-term follow-up (<2 years), non-English studies, or studies that did not specify the type of graft used for MPFLR were excluded.

Results

A total of 20 studies (6 allograft cohorts, 16 autograft cohorts), including 596 patients, were included. The mean patient age was 13.9 years (mean range, 10.7-16.2 years) and the mean follow-up was 44.1 months (mean range 24-68.4 months). Mean postoperative Kujala scores ranged from 92.7 to 96.5 in the allograft studies and from 84 to 100 in the autograft studies. The only allograft study that reported pre- and postoperative Kujala scores reported a delta of 20.6 points, while the delta of the autograft studies ranged from 19.9 to 74 points. Across the included cohorts the weighted mean failure rate was 4.7% for autografts versus 12.1% for allografts (range 0–26.1% and 4.5–17%, respectively).

Conclusion

Both autograft and allograft MPFL reconstructions improve patient-reported outcome measures following patellar dislocation in adolescent patients. Autograft reconstructions may provide a lower rate of failure in adolescent patients.

The financial burden of screening echocardiograms in infants with bronchopulmonary dysplasia in the neonatal intensive care unit

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Introduction

Screening for pulmonary hypertension (PH) in infants with bronchopulmonary dysplasia (BPD) is a standard of care recommended by the American Thoracic Society (ATS) in 2015. The definition of BPD changed in 2019 (Jensen et al). The reliability of the association between BPD and PH using the Jensen et al model remains unclear. We estimate the healthcare costs of following the guidelines.

Methods

A retrospective chart analysis was conducted of infants born at less than 32 weeks between January 1, 2020 and Dec 31, 2024 after IRB approval. BPD was defined as per Jensen et al. We routinely screen infants with BPD for PH with a transthoracic echocardiogram at 36 weeks corrected gestational age (CGA), which is read by a pediatric cardiologist. Attention is given to usual markers of PH such as septal flattening, tricuspid valve jet velocity, bulging of interventricular septum into the left ventricle, right ventricular and right atrial dilatation, direction of flow across patent foramen ovale and patent ductus arteriosus. Infants being discharged on home supplemental oxygen get a pre-discharge echocardiogram and are followed by pediatric pulmonology and pediatric cardiology.

Results

Demographic results for 289 infants born at less than 32 weeks were analyzed. 131 infants met criteria for BPD (all grades), all of whom were screened for PH with an echocardiogram at 36 weeks CGA. Only 3 infants screened positive, giving a rate of 3/131 or 2.2%. A total of 276 echocardiograms were performed, averaging 2.04 echocardiograms per infant. Each echocardiogram costs $2,500, costing a total of $352,500 over the five-year period.

Conclusion

The yield of screening for PH in infants with BPD in our cohort is very low. There are significant costs to following national guidelines in infants with BPD.

"Am I Cheating?": Patient perspectives on GLP-1 use for weight loss

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Introduction

GLP-1 receptor agonists are reshaping obesity treatment, yet patient perspectives across stages of use remain underexplored. We characterize thought-provoking patient responses to inform patient-centered care.

Methods

The objective of this mixed-methods study was to explore patients' perspectives on GLP-1 use for weight loss. Eligible participants were 18 years or older, without diabetes. Between March and July 2025, participants completed a 30-item survey and a semi-structured interview of 30 questions focused on their perceptions of GLP-1 medication. Each participant received a $20 e-gift card. Descriptive analyses were conducted using SAS, and coding and thematic analysis were manually performed in Dedoose.

Results

The interview was structured around six GLP-1 experience groups: those considering therapy (Group 1), on therapy for ≤3 months (Group 2), on therapy for >3 months without achieving their weight-loss goal (Group 3), on therapy for >3 months with weight-loss success (Group 4), discontinued after achieving weight-loss goals (Group 5), and discontinued without achieving weight-loss goals (Group 6). Of the 155 participants who consented, 140 completed both survey and interview, representing a 90% participation rate. The sample was primarily White (82%), female (63%), employed full-time (74%), college-educated with at least a four-year degree (75%), married (65%), and reported household income ≥$100,000 (47%), with a mean age of 45 years. Interviews lasted approximately 30 minutes (range 24–36 minutes), and while 21 themes were identified overall, 5 elicited particularly thought-provoking insights: stigma or perceptions of "cheating," responses to others' comments, clinician support, definitions of success, changes while on medication, social life impacts, experiences with significant others on medication, and personal fears or concerns.

Conclusion

Enthusiasm for GLP-1 coexists with stigma, access anxieties, and variable clinician education. Considerable heterogeneity in themes among participants is reflected in this poster and informs actionable recommendations for more patient-centered counseling.

The impact of demographic and clinical factors on meniscus repair outcomes

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Introduction

Meniscal repair aims to preserve function, reduce pain, and delay progression of osteoarthritis. Failure & revisions surgery rates are reported between 15-30%, with significant research evaluating anatomic and surgical factors that may contribute to failure risk. The role of patient and socioeconomic factors on outcomes is less understood. Identifying these factors is essential for optimizing surgical outcomes and guiding postoperative care. Therefore, the aim of this study was to evaluate clinical, surgical, and demographic factors associated with meniscus repair outcomes.

Methods

After obtaining IRB approval, a retrospective chart review identified patients who underwent meniscus repair with a minimum 1-year follow-up. Surgical details, injury mechanism, and clinical outcomes were collected. Failure was defined as revision meniscus surgery (repair or meniscectomy), meniscal transplantation, or total knee arthroplasty. Kruskal Wallis and Fisher exact tests were used to compare variables associated with failure first for the overall cohort, and then by compartment cohort (medial, lateral, bicompartmental).

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Results

A total of 412 patients were included with 76 (18.4%) failures requiring revision surgery. Age, sex, tobacco use, laterality, infection, repair type, injury mechanism, and concurrent ligament repair were not significantly associated with failure in the overall cohort or for any of the compartment subgroups. For patients that underwent lateral meniscus repair only, Medicaid (p=0.048), marital status as single (p=0.040), patients who underwent a lysis of adhesions to address arthrofibrosis (p=0.033), and race classified as Black/African American (p=0.017) were significantly more likely to fail. For bicompartmental meniscus repair, failure was significantly associated with race classified as Black/African American or other (p=0.004).

Conclusion

For patients undergoing lateral meniscus repair, Medicaid status, being single, and being of Black/African American race were significantly associated with failure, suggesting that social determinants of health may impact recovery. Understanding and addressing these disparities is key in improving long-term outcomes following meniscus repair.

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Biochemical Control in Localized Prostate Cancer: A Retrospective Comparison of Five Radiation Modalities

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Introduction

While various radiation modalities are used to treat localized prostate cancer, there is limited data directly comparing their effectiveness. This retrospective study assesses and compares biochemical control rates using PSA-based outcomes across five distinct radiotherapy techniques.

Methods

We conducted a retrospective analysis of 277 patients treated at a single institution between 2017 and 2025. Patients were divided into five treatment groups: Prostate Seed Implant (PSI), PSI plus Intensity-Modulated Radiation Therapy (PSI+IMRT), IMRT alone (IMRT), Adaptive Radiation Therapy (ART), and Stereotactic Body Radiation Therapy (SBRT). We defined biochemical recurrence using the Phoenix criteria and performed Kaplan-Meier survival analysis.

Results

The final analysis included 255 patients. Biochemical recurrence occurred in 17 patients (6.7%). The 5-year biochemical failure-free survival (BFFS) was 93.8% for the PSI group, 94.7% for the PSI+IMRT group, and 94.0% for the IMRT only group. The ART and SBRT cohorts showed excellent short-term control, though these results were limited by smaller sample sizes. We also observed that the time to PSA nadir and the nadir levels varied across the different modalities.

Conclusion

Our findings suggest that radiotherapy modalities for localized prostate cancer provide comparable and favorable biochemical control. We recommend larger studies with longer-term follow-up to evaluate efficacy, evaluate this across different risk groups, evaluate for other demographic factors, and assess long-term toxicity and quality-of-life outcomes.

Recurrent Abdominal Pain: An Atypical Food Allergy in a Pediatric Patient

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Introduction

Alpha-gal syndrome (AGS) is a delayed IgE-mediated allergy to galactose-α-1,3-galactose, a carbohydrate found in mammalian meat. Sensitization typically follows tick exposure, and while increasingly recognized in adults, AGS remains rare and underdiagnosed in children.

Methods

We describe a 13-year-old female who presented with recurrent abdominal pain, nausea, vomiting, fatigue, and visual disturbances. Extensive evaluation, including labs, imaging, neuromodulator trials, and gastroenterology consultation failed to identify a cause. A positive Carnett's sign raised suspicion for abdominal wall pain, and she underwent trigger point injections with partial relief. Ultimately, allergy testing revealed elevated alpha-gal-specific IgE levels and confirmed alpha-gal syndrome. Strict dietary avoidance led to complete resolution of symptoms, and previously planned endoscopy was canceled.

Results

This case highlights the diagnostic complexity of AGS in pediatric patients, where gastrointestinal and systemic symptoms may mimic functional, gynecologic, or motility disorders. Specifically, multisystem presentations of AGS, including fatigue, visual symptoms, and GI distress, may serve as misleading clinical clues for functional or postinfectious syndromes, delaying diagnosis. This case also stresses the importance of environmental exposure history and dietary correlation in evaluating unexplained abdominal pain. In regions

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where tick bites are endemic, AGS should be included in the differential, even in the absence of classic allergic features like urticaria or anaphylaxis.

Conclusion

In this report, we highlight an atypical presentation of alpha-gal syndrome and underscore the importance of thorough history-taking and timely recognition of the condition. Greater awareness among pediatricians and gastroenterologists can reduce unnecessary and invasive diagnostic procedures, prevent prolonged symptom burden, and improve outcomes through targeted dietary management for patients with AGS.

Comparisons of Outcomes Between Patella Mesh Plate and 2.7mm Variable Angle Locking Patella Plating System: A Retrospective Cohort Study

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Introduction

Patella fractures can present as complicated fractures in trauma care due to the articular surface of the patella, small fragments requiring fixation, and location of the patella within the patellar tendon, these fractures present many challenges. While orthopaedic surgeons have previously utilized a mesh plate and screw fixation to manage patella fractures, a new 2.7mm variable angle locking plate has been developed for managing patella fractures. There is a lack of data comparing the gold standard, mesh plate fixation, to the 2.7mm variable angle locking plate.

Methods

Patients undergoing patella fracture fixation at the University of Missouri from 1/1/2010 to 2/1/2025 were identified. Patients were excluded from the current study if they did not undergo fracture fixation with a mesh plate or 2.7mm locking plate. Patients undergoing fracture fixation with each respective construct were grouped. Medical records were then used to collect data on fracture details, follow-up information, surgical details, as well as major complications and loss of fixation. Data collection is ongoing and will be finished shortly. Descriptive and comparative statistics will be performed to compare outcomes between each fracture fixation groups.

Results

Data collection for the current study is currently ongoing. Final demographics included a total of 101 patients after exclusion was conducted with 41 patients (18 male, 23 female) being added to the 2.7mm locking plate cohort and 60 patients (26 male, 34 female) being added to the mesh plate group. There was a mean age of 56 and mean BMI of 28.95 for the 2.7mm locking plate cohort as well as a mean age of 48.7 and mean BMI of 29.9 for the mesh plate cohort. Data will be analyzed prior to Health Science Research Day.

Conclusion

Conclusion will be drawn from the final statistical results coupled with previously published clinical and biomechanical data.

The Missouri ConnectED Program: Addressing Social Determinants of Health in Urgent and Emergent Care Settings

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Introduction

Social determinants of health (SDOH) significantly impact child well-being, yet most screening programs are limited to primary care settings. A pilot study at the University of Missouri

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Emergency Department showed that families seeking urgent care have higher burdens of SDOH needs compared to those in primary care, highlighting the need for screening and intervention. The Missouri ConnectED program aims to address this deficit by implementing an electronic SDOH screening and intervention tool in these locations.

Methods

This study employed a cross-sectional design to analyze data from 552 completed screeners, collecting data on 12 distinct social needs, caregiver employment status, and insurance type. Descriptive statistics were used to quantify the prevalence of SDOH needs, rate of assistance requests, and associations between socioeconomic factors and positive screeners.

Results

Of the 552 families screened, 193 (34.96%) screened positive for ≥1 SDOH need. Among positive screens, 48 families (24.87%) requested assistance. The most prevalent SDOH needs were tobacco use at home (60.62%), food scarcity (47.15%), and lack of childcare (24.87%). A strong association was found between the presence of SDOH needs and both caregiver employment and the child's insurance status. Families with public or "other" insurance had a significantly higher rate of positive screens (43.03% and 42.31% respectively) compared to those with private insurance (18.13%). Similarly, employed caregivers showed a higher rate of positive screens (55.56%) than unemployed caregivers (45.45%).

Conclusion

The Missouri ConnectED program is an effective model for identifying a high prevalence of SDOH needs in urgent and emergent healthcare settings. The data suggests that SDOH screening is not only feasible but also identifies significant needs, particularly related to food insecurity and home environment safety. Future research will assess the effectiveness of the intervention component and long-term impact on family well-being.

A Proton MR Spectroscopic Study of Somatosensory Cortex in Chronic Stroke

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Introduction

The somatosensory cortex (SSC) plays an essential role in hand motor recovery after stroke, yet the underlying metabolic alterations possibly supporting this role remain poorly understood. Our group previously reported functionally relevant changes in neuronal-glial interactions in motor cortices after stroke. This study extended this work to investigate whether metabolites specific to neuronal-glial interactions, neuroinflammation, or cortical excitation are altered in the SSC in chronic stroke and whether these alterations relate to the hand motor impairment.

Methods

Sixteen ischemic subcortical stroke survivors (>six months post-onset) exhibiting hand impairment (Fugl-Meyer mean±SD, 44.4±19.7) but without sensory deficits, and ten matched healthy controls participated. Multivoxel MR spectroscopy was used to quantify metabolites involved in post-stroke reorganization, i.e., N-acetylaspartate (NAA-neuronal marker), myo-inositol (mI-glial), glutamate-glutamine complex (Glx-glutamatergic neurotransmission), and choline-containing compounds (Cho-neuroinflammation), in the radiologically intact SSC in the injured hemisphere. Metabolite concentrations (LCModel) were corrected for brain tissue composition within spectroscopic voxels (Matlab 2023a). Comparisons and correlation analyses were performed (SPSS v26).

Results

Compared to controls, stroke survivors showed significantly lower NAA ($p=0.018$), but no significant differences for other metabolites ($p>0.05$ for all), indicating that these alterations are pretty selective in nature. Significant correlations were found between specific metabolites, NAA-Glx, $r=0.73$, $p=0.001$, mI-Glx, $r=0.51$, $p=0.046$, and mI-Cho, $r=0.68$, $p=0.004$; these correlations did not

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reach statistical significance in controls (all p>0.05), suggesting a possible reorganization of the intercellular communication. No significant correlations were found between metabolites and hand motor impairment (p>0.05 for all); more work is needed to understand the nature of these relationships.

Conclusion

Our findings demonstrated persistent neuronal alterations and altered metabolic relationships in the spared SSC, supporting the hypothesis that post-stroke reorganization of this area occurs at the cellular-molecular level in this phase of stroke. Further work on the functional relevance of these reorganizational alterations is warranted.

Long term outcomes of combined phacoemulsification and excisional goniotomy with the Kahook Dual Blade

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Introduction

Glaucoma is the leading cause of irreversible blindness worldwide, and cataracts remain the most common cause of visual impairment. The Kahook Dual Blade (KDB) goniotomy has been shown to reduce intraocular pressure (IOP) when performed alone or in combination with phacoemulsification (phaco-KDB). Unfortunately, there is a paucity of literature on long-term outcomes. This study presents one of the longest follow-up analyses of phaco-KDB.

Methods

We conducted a retrospective chart review of patients who underwent phaco-KDB by three glaucoma specialists at the University of Missouri between 2017 and 2019. Eyes were eligible if they had ≥60 months of postoperative follow-up. Collected data included demographics, IOP, number of glaucoma medications, adverse events, and need for secondary procedures. Paired t-tests were used for IOP comparisons, and Wilcoxon signed-rank tests for medication use. Surgical success was defined as IOP ≤18 mmHg with either ≥20% IOP reduction or ≥1 medication reduction from baseline.

Results

A total of 114 eyes from 82 patients were included, with mean age 68 years (range, 50–90). Mean baseline IOP was 17.2 mmHg (SE 0.6), decreasing to 13.9 mmHg (0.4), 13.7 mmHg (0.5), and 14.2 mmHg (0.5) at 60, 72, and 84 months, respectively (p<0.005). Mean medication use was 2.0 (SE 0.1) at baseline and 2.0 (0.2), 1.8 (0.1), and 2.1 (0.2) at the same endpoints, respectively. Surgical success was achieved in 56.1%, 55.4%, and 57.4% of eyes at these endpoints, with ~15% meeting both IOP and medication criteria.

Conclusion

Phaco-KDB demonstrated sustained, statistically significant IOP reduction through 84 months, with more than half of eyes maintaining surgical success. Medication reduction was most evident during the first postoperative year but not maintained long-term. Most adverse events occurred early, with few long-term complications. These findings support the role of phaco-KDB as a durable surgical option for long-term IOP control.

Predicting Mortality After Transcatheter vs. Surgical Aortic Valve Replacement: Insights from a Real-World Retrospective Cohort Study

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Introduction

Aortic stenosis (AS) is the most common acquired valvular heart disease in developed nations. While surgical aortic valve replacement (SAVR) has long been the gold standard, transcatheter aortic valve replacement (TAVR) has become an increasingly common alternative across risk groups. Despite randomized trial evidence showing comparable survival, variability in real-world outcomes persists, underscoring the need for individualized risk prediction. We aimed to identify patient-specific predictors of mortality following TAVR and SAVR and to evaluate predictive model performance using real-world data..

Methods

We conducted a retrospective cohort study of 2,497 adult patients with AS treated at the University of Missouri Health Care between 2010–2023, using real-world data. Patients undergoing TAVR (n=2,094; 83.9%) and SAVR (n=403; 16.1%) were included. Demographic, clinical, and procedural factors were extracted, and mortality was the primary outcome. Multivariable logistic regression and random forest models were applied to identify predictors and compare predictive performance.

Results

Overall mortality was 22%, higher among SAVR patients (34%) versus TAVR (20%). Independent predictors of mortality included older age (OR 1.06 per year, 95% CI 1.05–1.08), higher BMI (OR 1.01 per unit, 95% CI 1.00–1.02), Black race (OR 1.92, 95% CI 1.21–2.99), unspecified diagnosis category (OR 2.66, 95% CI 1.40–5.06), and cancer history (OR 1.40, 95% CI 1.10–1.77). SAVR was associated with more than twofold higher odds of mortality compared with TAVR (OR 2.25, 95% CI 1.62–3.11). Model comparison showed superior discriminative performance of random forest (AUC 0.716) versus logistic regression (AUC 0.673).

Conclusion

Mortality following valve replacement is influenced by demographic, clinical, and procedural factors, with SAVR conferring a higher risk than TAVR. Machine learning approaches, particularly random forest, improved outcome prediction and may support individualized treatment decisions. Integrating predictive analytics into preoperative planning could optimize therapy selection and improve survival in AS.

Comparison of Surfactant Therapy in Early and Late Pre-Term Infants

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Introduction

Respiratory consequences are common complications of premature birth. While established guidelines exist for respiratory management of early preterm infants, the best practices have not been described in late preterm infants. A better understanding of these practices could improve respiratory outcomes of premature infants.

Methods

Descriptive, retrospective electronic chart analysis of preterm infants admitted and surviving the neonatal intensive care unit stay at the University Hospital from Jan 1, 2020 to Dec 31, 2024 was performed. Statistical analysis included the Mann-Whitney U test (continuous variables) and the Chi-Squared test (binomial variables), with significance defined as $p < 0.05$. Data was analyzed using Graph Pad prism software.

Results

The cohort included 330 early and 512 late preterm infants. Invasive ventilation was used significantly more often in early preterm infants ($p < 0.00001$), with 143 (47.5%) receiving it compared to 66 (12.9%) in the late preterm group. Early infants also required significantly longer durations of noninvasive (50.07 vs. 5.84 days, $p < 0.0001$) and invasive ventilation (14.35 vs. 1.24 days, $p < 0.00001$). Ventilation settings were recorded at 2 and 6 hours of life, and only the mean PEEP at 2 hours was significantly higher ($p = 0.0006$) in early

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infants (6.54 cm H_2O) compared to late infants (6.20 cm H_2O). Surfactant therapy was administered significantly more in the early preterm group ($p < 0.00001$), with 174 (58.6%) receiving treatment compared to 49 (11.3%) in the late group. Additionally, the average time of first surfactant dose was significantly shorter ($p < 0.00001$) in early infants (269.42 minutes) than in late infants (420.44 minutes).

Conclusion

This study found that late preterm infants received significantly different surfactant management compared to early preterm infants. By evaluating current practices, this project provides valuable insights that can help with the development of future specific gestational age guidelines.

Complications Following Open Reduction and Internal Fixation of Mandibular Fractures: Impact of Surgical Approach and Smoking Status

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Introduction

Intraoral and extraoral approaches for open reduction and internal fixation (ORIF) of mandible fractures are largely determined by surgeon preference, and fracture location. Intraoral approaches have been hypothesized to have greater risks of infection, but this has not been investigated at our institution or sufficiently stratified by patient comorbidities, such as smoking, which is a known risk factor for post-operative complications.

Methods

We performed an IRB-approved, retrospective cohort study of patients who had ORIF for mandible fractures at Mizzou from 2015 to 2023. Patients with no postoperative follow up were excluded. Outcomes of interest included complications (reoperation, hardware failure, infection, refractures, nerve injuries, and scarring). Variables collected included patient demographics, comorbidities, smoking status at the time of surgery, fracture characteristics, and surgical techniques. Patients were stratified by intraoral, extraoral, or combined surgical approaches, and further sub-stratified by smoking status (smokers versus non-smokers). 95% confidence intervals (CI) and fisher's exact tests were calculated with RStudio.

Results

Of the 176 included patients, 85 (48%) had intraoral, 48 (27%) had extraoral, and 43 (24%) had combined surgical approaches for mandible fractures. 90 (51%) were reported smokers and 86 (49%) were reported non-smokers. Overall complication rates were 0.259 (95%CI: 0.178-0.361) for intraoral, 0.271 (95%CI: 0.166-0.410) for extraoral, and 0.372 (95%CI: 0.244-0.521) for combined surgical approaches, with no significant difference (p=0.408). No differences were observed for overall infection rates (p=0.369). Overall infection rates were 0.153 (95%CI: 0.092-0.244) for intraoral, 0.104 (95%CI: 0.045-0.222) for extraoral, and 0.209 (95%CI: 0.114-0.352) for combined surgical approaches. No differences were observed for surgical approaches within the smoker (p=0.28) and non-smoker (p=0.948) groups.

Conclusion

Intraoral, extraoral, and combined surgical approaches for mandible fractures were not associated with higher rates of complications or infections for non-smokers and smokers.

The Impact of Social Determinants of Health on Hirschsprung Disease Outcomes

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Introduction

Hirschsprung disease (HD) is a congenital disorder marked by absence of enteric ganglion cells, causing functional bowel obstruction. Although surgery is the standard treatment, outcomes are influenced by more than surgical technique. Social determinants of health (SDoH)—including socioeconomic status, geography, healthcare access, and disparities—significantly affect postoperative complications and long-term outcomes. This impact remains underexplored in literature. This study examines how SDoH influence HD outcomes in a mixed urban-rural pediatric population.

Methods

A retrospective cohort study included pediatric HD patients from 2014–2024. SDoH were assessed using the Social Vulnerability Index (SVI), Area Deprivation Index (ADI), Childhood Opportunity Index (COI), and distance from the treating hospital. Associations between SDoH metrics and clinical outcomes were analyzed.

Results

Thirty patients (70% male) were included. Most (73%) underwent Yancey-Soave pull-through, 67% laparoscopically. Nearly all (97%) surgeries occurred before age 2; 75% of infants weighed under 4 kg. Subtypes included short-segment HD (77%), long-segment (10%), and total colonic (13%). Median distance to hospital was 38.8 miles (IQR: 35.1–73.8); 82% lived >35 miles away. Hirschsprung-associated enterocolitis (HAEC) occurred in 13% of patients, 67% of whom had low to medium COI, medium to high SVI, and lived >35 miles from care. Overall, 60% had low to moderate COI scores. 37% of cases required diverting ostomies. Anastomotic strictures occurred in 11%; no anastomotic leaks were reported. Most patients (70%) had a hospital stay of 1–5 days. One (3%) was readmitted for postoperative HAEC, surgical site infection, and obstruction. Yancey-Soave technique was linked to the lowest long-term complication rates.

Conclusion

SDoH significantly influences outcomes in children with HD. Those with higher SVI, lower COI, and greater distance faced worse outcomes. Improving healthcare access and community-level support is essential for equitable care. Future research should explore personalized strategies to reduce SDoH-related disparities in pediatric surgery.

A Preliminary Report of Tigers Connect Response Trends: Which Community Resource Needs Do We Capture Best?

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Introduction

Tigers Connect is a community-aid resource available to patients at the MU Healthcare–South Providence Pediatrics Clinic. Screening forms are provided at well-child visits, allowing families to report unmet needs. Families can then request assistance addressing these needs, and a trained volunteer connects them with resources. Tigers Connect aims to assist clinicians in addressing the social determinants of health. By further analyzing positive screens collected in August 2025, we hope to better characterize this patient population. This preliminary report also aims to assess the utility of analyzing screening results for trends.

Methods

Volunteers log each form's results in RedCap, with items compiled into the following categories– Food Scarcity, Housing, Childcare, Healthcare, Utilities, Transportation, Literacy, Safety Concerns, Tobacco Use, Substance Abuse, and Healthy Relationships/Companionship. We collected and analyzed data from the month of August 2025.

Results

There were 107 total positive screens. Of these screens, 56% were positive for Tobacco Use (59/107), 22% reported food insecurity (24/107), 19% reported childcare needs (20/107), 16% reported difficulty with utilities (17/107), 7% reported transportation needs (7/107), 6% reported housing insecurity (6/107), 5% reported healthcare needs (5/107), 5% reported healthy relationship/companionship needs (5/107), and 1%

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of screens were positive for substance abuse (1/107).

Conclusion

The highest need areas were tobacco use, food insecurity, and childcare. These preliminary findings suggest that continued analysis of screening trends may be helpful for volunteers and providers. Further retrospective and prospective analysis could provide critical information in a variety of ways. The better volunteers and providers understand their patient population, the more they can prepare and individualize assistance. Data analysis can also assist with delineating targets for future quality improvement projects, so that the Tigers Connect program can continue to evolve and improve over time.

Young-Onset Bladder Cancer: National Trends with Institutional Insights on Presentation and Diagnosis

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Introduction

Bladder cancer is uncommon in patients younger than 45, accounting for less than 2% of cases. When it occurs, presentation and management may differ from older populations. National registries such as SEER provide broad context but lack key clinical details such as presenting symptoms and diagnostic course. We aimed to describe demographics and characteristics of patients younger than 45 using SEER and compared these findings with our single-institution cohort that additionally captures outcomes and diagnostic timelines..

Methods

We queried SEER Research Plus for patients younger than 45 diagnosed with bladder cancer (2014-2021) and performed a retrospective chart review of patients younger than 45 diagnosed at the University of Missouri Hospital (2014–2024)..

Results

SEER identified 4,101 patients (71% male). 91.3% had urothelial carcinoma, and 67% of carcinomas were non-invasive. 19 cases were classified as high grade, and 36 were low grade. The University of Missouri group included 20 patients (90% male). 90% had urothelial carcinoma, and 65% were non-invasive. 10 cases were high grade, and 10 were low grade. Presenting symptoms available only in the University group included gross hematuria (11), dysuria (4), abdominal pain (3), and incidental findings (2). The median and mean time from presentation to definitive diagnosis was 32 and 89.8 days, respectively, in the University of Missouri group.

Conclusion

Our patients at the University of Missouri were reflective of national trends seen in young patients with bladder cancer. In areas that SEER lacks, our data fills in the gaps such as presenting symptoms and time to diagnosis. This information gives additional insight into how these young patients may appear in a clinical setting and whether there are associated delays in diagnosis and subsequent effects on outcomes which may call for a higher level of suspicion when evaluating young patients with urinary symptoms.

Reducing Unnecessary Glucose Estimations in the NICU

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Introduction

Low blood glucose is a frequent concern in neonates, and repeated monitoring is common in the NICU. However, excessive blood draws increase the risk of iatrogenic anemia and need for transfusion. At MU Hospital, laboratory reduction initiatives are ongoing, yet glucose testing remains a major contributor. This quality improvement project aimed to reduce nonessential glucose estimations while maintaining safe, evidence-based

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care.

Methods

This IRB-approved quality improvement study reviewed glucose monitoring practices in 94 NICU patients admitted between January–July 2025. Risk stratification followed Pediatric Endocrinology Society guidelines, incorporating gestational age, symptoms, maternal diabetes, perinatal stress, and family history. Target thresholds were ≥50 mg/dL after 48 hours for low-risk infants and ≥60 mg/dL for high-risk infants. Metrics included: total glucose estimations per admission, glucose values ≥ threshold before 48 hours, presence/absence of post–48-hour orders, number of glucose estimations performed without orders, and Thursday (routine check-in day) estimations. Counts were normalized by length of stay. The intervention in November 2024 consisted of targeted education for all NICU staff with presentation of preliminary data, review of literature on risk-based thresholds, and discussion of ambiguous order practices.

Results

Low-risk infants had significantly fewer glucose estimations post-intervention (1.1/day) compared to pre-intervention (1.9/day, p=0.02). Thursday glucose checks also decreased post-intervention (0.7/Thursday vs 1.5/Thursday, p=0.01).

Conclusion

Targeted education and feedback improved adherence to risk-based glucose testing guidelines, reducing unnecessary estimations in low-risk infants. Ongoing reinforcement of risk stratification and clear order entry may further decrease overtesting, minimizing iatrogenic blood loss and transfusion-related complications in this vulnerable population.

Dose-Dependent Effects of Bupivacaine in Shoulder Blocks on Postoperative Pain

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Introduction

The use of a peripheral nerve block can reduce pain scores, opioid consumption, and increase patient satisfaction post-operatively. However, complications can arise such as post-operative respiratory issues, numbness, and local anesthetic systemic toxicity (LAST). Therefore, determining the optimal dose of bupivacaine is important to maximize the benefits of lowering post-operative pain while minimizing adverse effects..

Methods

This retrospective cohort study examined 555 peripheral nerve blocks for shoulder surgery between April 1, 2024 to April 30, 2025. Patients were categorized low dose (≤15 mL of 0.5% bupivacaine or ≤30 mL of 0.25% bupivacaine) or high dose (>15 mL of 0.5% bupivacaine). Pain scores in the PACU and prior to discharge we examined using independent t-tests in RStudio.

Results

Average PACU pain scores did not differ significantly between the low dose group (1.951±2.356) and the high dose group (1.899±2.511), [t (148.63) = 0.132, p = 0.895, 95% CI (-0.730, 0.836)]. Similarly, average pain scores prior to discharge were comparable between the low dose group (2.857±2.722) and the high dose group (2.013±2.573), [t(151.5) = 1.978, p = 0.050*], 95% CI (0.001, 1.688)].

Conclusion

Bupivacaine was not associated with significant difference in the PACU, suggesting the dosages used in this study do not have an impact on immediate post-operative pain management. However, pain scores prior to discharge were significantly lower in the higher-dose group, indicating a potential dose-dependent benefit over a longer recovery period. Larger prospective studies examining additional outcomes such as opioid consumption, adverse effects, long-term follow-up for main management are needed to further elucidate the impact of differing dosages of bupivacaine in a peripheral nerve block for shoulder surgery.

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Predictive Modeling of the Risk of Myopic Degeneration and Retinal Detachments Incidence Using ACD:AL

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Introduction

To evaluate whether the ratio of anterior chamber depth (ACD) to axial length (AL) can serve as a predictive marker for myopic degeneration (MD) and retinal detachment (RD)..

Methods

Patients diagnosed with MD or RD were enrolled as cases, while controls were patients without these diagnoses but with IOL master axial length measurements greater than 26.5 mm. Demographics, ocular history, and IOL master measurements of ACD and AL were collected, and the ACD:AL ratio was calculated for each eye. Group comparisons were performed using the Wilcoxon Rank Sum Test (WRST), a nonparametric test that evaluates distributional differences without assuming normality, allowing for robust comparison between groups.

Results

The study included 134 control eyes and 146 case eyes. For controls, mean ACD:AL ratios were 13.44 (OS) and 13.83 (OD), while in cases the means were 13.53 (OS) and 13.46 (OD). Standard deviations ranged from 2.09 to 2.70, and the medians were nearly identical across groups. WRST analysis demonstrated no statistically significant differences (OD ratio: $p = 0.813$; OS ratio: $p = 0.690$). Box plot visualization confirmed these findings, showing marked overlap between groups and several outliers in both distributions.

Conclusion

ACD:AL ratios were not significantly different between patients with MD/RD and controls. The overlap in distributions suggests that this metric does not effectively distinguish between affected and unaffected individuals. Although axial elongation is strongly associated with myopic complications, the ACD:AL ratio does not provide additional predictive value for assessing risk of retinal detachment or myopic degeneration.

Predicting Patient Hospital Ratings: A Comparative Study of Machine Learning Models

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Introduction

Machine Learning models are useful tools for predicting outcomes. Predictions are based upon learning data given to the models which includes known associated outcomes. The Accuracy of a given model can change based upon a given model's architecture and more intrinsic elements such as parameters. In this study, we compared three different machine learning models: LASSO, Random Forest, and Neural Network. The goal of the study was to determine which model architecture is best able to predict hospital star ratings. LASSO is a simpler linear regression machine learning model, whereas Random Forest and Neural Networks are more complex nonlinear models. We hypothesized that the Random Forest model would perform best given its ability to work with nonlinear relationships and structured data.

Methods

US hospital data was collected from available CMS data. This data was then inputted into each individual model respectively (Lasso, Random Forest, Neural Net). Results from each model were then compared to the true star ratings. Model performance was evaluated through the metrics of: Overall accuracy, Kappa, Mean AUC, AUC for 5-star ratings. ROC curves with each model plotted together were created for better visualization of the performance differences.

Results

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Lasso model had an accuracy of 0.407 (kappa 0.216), Random Forest had an accuracy of 0.408 (kappa 0.217), and Neural Net had an accuracy of 0.393 (kappa 0.210). Mean AUC for Lasso was 0.767, Random Forest was 0.751, and Neural net was 0.745. AUC for 5-star reviews was 0.877 for the LASSO model, 0.871 for Random Forest, and 0.835 for Neural Net.

Conclusion

Random Forest and Lasso performed best at predicting patient start ratings of hospitals, outperforming the neural network model. Neural networks are likely not the preferred model of use in less complex data sets due to challenges such as overfitting.

Hypersensitivity Reaction to Tamsulosin in a Patient with Alpha-Gal Syndrome

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Introduction

Alpha-Gal Syndrome (AGS) is an IgE mediated allergy against galactose-alpha-1, 3-galactose (alpha-gal), a carbohydrate found in red meat and other mammalian-derived products such as dairy and certain pharmaceuticals. First identified in 2004 during cetuximab trials, AGS is most prevalent in the southeastern U.S. (Arkansas, Oklahoma, and Missouri) where the lone star tick (Amblyomma americanum) is endemic. Tick bites introduce alpha gal from their salivary glands and GI tract into the host skin, triggering IgE class switching and sensitization of mast cells and basophils. Subsequent exposure to mammalian products triggers histamine release, causing delayed (2–6 hr) reactions such as urticaria, angioedema, gastrointestinal symptoms, and potentially life-threatening anaphylaxis.

Methods

A retrospective chart review was conducted on a 27-year-old female who presented to the ED with bilateral upper extremity weakness.

Results

During hospitalization, she developed urinary retention treated with tamsulosin, followed by edematous papules with erythematous borders that coalesced into urticarial plaques on her extremities. Chart review revealed a history of alpha-gal syndrome with elevated IgE to alpha-gal (1.67 kU/L) and to pork (0.84 kU/L) and beef (1.11 kU/L). After treatment with triamcinolone 0.1% cream, her symptoms completely resolved. Tamsulosin was identified as the inciting factor after a thorough evaluation of the patient's medications. Tamsulosin relaxes bladder and prostate smooth muscle but may trigger hypersensitivity due to gelatin in its formulation in alpha gal sensitized patients.

Conclusion

It is imperative to thoroughly screen all medications administered for inactive ingredients that may cause delayed hypersensitivity reactions. Hospitals often stock multiple formulations of the same drug; therefore, alpha-gal free medications must be discernibly marked for clinicians to use to prevent unintentional administration. Accurate diagnosis is essential and involves obtaining a thorough clinical history alongside comprehensive screening protocols, such as serological evidence of sensitization to prevent life threatening reactions.

Pneumonic Tularemia: Presentation in Two Adolescents from Distinct Routes of Exposure

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Introduction

Tularemia is a zoonotic disease caused by the bacterium, Francisella tularensis. Incidence is the highest incidence in the south-central United States, particularly Missouri, Arkansas, Oklahoma, and Kansas. Transmission occurs via multiple routes, including tick and deer fly bites, handling infected animals, and inhaling dust or aerosols. Pneumonic tularemia, a rare, serious illness that warrants prompt recognition, may arise from primary inhalation or secondary spread from

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ulceroglandular disease.

Methods

We describe two adolescent males from Missouri diagnosed in the summer months in our health care system.

Results

The first patient developed substernal chest discomfort and fatigue after farm-related activities including digging old wells, lawnmowing, and working on a turkey farm. His symptoms persisted despite antibiotics for community-acquired pneumonia. Computed tomography of chest showed right lower lobe infiltrates with mediastinal and right hilar adenopathy. Testing for endemic mycoses was negative, and serology confirmed the diagnosis. His symptoms and imaging findings improved with ciprofloxacin therapy.

The second patient developed an ulcerative left flank lesion and left groin swelling after a presumed tick bite, that was unresponsive to cephalexin. He was later hospitalized with worsening right pleuritic chest pain, persistent left flank skin lesion, and inguinal lymphadenitis. Chest radiograph revealed a right lower lobe pneumonia with small pleural effusion. With serologic confirmation, he was diagnosed with pneumonic tularemia from the hematogenous spread of untreated ulceroglandular disease. Pleuritic pain resolved with doxycycline, although he needed inguinal abscess drainage and an additional course of ciprofloxacin leading to improvement.

Conclusion

These cases illustrate pneumonic tularemia can result from two distinct routes of exposure: primary inhalational and secondary hematogenous spread from ulceroglandular disease. Clinicians in endemic states should maintain a high index of suspicion for tularemia in persons with relevant exposures presenting with atypical pneumonia. Early recognition and initiation of appropriate antibiotic therapy can ensure favorable outcomes.

Cortical tonic GABAergic inhibition and hand recovery in subacute stroke

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Introduction

Hand impairment after stroke is a leading cause of long-term disability among adults. Hand recovery is mainly mediated by the reorganization of the remaining intact brain tissue. For example, a reduced GABAergic tonic inhibition (GTI) augments the plastic properties of the neuronal circuits, creating new networks and/or strengthening existing ones to generate a motor output to the hand. This knowledge derives mainly from preclinical studies; the relevance of this event in patients remains unclear. We evaluated non-invasively the nature and evolution of cortical GTI (MEGA-sLASER) to determine its role in motor recovery; we hypothesized that hand recovery would be related to the decrease in GTI.

Methods

Patients who have suffered a subacute unilateral stroke were recruited (n=21, 23.9[20.4] (mean[SD]) days post-onset, 66.2[9.9] years old, Fugl-Meyer, 40.8[23.1], normal=66). GABA levels, indicative of GTI, were quantified in bilateral radiologically normal-appearing motor and premotor cortices; other biomarkers were also detected (N-acetylaspartate, a neuronal marker, myo-Inositol-glial, and choline-neuroinflammation). Imaging and clinical hand (Fugl Meyer, 9-Hole Peg Test) evaluations were performed at admission to rehab (T1) and three months later (T2). Matched healthy controls were included for comparison.

Results

Compared to controls, at T1, patients (n=11) showed higher levels of GABA and choline, and lower N-acetylaspartate across bilateral cortices ($p<0.01$ for all). A higher myo-inositol was found in the cortices of the injured hemisphere or ipsilesional ($p<0.05$ for both). Ipsilesional GABA and N-acetylaspartate correlated with the hand impairment ($p<0.05$ for all). Data analysis is underway.

Conclusion

Our preliminary data showed that at admission

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to rehab, patients exhibited higher cortical GTI, neuronal metabolic depression, gliosis, and neuroinflammation, and the ipsilesional changes were functionally relevant. Upon completion, the results of this study will provide the foundation for augmenting hand recovery through GTI-targeted therapies, like adjuvant neurostimulation to current rehabilitation.

Peripartum Stress Cardiomyopathy Complicated by Placental Abruption: A Case Report

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Introduction

Takotsubo cardiomyopathy is a rare cardiac emergency in pregnancy, characterized by transient left ventricular dysfunction precipitated by emotional or physical stress. Prompt recognition and management are essential to mitigate maternal and fetal morbidity and mortality.

Methods/Results

We report a case of a 31-year-old G5P3105 woman at 38 weeks gestation who presented for repeat cesarean section following spontaneous rupture of membranes. While undergoing preparation for spinal anesthesia in the operating room, she experienced the onset of severe chest and head pain, describing an "explosion and crushing" sensation in her chest and radiating to her head. She became bradycardic over thirty seconds and experienced nausea and vomiting, glycopyrrolate was administered. The patient was then found to be in wide-complex ventricular tachycardia and anesthesia team administered esmolol, magnesium, and lidocaine. Rhythm then converted to tachycardia with bigeminy and then sinus tachycardia. A subsequent 12-lead EKG demonstrated transient ST-segment elevations with diffuse ST-segment depressions which resolved over a period of 30 minutes while patient stabilization continued. Diagnostic workup revealed significantly elevated cardiac biomarkers. Echocardiography showed a reduced ejection fraction (EF) of 45% with antero- and inferoseptal hypokinesis. Pulmonary embolus ruled out via chest CT. The patient was transferred to the cardiac intensive care unit where she desired to attempt TOLAC following discussion with cardiology and maternal fetal medicine team. Following sustained fetal bradycardia and vaginal bleeding the obstetrical team suspected placental abruption and performed an emergent cesarean section. Intraoperatively, the patient required phenylephrine boluses, tranexamic acid, a blood transfusion, and norepinephrine infusion due to hemorrhagic shock.

Postoperative cardiac MRI confirmed stress cardiomyopathy, showing EF of 47%, anterior and septal wall motion abnormalities, myocardial inflammation, and edema without myocardial infarction or myocarditis.

Conclusion

This case highlights the importance of a multidisciplinary approach to caring for obstetric patients at risk for complex cardiac disease.

Evaluating the Lived Experiences of Older Adults with Fall-Monitoring Technology

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Introduction

Every year in the US, 30% of community dwelling older adults fall. Traditionally, aging-in-place, a method of independent living preferred by 77% of older adults, has meant a preference to maintain independence and stay/age in their own homes with the ability to turn to family and friends as needed for help instead of institutionalization. Monitoring technologies have been proven to improve the quality of life of older adults who are living independently, enabling true aging-in-place. However, limited research has been done regarding

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lived experience of older adults with monitoring technologies.

Methods

Using interpretive phenomenological methodology, we interviewed older adults who had experienced living with fall-detecting technologies to elicit the influence of the technology on what it means to live independently and age in place. Eight older adults, with and without dementia, were recruited from two independent living centers. To ensure trustworthiness, field-notations, reflexive journaling, and participant check-backs were used.

Results

Several themes emerged that reflected the influence of technologies on lived experiences: Level of Comfort with Technology – residents expressed feelings related to ease or discomfort and how technology could become part of the background. Level of Usefulness – residents discussed how technology could lead to improvements or add complexity and difficulty depending on ease of use, and safety concerns. Usefulness was considered dependent upon technology monitoring being tied directly to actionable interventions to improve quality of life. Only then could technology allow the freedom to age-in-place. Approach to Technology – individual engagement with technology based on personality/cognition influencing the ability to abstract meaning and make sense of technology interventions.

Conclusion

This study significantly enhances the understanding of effective implementation strategies for monitoring technologies. Use of technology to empower aging-in-place requires a multifaceted approach that considers comfort, usefulness, and individual approaches to technology.

Long-Term Functional Outcomes Following Flexor Tendon and Digital Neurovascular Injury Repair

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Introduction

Flexor tendon lacerations are common hand injuries that may involve concomitant neurovascular damage, and missed injuries can result in significant long-term functional deficits. The objective was to determine the incidence of neurovascular injury in flexor tendon lacerations and evaluate long-term patient-reported outcomes following surgical repair.

Methods

A retrospective chart review was conducted of patients with surgically treated flexor tendon injuries between November 2, 2017, and May 29, 2024. Injury characteristics, operative details, and patient-reported outcomes were collected. Long-term outcomes were assessed via telephone survey evaluating sensation, function, pain, and activity limitations.

Results

Among 103 respondents, mean sensation recovery was 73.6% of normal and mean function was 70.4% of normal. Approximately 77% reported restoration of prior hand function. Mean pain score was 0.78/10. Activity difficulty was generally low, with greatest limitations reported for strength-dependent tasks such as carrying heavy groceries (1.82/5) and using a knife (1.81/5).

Conclusion

Surgical repair of flexor tendon lacerations yields high patient satisfaction and good functional recovery, though mild residual deficits remain in strength-demanding tasks. Ongoing data collection aims to strengthen statistical analysis and identify predictors of outcomes.

Informing Best Practices in Family Navigation for Autism Services: Principles from a scoping Review

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Introduction

Early intervention following an autism spectrum disorder (ASD) diagnosis is critical for improving developmental, behavioral, and family outcomes. However, families often encounter fragmented care systems, long wait times, and a significant emotional and logistical burden when attempting to access needed services. Family Navigation (FN) has emerged as a promising approach to improve access, reduce burden, and promote equitable outcomes. Objective: This scoping review aims to synthesize existing research on the persistent barriers and "pain points" experienced by families and providers in accessing and delivering autism services, to subsequently inform the development of best practice principles for future FN programs.

Methods

We reviewed existing literature to identify key service navigation barriers reported by families and providers, including systemic inefficiencies, knowledge gaps, and equity-related challenges. We also examined reported outcomes and implementation features of existing FN models. A PubMed search was conducted, followed by forward, backward, and related citation searches. Full-text records were retrieved and screened for eligibility, n = 92.

Results

Thematic analysis was performed on extracted data from eligible sources. The review identified several pervasive systemic, family-level, provider-level, and equitable access barriers. Challenges were intensified for minoritized groups facing intersectional difficulties associated with racism, language, income, immigration status, and mobility-related disruptions. Overall, FN programs demonstrated positive impacts, improving service utilization, reducing disparities, and increasing caregiver satisfaction. However, variability in implementation and difficulty reaching underserved families persist.

Conclusion

Understanding these identified pain points is crucial for designing and implementing future FN programs that are truly effective, equitable, and family-centered. FN programs should be co-designed with families, integrated into the medical home model, and culturally responsive. By directly addressing the systemic and individual challenges uncovered, FN can be optimized to significantly enhance access to timely, high-quality care and improve developmental and well-being outcomes for children with ASD and their families.

Pre-Operative Patient Resilience Scores are not Strong Predictors for Post-Hip Arthroscopy Complications

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Introduction

Hip arthroscopy shows desirable benefits to the patients including faster recovery times and less post operative complications compared to the traditional open approach. Resilience is best understood as the ability to bounce back or recover from stressful events. This study hypothesizes that patients with high resilience will have lower postoperative complications and more favorable patient reported outcomes (PROs) following surgery.

Methods

With IRB approval, patients undergoing hip arthroscopy were prospectively enrolled in a study designed to examine associations between resilience, PROs, and postoperative complications. The Connor Davidson Connor-Davidson Resilience Scale (CD-RISC) was used to assess resilience. PROs for hip pain, function, and health; and complications including, infection, reoperation, deep vein thrombosis (DVT) were pulled from medical records six-weeks, three-months, six-months, one-year, two-years following surgery. A

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Fisher test was used for analysis of continuous variables. Spearman and Pearson correlation coefficients were used to analyze the associations between resilience and PROs.

Results

43 patients, 58% female, met inclusion criteria with an average final follow up time of 9.98 months. 1 patient, 2.3%, underwent a revision arthroscopy and 1 patient, 2.3%, suffered a postoperative infection. No statistically significant correlation was found between resilience and these complications (p= 0.3721) and (p= 0.7907) respectively. No DVT occurred in patients enrolled in the study. Correlations between PROs and resilience were variable throughout the study.

Conclusion

Low resilience did not correlate with a higher risk of post-operative complications following hip arthroscopy. To further examine possible association between PROs and resilience, future studies should be conducted with a larger patient population using complete and regimented follow up surveys.

Financial and Gender Dynamics in Industry Sponsorship within Otolaryngology

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Introduction

Prior studies analyzing early CMS Open Payments data revealed differences in industry payments made to male and female otolaryngologists from pharmaceutical and device companies. With an increasing number of female otolaryngologists, has there been a corresponding shift toward more equitable distribution of industry research payments?

Methods

The 2021-2023 research payment datasets were downloaded from the CMS Open Payments Program website. According to CMS, research payments cover items such as time spent enrolling patients in studies, funding for research study coordination and implementation, study expenses, and direct physician compensation. These are separate from clinical trial funding. Payment results were compared between gender groups.

Results

Thirteen unique female otolaryngologists (16.5% of study population) received industry research payments in comparison to 66 males (83.5%). Women received a median of 3 (interquartile range [IQR] 1-10) payment transactions totaling to a median value of $5200 (IQR $1109-$14574), while men had a median of 2 (IQR 1-5) transactions totaling to $3712 (IQR $991-21488). However, mean payments were consistently higher than medians in both groups, likely secondary to a few high-volume outliers. When removing these outliers, the median payment amounts of female and male physicians decreased to $1750 (IQR $750-$8730) and $2625 (IQR $820-$11313), respectively, with no change in number of payment transactions.

Conclusion

Some gender disparities persist in industry research payments. Although not currently publicly available, we plan to contact CMS for access to the clinical trial funding data for further analysis of potential gender disparities.

Focal Dermal Hypoplasia in Males: A Systematic Review

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Introduction

Focal dermal hypoplasia (FDH), or Goltz syndrome, is a rare X-linked dominant disorder that is characterized by linear or reticular dermal

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atrophy, fat herniations, telangiectasias, and pigmentary changes, following Blaschko's lines. FDH also affects multiple systems, affecting the teeth, nails, eyes, scalp, face, skeletal, cardiovascular, central nervous, and gastrointestinal systems. Initially, FDH was thought to be embryonically lethal in males, but later reports identified sporadic mutations or somatic mosaicism as mechanisms of male survival. However, due to the rarity of male cases, a consistent male phenotype remains undefined. The objective was to systematically review reported male FDH cases to consolidate phenotypic patterns, identify key features, and explore genotype–phenotype correlations.

Methods

A systematic review of the PubMed database was conducted with no restrictions on publication date. This review was conducted in accordance with the PRISMA guidelines. The JBI Critical Appraisal Checklist Quality was used to appraise the included case reports and case series. Inclusion criteria were case reports and systematic reviews solely investigating FDH or Goltz syndrome.

Results

45 patient cases were identified across 38 case reports and studies. Dermal and skeletal involvement primarily involved extremities. Ophthalmologic and dental anomalies, including microphthalmia, colobomas, and enamel defects, were variably present. PORCN variants confirmed in all but one genetically tested patient, though phenotypes varied. The retrospective nature likely biased toward more severe or unusual presentations.

Conclusion

FDH in males exhibits marked clinical variability. The observed heterogeneity in histopathologic findings reinforces the need for flexible diagnostic criteria, with genetic testing for PORCN variants recommended when clinical suspicion remains high. A multidisciplinary approach is recommended, with surveillance of ocular, dental, and skeletal manifestations even in patients with minimal cutaneous findings. Further research into PORCN function and Wnt signaling is needed to refine genotype–phenotype relationships and explore alternative disease mechanisms.

Evidence-Based Restrictive Hematocrit Thresholds for PRBC Transfusion in the NICU

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Introduction

Extremely low birth weight (ELBW) infants frequently require packed red blood cell (PRBC) transfusions for anemia. Several risks are associated with transfusions, such as transfusion induced lung injury (TRALI), iron overload, infections, etc. Two recent studies determined liberal packed red blood cell (PRBC) transfusion thresholds did not significantly improve mortality or neurodevelopmental outcomes for ELBW infants compared to restrictive thresholds (Kirpalani et al. 2020, Franz et al. 2020). Therefore, a new evidence-based restrictive PRBC transfusion guideline was established (Deschmann et al). We aimed to reduce liberal hematocrit (Hct) threshold PRBC transfusions in babies born less than 30 weeks gestational age (GA) by 10% in three months in our neonatal intensive care unit (NICU).

Methods

An IRB-approved retrospective study of 63 ELBW infants <30 weeks GA who had PRBC transfusions from March 2022-April 2023 and October 2024-July 2025 in the NICU was performed. Exlusions: infants >30 weeks GA at birth, non-survivors, infants transferred to other institutions. Statistical analysis was performed via Mann–Whitney U Test (α=0.05).

Results

In the pre-intervention phase, 37 infants had 124 transfusions. In the post-intervention phase, 26 infants had 114 transfusions. Following intervention, there was a 28% reduction in liberal Hct transfusions. There was no negative balancing measure of additional Hct checks. Additionally,

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there was a 44% reduction in transfusions given as two aliquots of 10 ml/kg after intervention, which will likely improve infants' nutrition due to reduced time off enteral feeds. Following intervention, PRBC volume decreased by 20% ($p = 0.0046$, $\alpha = 0.05$). The greatest reduction in PRBC volume was in infants born at 24 weeks GA — a 38% reduction. By decreasing liberal PRBC transfusions and volume, there are expected reductions in transfusion-associated risks, procedural costs, and burden on blood supply.

Conclusion

Adopting evidence-based transfusions guidelines from literature reduced the volume of PRBC transfusions in the NICU.

Streptococcus Equi Subsp. Zooepidemicus Meningitis and Prosthetic Joint Infection: A Case Report

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Introduction

Streptococcus equi subsp. zooepidemicus (SEZ) is highly contagious and causes disease in horses but is seldom isolated in humans. Streptococcus equi subsp. zooepidemicus is a part of the normal bacterial flora in healthy horses and is commonly found on skin and mucus membranes of upper respiratory and lower reproductive tract, but it can cause infectious disease including pneumonia, upper respiratory infections, skin infections, epididymitis, and testicular and neonatal infections. Zoonotic infections are occasionally reported in individuals via direct horse contact, consumption of unpasteurized dairy products, or consumption of raw horse meat. Potential complications of S. Equi infections include meningitis, joint infections, fever, edema, and hydrostatic bullae. More specifically, complications associated with meningitis include sepsis, endophthalmitis, endocarditis, pneumonia, respiratory failure, brain abscesses, intracranial hypertension, cardiac failure, and brain infarction.

Methods

Records from two patients were obtained from the University of Missouri Healthcare electronic record system from six months before to six months after the patients' hospital visits. Relevant information was compiled from the patients' charts.

Results

Patient outcomes included meningitis and its sequelae (such as cerebritis, microhemorrhage, and death) and prosthetic joint infection (which required repeat aspirations and surgical revisions.

Conclusion

Complications of SEZ, including meningitis and prosthetic joint infections, may require repeat hospital visits and may potentially be fatal.

Feasibility of Using AI-Assisted Note Review to Identify Postoperative Complications: A Pilot Study with Microsoft Copilot

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Introduction

Large language models (LLMs), such as Microsoft Copilot and ChatGPT, are emerging technologies with potential to transform healthcare by streamlining documentation and enhancing manual tasks. Their performance, however, depends heavily on prompt design and specificity. In bariatric surgery, the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) provide standardized criteria for identifying complications, but it requires

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laborious manual chart review by trained personnel. This study evaluates whether LLMs can accurately identify post-surgical complications from de-identified clinical documentation, offering an efficient alternative.

Methods

Twenty patient records were selected with known 30-day postoperative complications in one of the four categories: readmission, reoperation, intervention, and other. Records were manually de-identified, then analyzed by Microsoft Copilot using five prompts with varied complexity. The first prompt was the simplest, while the fifth incorporated full MBSAQIP criteria. For each prompt, we recorded de-identification time, LLM analysis time, and a blinded reviewer quality score (1–4). Statistical analysis included Friedman rank sum tests, post-hoc Wilcoxon signed-rank tests with Bonferroni adjustment, and Spearman's correlations.

Results

De-identification required a mean of 32.9 minutes (range 13.3–165) for records averaging 54 pages. Copilot responses averaged 30 seconds (range 8–103) and correctly identified complications in all patients. Processing time did not differ across prompts (χ^2=6.99, df=4, p=0.136). In contrast, quality varied significantly by prompt (χ^2=18.76, df=4, p<0.001) with prompt 4 achieving the highest mean score (3.50), significantly outperforming Prompt 1 (p=0.039) and Prompt 2 (p=0.038). No other comparisons reached significance after correction, though Prompt 5 trended higher than Prompt 1 (p=0.078). Across all prompts, response time did not significantly correlate with quality (ρ range –0.19 to 0.23).

Conclusion

Microsoft Copilot accurately identified all complications, demonstrating rapid and consistent performance. Optimized prompt design can enhance AI-assisted chart review, supporting its role as an efficient tool for clinical research.

Participatory Group Discussions of the Viviendo Bien Study: Methods and Lessons Learned

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Introduction

Hispanic communities in the United States face a disproportionately high burden of type 2 diabetes mellitus (T2DM). Factors contributing to growing cases of pre-diabetes and T2DM vary across communities, underscoring the need for community-partnered strategies to address this problem.

Methods

An established community-health-academic partnership is conducting participatory discussion groups across two Missouri counties to better understand the needs of communities. A community-partnered research agenda will be developed to address the high burden of T2DM. Discussions are conducted in Spanish, or English, to support comfort and engagement. However, some challenges have been encountered when transcribing/translating and analyzing data from Spanish to English, such as loss of meaning, sense, and nuances.

Results

We have implemented several strategies to enhance the discussions, including an icebreaker at the start of the focus group. Additionally, facilitators summarize discussion points in real-time and ask participants to confirm whether the summary is accurate. To date, three discussion groups have been completed, and three additional discussion groups are scheduled in September and October 2025 to reach the goal of 60 participants. Thus far, community engagement and enthusiasm have been high and will provide important support when forming the community advisory board to develop a research agenda based on this study's findings.

Conclusion

Despite logistical and linguistic challenges, our participatory approach has proved both viable and valuable. Bilingual discussion groups, led by trusted community promotoras/community health

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workers, are generating rich, context-specific insights. This method supports the development of culturally grounded, community-partnered interventions to address T2DM in Hispanic populations.

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Investigating the Impact of Intraoperative Dexamethasone on Post-Operative Pain Scores

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Introduction

Inadequate patient pain control following surgery is linked to significant stress, chronic pain syndromes, poor transition to oral analgesics, and increased opioid use with notable side effects. Dexamethasone has recently been established as an adjunct that extends the duration of anesthetic blocks when administered perineurally with bupivacaine, to improve patient experiences after surgery. Initial studies show intravenous administration of dexamethasone during shoulder surgery may similarly extend block duration. This study investigates the impact of intraoperative dexamethasone on postoperative pain scores in the PACU and final pain scores prior to discharge to inform future patient pain control.

Methods

This retrospective cohort study analyzed shoulder surgeries performed at University Hospital between April 1, 2024, and April 30, 2025. Cases were excluded from analysis if they involved a patient below the age of 18, used Exparel in addition to bupivacaine, or did not include a postoperative self-reported pain score for primary endpoint analysis. Eligible cases were stratified by intraoperative dexamethasone administration, yielding 311 cases for analysis (280 in the dexamethasone group and 31 in the control group).

Results

PACU pain scores did not differ between patients who received intraoperative dexamethasone (M = 2.17, SD = 2.53) and those that did not (M = 1.93, SD = 2.24), t(253) = 0.467, p = 0.641, 95% CI (-0.753, 1.22). Final discharge pain scores were also similar for those receiving intraoperative dexamethasone (M = 2.62, SD = 2.69) and those who did not (M = 2.63, SD = 2.79), t(253) = -0.021, p = 0.983, 95% CI (-1.04, 1.02).

Conclusion

These findings challenge initial studies indicating that intraoperative dexamethasone is as efficacious as perineural dexamethasone administration in extending shoulder blocks. Larger prospective studies are warranted to better clarify the impact of intraoperative dexamethasone on pain management.

Comparing Pre-Existing Mental Health Conditions and Mental Health Outcomes Scores with Injury-Specific Patient-Reported Outcomes in Orthopaedic Trauma Surgery

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Introduction

Recovering from orthopaedic trauma is challenging, with many physical and mental stressors to overcome. When patients with mental health diagnoses sustain such an injury, they often lack coping mechanisms to navigate the recovery. This can lead to difficulty with pain management and a prolonged recovery time. The aim of this study was to find correlations among PROMIS mental health scores, psychiatric diagnoses, psychiatric treatment, sociodemographic information, and other injury-specific PROMs during the recovery process.

Methods

A total of 874 patient charts were reviewed, and data were collected regarding age, gender, employment status, insurance type, smoking history, alcohol use, drug use, number of fractures, and unplanned returns to the operating room. Data were then pulled from these patients' clinic visits

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post-surgery, which included mental and physical health questionnaires (PROMIS). The analysis identified correlations within the data set. This was accomplished with the Krustal-Wallis test followed by Dunn's post hoc test. The Bonferroni method was used to adjust *p*-values for multiple comparisons.

Results

Overall, PROMIS Global Mental Health scores were directly correlated with other PROMs following orthopaedic trauma. Patients with isolated psychiatric conditions, such as anxiety or depression, as well as those with multiple conditions performed worse on PROMIS. In addition, worse PROMIS scores were correlated with ongoing pharmacologic therapy for psychiatric conditions. Lastly, PROMIS scores were directly associated with gender, employment status, insurance type, smoking status, drug use, and unplanned return to the operating room.

Conclusion

When PROMs are used as a metric of recovery, patients with mental health conditions are more likely to experience both mental and physical difficulties while recovering from orthopaedic trauma. It is important for physicians to acknowledge and address these conditions to aid in a more successful recovery.

Exploring Perceptions of Patient Safety and Interdisciplinary Respect Among Healthcare Workers

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Introduction

Since the COVID-19 pandemic, U.S. healthcare workers have reported higher rates of burnout, job dissatisfaction, and patient safety concerns. Work environment, staffing, and leadership have been identified as contributing factors to patient safety. In the post-pandemic era, fewer reports have described differences in healthcare workers' perceptions of patient safety across clinical settings and disciplines.

Methods

This descriptive study examined healthcare workers' responses to the Agency for Healthcare Research and Quality (AHRQ) Surveys on Patient Safety Culture (SOPS) Hospital Survey in spring 2024. Responses from staff working in inpatient and ambulatory clinical settings were included. A Likert scale format was used (e.g., Disagree/Agree/Strongly Agree). The percentage of positive responses to questions relating to patient safety, work environment, staffing/operations, and leadership was assessed. All variables were categorical and were analyzed using the chi-squared test.

Results

A total of 811 survey responses were obtained from inpatient staff (n = 496) and ambulatory staff (n = 315). Overall, 71.1% (n = 577) rated patient safety in their clinical setting as having "Good," "Very Good," or "Excellent". Healthcare workers in ambulatory settings reported significantly higher patient safety ratings thaninpatient workers (75.9% vs 68.1%, p = 0.013). Ambulatory staff were also more likely to report being treated with respect by co-workers (71.4% vs. 61.5%, p < 0.001). Additional analyses are in progress and will be presented.

Conclusion

Analyses in progress.

Nationwide Trends in Management and Outcomes of Acute Type B Aortic Dissection

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Introduction

With advances in endovascular technology and surgeon experience, an evaluation of contemporary outcomes in patients with acute type B aortic dissection (TBAD) is warranted. We investigated rates of mortality and readmission in patients with nonelective emergency TBAD who received thoracic endovascular aortic repair (TEVAR) versus medical management.

Methods

We conducted a retrospective cohort study of patients in Nationwide Readmissions Database from 2018-2021.Patients with a primary diagnosis of TBAD and an urgent or emergency admission were queried using ICD-10 diagnosis and procedure codes. Patients were stratified into TEVAR or medical management groups. Primary outcomes were 30-day readmission and inpatient mortality. Statistical analyses included chi-square tests, t-tests, and multiple logistic regression.

Results

A total of 12,925 patients with TBAD ICD-10 code were included, of whom 1,401 received TEVAR and 11,524 received medical management. Patients treated with TEVAR were younger and presented with lower mortality risk ($p < 0.01$). TEVAR was associated with higher rates of complications, including acute kidney injury, limb ischemia, and mesenteric ischemia ($p < 0.05$), but rates of spinal cord ischemia and stroke were similar compared to medical management ($p > 0.05$). Medical management was associated with higher rates of acute myocardial infarction and sudden cardiac arrest ($p < 0.05$). TEVAR patients had longer lengths of stay and higher total charges ($p < 0.01$). Patients treated with TEVAR experienced significantly lower inpatient mortality and lower 30-day readmissions ($p < 0.05$). In multiple logistic regression, medical management was associated with increased odds of inpatient mortality (OR 1.55, 95% CI 1.28-1.88).

Conclusion

Patients with acute TBAD undergoing medical management had 1.55 times greater risk of mortality compared to TEVAR. Medical management of TBAD was associated with higher 30-day readmission and increased rates of MI and sudden cardiac arrest. While TEVAR was associated with increased complications and hospital utilization, the reduced mortality and readmission among patients receiving TEVAR may warrant endovascular repair in select TBAD cases.

A False-Positive HIV Result in the Setting of Long-Acting Injectable Pre-Exposure Prophylaxis

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Introduction

Long-acting injectable cabotegravir (CAB-LAI) has emerged as a highly effective strategy for HIV pre-exposure prophylaxis (PrEP). However, its use raises unique considerations for HIV diagnostic testing. While delays in seroconversion and viral detection during acute infection have been described, less attention has been given to the occurrence of false-positive HIV test results. We present a case of a false-positive HIV-1 RNA result in a patient receiving CAB-LAI and discuss implications for clinical practice.

Methods

We present a case of a 33-year-old male who began CAB-LAI 600 mg in June 2023, received a loading dose in July 2023, and continued treatment every 2 months. He had no missed or delayed injections. Prior to each injection, he underwent 4th generation HIV Antigen/Antibody (Ag/Ab) and HIV-1 RNA testing, which were both negative until January 2025. At that time, HIV Ag/Ab was nonreactive, and HIV-1 RNA was reported as positive. Repeat HIV Ag/Ab and HIV-1 RNA were both negative.

Results

In this case, the laboratory investigated the false-positive HIV PCR result. Upon reviewing the machine's curve data, an unusual curve was

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identified in the internal control and long terminal repeat curves. Other studies have similarly identified false-positive HIV testing results among patients using CAB-LAI for HIV PrEP. Breakthrough HIV infection during CAB-LAI PrEP use is rare, which may reduce the positive predictive value (PPV) of HIV testing in this setting.

Conclusion

HIV testing guidelines should account for the impact of highly effective HIV PrEP on the PPV of HIV testing. False-positives can lead to significant clinical and psychological consequences, including unnecessary interruption of PrEP, initiation of inappropriate therapy, and patient distress. In patients with a low pretest probability, clinicians should consider repeating a single positive HIV PCR to ensure accurate diagnosis.

Navigating the Autism Landscape in Kenya: Systemic, Cultural, and Community Responses from Eldoret: A Qualitative Study

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Introduction

Autism spectrum disorder (ASD) remains underrecognized and underserved in many low- and middle-income countries, including Kenya. This project explored the current landscape of autism diagnosis, care, and community response in Eldoret, a medical and academic hub in Western Kenya.

Methods

This study aimed to explore the systemic, educational, and cultural barriers to autism diagnosis and care in Eldoret, Kenya, and to identify sustainable, community-driven strategies that support autistic children and their caregivers.

Results

The study engaged 76 participants, including caregivers, physicians, nurses, therapists, educators, child life specialists, and social workers.

Several key challenges emerged. Autism diagnosis was frequently delayed beyond age four due to a lack of neurodevelopmental specialists, unaffordable or inaccessible therapies, and limited diagnostic tools.

Education professionals reported minimal autism training, and children with ASD were often excluded from school, especially if they were not toilet trained. Autism content was notably absent from most teacher and health worker training curricula.

Caregivers, particularly mothers, reported emotional exhaustion, social isolation, and stigma. Fathers were often disengaged, underscoring a gender gap in caregiving roles. Caregiver mental health support was virtually nonexistent. Despite these challenges, several caregivers transitioned into advocacy roles, using their lived experience to help others.

Community-driven solutions were emerging. TAKIA, a navigator program, and PEPEA, a caregiver training model, are equipping families with culturally relevant autism knowledge and skills. Participants raised concerns about long-term planning for autistic children, especially as they age out of existing support systems.

Conclusion

To address these disparities, autism care must be integrated into Kenya's clinical and education systems. Supporting caregiver well-being and scaling grassroots programs like TAKIA and PEPEA are vital steps toward sustainable, inclusive autism care.

Intersection of Food and Nutrition Security Status and Cannabis Usage

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Introduction

Low food nutrition security has risen significantly in the United States since 2021. Concurrently, the use of cannabis has increased due to changes in state laws. However, the intersection between nutritional security status and cannabis use remains poorly understood.

Methods

From June to August 2024, participants filled out a 50-question health-related survey at community festivals across Missouri. The survey included a validated 4-item food nutrition security instrument (low, high), cannabis use status (yes, no), reason for cannabis use (recreational only, medical only, or both), urban-rural classification, demographics, and health care utilization indicators. Participants were categorized as having either high or low food nutrition security. Chi-square tests and a logistic regression model were conducted using SAS 9.4.

Results

Among the 5,001 participants, most were White (78%), female (68%), employed (81%), and urban residents (87%). Cannabis use was more prevalent among participants with low food nutrition security status (n = 1,339) with 66% reporting use, compared to 53% among those with high nutritional security (n = 3,662). This difference was statistically significant (λ^2 62.4, p-value = 0.0001). Multivariable logistic regression identified several significant positive predictors of low nutritional security. These included identifying as Black (OR 1.43, 95% CI 1.10-1.85), being unemployed (OR 1.38, 95% CI 1.05-1.80), lacking a regular doctor (OR 1.46, 95% CI 1.25-1.70), and having delayed medical care in the past year (OR 3.05, 95% CI 2.63-3.54). Cannabis use for medical reasons (OR 1.68, 95% CI 1.37-2.07) and combined medical/recreational use (OR 1.55, 95% CI 1.19-2.02) were also associated with low nutritional security.

Conclusion

People who use cannabis for medical reasons are more likely to experience low nutritional security, even after accounting for socioeconomic and healthcare factors. This suggests that use of cannabis for medical reasons may be a marker of underlying health vulnerability and that nutritional insecurity reflects broader challenges in healthcare access.

Outcomes of Transtibial Pull-Out Fixation Versus Suture Anchor Fixation for Repair of Meniscus Posterior Root Tears

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Introduction

Posterior meniscus root tears are a common injury that can result in significant joint dysfunction. These tears are commonly treated with a transtibial pull-out (TO) repair, but persistent meniscus extrusion and overall failure rates of 19-23% have been reported. Recently, a knotless adjustable suture anchor (SA) has been introduced as an alternative fixation technique. However, limited clinical data exist comparing this method with established TO techniques. The purpose of this study was to compare patient-reported outcomes (PROs) and failure rates of TO versus SA fixation.

Methods

Following institutional review board approval, a retrospective chart review identified patients who underwent posterior meniscal root repair with either a TO or SA technique with a minimum 1-year follow-up. Surgical details, clinical outcomes, and patient reported outcome measures (PROs) were collected and analyzed using Kruskal-Wallis for continuous variables and Fisher's exact test for categorical differences between groups. Failure was defined as revision meniscus repair, transplant, or conversion to total knee arthroplasty.

Results

A total of 117 patients met inclusion criteria and were included for analysis (86 TO, 31 SA). Patients in the SA group were significantly older (p = .016), more likely to be female (p = .009), more likely to be married (p = .022), and had significantly lower follow-up (p < .01, TO 29.4 months vs. 14.5 months SA). Failure was significantly more likely in TO

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patients (p = .034, 14% TO vs 0% SA), occurring at a mean of 19.8 months postoperatively (range 8–55 months). There were no significant differences in PROs between groups at any time point.

Conclusion

The study presents early clinical outcomes of suture anchor fixation for posterior meniscal root repairs. The findings demonstrate equivalent PROs and decreased early failure rates in short-term follow-up of suture anchor versus transosseous posterior meniscus root repair, suggesting non-inferiority; however, longer-term studies are needed to assess superiority.

Postoperative Quadriceps Metrics and Pain Levels Inform Functional Outcomes Months later in Geriatric Hip Fracture

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Introduction

Despite progress in surgical management, geriatric hip fractures still result in substantial morbidity and mortality. Surgery aims to enable early mobilization and weight-bearing; however, muscle weakness and pain are significant obstacles. We were the first to quantify the quadriceps structure at bedside and pain level early postoperatively; we hypothesized that the degree of muscular weakness and pain would inversely correlate with weight-bearing and inform functional status months later.

Methods

Nine patients (mean [standard deviation], 76.9 [7.0] years old, 33.3% male, BMI=22.8 [2.5], 44.4% smokers) with unilateral traumatic hip fractures underwent open reduction and internal fixation (66.7%) or total hip arthroplasty (33.3%). Quadriceps ultrasound (thickness and echogenicity, GE Vscan Air handheld device), behavioral (weight-bearing force peak and loading rate, LoadSol-T insole; number of steps, 3DTriSport pedometer), and clinical measures (pain on 0-10 scale, measured repeatedly immediately after surgery; Parker Mobility Score-PMS) were obtained within 72 hours (early, n = 9) and three months (late, n = 4) postoperatively.

Results

Early postoperative: we found significantly lower weight-bearing force and loading rate (p = 0.003 and 0.01, respectively) and moderate pain (6.1[1.4]), but failed to find significant quadriceps alterations (thickness, p = 0.4; echogenicity, p = 0.8). Yet, echogenicity negatively correlated with PMS scores (p = 0.04), suggesting greater mobility in those with healthier quadriceps.

Late postoperative: we found non-significant differences in weight-bearing or ultrasound metrics between legs (p > 0.05 for all), indicating recovery of the operated leg function. Those with greater echogenicity walked more (p = 0.02).

Early-to-late prediction: Early thickness tended to predict late step number (p = 0.14), suggesting that greater muscle strength 72 hours after surgery results in better leg function three months later. Early pain also tended to correlate negatively with late thickness (p = 0.07), indicating the impact between early pain, weight-bearing and early mobilization, and subsequent muscle strength.

Conclusion

These findings indicate that postoperative quadriceps and pain metrics provide information about the recovery potential. Further work with larger sample sizes is warranted.

Postnasal Dexamethasone Administration for Prevention of Bronchopulmonary Dysplasia in Premature Infants with Respiratory Distress Syndrome

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Introduction

In premature infants, respiratory distress syndrome (RDS) and its sequalae are major causes of morbidity and mortality. Administration of postnatal steroids has historically been used to prevent or treat bronchopulmonary dysplasia (BPD) in premature infants with RDS, with dexamethasone being the most common choice of steroid. Among infants diagnosed with BPD, severity is stratified into grades 1, 2, and 3. The aim of this study was to assess the effects of postnatal dexamethasone administration on the incidence and severity of BPD.

Methods

A retrospective review was conducted of infants born before 32 weeks' gestation who received care in our NICU from January 1, 2019, to December 30, 2024. Patients were separated into groups based upon administration of dexamethasone as per DART dosing prior to 36 weeks gestation or lack thereof. We assessed baseline demographics, length of stay, duration of invasive and noninvasive ventilation, time to full oral feeds, diagnosis of BPD, antenatal steroid administration, and presence of maternal diabetes.

Results

In total, 372 patients were included in the study, with 39 in the postnatal steroid group and 333 in the no-postnatal-steroid group. The postnatal steroids group had significantly increased rates of BPD diagnoses compared to the no postnatal steroids group (87.2% and 37.8%, respectively). Rates of grade 3 BPD were higher in patients who received postnatal dexamethasone than in those who did not.

Conclusion

We found that postnatal dexamethasone administration did not reduce the incidence or severity of BPD in premature infants with RDS. Dexamethasone did not reduce the incidence of grade 3 BPD. Our findings support caution in the use of dexamethasone for prevention or treatment of BPD in premature infants with RDS.

Negative Predictive Value of Tumor Markers in Diagnosing Ovarian Cancer

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Introduction

Ovarian cancer remains a challenging gynecologic malignancy due to difficulties in early detection. Nearly 80% of cases are diagnosed at an advanced stage, underscoring the need for improved diagnostic tools. This study aimed to assess the utility of standard tumor markers in patients referred for suspected pelvic masses.

Methods

We conducted a retrospective chart review of patients referred to a gynecologic oncology clinic at Ellis Fischel Cancer Center. Patients were included if they had pelvic imaging (ultrasound, CT, MRI, PET scan) demonstrating an ovarian or pelvic mass, measurements of at least one serum tumor marker (CA-125, CA 15-3, CA 19-9, CEA, LDH, inhibin A, inhibin B, beta-hCG, AFP), and surgery with pathologic examination for malignancy.

Results

A total of 156 patients were included, of whom 112 had benign pathology and 44 had a malignancy of any kind. Patients were grouped into three categories: (1) all nine markers tested and negative, (2) all available markers negative (though not all 9 were tested), and (3) at least one positive marker. The analysis included 38 true positives (positive markers and malignancy), 42 false positives (positive markers and benign pathology), 70 true negatives (negative markers and benign pathology), and six false negatives (negative markers and malignancy). The negative predictive value (NPV) was 92.1% when considering patients with all available markers negative, and 86.8% when restricting to patients who had all 9 markers tested and negative. Of the false-negative patients, three had uterine cancer, two had borderline ovarian tumors, and one had low-grade serous ovarian carcinoma. Therefore, the NPV for ruling out high-grade ovarian cancer was 100%.

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Conclusion

Tumor markers demonstrated reliable NPV in patients with suspected ovarian cancer, particularly when all available markers were negative. These findings suggest a potential role for tumor markers in refining diagnostic pathways, reducing unnecessary procedures, and guiding management decisions.

Incarcerated Rectal Prolapse Due to Rectal Polyposis: A Case Report

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Introduction

Rectal prolapses are rare and estimated to affect less than 0.5% of the US population[1]. Incarcerated or strangulated prolapsed rectal polyps are even rarer. Although rectal adenomas and polyps are common, their presentation as incarcerated or strangulated rectal prolapse has seldom been reported. We present a case of an acutely incarcerated rectal prolapse of dysplastic villous adenomatous polypoid tissue.

Methods

A 49-year-old woman presented to our facility with a large, painful rectal mass, mucus, and bright red blood per rectum. This occurred after two hours of straining to have a bowel movement. She denied past colonoscopies, anal receptive intercourse, and any personal or family history of bowel disease or cancer. The tissue was unable to be manually reduced, and computed tomography scans showed a full thickness rectal prolapse with signs of edema and ischemia, prompting emergent surgical intervention. A diagnostic laparoscopy showed no pathology of the large bowel or rectum. A temporary diverting loop sigmoid colostomy was created. The prolapsed mucosal mass was circumferentially resected, and the rectum was subsequently reduced. Surgical pathology reported villous adenoma, extensive high-grade dysplasia, and foci of pseudo-invasion, with no evidence of invasive carcinoma. A follow-up rectal exam under anesthesia and flexible sigmoidoscopy during her hospital stay identified multiple large rectal polyps but no evidence of rectal ischemia.

Results

The patient had an uneventful postoperative course and was discharged home on hospital day 11 for outpatient follow-up with colorectal surgery.

Conclusion

Rectal prolapse can occur in the setting of a damaged or dysfunctional anal sphincter or conditions that lead to increased intra-abdominal pressure. Management of prolapses can be complex. In the setting of these rare incarcerated or strangulated prolapsed dysplastic polyps, emergent surgical intervention is still indicated.

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Dual Complications Following Labor Epidural: Post-Dural Puncture Headache and Pneumocephalus

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Introduction

Post-dural puncture headaches (PDPH) are usually secondary to an iatrogenic cerebral spinal fluid (CSF) leak and are a well-known cause of headaches in laboring patients after receiving an epidural, occurring in 0.1-3% of labor epidurals. Pneumocephalus, air within the intracranial cavity, is a less frequent but more serious complication that is most often associated with the use of the loss-of-resistance to air (LORA) technique when placing an epidural. Although the simultaneous occurrence of these epidural complications less commonly occurs, it reinforces the need for clinicians to promptly identify and differentiate the two for appropriate management.

Methods/Results

This case is a G3P3, 36-year-old female with a past medical history of anxiety, childhood seizure disorder, asthma, and migraines who underwent epidural placement for a vaginal delivery at an outside facility. Two attempts were required for proper placement, with inadvertent dural puncture occurring during the first attempt. The patient immediately developed a headache that persisted throughout labor into postpartum day two. The headache had a positional component but did not fully resolve when supine. In addition to the headache, the patient experienced severe photophobia, phonophobia, and neck tension. Head computed tomography (CT) at an outside facility revealed the patient had pneumocephalus. She was then transferred to the University for further management, in which she received high-flow nasal cannula oxygen to promote air reabsorption through nitrogen washout. On hospital day two, the repeat head CT demonstrated improvement in the pneumocephalus. Due to the persistent positional headache, an epidural blood patch was performed, resulting in symptomatic relief of the PDPH.

Conclusion

While cases of concurrent PDPH and pneumocephalus are infrequent, awareness of overlapping but distinct features of each condition is crucial for effective treatment and optimizing maternal recovery.

Pre-Operative Diagnosis of Obstruction Predicts Higher Risk of Post-Operative Surgical Site Infections Following Bowel Resections with Anastomoses

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Introduction

Surgical site infections (SSIs) increase morbidity and risk of downstream complications such as wound dehiscence and ventral hernia. Deep SSIs may require percutaneous or open drainage to prevent dissemination or long-term sequelae. We analyzed outcomes of elective and emergent bowel resections with anastomoses to assess the incidence of post-operative SSIs.

Methods

A retrospective chart review was conducted for small and large bowel anastomoses performed between 2018–2024. Collected variables included demographics, medical/surgical history, indication for surgery, anatomy and technique of anastomosis (small vs. large bowel, hand-sewn vs. stapled), number of operations per admission, fascial closure method, and post-operative complications (leaks, infections, dehiscence/evisceration). Continuous

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variables were compared with Student's t-test and categorical variables with Chi-squared test ($p < 0.05$). IRB exempt, Project No. 2122397.

Results

A total of 382 index operations were reviewed:

- Indications: obstruction (78), malignancy (93), diverticulitis (50), trauma (52), perforation (40), hernia (36), ischemia (21), enterocutaneous fistula (6), volvulus (7).
- Timing: 261 elective vs. 183 emergent (including 42 second-look and 14 third operations in same admission).
- Complications: 55 SSIs (24 superficial, 26 deep, 3 mixed, 2 bacteremia).
- Key finding: Operations for bowel obstruction were nearly twice as likely to incur SSI (OR 1.84, $p = 0.0129$).

Conclusion

Patients undergoing bowel resection with anastomosis for obstruction represent a high-risk population for SSI, with nearly double the incidence compared to other indications. Recognizing this risk can guide:

- Enhanced prophylactic strategies (antibiotics, wound protection).
- Tailored intra-operative decision-making (consider diversion, meticulous technique).
- Closer post-operative surveillance for early detection and management of SSIs.

Further study of additional risk modifiers may refine strategies to decrease morbidity in this vulnerable population.

Difference in PCL-5 Scores Between Participants with PTSD and Those with Other Psychiatric Disorders

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Introduction

Post-traumatic stress disorder is a psychiatric disorder that develops after a traumatic event(s), which can lead to autonomic hyperactivity, along with distress and impairments for daily living activities, sleep, and cognition that persist for 1+ months. Other psychiatric disorders (Depression/Anxiety) can also cause the symptoms listed in the PCL-5. We aimed to examine whether those diagnosed with PTSD relative to those diagnosed with a different psychiatric condition would have a greater symptomatic response, as well as more of these symptoms.

Methods

Participants completed (N=22, M_{age}=18.28, SD_{age}=0.835) completed two study visits (~2 weeks apart) with n=2 reporting a diagnosis of PTSD and n=2 reporting a diagnosis of an "other" psychiatric disorder. We used the participants self-reported scores (from 0-4) for symptom severity for the 20 items on the PCL-5. We then got an average score by totaling up the points and dividing them by 20. We also compared the two groups in terms of how many out of the twenty symptoms where they had at least a 1 on the scale. An independent t-test evaluated the difference between those with PTSD and those with another diagnosis with stress response.

Results

Younger adults with PTSD had a higher average PCL-5 scores (M=1.725, SD=1.3) compared to those with other psychiatric disorders (M=0.30, SD=0.69; $p<0.001$). The PTSD participants had a higher number of symptoms (M=14.5) than the other participants (M=3.5, $p<0.001$).

Conclusion

Findings show that the participants with PTSD had more symptoms and higher average scores on the PCL-5. Despite other psychiatric disorders contributing to the development of these symptoms, individuals with PTSD may have greater susceptibility. We postulate that this greater negative impact may be contributed to autonomic dysfunction in PTSD populations. Future investigations with larger sample sizes and various anxiety/stress related disorder may help delineate the cause of this difference in symptom severity.

Evaluation of Insurance Status

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and Postoperative Outcomes in Flexor Tendon Injuries

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Introduction

Flexor tendon injuries can significantly impair daily function and work. While many factors influencing recovery are well-documented, the role of insurance status is less clear. This study evaluates outcomes in insured, uninsured, and workers' compensation (WC) patients after flexor tendon repair, aiming to identify patterns that may guide treatment strategies and enhance recovery outcomes.

Methods

This IRB-approved, retrospective review included patients who underwent repair between January 2009 and January 2023 at a single institution. Exclusion criteria were zone 1 avulsions, delayed/non-primary repairs, or attritional ruptures. Data collected included demographics, comorbidities, complications, and rehabilitation type. 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 an α value of 0.05.

Results

Among 494 patients, 389 were insured and 105 uninsured. Of the insured patients, 45 were covered by workers' compensation claims (9%). The most common complication among WC patients was stiffness (77%, p=0.005), compared to numbness (45%) in those without WC insurance, and stiffness (46%) in those without insurance. All WC patients participated in formal occupational therapy, averaging 22.7 ± 20.5 weeks (p=<0.001), compared to non-WC patients (13.7±11.9) and those without insurance (9.0±10.6). WC patients also had a longer clinic follow-up time (52.4 ± 45.8 weeks, p=<0.001) compared to non-WC patients (24.2±20.5 weeks) and patients without insurance (14.0±24.96 weeks).

Conclusion

This study highlights the influence of insurance status on both complication patterns and rehabilitation adherence following flexor tendon repair, offering novel and practical insights to optimize patient treatment strategies. These findings highlight the need for tailored post-operative protocols addressing disparities in therapy access and follow-up to improve recovery and equity in care.

Idiopathic Multicentric Castleman Disease with Severe Abdominal Manifestations: A Case Report

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Introduction

Multicentric Castleman disease (MCD) is a rare lymphoproliferative disorder characterized by systemic inflammation. Idiopathic MCD (iMCD), a subtype without known viral cause, involves overactive inflammatory cytokines, particularly IL-6. Its pathogenesis and natural history are poorly understood. We describe an iMCD case, plasma cell variant, in a patient with typical Castleman disease features, combined with extensive intraabdominal lymphadenopathy, peritonitis, and sepsis.

Methods

A 35-year-old African American male with iMCD (plasma cell variant) and hemolytic anemia presented with diffuse abdominal pain, nausea, vomiting, tachycardia, and shortness of breath. He had been treated with siltuximab but lacked follow-up for over a year. Examination showed diaphoresis, increased respiratory effort, tachycardia, hypotension, and decreased oxygen saturation. Bloodwork indicated leukocytosis, thrombocytosis, anemia, hyponatremia, and lactic acidosis. Imaging revealed extensive lymphadenopathy, severe ascites,

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ischemic bowel with peritoneal enhancement, and multicentric abscesses. An emergent laparotomy exposed extensive intraabdominal adhesions, ischemic ileum, cecum, and ascending colon, necessitating adhesiolysis, ileal resection, partial colectomy, detorsion, and washout for peritonitis with temporary abdominal closure. Post-operatively, the patient remained in SICU with mixed respiratory and metabolic acidosis, requiring further surgery for definitive resection and ileostomy creation.

Results

This iMCD case demonstrates the complexity in understanding disease pathophysiology and identifying potential new subtypes. The systemic inflammatory nature and role of IL-6 highlight the need for further research to delineate mechanisms and improve classification. The patient's presentation illustrates the criticality of adherence to follow-up and treatment, as a short lapse led to severe septic shock and peritonitis.

Conclusion

This case underscores the importance of early recognition and comprehensive management of Castleman disease. Multidisciplinary care and ongoing research are vital for understanding and treating complex cases like iMCD.

Prevalence of Functional Abnormalities on Flexible Nasolaryngoscopy in the Aspirating Pediatric Patient

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Introduction

The evaluation algorithm for pediatric aspiration varies between institutions, however, it often involves universal office flexible nasolaryngoscopy (FNL). This study aimed to identify the utility of in-office FNL prior to triple endoscopy (direct laryngoscopy, esophagoscopy, and bronchoscopy).

Methods

Retrospective chart review was conducted on pediatric patients with clinical and/or radiologic evidence of aspiration between 2015 and 2024 who underwent office FNL interpreted by a single pediatric fellowship trained otolaryngologist and later triple endoscopy. Patient demographics, clinical presentation, medical history, radiographic results, FNL findings, and triple scope findings were collected and analyzed.

Results

372 total patients were reviewed (59.1% male, average age at presentation was 1.3 years). There were 31 (8.3%) patients with significant functional findings on FNL (10 with vocal cord mobility disorders, 22 with palatal insufficiency). 80% of patients with a vocal cord mobility abnormality presented with dysphonia; the remaining two were originally evaluated as questionably hypomobile and did not have abnormalities on repeat FNL.

Conclusion

Despite what is theoretically expected, office FLN did not have significant or unique diagnostic yield for aspirating pediatric patients with only 2.7% (10/372) having a vocal cord mobility disorder and 5.9% (22/372) with palatal insufficiency. While the approach for each patient should be individualized, this data suggests an opportunity to discuss using FNL in every aspirating patient. Consideration of patient factors such as the presence of dysphonia, prior intubation, palate mobility on modified barium swallow, and neurologic dysfunction may allow for more specific, yet sensitive, patient selection and improvement in cost burden to the healthcare system and families.

Pediatric Hepatitis C Treatment: Experience at a Single-Center Specialty Clinic

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Introduction

Pediatric Hepatitis C virus (HCV) infection is a public health priority for achieving national HCV elimination. The rate of mother-to-child transmission is approximately 5% and by age 4 years, 25-50% will spontaneously resolve infection. Unresolved, chronic HCV infection can persist in adulthood, increasing the risk of advanced liver disease and cancer. Following approval of highly effective, pan-genotypic direct-acting antiviral regimens for children, in 2022, national guidelines recommended treatment for all pediatric patients with HCV infection aged 3 years and older, regardless of disease severity. Part-2 DORA trial that demonstrated high efficacy and safety in 80 children aged 3 to <12 years (including 51 children in 3 to < 9-year age cohorts) led to approval of a once daily, 8-week glecaprevir/pibrentasvir (GLE/PIB) regimen in 2021. In this retrospective observational study, we aim to confirm the efficacy and safety of GLE/PIB, since we started to accept referrals for pediatric HCV treatment in 2024.

Methods

We reviewed electronic medical records of pediatric patients with HCV infection treated at our clinic for demographics, clinical characteristics, adherence, primary efficacy endpoint, tolerability and adverse events related to treatment. The primary end point was defined as sustained virologic response (i.e., undetectable viremia) 12 weeks post-treatment (SVR12).

Results

We identified six patients (range: 3 to <9 years) treated with GLE/PIB in 2024. All patients were asymptomatic and treatment naïve. All (100%) completed treatment, and all (100%) achieved SVR12. Treatment was well tolerated, without any adverse events.

Conclusion

Real-world efficacy and safety data on GLE/PIB in pediatric HCV are limited. Our case series representing 11% of age-matched enrollment in Part-2 DORA trial demonstrates a substantial contribution within one year at a mid-Missouri clinic. Timely dissemination of this data underscores treatment effectiveness to our referring providers and the need for robust linkage to care to ensure equitable pediatric HCV therapy.

Effect of Placing Pre-Term Infants on High Flow Nasal Cannula before 36 weeks on Time to full Oral Feeding

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Introduction

Studies describe placing pre-term infants on high flow nasal cannula (HFNC) may be associated with achieving oral feeds earlier than those on continuous positive airway pressure (CPAP) (Leibel et al). We studied the effect of switching to HFNC before 36 weeks corrected gestational age (CGA) on the time to full oral feeding.

Methods

IRB approved retrospective electronic chart analysis of pre-term infants born between January 1, 2020 and December 31, 2024 at less than 32 weeks gestation admitted and surviving the NICU stay was performed. Time to full oral feeding (FOF, 150ml/kg/day) in infants treated with HFNC before 36 weeks CGA was compared to those treated with only CPAP. Infants with NEC, intestinal surgery, or gastrostomy tube were excluded. Chi-squared tests were used to analyze categorical data, and Mann-Whitney U T-tests for continuous variables. A p-value < 0.05 indicated statistical significance.

Results

A total of 170 preterm infants born at less than 32 weeks gestation were placed on HFNC or CPAP (51 HFNC, 119 CPAP). Median days to reach FOF was 21 in the HFNC group (IQR 10, 29) and 18 days in the CPAP group (IQR 11, 28; p=0.9124). Median

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length of stay was 76 days in HFNC group (IQR 59, 89) and 61 in CPAP group (IQR 49, 84; p=0.0198). The median duration of non-invasive ventilation was 56 days for HFNC group (IQR 43, 70) and 31 in CPAP group (IQR 19, 55; p<0.00001).

The gestational age, birth weight, duration of invasive ventilation, antenatal steroids, use of postnatal steroids, or the presence of maternal diabetes was not different between the two groups

BPD was significantly higher in the HFNC group (p<0.00001).

Conclusion

Infants placed on HFNC did not reach FOF earlier, had longer length of stay, and increased bronchopulmonary dysplasia.

Examining Views on Head-Up CPR in Cardiac Arrest Care

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Introduction

Head-Up cardiopulmonary resuscitation (CPR), achieved by elevating the head and thorax during chest compressions, aims to improve cerebral perfusion and neurological outcomes in cardiac arrest. While physiological studies suggest benefit, limited qualitative data exist on Emergency Medical Services (EMS) providers' real-world experiences. This study explores EMS professionals' perceptions, operational challenges, and recommendations related to Head-Up CPR implementation.

Methods

We conducted a qualitative study using semi-structured interviews with three EMS professionals from different agencies, each with experience performing Head-Up CPR. Interviews were transcribed and analyzed thematically following Braun and Clarke's six-phase approach: familiarization, initial coding, theme development, review, definition, and reporting. Codes were grouped into themes and subthemes, and representative quotes were extracted with source attribution.

Results

Nine themes emerged: (1) Perceptions & attitudes—general enthusiasm for the physiological rationale, tempered by concerns about execution; (2) Perceived benefits—reduced intracranial pressure, improved airway management, and better neurological outcomes; (3) Patient outcomes—ROSC rates unchanged or reduced, but improved neurological function among survivors; (4) Implementation & training—staged rollouts and inclusive planning fostered buy-in, while top-down mandates generated resistance; (5) Logistics—improvisation was key, but off-chest time during setup was a key barrier; (6) Practical barriers—scene constraints, patient size, variable crew familiarity, and ingrained supine-CPR habits; (7) Team dynamics—clear roles and anticipatory support improved efficiency; (8) Execution fidelity gap—real-world conditions increased delays compared with training; (9) Recommendations—enhanced training, checklists, pre-assembled kits, and workflow standardization.

Conclusion

EMS providers perceive Head-Up CPR as a promising, patient-centered innovation, especially for improving neurological outcomes. Implementation success depends on minimizing off-chest time, tailoring workflows to diverse field environments, and ensuring team readiness through inclusive planning and repeated high-fidelity training. Linking these qualitative insights with system-level outcome data may guide optimization of Head-Up CPR protocols across EMS systems.

Phytophotodermatitis in a Pediatric Patient

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Introduction

Phytophotodermatitis involves a set of

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phototoxic reactions with characteristic erythema, hyperpigmentation, and blisters. It is defined as an inflammatory response resulting from exposure to ultraviolet radiation in combination with a photosensitizing agent. These agents can be found in plants, fragrance products such as bergamot, or foods such as limes and figs. Phytophotodermatitis can arise in settings where a host of other diagnoses may be initially considered including adverse reactions to medications, contact dermatitis or autoimmune conditions warranting consideration of a broad differential diagnosis.

Methods

This study describes a single patient case of a seven-year-old female patient presented to the emergency department for evaluation of a painful rash on the face and hands. The initial presentation of blistering matches the timeframe of phytophotodermatitis with the subsequent manifestation of hyperpigmentation in affected areas. Treatment primarily involves controlling the acute inflammation with topical corticosteroids, antihistamines and monitoring for secondary infections.

Results

Prevention is the best treatment for phytophotodermatitis. After exposure, treatment of mild to moderate cases primarily involves controlling the acute inflammation with topical corticosteroids. Topical calcineurin inhibitors have also shown efficacy in phytophotodermatitis. Wet wraps with emollients and cool compresses can also help soothe pain and irritation. Topical or oral antihistamines can sometimes help with pruritus and sleep disturbance. In addition, it is important to counsel patients about the expected hyperpigmentation once the acute inflammation resolves and the importance of diligent sun protection/avoidance. Monitoring for secondary infections and initiating topical or systemic antibiotics as needed is another important consideration.

Conclusion

This case report highlights a classic example of phytophotodermatitis with characteristic blistering and hyperpigmentation. The location of the lesions involved areas that were exposed to UVA light and a photosensitizing agent. The initial presentation of blistering matches the timeframe of phytophotodermatitis with the subsequent manifestation of hyperpigmentation in affected areas.

Antibiotics and Mechanical Ventilation in TBI: PROPHY-VAP or RISKY-VAP?

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Introduction

Patients with traumatic brain injuries (TBI) are at risk for ventilator-associated pneumonia (VAP). The PROPHY-VAP trial showed a single dose of ceftriaxone reduces incidence of early VAP. We hypothesized that any antibiotic administered within 12 hours of intubation would decrease early VAP incidence in TBI patients.

Methods

This single center, two-year retrospective review included adults (age ≥18 years) with TBI, Glasgow Coma Score (GCS) ≤ 8, and mechanically ventilated (MV). Patients were grouped by antibiotic administration within 12 hours of intubation. The primary outcome was VAP between days 2-7 of MV, defined by NHSN criteria. Secondary outcomes were mortality, ICU length of stay (LOS), specific antibiotic exposure, and ventilator free days (VFD).

Results

Of 745 patients, 390 received any antibiotic within 12 hours of intubation and 355 received no early antibiotic treatment. VAP occurred in 42 patients (5.6%). Among patients who developed VAP, 31 (73.8%) had received antibiotics compared with 11 (26.2%) without exposure (P=0.004). Among those without VAP, 359 (51.1%) received antibiotics compared with 344 (48.9%) without exposure. Of those receiving antibiotics (n=221, 29.7%), 20 patients (9.4%) developed VAP while 201 did not (90.1%). Cefazolin was the most common

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antibiotic administered (n=181), with 165 patients (82%) developing VAP while 16 (8.8%) did not. Cefazolin exposure was not significantly associated with VAP (P=0.539). No significant differences were observed in mean ICU LOS, VFD, and mortality between early and no antibiotic groups.

Conclusion

Antibiotic administration within 12 hours of intubation did not reduce VAP incidence in TBI patients. Surprisingly, patients who received early antibiotic were more likely to develop VAP between days 2-7 of MV. These findings differ from the PROPHY-VAP trial and highlight the need for prospective studies to better define the role of early antibiotic use in preventing VAP in TBI patients.

BIG: Implementing Evidence Based Practice for Intracranial Bleeds for Brain Injury Guidelines

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Introduction

The Brain Injury Guidelines (BIG) are a set of criteria used in academic hospital settings to classify and treat traumatic brain injury (TBI) patients based on their initial clinical assessment. CoxHealth, a busy community hospital, adopted a modified BIG system to guide best practices and utilization of critical care admission, hospitalization, imaging, and neurosurgery consults. This study was designed to evaluate the implementation of this system and areas for improvement.

Methods

This retrospective cohort study included TBI cases between August 2023 and June 2025. Data collected included demographics, GCS, neurologic exam, ETOH/drug use, anticoagulant/NSAID use, skull fracture, type of intracranial bleed, midline shift, readmission ≤28 days, repeat head imaging, neurosurgical consult, BIG category, ICU admission, and polytrauma status. Chi-squared test, t-tests, and Mann-Whittney U tests were utilized for data analysis.

Results

265 patients met inclusion criteria. 30 patients were classified as BIG1 and 235 BIG2. ICU admission was seen in 8 (26.67%) BIG1 and 186 (79.24%) BIG2 patients. No BIG1 cases were readmitted within 28 days of discharge. Neurosurgery was consulted for 16 (53.33%) BIG1 and 226 (96.17%) BIG2 cases. Regardless of BIG classification, 90 (33.96%) patients were confirmed to have used alcohol or drugs on admission, 35 (13.21%) had not, and the remaining 140 (52.83%) were unknown. Similarly, 137 (51.70%) patients were using anticoagulation or NSAIDs at the time of admission, 107 (40.38%) were not, and 21 (7.92%) were unknown.

Conclusion

A modified BIG system has reduced unnecessary burden on the healthcare system in one community saving at least 30 repeat head CT scans, 24 ICU days, and 14 neurosurgical consults. Opportunities for improvement include increased screening for alcohol or drug use. Next steps include expanding our sample size and transitioning to a three-tiered BIG system.

Pregnancy-Associated Exacerbation of Cervical Spinal Schwannoma

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Introduction

Spinal schwannomas are benign, slow-growing nerve sheath tumors that can cause progressive neurological deterioration due to spinal cord compression. During pregnancy, progression of symptoms may accelerate, potentially from regular hormone-mediated and weight-mediated effects of pregnancy. Spinal schwannomas often express estrogen and progesterone receptors; thus, hormonal changes during pregnancy can stimulate

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tumor growth and cause further nerve compression. Weight-mediated effects from pregnancy, such as increased maternal weight, lumbar lordosis, and intra-abdominal pressure, increase mechanical stress on the spinal cord, leading to worsening pain and neurological deficits. This case highlights the rapid progression of spinal schwannoma symptoms in a pregnant patient.

Methods/Results

A 34-year-old female, G3P1, developed progressive right-sided weakness over 18 months, initially presenting as intermittent right foot weakness and later right upper extremity with numbness and tingling in the fingers. During pregnancy, symptoms worsened, including right-hand spasticity, right upper extremity contraction, increased weakness, frequent falls, and new lower extremity spasms. The patient presented to our facility late into her pregnancy with new loss of ambulation. Due to worsening neurologic concerns with unknown etiology, she underwent cesarean delivery and MRI under general anesthesia. Postpartum MRI revealed a right-sided C1-C2 mass compressing the cervical cord. She underwent right C1 laminectomy with limited C2 laminectomy and gross total resection of a WHO grade 1 schwannoma one week after delivery. Two weeks postoperatively, she was ambulating with a walker, with improving right hemiparesis and intact bowel and bladder function. Postoperative imaging showed no residual tumor, and a follow-up six-month MRI was scheduled.

Conclusion

This case highlights how hormonal and mechanical factors of pregnancy potential can drive rapid neurological deterioration in patients with spinal schwannomas. Maternal and fetal outcomes depend on early recognition, timely imaging, and multidisciplinary management, with postpartum surgery offering the potential for significant neurological recovery.

Prep for Success: Improving Colonoscopy Completion Through Quality Improvement

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Introduction

Colorectal cancer (CRC) is the second leading cause of cancer death in the United States but is highly preventable with timely screening. Patients from Federally Qualified Health Centers (FQHCs) face unique barriers to colonoscopy completion, including financial constraints, transportation challenges, variation in bowel prep types, and inconsistent communication protocols between their clinics and referred procedure centers. These challenges contribute to low screening and completion rates. This quality improvement project aims to identify patient and system-level barriers to colonoscopy completion for FQHC patients in central Missouri and to create targeted interventions to improve screening rates.

Methods

Three FQHCs partnered in this project to identify commonly referred colonoscopy procedure centers (PC, n=16) in their catchment areas; interviews have been completed at six PCs. PC staff were asked about referral processes, bowel prep protocols, patient barriers, and workflows. Responses were organized to identify barriers and guide development of workflow intervention design. Data collection is ongoing.

Results

All contacted PCs reported that their gastroenterologists either currently use or are willing to adopt MiraLAX as their primary bowel preparation – a relatively inexpensive over-the-counter option for prep standardization. Two PCs report having dedicated staff for coordinating patient scheduling and sending results, while some others require patients to call and retrieve results themselves. We also found that two visits, a pre-procedure consultation and the procedure itself, are required at some centers (often dependent on clinician's preference), making screening completion more difficult for those with transportation issues.

Conclusion

Preliminary results highlight opportunities to standardize bowel prep selection, streamline communication between FQHCs and procedure

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centers, and reduce unnecessary pre-procedure consultations. Next steps include piloting and refining these interventions through iterative improvement cycles in collaboration with partner clinics and procedure centers. Sustainable implementation has the potential to improve colonoscopy completion and reduce disparities in CRC outcomes among FQHC patients.

Concurrent Small and Large Bowel Anastomoses After Resections are More Likely to Incur Surgical Site Infections

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Introduction

Surgical site infections (SSIs) increase patient morbidity and the risk of downstream wound complications such as dehiscence or ventral hernias. Deeper SSIs may require percutaneous or open drainage procedures to prevent dissemination or long-term abdominal complications. We analyzed a retrospective database of elective and emergent small and large bowel resections with anastomoses for incidence of post-operative SSIs.

Methods

A retrospective chart review of small and large bowel anastomoses was conducted. Variables captured included demographics, medical and surgical history, anatomy and method of anastomoses (small vs large bowel, hand-sewn vs stapled), number of operations per admission, method of fascial closure, and post-operative complications (leaks, infections, dehiscence, evisceration). Continuous variables were compared using Student's t-test and categorical variables were compared using the Chi-squared test with a p-value level of significance at 0.05. IRB exempt project No. 2122397.

Results

382 index operations were recorded between 2018 and 2024. 409 total anastomoses were performed, 225 between small bowel and 184 between large bowel, with 91 cases of both small and large bowel anastomoses performed during the same index case. SSIs were significantly more likely if both small and large bowel anastomoses were performed (OR=1.87, p=0.0197) but no differences were found for isolated small or large bowel anastomoses performed. 55 post-operative SSIs occurred which included 2 bacteremia, 24 superficial, 26 deep, and 3 with both.

Conclusion

Performing both small and large bowel anastomoses during the same index operation nearly doubled the risk of post-operative surgical site infection.

Suspected Serotonin Syndrome in the Perioperative Setting: A Case Report Highlighting Diagnostic Challenges and Anesthetic Implications

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Introduction

Serotonin syndrome is a rare but potentially life-threatening condition caused by excessive serotonergic activity in the central nervous system. It can be difficult to diagnose in the perioperative setting due to overlapping presentations with other postoperative complications. We present a pediatric case highlighting diagnostic challenges and anesthetic considerations.

Methods

A 12-year-old female with multiple psychiatric comorbidities, including ADHD, anxiety, and Tourette's disorder, underwent esophagogastroduodenoscopy under general anesthesia. Her home medications included sertraline and methylphenidate. Intraoperative

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medications included propofol, fentanyl, ondansetron, dexamethasone, and midazolam. Postoperatively, she developed tremors and ocular clonus after receiving meperidine for presumed shivering.

Results

The patient's symptoms worsened despite benzodiazepine administration, progressing to agitation and visual hallucinations. Given her serotonergic medication exposure, serotonin syndrome was suspected. She received oral cyproheptadine with subsequent improvement in symptoms. She was admitted to the Pediatric ICU for monitoring, where her tremors resolved, and she was discharged the next day in stable condition.

Conclusion

This case illustrates the diagnostic complexity of serotonin syndrome in pediatric patients, particularly when overlapping with postoperative shivering or underlying psychiatric conditions. Recognition is critical, as commonly used anesthetic and analgesic medications, including fentanyl, ondansetron, and meperidine, may exacerbate serotonergic activity. Early suspicion, supportive management, and use of serotonin antagonists can lead to favorable outcomes. Clinicians should carefully review medication histories and consider alternatives to serotonergic perioperative drugs, especially in high-risk patients.

Eosinophilic Fasciitis Without Eosinophilia: An Atypical Case Presentation

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Introduction

Eosinophilic fasciitis (EF), also known as Shulman's disease, is a rare, autoimmune sclerosing connective tissue disorder that classically presents with erythema, edema, and induration of the extremities, with laboratory findings including peripheral eosinophilia and hypergammaglobulinemia. However, up to one-third of cases may lack classic features, creating diagnostic challenges and overlap with other sclerosing and connective tissue disorders.

Methods

Retrospective chart review of a 51-year-old woman referred to dermatology for progressive swelling of the distal extremities, unresponsive to diuretics and a short course of low-dose steroids.

Results

Physical exam revealed mottled hyperpigmentation with firm, tender, woody induration of the forearms and lower legs, along with dark brown macules on the palms and soles. Laboratory studies revealed elevated ANA and CRP, but no peripheral eosinophilia or hypergammaglobulinemia. An initial punch biopsy was nondiagnostic, prompting further evaluation. MRI and a subsequent deep incisional biopsy confirmed EF. Histology showed subcutaneous septal degenerative changes and fasciitis with lymphocytic infiltration, fibrosis, and perivascular cuffing, without eosinophils. Based on these findings, immunosuppressive therapy was initiated with prednisone, methotrexate, and folic acid. The patient experienced progressive symptomatic improvement with increased range of motion and decreased pain. Corticosteroids were tapered, and methotrexate was continued as a steroid-sparing agent.

Conclusion

This case highlights how eosinophilic fasciitis can present with non-classic features, lacking eosinophilia or hypergammaglobulinemia, and with palmar involvement. Such atypical findings can obscure recognition and delay appropriate therapy. Early diagnosis is crucial to relieve symptoms, preserve mobility, and prevent irreversible functional impairment. A high index of suspicion should be maintained for EF in patients with progressive extremity induration, even in the absence of typical laboratory findings.

Effect of Adjunctive Intra-Arterial Tenecteplase on Infarct Volume in Acute Ischemic Stroke Patients

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Undergoing Thrombectomy

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Introduction

Adjunct intra-arterial (IA) Tenecteplase (TNK) has been proposed to improve microvascular patency post thrombectomy in acute ischemic stroke patients. This study explores the effect of IA-TNK on infarct volume in large vessel occlusion (LVO) acute ischemic stroke (AIS).

Methods

Charts of AIS-LVO patients who received IA-TNK with endovascular thrombectomy (EVT) and EVT alone were retrospectively reviewed. Infarct volume on post-intervention MRI was calculated using 3D Slicer software. One-way ANOVA compared infarct volumes between groups, and Pearson correlation assessed the relationship between infarct volume and last known modified Rankin Scale (mRS). Mortality and last known mRS were reported as proportions. Statistical analysis was performed using R (version 4.1.2).

Results

A total of 56 patients with LVO-AIS who underwent EVT were included;14 patients who received adjunctive IA-TNK and 42 received EVT alone. Post-procedure, the proportion of patients who achieved Thrombolysis In Cerebral Infarction (TICI) ≥ 2b was 100% vs. 88.0% in patients who received adjunctive IA-TNK and those who received EVT. The mean (± SE) infarct volume on post-intervention MRI was significantly smaller in the EVT-TNK (33.0 ± 9.2 cm^3 vs. 58.8 ± 10.1 cm^3, p = 0.06). The median (IQR) last know mRS was 2.5 (1–4) vs. 3.0 (2–6) with 50% vs. 35.7% achieved mRS 0–2. A significant correlation was found between infarct volume and last know mRS in the overall cohort.

Conclusion

Adjunctive IA-TNK with EVT in LVO-AIS patients resulted in smaller post-intervention infarct volumes compared to EVT alone.

Investigating the Dermatological Effects of GLP-1 RAs: A Link to Hair Loss?

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Introduction

Glucagon-Like Peptide-1 Receptor Agonists have acquired widespread use in the treatment of type 2 diabetes and obesity. Nevertheless, emerging reports have raised concern about the potential association between GLP-1 RA medications and hair loss. This study hypothesizes that GLP-1 RA use is linked to alopecia and investigates to discern which specific subtype (telogen effluvium, anagen effluvium, or androgenetic alopecia) is most common.

Methods

This is an IRB approved retrospective study of 5 patients who reported hair loss while taking a GLP-1 RA medication presenting to either the family medicine or dermatology clinic at MU Health Care. Clinical and laboratory data from 01/01/2022 to 03/01/2025 was investigated to explore associations between hair loss onset and severity with GLP-1RA type, dose, duration and degree of weight loss. Clinical data was analyzed to determine the most common alopecia subtype.

Results

The study population included 5 female patients (mean age 40.6 years old, mean starting BMI 42.3 kg/m^2, mean weight loss 24.580654%). The GLP-1 RAs used were Semaglutide and Tirzepatide. Cases 1-4 reported hair loss before GLP-1 RA dose was increased or decreased. Case 5, reported hair loss after GLP-1RA dose was increased. The majority (Cases: 1, 2, 4, and 5), reported hair loss after at least 5 months of GLP-1 RA treatment. Clinical details were insufficient to diagnose the specific subtype of alopecia associated with GLP-1 RA use.

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Conclusion

Clinicians should screen female patients for hair loss starting 4 months after initiating the GLP-1 RA medication regardless of the current dose, type of medication, or amount of weight loss. Future studies should perform skin biopsies of the scalp to identify the type and pathomechanism of hair loss so that medical therapy can be directed toward this common adverse effect of GLP-1 RA therapy.

Psychiatric Sequelae Following Hidradenitis Suppurativa Diagnosis: A Temporal and Demographic Analysis

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Introduction

Hidradenitis suppurativa (HS) is a chronic, inflammatory skin disorder that disproportionately affects intertriginous areas. Risk factors include mechanical stress, obesity, smoking, hormonal influences, bacteria, and medications like hormonal agents with androgenic activity and TNF-alpha inhibitors. Clinically, HS is characterized by painful, recurrent inflamed nodules that can progress to draining tunnels (sinus tracts) and hypertrophic scarring. These physical manifestations result in significant pain, malodor, and disfigurement, which can cause a profoundly negative psychosocial effect. This impact has been highlighted by various studies examining the prevalence of major depressive disorder (MDD) and anxiety in patients with HS. The presence of psychiatric comorbidities makes HS a challenging disease for patients to deal with and clinicians to treat.

Methods

IRB approval was obtained prior to data collection. The Snowflake database was used to obtain demographic information and inclusion criteria for patients included diagnosis of HS after 10/01/2015 and a diagnosis of MDD or anxiety after the diagnosis of HS. Primary analysis included logistic regression and correlation matrix to examine the relationship of psychiatric comorbidity ad HS, as well as between demographics and psychiatric comorbidity. Secondary analysis included ANOVA and Tukey's Honestly Significant post-hoc test to identify significant differences between diagnostic groups.

Results/Conclusion

Logistic regression identified age as a significant predictor of psychiatric comorbidity, and correlation matrix confirmed a negative correlation, indicating that increased age corresponds to lower odds of psychiatric comorbidity. Patients diagnosed with both MDD and anxiety following their HS diagnosis were diagnosed with HS at a significantly earlier age compared to those with MDD only and HS. Furthermore, patients with both MDD and anxiety had the psychiatric comorbidity diagnosed significantly earlier than MDD only or anxiety only following HS diagnosis. Future work should identify institutional interventions that may contribute to, or prevent, the development of psychiatric comorbidity with earlier diagnosis.

The Utilization of the RobotiX Mentor Surgical Simulator for Medical Students and Medical Education

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Introduction

Simulation-based surgical training provides a controlled environment to assess how cognitive load and distractions influence skill acquisition. This study examined the effects of distinct distraction types—including priming, evaluative feedback, dialogue, multitasking, and time pressure—on robotic surgical performance in medical students.

Methods

A repeated-measures, quasi-experimental

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design was conducted with University of Missouri–Columbia medical students. Participants completed robotic simulation exercises across three sessions while exposed to specific distractions: (1) priming bias, where students were told a task was easier or more difficult than it truly was; (2) positive or negative criticism, in which participants were informed they ranked in the 90th versus 20th percentile before beginning; (3) dialogue-based interruption, requiring verbal responses to facilitator questions during performance; (4) multitasking demands, with participants generating animal or food names corresponding to each letter of the alphabet while operating; and (5) time constraints, requiring completion within a shortened five-minute window. Simulator-derived metrics included completion time, error frequency, efficiency, and instrument handling patterns.

Results

Overall, participants improved across sessions, though distraction type shaped outcomes. Under priming bias, missed targets decreased by 70% in the easier-primed condition and completion time fell by 30%, with moderate correlations for movement ($r = 0.55$) and timing ($r = 0.52$). Critical feedback increased movement activity despite stable peg transfer success, with correlations of $r = 0.22–0.32$. Dialogue interruptions produced mixed effects—instrument collisions were reduced, but peg loss increased, with weak correlations ($r < 0.20$). Multitasking yielded a 95% reduction in missed targets and moderate-to-strong consistency in instrument use ($r = 0.33–0.49$). Under time pressure, line-following precision improved, yet total errors increased, with strong correlations in error and cutting patterns ($r = 0.49–0.73$). Demographic analyses showed greater improvements among females and younger participants.

Conclusion

Robotic skills improved despite distractions, though performance stability varied by distraction type. Priming and evaluative feedback most affected accuracy and efficiency, while multitasking and time limits revealed resilience but also new vulnerabilities. Incorporating distraction-resilience protocols into simulation curricula may enhance surgical preparedness and patient safety.

Understanding Lifestyle Changes and Restrictions for Caregivers of Patients with Alzheimer's Disease and Related Dementia

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Introduction

Daily care directly affects a patient's health and well-being, whether provided by family members or healthcare workers. For patients with Alzheimer's disease and related dementia (ADRD), caregivers often provide support over many years while taking on increasing responsibilities. The effects of caregiving on spouses, who are frequently the primary caregivers, are not fully understood. This study examines how spousal caregivers experience changes and restrictions in their daily lives over time.

Methods

Five caregivers were recruited through the Remote Sensing for ADRD-Specific Activities Identification in Older Adults Study (IRB# 2101666). Qualitative interviews and PEAR scoring were used for thematic analysis. Interviews addressed three aspects of caregiver quality of life: enjoyable activities and meaningful moments, participation in community life, and at-home recreation and daily routines. Responses were scored using the PEAR model, which combines the Pleasant Events Schedule and the Activity Restriction Scale to classify caregivers into one of three categories: high pleasant/low restriction, some activities/some restriction, or low pleasant/high restriction.

Results

Care recipients were aged 60 to 79 years, predominantly White and non-Hispanic, and all were married and living in personal or family residences. Educational attainment ranged from some college to a master's degree, and most reported a Christian religious affiliation. Cognitive diagnoses included mild or major neurocognitive disorder, with evaluations spanning 2019 to 2024 at the Adult

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Neuropsychology Clinic. Rural status varied across participants, with some residing in isolated areas and others in less rural environments, suggesting differences in access to resources and community support.

Conclusion

Analysis is ongoing. Results will add to the understanding of how spousal caregivers experience lifestyle changes and restrictions while supporting individuals with ADRD.

Diagnostic Accuracy of Skin Cancer in Primary Care Settings: Insights from Dermatology ECHO Cases

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Introduction

The diagnosis of skin cancer in primary care settings has been notably challenging. Primary care providers (PCPs) often lack specific dermatologic training, leading to misdiagnosis or delayed identification of malignancies, especially in high-risk areas like the ears and lips and in lesions that present atypically. Studies show diagnostic concordance between PCPs and dermatologists for skin cancer is low, and incomplete or incorrect biopsies can result in missed or delayed diagnoses. A study showed residents in primary care were shown to misdiagnose malignant melanomas 40% of the time in studies. This study evaluates the diagnostic accuracy and decision-making patterns in PCP-submitted dermatology ECHO cases involving suspected skin cancer.

Methods

A retrospective cohort study was performed on recorded dermatology ECHO cases that were submitted by primary care providers. The clinical presentation, initial PCP diagnosis, feedback from dermatologists, performance of a biopsy or not, and final pathology were reviewed for each case when available. Cases were assigned a diagnostic accuracy score (0 = incorrect, 0.5 = partially correct, 1 = correct).

Results

Of 543 cases reviewed, 11 met inclusion criteria, 3 were excluded due to missing information. Among the remaining 8 cases, 4 cases (50%) had a diagnostic accuracy score of 0, 2 cases (25%) scored 0.5, and 2 cases (25%) scored 1. Errors leading to low diagnostic accuracy scores included misdiagnosing malignant lesions as benign, failure to biopsy high-risk areas (lips, ears), and discomfort from the provider with performing biopsies. Feedback from Dermatologists emphasized the need to maintain a low threshold for biopsy in sun-exposed or atypical lesions.

Conclusion

This analysis highlights the diagnostic challenges faced by PCPs in identifying skin cancers and highlights the value of specialist input. Expanding dermatologic training outside the specialty and improving confidence in performing biopsies could help mitigate delays in diagnosis.

Alpha-Gal Syndrome in Mid-Missouri: Clinical Manifestations and Diagnostic Patterns Across Age Groups

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Introduction

Alpha-gal syndrome (AGS) is an allergy to galactose-a-1,3-galactose, a carbohydrate found on non-primate mammalian tissues. In contrast to classic IgE-mediated food allergies, AGS manifests with a delayed onset and is induced by a bite from the Amblyomma americanum tick. We hypothesized that adult and pediatric patients have different clinical presentations. In this study, we characterized adult and pediatric presentations of AGS, investigated diagnosing medical specialty and presentation, and evaluated associations between tick exposure and disease manifestation.

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Methods

Retrospective cross-sectional study investigating patients diagnosed with AGS at the University of Missouri between January 2022 and December 2024. Eligible patients were identified through both ICD-10 code Z91.014 and AGS IgE titer >0.10k/UL. Chart review was conducted by two investigators using standardized data extraction methods.

Results

343 cases were identified. Tick bite history was documented in 56.85% of pediatric and 52.9% of adult patients. Dermatological manifestations were the most common presentation in both groups, followed by gastrointestinal symptoms. Notable differences included higher rates of nausea or vomiting in pediatric patients and lower rates of anaphylaxis. Most diagnoses were made by allergy specialists in both populations.

Conclusion

We found no significant differences in tick-bite history between adult and pediatric populations, contrasting with prior studies suggesting higher prevalence of documented tick exposure in adults. This suggests ubiquitous exposure to A. americanum in mid-Missouri or recall bias inherent to retrospective analysis. Additionally, we found that most diagnoses were made by allergy specialists although many AGS patients resided in rural areas. This highlights the need for enhanced clinical awareness among primary care providers who often serve as the principal healthcare contact for rural populations. Future research should explore symptomatology in minority groups to improve diagnosis of this phenotypically heterogeneous condition.

Clinic and Histopathologic Findings in a Case of Nevoid Melanoma

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Introduction

Nevoid melanoma (NM) is a rare variant of malignant melanoma that closely mimics benign melanocytic nevi both clinically and histopathologically, often leading to misdiagnosis and treatment delays. Its resemblance to intradermal or compound nevi can obscure malignant potential, particularly when initial biopsies are superficial or partial.

Methods

We report the case of a 41-year-old female who initially presented with a verrucous plaque on the left helical rim. A shave biopsy performed at an outside institution was interpreted as an irritated intradermal nevus, and a second review confirmed this benign diagnosis. Upon referral to our dermatology center, repeat biopsy and molecular analysis were pursued due to clinical progression of the lesion.

Results

Histopathologic examination revealed a proliferation of nevoid melanocytes with features concerning for nevoid melanoma. Molecular testing identified a TERT promoter mutation, supporting a diagnosis of malignant melanoma. The lesion was staged as T2aN1c (Stage IIIb). The patient underwent neoadjuvant immunotherapy with ipilimumab and nivolumab, followed by left auriculectomy. Final pathology demonstrated a complete pathological response, with no residual tumor or nodal involvement.

Conclusion

This case illustrates the diagnostic pitfalls of NM and emphasizes the importance of considering repeat biopsy, comprehensive histopathologic review, and molecular diagnostics when clinical suspicion persists. Despite initial misclassification, prompt multidisciplinary intervention and immunotherapy led to an excellent outcome. Clinicians should maintain a high index of suspicion for NM in atypical verrucous or polypoid lesions to avoid delays in management.

The Role of Sibling Presence in Shaping Physical Activity and Sedentary Patterns in Youth

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Introduction

Sedentary behaviors in pediatric populations have emerged as a significant public health concern due to their associations with adverse physical, mental, and developmental outcomes. Evidence suggests that siblings can play both protective and risk-enhancing roles in shaping sedentary behavior. Limited research exists analyzing the effects of siblings on sedentary behaviors and physical activity (PA). This study examines if adolescents without siblings have higher self-reported sedentary behavior and lower PA than those with siblings.

Methods

In this cross-sectional study, data was collected between 2023-2025 as part of a larger study examining healthy lifestyle behaviors and executive functioning in youth. Youth aged 11-17 years old completed questionnaires focused on PA and sedentary behaviors. Parents completed a demographic questionnaire.

Results

Fifty adolescents participated. Adolescents averaged 12.98 years old. Additionally, 58.8% were female, 90.2% white and 5.9% Bi-racial. Participants included 10 singleton children and 40 non-singleton children. T-tests were conducted to examine group differences. Children with siblings reported significantly higher levels of PA compared to those without siblings, particularly in walking ($p = .009$), completing outdoor chores ($p < .001$), and participating in sports ($p = .01$). Children with siblings had significantly lower screen time ($p < .001$) compared to those without siblings. Although other activities such as indoor chores and recreational play showed higher mean values for children with siblings, these differences were not statistically significant.

Conclusion

Overall, the presence of siblings was associated with greater physical engagement and reduced sedentary behavior. These findings indicate that having siblings may be linked to higher PA levels, while the absence of siblings may be associated with increased sedentary, screen-based behaviors among youth. These findings highlight the importance of involving the family unit in interventions targeting youth PA and emphasize the need to incorporate peer-based support strategies for only children to help mitigate sedentary behaviors.

Quantifying Placental Villous Features: Interobserver Variability and Future Directions in Gestational Diabetes

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Introduction First Level Header is Segoe UI Bold, 12 pt

Gestational diabetes mellitus (GDM) alters placental maturation, often producing fewer vasculo-syncytial membranes, increased syncytial knots, and abnormal villous branching. These histologic features reflect impaired villous development and reduced efficiency of maternal–fetal exchange. Because they could serve as biomarkers of disease, establishing reproducibility across independent observers is essential before these measures can be applied in research studies or considered for clinical screening.

Methods

Placentas collected at term were processed with hematoxylin–eosin staining. Two independent pathologists quantified the number of terminal villi, the number of terminal villi containing syncytial knots, and the number of terminal villi containing vasculo-syncytial membranes. Agreement was assessed at the villus level using intraclass correlation coefficients to evaluate reproducibility of continuous counts and weighted kappa statistics to capture categorical villus-by-villus agreement.

Results

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Preliminary analysis of the available placentas demonstrated excellent reproducibility. Intraclass correlation coefficients were 0.986 for terminal villi counts, 0.994 for syncytial knots, and 0.984 for vasculo-syncytial membranes. Categorical villus-level agreement was also high, with weighted kappa values of 0.94 for syncytial knots and 0.93 for vasculo-syncytial membranes, corresponding to 99% raw agreement. Exact-match agreement for terminal villi counts per high-power field was lower, reflecting small but consistent numerical differences between raters. Taken together, these results demonstrate that standardized quantification protocols yield robust and reliable data despite the inherent subjectivity of histologic scoring.

Conclusion

This study demonstrates that placental features of villous maturity—terminal villi, syncytial knots, and vasculo-syncytial membranes—can be measured with excellent reproducibility between pathologists when assessed at the villus level. These findings provide a strong foundation for future analyses comparing placentas from pregnancies complicated by GDM to age-matched controls. Ongoing work will link villous histology with first-trimester ultrasound measures of placental vascularization, with the long-term goal of developing non-invasive screening tools to identify women at risk for GDM earlier in pregnancy.

"Unaffected" Hand Motor Control Is Altered in Subacute Stroke

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Introduction

After a stroke, while the paretic hand motor impairments have been overwhelmingly studied, the motor function of the clinically described "unaffected" hand has received little attention. Despite high reliance on this hand in performing manual tasks, especially for those with severe hemiparesis, the impact of possible impairments of this hand on rehabilitation has been largely ignored by clinicians. This study investigated the nature, evolution, and functional relevance of the "unaffected" hand motor function changes during rehabilitation after unilateral stroke.

Methods

Right-handed patients (n=5, mean[SD], 67.2[8.8] yrs old, 60% male, 14.2[13.6] days post-stroke, right hemisphere stroke, 80% subcortical) performed with their right-hand/unaffected a conditioned 2D reaching task at admission to inpatient rehabilitation (early) and three months later (late). Eight matched healthy controls performed the task once. A workstation, integrated and synchronized with a six-degree-of-freedom motion tracking system (Polhemus Patriot), was used to quantify movement planning (reaction time) and execution (movement time, smoothness, and errors). To study the bi-hemispheric control, movements were randomly performed in the ipsilateral and contralateral spaces of the tested hand.

Results

Nature (early): Compared to controls, patients showed slower reaction and movement times and made more errors for both, ipsilateral ($p<0.001$, $p<0.0001$, and $p=0.03$, respectively) and contralateral ($p=0.009$, $p=0.0006$, $p=0.002$), targets. Evolution (late vs. early): Movement time and errors improved for both targets, but more significantly for ipsilateral (1.92 vs. 2.95; 0.50 vs. 0.64s) than contralateral (2.38 vs. 2.95; 0.70 vs. 0.74s) target.

Conclusion

Significant alterations in the "unaffected" hand motor planning and execution were found within a month after stroke, with some alterations recovering three months later. If larger studies confirm our results, this data has implications for developing new rehabilitation interventions, possibly addressing motor impairments of both hands.

Comparison of Respiratory Morbidity in Infants Born to Mothers with and without

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Diabetes Mellitus

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Introduction

Maternal diabetes mellitus (MDM) is known to impede fetal lung development, often leading to neonatal respiratory distress. To mitigate these risks, guidelines support antenatal corticosteroids and neonatal surfactant therapy. Such measures are not standardized for infants of non-diabetic mothers, despite many experiencing similar respiratory complications. Identifying specific management in MDM cases can guide development of broader strategies to improve neonatal respiratory morbidity.

Methods

This IRB-approved retrospective study included infants admitted to and discharged from the NICU at the University of Missouri-Columbia Hospital between January 1, 2019, and December 31, 2023. Infants were divided into two cohorts based on maternal diabetes status. Data were extracted from electronic medical records. Statistical analyses included Chi-squared tests for categorical data, and Mann-Whitney U or paired T-tests for continuous variables. A p-value < 0.05 indicated statistical significance.

Results

The MDM cohort included 267 infants; the non-MDM cohort had 917. MDM infants had significantly higher birth weights (3192.1 g vs. 2828.4 g, $p < 0.0001$) and maternal weights (98.92 kg vs. 83.68 kg, $p < 0.0001$) and were born to older mothers (29.4 vs. 28.09 years, $p = 0.0031$). Non-MDM infants had slightly greater gestational age (36.75 vs. 36.38 weeks, $p = 0.0127$). More MDM infants received surfactant (12.9% vs. 8.2%, $p = 0.0277$), and at a faster rate (367.35 vs. 762.39 minutes, $p = 0.0087$). No significant differences were found in corticosteroid use or non-invasive ventilation. However, non-MDM infants required longer invasive ventilation (2.12 vs. 1.62 days, $p = 0.0007$).

Conclusion

Infants born to mothers with MDM had significantly less time on invasive ventilation than infants born to mothers without MDM. They also received more surfactant and on a quicker timescale. This highlights the potential benefits of using similar respiratory guidelines to reduce respiratory morbidity in all neonates.

Strategies to Minimize Postoperative Complications in Microsurgical Free Tissue Transfer: The Role of Anticoagulation, Antiplatelets, and Ambulation

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Introduction

Microvascular free tissue transfer (FTT) is a cornerstone of reconstructive surgery. Despite advances, thromboembolic complications remain the leading cause of flap failure This study evaluates how perioperative anticoagulation, antiplatelet therapy, and ambulation affect postoperative complications in FTT.

Methods

A retrospective review of 497 FTT procedures assessed associations between anticoagulation, antiplatelet therapy, ambulation, and postoperative outcomes. Anticoagulants included warfarin, unfractionated heparin, and low-molecular-weight

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heparin. Antiplatelets included aspirin and clopidogrel. Medication use was recorded at multiple timepoints: preoperatively, 24 hours before surgery, intraoperatively, postoperative days 0–7, and discharge. Ambulation during postoperative days 0–7 was documented. Complications included flap loss, arterial or venous thrombosis, return to the operating room, hematoma, dehiscence, infection, and fat necrosis. Multivariable logistic regression identified predictors of complications.

Results

From 2012–2021, 497 free flaps were analyzed. Controlling for age, sex, and nicotine use, ambulation on postoperative day 1 was linked to reduced arterial/venous thrombosis (OR 0.34, p=0.003) and fewer operating room takebacks (OR 0.56, p=0.006). Anticoagulation on day 6 increased takeback odds (OR 1.64, p=0.029). Antiplatelet therapy on day 7 decreased takeback odds (OR 0.65, p=0.04). Day 7 ambulation lowered odds of any complication (OR 0.67, p=0.042).

Conclusion

Early ambulation reduces the risk of complications and reoperation, while extended anticoagulation increases it. Antiplatelet therapy on day 7 offers protective benefits. These findings support the importance of timely mobilization and medication strategies and underscore the need for standardized postoperative care protocols in FTT.

Effects of Social Evaluation Stress on Autonomic Functioning in Older Adults and Younger Adults with Varying Post-Traumatic Stress Disorder Symptom Severity

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Introduction

Post-traumatic stress disorder (PTSD) increases susceptibility to stress in younger adults. The stress response is regulated by the autonomic nervous system; the parasympathetic branch promotes rest and the sympathetic branch promotes arousal to stress. Heart-rate variability (HRV) assesses changes in autonomic functioning. Root mean square of successive differences (RMSSD) and standard deviation of normal-to-normal beats (SDNN) are calculated from HRV data to assess parasympathetic activity and overall autonomic activity, respectively. We examined how autonomic functioning is affected by social stress in younger and older adults with varying PTSD symptom severity.

Methods

Younger adults aged 18-40 and older adults aged 60+ were recruited from Columbia, MO and surrounding areas. The PTSD Checklist for DSM-5 assessed PTSD symptom severity. Participants completed two visits as part of the Trier Social Stress Test (TSST), in a crossover study design. In control conditions, participants read a passage out loud. In the stress task, participants were under the guise of being recorded and judged while delivering a 5-minute speech to experimenters and interrupted twice to complete cognitive tasks. A three-lead electrocardiogram measured participants' RMSSD and SDNN at baseline and during conditions. A paired t-test assessed the RMSSD and SDNN during control and stress conditions with baselines subtracted.

Results

In younger adults, the stress task condition significantly increased SDNN scores (M = 3.81, SD = 8.04) compared to the control condition (M = -2.468, SD = 8.47) ($p = .038$). No significant difference in RMSSD was found ($p = 0.16$). Data from older adults is currently being processed.

Conclusion

These findings suggest social evaluation stress impacts autonomic dysfunction in younger adults with varying PTSD symptom severity. The significant increase in SDNN, but not RMSSD, suggests a stronger sympathetic than parasympathetic response. Characterizing how social stress affects autonomic functioning in PTSD will help inform stress intervention development.

Adverse Neurological Patient

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Events Related to Spinal Navigation Systems: A Review of U.S. Medical Device Reports

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Introduction

Advancing technologies in navigation systems are increasingly incorporated in spinal surgery. These systems aim to maintain higher accuracy than previous freehand techniques and lessen patient complications. One system in particular, which combines CT imaging with navigation capabilities for real-time 3D surgical display, enhances surgeon's skills. Nevertheless, these technologies remain in development and complications still occur. This study reviews reported adverse events due to device malfunction, involving spinal navigation systems, using data from the U.S. Food and Drug Administration's (FDA) Manufacturer and User Facility Device Experience (MAUDE) database.

Methods

MAUDE, a voluntary reporting database, was extracted for all adverse events related to spinal navigation systems from 1/1/2020 to 12/31/2024. The data was drawn through product codes/FDA identifiers and characterized by device malfunction and patient complications. Results were reviewed by event descriptions, and cases that resulted in neurologic injury were measured. Product codes under "OWB" for Interventional fluoroscopic X-ray system and "OXO" for Mobile image-intensified fluoroscopic X-ray system were utilized, as they encompassed reports from desired devices relevant to O-arm imaging guidance.

Results

Of the 190 adverse events reported to MAUDE, 48 cases portrayed significant neurologic injury due to device malfunction, including 7 deaths. 36 cases out of the 190 were discarded as they were out of the spinal navigation realm, bringing the total cases to 154. Therefore ~31.2% of adverse events resulted in neurologic injury, and/or death, such as weakness, paralysis, pain, and dysfunction.

Conclusion

Due to MAUDE's voluntary nature, underreporting likely persists. While O-arm imaging systems increase precision and safety, device malfunctions still lead to patient complications. Centers for Medicare & Medicaid Services (CMS) data, representing ~38% of the population, documents 15,700 spinal navigation surgeries within the specified timeframe. Extrapolating to other patients, the magnitude of surgeries performed without additional reporting highlights the likelihood of underreported complications.

Impact of a Student-Run Critical Care Interest Group on Medical Student Familiarity and Engagement

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Introduction

Early exposure to subspecialties can shape a medical student's career path and knowledge base. Limited opportunities to explore fellowship tracks contribute to educational and professional gaps, especially in critical care medicine (CCM). A growing shortage of CCM physicians makes early exploration critical. While most prior work has focused on residency and fellowship, few studies address medical student engagement. This study evaluated the impact of our university's Critical Care Interest Group (CCIG) on medical student familiarity with CCM through educational activities.

Methods

A voluntary survey was distributed to CCIG members at the end of the 2024–2025 academic year. Students rated familiarity with CCM before and after the year on a 10-point Likert scale. Engagement was assessed through rating skill

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sessions, panel discussions, and interest in future programming such as journal clubs, certification tracks, and national affiliation. A paired t-test measured changes in familiarity.

Results

Ten students completed the survey (Average session attendance was 24). Mean familiarity rose from 6.7 to 8.2 (mean difference 1.5, $p = 0.013$). Skills events (rated 9.4/10) and panel discussions (7.2/10) were highly rated. All respondents expressed interest in a CCM Scholar track, with most supporting future initiatives, such as journal clubs (80%), certificate programs (90%), and national affiliation (80%).

Thematic analysis of open-ended responses showed strong interest in gaining hands-on skills and mentorship, with students citing skills labs and faculty as key motivators. Most reported increased interest in CCM.

Conclusion

Participation in a student-led CCIG was linked to an increase in familiarity with CCM. Findings support continued investment in specialty-specific interest groups and opportunities for enrichment through scholarly recognition, certification, and national collaboration.

Limitations include small sample size, single-site participation, and selection bias. Future work will examine long-term outcomes, such as career interest and clinical performance, and compare metrics with other specialty interest groups.

Diagnostic and Therapeutic Outcomes of a Combined Rheumatology Dermatology Clinic in the Midwest

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Introduction

Autoimmune connective tissue diseases with both systemic and cutaneous manifestations have complex management that often requires multidisciplinary care. As management can be nuanced between rheumatology and dermatology and disease is often recalcitrant to single modality treatments, it is helpful to utilize a combined clinic in which patients see both clinicians simultaneously. This study investigated the diagnostic and management contributions of the MU dermatology-rheumatology clinic.

Methods

A retrospective cohort study was performed from January 2018 to December 2023 including all adult patients scheduled to the combined clinic for initial evaluation. Data collected via chart review described patient demographics, delineated concordance of diagnosis and treatment regimens from pre- and post- combined clinic management, and evaluated longitudinal patient follow-up. Patients were excluded who were not simultaneously evaluated by both dermatology and rheumatology as defined by presence of clinic notes on the same day.

Results

A total of 120 patients met the inclusion criteria during the study period. 97 patients were female and 23 were male. 38% of patients' home zip codes were greater than 41 miles from the clinic. A change in diagnosis at first visit occurred in 61% of patients. Systemic rheumatic disease was confirmed in 36%, excluded in 33%, diagnosed in 9%, and changed in subtype in 8% of patients. Systemic medications were changed in 61%, stopped in 8%, and started in 33% of patients. The average number of clinic visits per patient was 2.44. Of those who returned to clinic more than once, the mean length of follow-up was 18.15 months.

Conclusion

MU is the nearest academic center for many Missourians and referring rural physicians. Benefits of a combined dermatology-rheumatology clinic include improving communication between disciplines, increasing patient access to care, providing diagnostic confirmation and appropriate treatment, and optimizing the use of systemic and topical therapies.

QL vs TAP Blocks: The Role of

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Pain and Ketamine in Postoperative Opioid Use

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Introduction

Quadratus lumborum (QL) and transversus abdominis plane (TAP) blocks are regional anesthetic techniques commonly utilized in abdominal surgeries for perioperative pain management. QL blocks are thought to provide longer-lasting analgesia due to local anesthetic spread into thoracolumbar fascia and the paravertebral space. However, studies comparing these blocks do not account for the influence of adjunct analgesics such as ketamine, a known modulator of central sensitization, reducing postoperative opioid needs.

Methods

We retrospectively analyzed 111 adults who received QL (n = 57) or TAP (n = 54) blocks for abdominal surgery. Groups were matched on age, sex, ASA class, weight, and height. Outcomes included intraoperative ketamine dose, opioid requirements (intraoperative and PACU; morphine milligram equivalents [MME]), pain scores (PACU and discharge), and recovery outcomes. Between-group comparisons were performed using independent t-tests. Mediation and moderation analyses were conducted using PROCESS for SPSS (Models 4 and 1).

Results

QL blocks were associated with higher opioid use than TAP blocks, both postoperatively [$t(87.70) = 2.55$, $p = .012$] and overall [$t(109) = 2.08$, $p = .040$]. TAP blocks received significantly more intraoperative ketamine [$t(81.71) = -2.98$, $p = .004$], and greater ketamine use was associated with reduced opioid requirements (indirect effect $\beta = 1.44$, 95% CI [0.03, 3.36]). Moderation analysis revealed a significant interaction between pain and block type ($\beta = 2.86$, $SE = 1.27$; $t = 2.26$, $p = .026$, 95% CI [0.35, 5.38]). For QL patients, pain strongly predicted opioid use ($\beta = 2.45$, $p = .003$), but no association was observed in TAP patients ($\beta = -0.41$, $p = .670$).

Conclusion

QL blocks were associated with greater opioid use, potentially due to reduced intraoperative ketamine administration. Pain intensity more strongly predicting opioid requirements in patients receiving QL blocks, suggesting differential analgesic mechanisms between the blocks. This data challenges the generalization that QL blocks are superior to TAP blocks. Future studies should assess optimizing the combination of opioids and adjunct analgesics to maximize analgesic benefit in QL blocks.

Intelligent Radiology Worklist Prioritization Using Locally Hosted Open-Source Large Language Models (LLM) – A Pilot Study

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Introduction

Radiology worklist prioritization is essential for timely interpretation and optimal patient care. At MU, exam priority is currently assigned manually by technologists, a process prone to errors, inconsistency, and workflow bottlenecks. Large language models (LLMs), with advanced textual comprehension and reasoning capabilities, present a promising solution. This pilot study evaluates the potential of open-source LLMs, as well as a hybrid model combining LLM reasoning with traditional machine learning (ML), to automate worklist prioritization.

Methods

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We retrospectively analyzed 27,635 CT and MRI exams (Jan–Mar 2025). Data captured included exam type, indication, encounter type, hospital unit, same-day appointment, and technologist-assigned priority. Data was split 80/20 for training/testing. Eight open-source LLMs and six ML algorithms were evaluated using prompt engineering and in-context learning (ICL). A hybrid framework was also tested, applying fixed rules and ML for straightforward cases and reserving LLM reasoning for ambiguous edge cases.

Results

LLMs demonstrated high potential for automated prioritization with explainable outputs. A hybrid model incorporating medGemma:4b achieved the highest balanced accuracy (83%), compared with 79% using medGemma:4b without the hybrid framework. The hybrid model improved efficiency and accuracy while maintaining interpretability. Most errors involved "priority 6" i.e. routine inpatient exams, where some models overestimated urgency.

Conclusion

Open-source LLMs demonstrate a promising capability to automate radiology worklist prioritization, offering explainability and adaptability not available with traditional ML. A hybrid ML–LLM framework delivered the best performance, balancing speed, accuracy, and transparency. Future work will explore fine-tuning, knowledge distillation, and role-specialized LLM stacking to further optimize prioritization accuracy and clinical integration.

Disruptive Mood Dysregulation Disorder and Autism Spectrum Disorder as Combined Risk Factors for Aggression in Pediatric Inpatient Psychiatry

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Introduction

Comprehensive reviews of the literature have documented high levels of violence in many health care settings, including emergency departments and inpatient psychiatric units. With respect to inpatient psychiatric settings, data has been almost exclusively derived from adult units, with little information on child and adolescent inpatient services. Aggression within the inpatient pediatric psychiatric units represents a significant challenge, leading to concerns for safety of both patients and staff members while also potentially complicating treatment. There is an existing gap in literature regarding the role of Disruptive Mood Dysregulation Disorder (DMDD), Autism Spectrum Disorder (ASD), and other psychiatric and social variables in aggressive behavior outcomes in pediatric psychiatric inpatient populations.

Methods

This retrospective case-control study examined multiple psychiatric and social risk factors for aggression with a focus on DMDD and ASD. Subjects comprised of 44 pediatric psychiatric inpatient unit patients who were divided into two groups based on aggressive incident frequencies: no aggressive incident (n=22) and two or more aggressive incidents (n=22).

Results

Our findings indicate a significant positive association between repeated aggressive incidents and DMDD, ASD, and Attention-deficit/hyperactivity disorder, as well as history of being displaced from home and having a history of a prior aggressive incident. Notably, the co-occurrence of DMDD and ASD was also associated with a significantly increased risk of aggression (OR = 9.8; 95% CI: 1.09–88.2; p= 0.035). Other factors such as anxiety, post-traumatic stress disorder, or Cluster B Traits were found to not be significantly associated with aggression.

Conclusion

To our knowledge, this study is one of the first to examine the interaction of DMDD, ASD, and social factors in predicting aggressive incidents among pediatric inpatient psychiatric units and hopes to highlight the importance of comprehensive assessment with multi-domain risk factors in clinical evaluation of patients to improve safety and treatment outcomes.

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Whole-Body Electrical Muscle Stimulation as an Effective Exercise Modality to Improve Physical Function in Adults with Myasthenia Gravis

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Introduction

Myasthenia Gravis (MG) is characterized by fatigability and muscle weakness that compromise physical function. Although exercise can provide functional benefits in individuals with MG, traditional aerobic and resistance training may be poorly tolerated in this population. This study aims to evaluate the effects of whole-body electrical muscle stimulation plus exercise (WB-EMS Exercise) on fatigue, physical function, and neuromuscular junction (NMJ) transmission in adults with MG.

Methods

Participants completed a 4-week intervention using a commercially available WB-EMS system, performing 20-minute workouts with 10-12 exercises per session (twice weekly) at mild to moderate intensities. Stimulation parameters were tailored to individual tolerance and response. Assessments were conducted 2-4 days before and after the intervention and included the Fatigue Severity Scale (FSS), Six-Minute Walk Test (6MWT), Arm Movement Test (AMT), and Single Fiber Electromyography (SFEMG) of the vastus lateralis. Pre-test and post-test measures were analyzed using paired t-tests.

Results

Eight participants (age range 21-77, 3M/5F) have enrolled and completed the exercise intervention. Statistically significant improvements occurred in walking endurance in the 6MWT ($p=0.002$) and upper-extremity endurance in the AMT ($p=0.007$ [right], $p=0.026$ [left]). Trends toward improvement were observed in perceived fatigue (FSS) and neuromuscular junction transmission (SFEMG). Participants with clinically significant fatigue (FSS>37) showed reduced fatigue post-intervention ($p=0.021$). Those with abnormal SFEMG jitter values demonstrated partial to complete normalization following WB-EMS Exercise.

Conclusion

WB-EMS Exercise appears to be a feasible and well tolerated intervention for adults with MG, potentially improving fatigue, NMJ function, and physical function. Significant improvements in the 6MWT and bilateral AMT show increased endurance and support the functional benefits of WB-EMS Exercise. Preliminary findings also suggest that individuals with greater baseline impairments in fatigue and NMJ transmission may derive more pronounced improvements in those measures.

A Review of the Biomechanical and Clinical Outcomes of Tibial-sided Fixation for Anterior Cruciate Ligament Reconstruction

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Introduction

Tibial fixation remains a biomechanical weak point in anterior cruciate ligament reconstruction (ACLR) due to low bone density and directional loading. Traditional interference screws provide aperture fixation but risk graft slippage, tunnel widening, and tension loss. Alternative strategies, including suspensory fixation, supplemental backup devices, and internal brace augmentation, aim to improve stability and reduce failure risk.

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Methods

A narrative review of biomechanical and clinical studies was conducted to compare tibial fixation techniques, including interference screws, suspensory fixation, supplemental constructs (staples, screw-and-post, knotless anchors), and internal brace augmentation. Outcomes assessed included graft slippage, cyclic displacement, load-to-failure, laxity, and graft failure rates.

Results

Interference screw fixation alone demonstrated significant tension loss over 24 hours and high reported failure rates, indicating that aperture fixation alone is not sufficient. Suspensory fixation engages cortical bone and is associated with less anterior laxity and fewer ruptures. Supplemental constructs consistently increased fixation strength, with knotless anchors achieving equivalent failure loads to bicortical posts, while reducing graft slippage and hardware malfunctions. Internal brace augmentation reduced graft elongation by up to 60% and improved ultimate failure loads by 20–70%, offering additional protection during early rehabilitation.

Conclusion

Biomechanical and clinical outcomes indicates that hybrid or augmented tibial fixation strategies provide superior initial stability compared to interference screws alone. These approaches may reduce graft failure, particularly in high-demand athletes or revision ACLR, though long-term clinical outcomes require further investigation.

Can Clarity Improve Patient Utilization of a Community Aid Resource: A Preliminary Analysis of a Quality Improvement Project

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Introduction

Tigers Connect is a community-aid resource program available to families receiving care at the MU Healthcare–South Providence Pediatrics Clinic. Founded in February 2021, this program helps clinicians better address the social determinants of health. However, relatively few respondents who report a need ultimately request assistance and enroll in the program. This project aimed to increase enrollment by updating the screening form to better convey the program's purpose and function.

Methods

We used a fishbone diagram to determine potential barriers to enrollment and then devised ways to address each barrier. Potential solutions included creating an "order form" for participants to directly request specific assistance or updating the current screen. Effort-Yield analysis helped us predict the feasibility and effect of each option, and we determined modifying the screening form would be most practical and efficacious. The updated survey includes a clear explanation of next steps should a respondent request assistance. Data from every completed screen is stored in REDCap as standard procedure. The updated screen was implemented August 1, 2025. Statistical analysis included a chi-square test and odds ratio calculation.

Results

Results from screens collected in August 2024 and August 2025 were compared. In August 2024, 18.9% (17/90) of positive screens enrolled. August 2025 saw both an increase in the number of positive screens and rate of enrollment (23.4%, 25/107). However, statistical analysis did not demonstrate a significant association between the modified screening form and enrollment rate ([OR] 1.31, 95% CI 0.66-2.62, p=0.22), $X^2(2, n=107)=1.5$, p=0.22.

Conclusion

Though initial results are promising, our findings are limited by sample size, power, and lack of statistical significance. Data collection over the next calendar year will further inform us if the updated form has an effect on patient participation.

Increased Complexity of Impairment-Oriented Motor Training May Improve Stroke

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Recovery

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Introduction

Stroke is the leading cause of long-term disability worldwide. Strong experimental neurobehavioral evidence shows that intensive training improves hand motor recovery; yet, we still have limited knowledge of why some patients recover more completely, while others do not. The best training approach must address the individual's impairments and incorporate sufficient complexity to challenge the motor system. We addressed this within a theoretical context: a workstation was built to manipulate the cognitive effort while focusing the learner's attention on a common impairment after stroke during a functional task repetition.

Methods

The workstation consisted of a turntable (with adjustable speed) placed on a height-adjustable, stable table. Participants were seated in front of the table with the tested hand resting approximately half the distance between the sternum and the umbilicus. Real-world objects, i.e., can, jar, book, etc., are presented randomly within a comfortable range for grasping (about 90% arm's length) on the turntable. In response to an auditory signal, the participant will reach and grasp the object and move it to the initial hand location at a comfortable self-selected speed. Visual feedback (app) about elbow extension using an electrogoniometer (KINVENT K-MOVE) on their lateral epicondyle is presented after the end of the movement with a decreasing frequency throughout the practice session (90 repetitions).

Results

Three healthy controls validated mechanical performance, ergonomic fit, and range of motion before the clinical testing. Results indicated that the workstation enabled smooth and repeatable elbow flexion-extension cycles across the functional range (0–135°). KINVENT K-MOVE provided reliable angular measurements with minimal noise. User feedback confirmed that the setup was intuitive, simulating real-life movements critical for rehabilitation.

Conclusion

This workstation offers a low-cost, technically robust platform, integrating controlled movement, real-time kinematic monitoring, and functional task practice. Patient training will start soon.

A Retrospective Analysis of Merkel Cell Carcinoma Subtypes in MU Health Patients

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Introduction

Merkel cell carcinoma (MCC) is a rare and aggressive skin cancer. Most cases are associated with Merkel cell polyoma virus (MCPyV), and the remaining cases are associated with UV radiation. The literature suggests MCPyV-negative cases are more aggressive, but long-term follow up data is scant. The squamous cell carcinoma (SCC)-MCC combination tumor is a recently described subtype of MCC of uncertain pathophysiology and clinical course. The objective of this study was to compare cases of combination SCC-MCC and isolated MCC in patients diagnosed by the MU dermatopathology lab for differences in MCPyV status and clinical outcomes.

Methods

Retrospective review of cases that were processed by the dermatopathology laboratory and identified by keywords "Merkel cell" and "Neuroendocrine" in the pathologist's report. Cases without the diagnosis of MCC were excluded. Included cases were divided by MCPyV status (positive, negative, unknown) and tumor type, then staging, recurrence, and survival analyses were performed.

Results

Thirteen cases were identified. The average age was 74.9 years. Median survival after diagnosis by Kaplan-Meier analysis was 19 months. Twelve cases

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were isolated MCC tumors. Of these, seven were MCPyV-positive, while five were MCPyV-unknown. 14.3% of patients with MCPyV-positive and no patients with MCPyV-unknown tumors exhibited recurrence. Mortality was 14.3% for MCPyV-positive after both one and three years, and was 60% and 80%, respectively, for MCPyV-unknown. The combination SCC-MCC case was MCPyV-negative, diagnosed at the youngest age of all cases in the study, exhibited early recurrence, and the patient died six months after diagnosis.

Conclusion

The sample size was inadequate to make statistical comparisons between groups. However, the aggressive nature of the combination SCC-MCC case is consistent with existing literature and expectations of MCPyV-negative MCC. Understanding differences in clinical course between histological and etiological MCC subtypes may be important for clinical counseling and medical management.

Identifying Biomarker(s) Indicative of Future Amyotrophic Lateral Sclerosis Development in Midlife Adults with a History of Repeated Mild Traumatic Brain Injury

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Introduction

Amyotrophic lateral sclerosis (ALS) incidence is disproportionately high among individuals with repeated mild traumatic brain injury (rmTBI). There are no studies assessing ALS-specific endophenotypic features in these individuals. As no cure exists for ALS, there is an urgent need to understand the exact nature and extent of the link between rmTBI and ALS for the nearly 2.2 million rmTBI individuals who will grow old. We will study midlife biological profiles in rmTBI individuals to produce early biomarker(s) for the risk of future development of ALS.

Methods

We will assess the levels of brain (7T MR Spectroscopy; inflammation, glutamatergic toxicity, oxidative stress, iron deposits) and serum/plasma (α-synuclein, TDP-43, Tau, NFs, GFAP, BDNF, Aβ 42/40 ratio) biomarkers of neurodegeneration, fine-grained metrics of the hand/leg motor function (kinematics), and neurological status 3x over six months in healthy individuals, aged 40-55, at 5+ years after rmTBI (n=80), matched healthy controls (n=80), and ALS patients (n=40). This protocol is used in our lab on other populations. We will also develop a TBI & ALS database to facilitate recruitment and retention.

Results

We expect that rmTBI individuals with subtle motor function impairments demonstrate altered levels, accelerated trajectories of brain/serum biomarkers, and accelerated motor decline compared to controls or rmTBI individuals without motor impairments and earlier than ALS patients. We also expect to identify the most potent combination of brain/serum biomarkers that predict the ALS emerging behavioral patterns and decline trajectories in rmTBI individuals by applying machine learning algorithms and generalized estimating equation models.

Conclusion

The results of this study will aid in defining the susceptibility of the rmTBI individuals to develop ALS, potentially speeding up the time to diagnosis and guiding the development of targeted treatments. Advancing research in this area holds the potential to drastically improve outcomes and quality of life for those affected.

Pre-Operative Diagnosis of Hernia is More Likely to Incur a Post-Operative Surgical Site Infection after Bowel Resection and Anastomosis

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Introduction

Surgical site infections (SSI's) increase patient morbidity and the risk of downstream wound complications such as dehiscence or ventral hernias. Deeper SSIs may require percutaneous or open drainage procedures to prevent dissemination or long-term abdominal complications. We analyzed a retrospective database of elective and emergent small and large bowel resections with anastomoses for incidence of post-operative SSIs.

Methods

A retrospective chart review of small and large bowel anastomoses was conducted. Variables captured included demographics, medical and surgical history, anatomy and method of anastomoses (small vs large bowel, hand-sewn vs stapled), number of operations per admission, method of fascial closure, and post-operative complications (leaks, infections, dehiscence/evisceration). Continuous variables were compared using Student's t-test and categorical variables were compared using the Chi-squared test with a p-value level of significance at 0.05. IRB exempt project No. 2122397.

Results

382 index operations were recorded between 2018 and 2024, where 40 were performed for bowel perforation, 21 for bowel ischemia, 78 for bowel obstruction, 36 for hernia, and 50 for diverticulitis. 52 operations were for trauma while 93 were for malignancy, 6 for enterocutaneous fistula, and 7 for volvulus. 261 operations were elective and 183 were emergent which included 42 second operations and 14 third operations during the same admission. Operations performed for hernias were at a significantly higher risk of developing a post-operative SSI (OR=2.74, p=0.0065). 55 post-operative SSI's occurred which included 2 bacteremia, 24 superficial, 26 deep and 3 with both.

Conclusion

Bowel resections and anastomoses performed for a preoperative diagnosis of hernia were almost three times more likely to develop a post-operative surgical site infection. More data are needed to identify possible convoluted variables that inform this correlation.

Autoimmune Bullous Pemphigoid in a Vietnam Veteran with Suspected Agent Orange Exposure

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Introduction

At the time of Agent Orange (AO) spraying in Vietnam, 2,3,7,8-tetrachlorodibenzop-dioxin (TCDD), the most toxic form of dioxin, was an unintended contaminant during production. All ground forces were presumed exposed, but the threshold of TCDD required to trigger disease remains unknown.

Methods

A Marine Veteran serving in Vietnam in 1969-70 was discharged from active duty in generally good health. In March, 2022, he experienced a rash and itchiness on the upper chest/back and spreading to extremities. A preliminary diagnosis of "Dermatitis due to unknown cause" was rendered. Two weeks later, he was in the sun for ~20 minutes without a shirt. Within hours, tense fluid-filled bullae erupted on the upper body, associated with severe pruritus but minimal pain. He sent digital images to his dermatologist, who recommended starting prednisone immediately.

Results

Skin biopsy confirmed bullous pemphigoid (BP). Treatment with prednisone 60 mg/day followed by dupilumab allowed successful tapering and discontinuation of steroids after 10 months. The

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disease remains quiescent on dupilumab.

Conclusion

A well-studied role of TCDD involves persistent activation of the aryl hydrocarbon receptor (AHR). It is likely that AO exposure caused BP through a biological continuum of acquired driver gene mutations in long-lived bone marrow stem cells, fueled by chronic release of TCDD from adipose stores. This persistent AHR hyperactivation may provide a selective clonal growth advantage and induce epigenetic immune defects, ultimately breaking immune tolerance. The resulting loss of regulatory B-cell control over the balance between T-regulatory and T-helper clones can drive autoantibody production, culminating in clinical disease decades after exposure.

Impact of Recreational Cannabis Legalization on Maternal Breastfeeding Practices in Missouri

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Introduction

Breastfeeding provides important health benefits to both infants and mothers. Cannabis legalization has been linked to reduced perceived risk of use during breastfeeding, but its influence on maternal decisions remains unclear. This study assessed whether recreational cannabis legalization in Missouri was associated with changes in prenatal cannabis use, breastfeeding initiation at hospital discharge, and continuation at 6 weeks postpartum.

Methods

We conducted a retrospective cohort study using electronic medical records from University of Missouri Health Care. Mothers delivering from November 8, 2021 - November 8, 2022 comprised the pre-legalization group, while those delivering from November 9, 2022 - November 9, 2023 comprised the post-legalization group. Data included demographics, obstetric history, cannabis use (self-report, urine drug screen, CordStat7), delivery complications, NICU admissions, and breastfeeding status at discharge and at 6-week postpartum. Chi-square tests were performed to compare outcomes between groups, and logistic regression with backward selection was used to identify predictors of breastfeeding continuation.

Results

A total of 1,224 mothers were included: 600 pre-legalization and 624 post-legalization. Prenatal cannabis use was documented in 7.3% of pre-legalization deliveries versus 7.8% post-legalization. Breastfeeding initiation at hospital discharge occurred in 91.6% pre-legalization compared to 88.8% post-legalization. Continuation at 6 weeks was 86.6% pre-legalization and 89.5% post-legalization. Logistic regression demonstrated that cannabis use, tobacco use, teen motherhood, Black race, obesity, and postpartum mood disorder significantly reduced odds of breastfeeding continuation (ORs 0.35–0.49).

Conclusion

Recreational cannabis legalization was not associated with substantial changes in breastfeeding practices overall, though a modest decline in initiation was observed post-legalization. Individual-level predictors, including cannabis and tobacco use, race, obesity, and postpartum mood disorder, were more strongly associated with early breastfeeding cessation. These results highlight the importance of targeted support for at-risk mothers as cannabis use becomes more socially normalized.

Low-Level Blast Exposure and CNS Disease in Gulf War Veterans

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Introduction

Long-latency neurologic syndromes are being recognized 2-4 times more frequently in veterans of Gulf Wars and Afghanistan combat deployments (GWTs) as compared with veterans not deployed. An area of particular interest is low-level blast exposure (LLBE), which was not previously appreciated as causative of traumatic brain injury (TBI).

Methods

We present the case of a GWT (1990-1991) with a history of occupational LLBE who presented with acute cerebral infarction and resultant permanent right leg weakness. His deployment duties included explosive ordnance disposal (EOD) with detonation of captured munitions. MRI demonstrated multiple acute subcortical lesions on T2/FLAIR, consistent with ischemic stroke. An initial appeal for upgraded VA benefits was denied based upon limited evidence at that time. It was subsequently granted following a 3-year appeal, which included a nexus argument linking emerging evidence of his occupational LLBE to increased chronic neurovascular and TBI-related risk.

Results

Research has linked LLBE with chronic neurocognitive and neurovascular changes. LLBE includes activities such as firing high-caliber weapons, detonation charges during breach entrances, and detonation of captured munitions. Veterans with LLBE have reported poorer health and functionality than peers without LLBE. Neuroimaging studies have demonstrated a significantly increased prevalence of prefrontal cortical gray matter loss, increased cortical brain thickness, and reduced cerebral blood flow consistent with reported neurologic symptoms. Accelerated atherosclerotic disease in GWT veterans may include mechanisms such as higher systemic inflammation and reduced CNS defense against oxidative stress. Similar neurovascular alterations have been demonstrated in animal models of LLBE.

Conclusion

Emerging evidence elucidates previously unrecognized connections between LLBE and a wide gamut of neurocognitive consequences. The full clinical expression of occupational LLBE may be associated with a latency period of many years, justifying VA medical benefits appeals for affected veterans.

Comparing Post-Operative Outcomes of Corrective Osteotomies Between Three Pre-Preoperative Planning Protocols

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Introduction

Distal femoral and high tibial osteotomies are widely used surgical treatment options aimed at correcting valgus or varus malalignment in legs associated with pain, dysfunction, and early progression to osteoarthritis. The primary aim of this study was to compare post-operative outcomes as defined by accuracy of limb alignment of corrective distal femoral and high tibial osteotomies following use of either free-hand planning, surgeon-templated software systems, or custom patient specific guides. Secondary outcomes include evaluations of patient-reported outcomes (PROMs) between groups.

Methods

Patients who underwent either distal femoral or high tibial osteotomy between 01/01/2010 to 04/15/2024 were identified and grouped by planning modality. Demographics, pre- and post-correction radiographic alignment, rate of hardware removal, rate of failure, and PROMs at pre-operative and final follow-up were analyzed and compared across groups. Fisher's exact test and Kruskal-Wallis rank sum test was used to analyze categorical and continuous variables with significance set at $p<0.05$

Results

75 patients met inclusion criteria with no significant differences in groups for age, sex, marital status, final follow-up time, or ethnicity. Osteotomy group was not significantly associated with failure, need for hardware removal, or any differences in

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pre- or post-operative PROMs. In evaluating post-operative limb corrections, free patients had a mean final limb alignment of 177 degrees (sd 1.9), software patients a mean of 177 degrees (sd 2.2), and custom patients a mean of 178 (sd 1.4) degrees. Custom patients had the closest return to neutral alignment (178-179 degrees).

Conclusion

The study results suggest patient specific custom cut osteotomy guides are non-inferior to freehand or software techniques, but longer-term outcomes studies are needed to determine if patients achieve improved outcomes over time.

Sclerosing Encapsulating Peritonitis in a Patient with a Ventriculoperitoneal Shunt: A Case Report

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Introduction

Sclerosing encapsulating peritonitis (SEP), also called abdominal cocoon syndrome, is a rare cause of small bowel obstruction (SBO) characterized by a fibrocollagenous membrane encasing the intestines. Although most often linked to peritoneal dialysis or recurrent peritonitis, SEP secondary to ventriculoperitoneal (VP) shunt placement is exceedingly rare, with only a few published cases.

Methods

We reviewed the patient's medical records, operative findings, imaging, and hospital course to describe presentation, management, and outcomes of SEP likely secondary to VP shunt placement.

Results

A 27-year-old male with cerebral palsy and a longstanding VP shunt presented with recurrent, non-resolving SBO. Initial CT imaging showed free abdominal fluid, small bowel dilation, and a right lower quadrant transition zone. Exploratory laparotomy revealed a dense fibrous membrane encasing multiple loops of small bowel concentrated around the distal VP shunt, requiring four hours of adhesiolysis. Findings were consistent with cocoon abdomen. One month later, recurrent obstruction necessitated reoperation, confirming progressive SEP with dense adhesions and mesenteric contraction. Extensive dissection led to unavoidable enterotomies and necessitated small bowel resection, diverting loop ileostomy, and gastrostomy tube placement. Intraoperative spillage prompted conversion of the VP shunt to a ventriculopleural system to reduce infection risk and further peritoneal irritation. Postoperatively, the patient became TPN dependent with recurrent admissions for obstruction, dehydration, and sepsis. As further surgery carried prohibitive risk, the patient and family elected for comfort-focused care, and he was discharged to home hospice.

Conclusion

This case highlights SEP as a rare but serious complication of chronic VP shunt irritation. It underscores the diagnostic difficulty, the limited effectiveness of repeated surgery in progressive disease, and the importance of early recognition and palliative involvement. Clinicians should maintain suspicion for SEP in VP shunt patients presenting with recurrent SBO and intraoperative findings of dense peritoneal fibrosis.

Evaluation of Ultrasound as a Diagnostic Tool for Pediatric Acute Appendicitis in Patients with Higher Body Mass Index

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Introduction

Ultrasound (US) is a key imaging modality in the diagnosis of acute appendicitis in pediatric patients. However, the appendix may be nonvisualized on US for several reasons, including higher body mass index (BMI). This study evaluates the diagnostic performance of US in overweight compared to non-overweight pediatric patients at the University of Missouri.

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Methods

A retrospective chart review was conducted of pediatric patients ages 2–18 who presented to the University of Missouri with clinical suspicion of appendicitis and underwent diagnostic US. Data collected included appendix visualization, final pathology, and BMI percentile. Patients with BMI ≥95th percentile were classified as overweight, while those below the 95th percentile were considered non-overweight. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of US were calculated for each group.

Results

In the overweight group, US demonstrated a sensitivity of 72.2% (95% CI 49.1% – 87.5%), specificity of 99.3% (CI 96.2% – 99.9%), PPV of 10.4% (CI 68.5% – 98.7%), and NPV of 99.9% (CI 68.5% – 98.7%). In the non-overweight group, sensitivity was found to be 75.8% (CI 66.1% – 83.5%), specificity 99.4% (CI: 98.3% – 99.8%), PPV 16.4% (CI 88.5% – 98.6%), and NPV 99.9% (CI 93.8% – 97.2%). These findings suggest minimal difference in diagnostic performance between groups.

Conclusion

In this study, ultrasound is highly specific but less sensitive for diagnosing pediatric acute appendicitis. No statistically significant difference in diagnostic accuracy was observed between overweight and non-overweight patients, suggesting that nonvisualization due to higher BMI did not significantly impact diagnostic outcomes.

Effect of a Multidisciplinary Gastrostomy Tube Program on Outcomes, Caregiver Education, and Social Determinants of Health

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Introduction

Gastrostomy tube (G-tube) care has traditionally occurred on an as-needed basis, often leading to preventable complications due to inconsistent follow-up and limited caregiver education. This fragmented model results in emergency department (ED) visits, unplanned clinic encounters, and increased caregiver stress and financial burden. In 2022, we established a multidisciplinary pediatric G-tube clinic featuring standardized follow-up and caregiver education. We hypothesized that this model would reduce complications and unscheduled care while improving caregiver knowledge and patient outcomes.

Methods

We conducted a retrospective review of patients receiving G-tube care from January 2020 to present. Patients were divided into pre-implementation (1/2020-12/2022) and post-implementation (1/2023-present) groups. Data collected included demographics, complication rates, treatment types, ED and unplanned clinic visits, caregiver phone calls, travel distance, social determinants of health, and emergency care costs.

Results

A total of 136 patients were included (105 pre-clinic, 31 post-clinic). The most common complication was granulation tissue (101 cases, 74.2%), primarily treated with silver nitrate (55 cases, 54.5%). Among patients, 14.7% had a Very Low Childhood Opportunity Index (COI), 25.7% Low, and 29.4% Moderate. Compared to the post-clinic group, pre-clinic patients had 6.8 times more ED visits and 5.1 times more unplanned clinic visits. Phone calls regarding G-tube issues were 2.1 times higher in the pre-clinic group. The average travel distance for care was 58 miles.

Conclusion

The implementation of a dedicated G-tube clinic significantly reduced ED utilization, unplanned clinic visits, and caregiver phone calls. This model supports improved caregiver education, clearer expectations, and reduced social and financial burden, which is especially impactful for patients with significant social determinants of health. Our findings support the value of standardized, multidisciplinary care for pediatric G-tube management.

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Predicting The Risk of Inpatient Cardiac Arrest Following an Acute Myocardial Infarction Using Real-World Data with Machine Learning Models

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Introduction

With a steady increase in rates since the 1990s, the risk of inpatient cardiac arrest following an acute myocardial infarction (AMI) remains an important topic to address. Prior studies predicting its incidence have shown promising results but have faced obstacles such as poor patient diversity and low sample sizes, which may impact their model's application to clinical practice. This study compares the effectiveness of two predictive algorithms to assess patients' future risk of death post-AMI.

Methods

De-identified real-world patient data from the University of Missouri Hospital were collected from electronic health records. The patients included in the study were diagnosed with any of the I21 ICD-10 codes and were admitted to an inpatient unit of the hospital. We trained two predictive models: a LASSO GLM and an XGBoost algorithm.

Results

A total of 7,107 patients following the inclusion criteria were extracted from the database (mean age 65.5 years, 58.5% male, 90.4% White, 8.4% Black, 12% mortality rate). 170 features were collected for analysis, including patient vital signs, demographic information, medical history, and current medication use. XGBoost model showed a higher area under the curve (AUC) as compared to the LASSO GLM model (0.87 [95% CI 0.85-0.89] vs. 0.84 [0.82-0.87]). XGBoost also showed a more balanced performance in sensitivity (0.80 [0.78-0.82] vs. 1 [1-1]) and specificity (0.75 [0.69-0.81] vs. 0.06 [0.02-0.09]).

Conclusion

Risk stratification among AMI patients admitted to the hospital is possible with relatively high accuracy using machine learning. XGBoost allows for this risk stratification better than the LASSO GLM algorithm. Future use of this data will be to expand the scope of research in this field by creating a novel machine learning model with age stratification, which will explore an understudied aspect of AMI.

Analysis of ECHO Autism Implementation Science Outcomes

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Introduction

Extension for Community Healthcare Outcomes (ECHO) Autism is an innovative tele-mentoring model designed to enhance community healthcare providers' knowledge and confidence in applying best practices for treating individuals with Autism Spectrum Disorder (ASD). Although the ECHO Autism model has been widely implemented and adapted in diverse settings, existing data on its implementation science outcomes have yet to be systematically reviewed and synthesized. This study conducted a literature review identifying the number of articles that examined the acceptability, adoption, feasibility, and appropriateness of the ECHO Autism framework, as well as the measures used to assess these outcomes.

Methods

Two independent PubMed searches yielded 153 and 773 articles, respectively. Of these, 41 were selected for full-text review. An additional 8 articles were identified from existing ECHO Autism citation lists, resulting in a total of 49 articles reviewed in-full. Based on inclusion and exclusion criteria, 21 articles were included in the final analysis.

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Results

Of the 21 articles, 19 assessed acceptability, 12 feasibility, 13 adoption, and 1 appropriateness. Some articles used multiple measures to evaluate one implementation outcome, most commonly in the evaluation of acceptability. Some articles also evaluated more than one implementation science outcome at a time, with 12 articles assessing both acceptability and feasibility using distinct measures. An important limitation of this study was that only one researcher independently coded which articles evaluated each outcome.

Conclusion

While numerous studies have examined the acceptability, adoption, and feasibility of ECHO Autism, evidence regarding its appropriateness across diverse settings remains limited. Assessing appropriateness is essential to understanding the impact of ECHO Autism in varied contexts, and our data highlights the need for future research in this area. Additionally, several studies identified the need for further investigation into patient-oriented outcomes resulting from provider participation in ECHO Autism, which should be prioritized in future research.

Disparities Beneath the Surface: Atopic Dermatitis and Quality of Life in Patients with Skin of Color

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Introduction

Atopic dermatitis (AD) is a chronic inflammatory skin condition that affects individuals across all skin tones. However, its burden is not equally distributed. Patients with skin of color experience disproportionate challenges, including delayed diagnosis, inadequate treatment, and post-inflammatory pigmentation changes. Systemic obstacles, such as limited access to dermatologic care and underrepresentation in medical education resources, contribute to misdiagnosis and mismanagement. Prior research demonstrates that AD in patients with darker skin tones is associated with decreased quality of life and higher rates of anxiety and depression, yet psychosocial outcomes remain underrecognized in clinical practice.

Methods

A narrative review of the literature was conducted using PubMed and Google Scholar to identify studies examining disparities in AD care among patients with skin of color. Search terms included atopic dermatitis, eczema, skin of color, quality of life, anxiety, depression, and disparities. Articles were screened for relevance to clinical outcomes, psychosocial burden, and barriers to care.

Results

Evidence indicates that individuals with skin of color are more likely to experience diagnostic delays and disproportionate psychosocial burden compared with patients with lighter skin tones. Post-inflammatory pigmentary changes also disproportionately affect quality of life in these populations. Multiple studies reported higher rates of anxiety and depression in patients with darker skin tones living with AD, suggesting a need for integrated approaches to management. Despite these findings, limited research specifically addresses patient-reported outcomes and the lived experience of AD in historically marginalized groups.

Conclusion

Patients with skin of color face significant disparities in the diagnosis, treatment, and psychosocial impact of AD. Improving care requires strategies that combine equitable access to dermatologic care with recognition of mental health needs. Further research focused on patient-reported outcomes is essential to inform more effective, culturally sensitive, and equitable management strategies for AD.

The Burden of Blunt Splenic Injury in a Mixed Urban-Rural Pediatric Cohort

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Introduction

There are nearly 2,000 trauma centers in the United States. Of these approximately 160 are pediatric trauma centers (PTCs). Our aim is to evaluate pediatric blunt splenic injury (BSI) at a level 1 adult trauma center in mid-Missouri to understand the gap in care compared to PTCs. Our hypothesis is that management of BSI in a non-PTC center will deviate from pediatric standards of care.

Methods

Data ranged from 01/01/2020 – 05/01/2025. Data included pediatric patients with an injury severity score of four or greater. Burn patients without traumatic injury, isolated hip fractures, and penetrating injury were excluded. In total 678 patients were identified. Twenty-two had blunt splenic injury. Outcome variables included laparotomies, splenectomies, consultation of pediatric surgeons, transfers, adherence to the American Pediatric Surgical Association (APSA) guidelines, complications, social depravity index (SDI), child opportunity index (COI), and social vulnerability index (SVI).

Results

Twenty three percent underwent exploratory laparotomies, each having splenectomies. Forty-one percent had an elevated shock index pediatric adjusted (SIPA). The APSA protocol wasn't followed 45% of the time. Fourteen percent were transferred to PTCs, 9% had infections, 9% had ileus, 36% had pediatric surgery consultations with 88% resulting in successful APSA protocol adherence. Over half had low SDI, COI, and SVI scores. We found a 22.7% splenectomy rate and a 77% non-operative management (NOM) rate. This contrasts with a 1-4% splenectomy rate and >90% NOM rates at PTCs. Each pediatric surgery consult resulted in successful NOM.

Conclusion

In this study, we observe a deviation from pediatric standards of care in the management of BSI with higher splenectomy and lower NOM rates. Notably, many of these injured patients came from zip codes associated with poor social determinants of health (SDI, SVI, and COI), indicating an opportunity to improve education and resources to these communities.

Identifying Gaps in Latent Tuberculosis Treatment Care: An Analysis of Completion Rates and Delays in Columbia, Missouri

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Introduction

Despite decades of declining incidence, latent tuberculosis infection (LTBI) is resurging in the United States, underscoring persistent challenges in timely diagnosis, treatment initiation, and therapy completion. Columbia, Missouri, as a regional hub serving both urban and surrounding rural populations, provides a unique setting to examine treatment patterns and delays, offering insight into barriers within the care cascade. This QI study evaluates LTBI treatment completion and pre-treatment delays to identify opportunities for intervention and inform strategies to optimize care delivery.

Methods

We conducted a retrospective review of patients with untreated LTBI referred to the Boone County Health Department between October 2021 and December 2024. Electronic medical records were reviewed to assess treatment initiation, completion, and delays, as well as the intervals between a positive QuantiFERON test, chest X-ray, and LTBI education session. Successful treatment was defined as completion of a 9-month daily course of isoniazid, a 4-month daily course of rifampin, or a 3-month weekly course of rifapentine plus isoniazid.

Results

Among 25 patients included in the analysis, 19 (76%) successfully completed therapy. Reasons for incomplete treatment included loss to follow-up, adverse effects, and patient choice. Among patients who completed therapy, the mean delay from initial testing to treatment initiation was 104 days (≈3.5 months), with observed delays ranging from 23 to

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330 days. Delays were concentrated in the pre-treatment phase, highlighting a critical window for targeted intervention.

Conclusion

While shorter rifamycin-based regimens facilitate treatment adherence and completion, substantial pre-treatment delays represent a significant barrier to optimal LTBI care. These findings underscore the need for strategies such as streamlined referral processes, structured patient follow-up, and tailored educational interventions to accelerate treatment initiation and improve outcomes. Future research should explore patient- and system-level determinants of delayed initiation to develop evidence-based interventions aimed at enhancing LTBI management within regional healthcare networks.

Endothelial Cell Mineralocorticoid Receptor Mediates Western Diet–Induced Cerebral Blood Flow Reductions in Female Mice

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Introduction

Cerebral blood flow (CBF) is a critical determinant of brain health, and its impairment contributes to cognitive decline and vascular dementia. The endothelial cell mineralocorticoid receptor (ECMR) regulates nitric oxide (NO) and stress signaling under physiological conditions but becomes maladaptive under Western diet (WD)–induced activation of the renin–angiotensin–aldosterone system. Emerging evidence suggests females may be especially vulnerable due to interactions between estrogen signaling and MR activity, particularly with aging.

Methods

Wild-type (WT) and ECMR knockout (KO) C57B16/J mice were maintained on either control diet or WD. In vivo cerebral blood flow was measured on a 7T/20 MRI system using continuous arterial spin labeling (CASL). Volumetric and region-based segmentation analyses were performed across brain regions, with comparisons stratified by sex, diet, genotype, and age.

Results

In female WT mice, WD significantly reduced CBF in the hippocampus and thalamus compared to controls (hippocampus: WTCD vs. WTWD, p=0.016; thalamus: WTCD vs. WTWD, p=0.046). ECMR deletion preserved perfusion despite WD exposure (hippocampus: KOCD vs. WTWD, p=0.017; thalamus: KOWD vs. WTWD, p=0.026). Male mice showed no significant WD-induced reductions, though females on WD exhibited lower thalamic perfusion compared to males (p=0.0189). Aging further amplified cerebrovascular vulnerability.

Conclusion

ECMR mediates Western diet–induced reductions in cerebral blood flow, with greater susceptibility in females and with aging. ECMR deletion protects against diet-induced cerebrovascular dysfunction, identifying ECMR as a potential therapeutic target for vascular dementia and related conditions, especially in women.

Repeated Mild Traumatic Brain Injury Induced Cardiac Remodeling in Female Mice

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Introduction

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Mild traumatic brain injury (mTBI) is a distinct neurologic disease with systemic effects, particularly involving autonomic dysregulation. Damage to central autonomic network (CAN) components, such as the hypothalamus and medulla, may lead to persistent sympathetic overactivation, altered hemodynamics, and cardiac remodeling. This study employed 7T cardiac MRI to investigate structural and functional remodeling in the left ventricle (LV) following Open-Field Blast (OFB)-induced mTBI in female mice.

Methods

Adult female C57BL/6J mice (n=4-5/group) were exposed to 0x, 1x, 2x, or 3x OFB at a 3-meter distance from a 350g C-4 explosive detonated 1 meter above ground. At 1-month post-injury, mice were imaged using a 7T MRI under 1.5% isoflurane with physiological monitoring. Short-axis cine MRI was acquired to span the LV. Quantitative structural measurements included LV weight (LVW), LVW/body-weight ratio (LVW/BW), anterior-septal-wall (ASW), and posterolateral-wall (PLW) thickness. Hemodynamic indices included ejection fraction (EF), fractional shortening (FS), stroke volume (SV), cardiac output (CO), end-diastolic volume (EDV), end-systolic volume (ESV), initial-filling rate (IFR), peak-filling rate (PFR), and relaxation time (RT). Data were analyzed using Segment (Medviso) and Paravision software. Statistical comparisons used two-tailed Student's t-tests; $p<0.05$ was considered significant.

Results

The 3x group demonstrated significant LV remodeling consistent with eccentric hypertrophy, including reduced LVW and LVW/BW ($p<0.05$), and decreased ASW and PLW thicknesses, indicating myocardial thinning. Enhanced systolic function was observed with elevated EF and SV ($p<0.05$), along with decreased ESV. Hemodynamic analysis revealed reduced IFR and PFR, suggesting early diastolic dysfunction. In contrast, 1x and 2x groups exhibited no statistically significant differences compared to controls.

Conclusion

Repeated mTBI induces significant cardiac remodeling independent of direct cardiac trauma. Cardiac MRI reveals neurocardiac-axis dysfunction marked by eccentric hypertrophy and early diastolic impairment in female mice at 1-month post-injury.

Assessing the Clinical Defensibility of Oral JAK Inhibitors for Short-Term Use in Moderate-to-Severe Atopic Dermatitis

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Introduction

Atopic dermatitis (AD) is a common, chronic, and inflammatory skin disease with significant physical burden and psychosocial implications. While biologics are guideline-preferred systemic agents, oral Janus kinase inhibitors (JAKi) have demonstrated superior short-term efficacy but carry class-wide black box warnings. Their role as short-term or bridging therapy remains unclear.

Methods

We conducted a PubMed and Google Scholar search (January 2020–August 2025) combining "atopic dermatitis" with terms related to JAK inhibitors, biologics, bridging therapy, and short-term use. English-language clinical trials, reviews, guideline summaries, and prescribing information were prioritized. Additional references were incorporated from citations and expert commentary on access and feasibility.

Results

Primary literature and reviews find that upadacitinib and abrocitinib achieve faster and greater clearance than biologics at early endpoints but this superiority over biologics may be short-lived. Though all JAKi carry black box warnings, serious adverse events were rarely reported. Biologics, while slower to act and less efficacious in shorter trials, carry fewer perceived risks and eventually meet or surpass oral JAKi in efficacy. Initiating oral JAKi is more complicated than initiating biologic medications. Patient-specific factors such as pregnancy or financial status further limit use and accessibility.

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Conclusion

Oral JAKi provide rapid symptom relief and are clinically defensible for short-term use in moderate-to-severe AD in select patients who prioritize rapid disease control. Side effect profile and logistical barriers favor biologics for maintenance therapy. Further research is needed to validate oral JAKi use as induction or bridging therapy.

Outcomes of Free Hand versus MD3T Technique for Tibial Tubercle Osteotomy

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Introduction

Tibial tubercle osteotomy (TTO) is used to address patellar instability, maltracking, or an abnormal tibial tubercle-trochlear groove (TT:TG) distance. Recurrence and revision surgery are common, however, with only 50-65% success at 10-15 years. Studies suggest that traditional freehand techniques may be imprecise, leading to a high re-operation rate. The purpose of this study was to compare outcomes of freehand TTO versus TTO using the Multi-Directional Tibial Tubercle Transfer (MD3T), patient-specific instrumentation.

Methods

With IRB approval, patients who underwent a primary TTO between 1/1/2018-6/1/2024, were > 13 years of age, and had at least 1 year of follow-up were included. Demographics, surgical techniques and patient reported outcome measurements (PROs) were collected to identify factors associated with the need for re-operation after TTO. Fisher's exact test and Kruskal-Wallis rank sum test were utilized to compare groups with significance set at $p<0.05$.

Results

62 patients were included, 50 in the freehand group and 12 in the MD3T group. Mean follow-up was 35.3 + 21.1 and 24.4 + 19.4 months per group respectively (p=0.047). 7 patients underwent a revision surgery (11.3%), 7 were in the freehand group and 0 were in the MD3T group. Mean follow-up for revision groups was 48.1 + 21.3 and 31.3 + 20.5 for non-revision groups (p=0.046). Patients were significantly more likely to undergo revision if they had lower TT:TG values pre-operatively (p= 0.024). Age, sex, race, BMI, tobacco use, health literacy were not significantly correlated with the need for revision.

Conclusion

While the difference in revision rates between freehand and MD3T techniques did not reach statistical significance, the absence of any revisions in the MD3T group compared to a 14% revision rate in the freehand group may represent a clinically meaningful improvement. Longer-term outcome studies are needed to determine whether this reduction in revision rates is sustained over time.

Chronic 5-HT2C Agonism Administration Increases Motor Function in Aged Mice

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Introduction

Sarcopenia, or age-related pathological decline in muscle mass and strength, contributes to increased risk of loss of independence and all-cause mortality and lacks approved medical therapies. While the pathogenesis of sarcopenia is multifactorial, growing evidence suggests neural mechanisms. Our recent work showed that acute 5HT2c agonism increases neural excitability and improves muscle function in aged mice. Here, we sought to investigate the impact of chronic 5HT2C agonist treatment on motor function and neural excitability in aged mice.

Methods

At baseline, aged mice (20-month-old, n=12-14,

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50% female) underwent behavioral assessments of muscle function (all-limb grip, rotarod, and the weighted cart pull (WCP) with average power estimation) and in-vivo electrophysiology (compound muscle action potential (CMAP) and cervical motor evoked potential (cMEP)) and muscle contractility. Mice were randomized to daily treatments (3 mg/kg lorcaserin, an orally available, selective 5HT2c agonist or saline) by oral gavage 2 hours before dark (12h-12h light-dark cycle) for 6 weeks. Mice were retested on all measures at both 3-weeks and 6-weeks. All behavioral assessments occurred at the same time of day. All statistical tests were mixed effects with post-hoc Sidak's multiple comparisons.

Results

Chronic lorcaserin treatment significantly increased maximum weight pulled (p=0.0067) and average power (p=0.0335) during the weighted cart pull test. Electrophysiologic assessments showed higher CMAP (p=0.0366) and cMEP (p=0.0247) amplitudes in lorcaserin-treated mice compared with age-matched vehicle controls. At 6 weeks, lorcaserin treatment was associated with a modest increase in percent lean mass (p=0.0440).

Conclusion

Chronic 5HT2C agonism via lorcaserin treatment improved measures of motor function and neural excitability in aged mice at 6-weeks compared to controls and may represent a promising strategy for sarcopenia treatment in older adults.

Imaging the "Invisible Injury": DTI-MRI Reveals Gray and White Matter Damage in Blast-induced Female mTBI Mice

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Introduction

Mild traumatic brain injury (mTBI) accounts for 75-90% of TBIs yet remains difficult to detect with conventional imaging. In particular, blast-related mTBI has been termed the "Invisible Injury", contributing to underdiagnosis and long-term complications. Improved neuroimaging biomarkers are urgently needed for early detection and targeted intervention. This study utilized ultrahigh-resolution MRI to characterize longitudinal gray and white matter microstructural changes, with the goal of identifying imaging biomarkers for mTBI.

Methods

Female C57BL/6J mice (3-month-old, n=3-5/group) were exposed to open-field 1x or 2x blasts under anesthesia; sham controls underwent identical procedures without exposure. Longitudinal MRI was conducted under anesthesia at 1 day, 7 day, 1, 2, 3, 7, and 9 months, post-injury using a 7T/20 MRI/CryoProbe system. Diffusion tensor images (DTI) were processed using DSI Studio to quantify key diffusion metrics and group comparisons were analyzed using two-tailed t-tests.

Results

In the acute-subacute phase (1 and 7 day), blast-exposed mice exhibited significant axonal loss and cytotoxic edema in the corpus callosum, middle cerebral peduncle, and primary somatosensory cortex (PSC) compared to control. Intermediate timepoints (1, 2, and 3 months) revealed vasogenic edema and demyelination, particularly in PSC and thalamus compared to control. Chronic phase imaging (≥7 months) demonstrated further microstructural degeneration seen as significant cytotoxic edema in the thalamus, internal capsule, PSC.

Conclusion

Blast-induced mTBI revealed distinct, time-dependent injury patterns and region-specific neuronal damage. By capturing significant microstructural changes with ultrahigh-resolution MRI, these findings highlight the potential of advanced neuroimaging as a tool for early diagnosis, longitudinal monitoring, and therapeutic targeting of mTBI.

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Provider Attitudes Toward Pain Management Practices for IUD Insertion Following the 2025 ACOG Guideline Update

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Introduction

Pain during intrauterine device (IUD) insertion is a common barrier to patient comfort and uptake of this effective contraceptive method. Historically, pain management approaches have varied, with many patients receiving little or no anesthesia. In May 2025, the American College of Obstetricians and Gynecologists (ACOG) released new guidelines recommending a patient-centered approach that includes local anesthetics, consideration of intravenous sedation or general anesthesia when appropriate, and shared decision-making. This study examines current IUD pain management practices among Ob/Gyn physicians and trainees, their alignment with ACOG's updated recommendations, and factors influencing openness to change.

Methods

We conducted a cross-sectional, anonymous online survey of obstetrician-gynecologists and trainees across the United States, distributed via the Council on Resident Education in Obstetrics and Gynecology (CREOG) listserv. The 12-item survey assessed clinical practices, changes in the past five years, openness to adopting ACOG guidelines, provider confidence, perceived barriers, and interest in training. Demographics included clinical role, years in practice, institution type, and geographic region.

Results

To date, 47 respondents have completed the survey. Most were generalists (94%), practicing in university-affiliated medical centers (53%) or community hospitals (28%). The largest regional representation was from the Midwest (60%). About 30% were residents or trainees. Many reported offering multiple pain management options, though practice patterns varied. Nearly all respondents indicated openness to discussing pain control with patients, and a majority expressed willingness to adopt ACOG's May 2025 recommendations. Reported barriers included institutional constraints and limited resources. Confidence in administering techniques such as paracervical block varied, with many respondents expressing interest in additional training and educational resources.

Conclusion

Preliminary findings suggest that while IUD pain management practices remain variable, most providers are receptive to patient-centered, guideline-aligned approaches. Institutional support and expanded training may facilitate broader adoption of evidence-based pain management, improving patient experience and equitable contraceptive access.

Enriched Environment Improves Stroke Recovery - A Topical Review

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Introduction

Stroke patients are physically/cognitively inactive during inpatient rehabilitation up to 80% of their weekdays; the inpatient rehabilitation occurs typically in the early subacute phase of stroke, a window of heightened neural repair and plasticity. Overwhelming preclinical evidence shows that cognitive, social, and physical stimulation (so-called enriched environment, or EE) enhances stroke recovery through direct impact on brain plasticity (i.e., promoting neurogenesis, axonal sprouting, angiogenesis, and increasing neurotrophic factors level) and the indirect effects, such as improving mental status; these translated into improved neurobehavioral scores and learning, and a decrease in infarct size and mortality. Yet, there is no consensus on integrating EE into the rehabilitation settings.

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Methods

We have searched the Cochrane Library, PubMed, and Embase from their inception to the present for the following words: EE, stroke patients, acute & subacute stroke (ongoing process).

Results

This preliminary review involved four studies on 94 patients, which came mainly from Australia. The EE included encouragement of voluntary activity in patients within a stimulatory setting: access to a computer with internet connection, reading material, audiobooks, music, board/Nintendo Wii games, a community area for mealtime, recreational activities, and personal hobbies. When implemented in the inpatient rehabilitation setting, a two-week EE exposure resulted in a greater engagement in cognitive (1.7x) and social (1.2x) activities and a less likely inactivity and being alone (0.7x) or asleep (0.5x) compared to the non-EE exposure. A similar EE protocol was introduced in an acute stroke unit, and a significant positive effect on activity levels across all domains was reported immediately and three months later. Notably, a significantly shorter length of stay without increasing staffing levels was noted in both settings.

Conclusion

In collaboration with the Australian team, we will be first in the US to implement an EE protocol during inpatient rehabilitation at Rusk Rehabilitation Hospital.

From Blast to Brain: Decreased Cerebral Blood Flow in Female Mice Following Blast-Induced Mild TBI

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Introduction

Mild traumatic brain injury (mTBI) is one of the most common injuries sustained by soldiers, particularly those exposed to blasts during combat. Despite its high prevalence and the associated neurologic deficits, there are no reliable tools for detecting mTBI. Understanding the pathophysiology of mTBI and the recovery process is essential for advancing diagnosis and treatment strategies. This study investigates cerebral blood flow (CBF) changes as a potential biomarker for mTBI.

Methods

Mice were separated into three groups: non-injury control (NIC), one blast, and two blasts. Blast-exposed mice received blasts of 350g C4 with a peak pressure of 46.6 kPa once or twice within an open-field blast setup. MRI was performed at 8 time-points (acute-chronic) on a 7T/20cm MRI/CryoProbe. T2-weighted imaging was used for segmentation of the brain, and Continuous Arterial Spin Labeling (CASL) was conducted to analyze CBF. ITK-SNAP software was utilized to evaluate CBF in the cortex, hippocampus, and thalamus. Mean signal intensities were compared across groups and time-points.

Results

Female mTBI mice showed CBF reductions within the cortex, hippocampus, and thalamus. At 7 days, one-blast mice had reduced perfusion in all regions compared to controls. At one month, both blast groups exhibited hypoperfusion within the cortex. By 7 months, only two-blast mice continued to exhibit cortical hypoperfusion. There are greater chronic (1-3 months post-injury) decreases in CBF compared with the acute phase.

Conclusion

Female mTBI mice exhibited sustained CBF reduction post-blast with greater effects in the chronic phase. These findings support using CBF as a potential biomarker for mTBI, as hypoperfusion persisted for months and may contribute to neurologic changes. Longitudinal monitoring of CBF changes could help distinguish acute from chronic phases of mTBI, which may aid in the accurate diagnosis and improved therapeutic treatments.

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Developing Standardized Patient Profiles to Assess Perceived Risk in Response to a Digital Health Intervention: Integrating Clinical Complexity and Social Determinants of Health

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Introduction

Hypertensive disorders of pregnancy (HDP) remain a leading cause of maternal morbidity and mortality in the United States. Digital health interventions can utilize patient-generated blood pressure data to support home monitoring and clinical decision support. Previous studies indicate clinicians have concerns about how patients perceive risk and take action based on home blood pressures readings. Social determinants of health also play an important role in shaping decisions making. The purpose of this study is to draw upon perinatal care team interviews and environmental scans to create standardized patient profiles.

Methods

This multi-method project includes a secondary analysis of qualitative interview data collected from perinatal clinicians at a large academic health center in Missouri and an adapted environmental scan. Seven interviews were included which contained clinician's descriptions of clinical workflows, communication challenges, and SDoH. Interview results were synthesized with results of an environmental scan of selected Missouri communities to develop Standardized Patient profiles.

Results

Qualitative themes were related to medication management, clinician's perceiving variation in patient adherence to home blood pressure monitoring decision making, and the role of SDoH on patient action. These findings informed the development of standardized patient profiles situated in rural and suburban MO (Fayette, Tarkio, Columbia) and contrast determinants associated with access patterns of border towns, rural, and suburban localities. Each profile integrates clinical features with contextual factors such as transportation challenges, health literacy, family support, and digital access.

Conclusion

Standardized patient profiles grounded in clinician insights and local context provide a novel tool for examining risk perception, communication, and equity when using digital health solutions in hypertensive pregnancy care. To our knowledge, no prior studies have applied contextualized standardized patient profiles to studies assessing risk perception and action associated with digital health intervention, making this work an important foundation for future research.

DUSP11 Modulates Tumor Microenvironment as an Innate Immune Checkpoint

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Introduction

Understanding the mechanisms that drive an immunologically "cold" tumor microenvironment (TME) accelerates development of strategies to enhance cancer immunotherapy. Lung adenocarcinoma (LUAD), the most common subtype of non-small cell lung cancer, is characterized by a cold TME and shows limited responses to immune checkpoint inhibitors when used as second-line therapy. This limited response implies the existence of other immunosuppressive mechanisms. In prior work, we identified Dual Specificity Phosphatase 11 (DUSP11) as an

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intracellular innate immune checkpoint that suppresses immunogenic RNA sensing, and its inhibition triggers potent immunity activation in LUAD and other cancers. Here, we further investigated the role of DUSP11 in modulating the TME.

Methods

For in vitro immune activation, LUAD cells were treated with DUSP11 siRNA or control siRNA, followed by transferring the conditioned media to human PBMCs. For in vivo TME modulation, siRNA pre-treated LUAD cells were implanted subcutaneously to nude mice or humanized mice.

Results

DUSP11 knockdown (KD) in LUAD cells led to an ~1.8-fold increase in MHC class I expression at 48h compared with control cells. Conditioned media from KD LUAD cells activated human PBMCs, evidenced by (i) increased CD69 expression in B cells and both in naïve and memory $CD4^+/CD8^+$ T cells, and (ii) elevated CD107a in T cells. In the xenograft nude mouse model, DUSP11 KD suppressed LUAD engraftment and was associated with increased MHC class II expression in NK cells despite the absence of functional T cells. Ongoing humanized mouse studies aim to define how DUSP11 KD alters immune composition in the TME, lymph nodes, and blood in a setting that is more clinically relevant than immunocompromised nude mice.

Conclusion

DUSP11 contributes to a pro-tumor TME, and its inhibition enhances tumor immunogenicity, highlighting DUSP11 as a potential target to potentiate immunotherapy in LUAD.

Domain-Specific Remodeling of Lipid Rafts and Lysosomes in PMP22-Linked Neuropathies

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Introduction

Charcot-Marie-Tooth disease (CMT) is the most common inherited neuropathy, affecting ~1:2,500 people worldwide. The most common cause is PMP22 gene dosage alteration, with duplication causing CMT1A and deletion causing HNPP. PMP22 is highly enriched in Schwann cells and partitions into lipid rafts, yet its precise function in myelin and the mechanisms by which PMP22 imbalance drives neuropathy remain poorly defined. Node of Ranvier (NOR) and Schmidt–Lanterman incisures (SLIs) are specialized axo–glial microdomains essential for conduction and myelin integrity, and our prior work shows they are molecularly mispatterned in CMT1A and HNPP. We hypothesize that defective lipid rafts and impaired PMP22–raft association underlie these abnormalities, leading to myelin dyshomeostasis, lysosome accumulation, and ultimately disease pathogenesis in PMP22-linked neuropathies.

Methods

We analyzed the lipid raft markers Cav1 and Flot1 along with the lysosomal marker LAMP1 in sciatic nerve fibers from wildtype, CMT1A, and HNPP mice using confocal microscopy with 3D quantification.

Results

At NORs, CMT1A fibers exhibited accumulated Cav1 and LAMP1, whereas HNPP fibers displayed increased LAMP1 with more modest Cav1 changes, indicating varying degrees of remodeling of both raft-associated and degradative components. At SLIs, CMT1A and HNPP fibers showed reciprocal changes: CMT1A exhibited LAMP1 accumulation with reduced Flot1, while HNPP displayed diminished LAMP1 with increased Flot1.

Conclusion

Our findings demonstrate that PMP22 dosage imbalance differentially disrupts axo–glial microdomains. In CMT1A, NORs and SLIs both exhibit lysosome accumulation whereas lipid rafts are reduced at SLIs (Flot1) but increased at NORs (Cav1). In HNPP, lysosomes accumulate at NORs, while raft components are enhanced at both sites. These reciprocal changes support a model in which PMP22 dosage perturbs lipid rafts, shifting the balance of lysosomal degradation and driving microdomain instability. Our study identifies a

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novel potential mechanism of myelin dyshomeostasis and highlights domain-specific pathways for therapeutic intervention in CMT.

The Bovine H5 PB2 Gene Originates from Low Pathogenicity Avian Influenza and Supports Mammalian Polymerase Activity

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Introduction

In March 2024 the first case of H5N1 highly pathogenic avian influenza (HPAI) was detected in a herd of dairy cattle in Texas, USA. Since then, the virus has spread across North America resulting in an unprecedented panzootic outbreak affecting livestock, wild avian species, domestic poultry, and wild mammalian species. This strain descended from a H5 lineage first introduced to North America in 2021 Newfoundland, Canada. Prior to the spillover into cattle, this strain underwent multiple reassortment events allowing it to acquire 3 polymerase genes (PB2, PB1, and NP) from North American low pathogenic avian influenzas (LPAIs).

Methods

This project will utilize minigenome assays to identify polymerase gene(s) of interest which play a strong role in supporting the bovine H5 mammalian polymerase activity, compare phylogenetic relationships to determine which polymerase genotypes gene(s) of interest commonly cluster with it in avian and mammalian species, and explore temporal patterns in North American H5 mammalian polymerase activity by comparing the polymerase activity of different H5 strains.

Results

Results indicate the bovine H5 polymerase has enhanced mammalian polymerase activity compared to LPAIs, an ability strongly associated with the PB2 gene. Unlike the PB2 gene of previous H5 strains, the bovine H5 PB2 can enhance the mammalian polymerase activity of LPAIs. Phylogenetic analyses suggest the bovine H5 PB2 gene is closely related to that of a North American H4N6 LPAI (A/blue-winged teal/Ohio/12OS2244/2014) which our lab previously demonstrated to have enhanced mammalian replicative abilities in mammals.

Conclusion

These results support a strong role for the bovine H5 PB2 gene in supporting mammalian polymerase activity. Future studies will further investigate which PB1, PA, and NP genotypes this PB2 gene commonly associates with in avian and mammalian species.

Investigating the Role of Sex Hormones in Renal Cell Carcinoma

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Introduction

The kidney is an essential organ and vital for maintaining normal body functions and human survival. Some of its important functions include excretion of waste, hormone secretion, acid balance, and regulating blood pressure. Kidney cancer is a frequent malignant tumor that accounts for approximately 5% of all cancer incidences, and renal cell carcinomas (RCCs) account for 90% of kidney cancers. Interestingly, males are twice as likely to develop kidney cancer as females, with higher incidence, morbidity, and mortality than age-matched women. The sex differences in kidney cancer are believed to stem from the biological actions of sex hormones; however, their influence remains poorly understood. Thus, understanding the role of sex hormones in kidney cancer is essential to offer better diagnosis and therapeutic

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strategies. Emerging evidence suggests that estrogen may suppress RCC progression, while androgens may promote tumor growth. Based on this, we hypothesized that the expression levels of sex hormone receptors correlate with testosterone-induced proliferation and estrogen-mediated growth inhibition in RCC.

Methods

To test this hypothesis, we quantified hormone receptor expression by PCR and western blot and assessed cell proliferation and colony formation, in RCC cell lines derived from both sexes and from both primary and metastatic tumours.

Results

Interestingly, our initial results suggest that cells with similar expression profiles of receptors show different responses to both hormones.

Conclusion

These results suggest that receptor expression alone may not fully explain the observed hormonal effects in RCC. Further studies are needed to elucidate the molecular mechanisms underlying these differences.

First Autograft Mouse Model of Spontaneously Recovering Alopecia Leading to Alopecia Areata

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Introduction

Alopecia areata (AA) is a non-scarring, cell-mediated, autoimmune disease that causes hair loss in mammals. About 2% of people across the world will experience AA at some point in their lifetime. The general efficacy of most existing therapy is unsatisfactory and while the disease and immune mechanisms are incompletely understood. To date, validated autoantigens have not been identified. In the best-characterized mouse model of AA, C3H/HeJ, CD4 and CD8 T cells are involved in natural disease incidence and transplant-induced transfer. Our research group observed an unexpected development of AA in a subset of healthy C3H/HeJ recipient mice following syngeneic skin transplantation from healthy C3H/HeJ donor mice. We hypothesized that the transplantation process itself might have accelerated the expression of naturally spontaneous AA mice to express AA earlier.

Methods

To understand the possibility, we used an autograft transplantation approach where the same mouse served as donor and recipient of its own skin. We assessed 100 such autograft mice comparing with 100 control mice on which no procedure had been performed.

Results

We observed two distinct outcomes - manifestation of AA in some mice and a transient or dynamic form of alopecia in others. This latter presentation was marked by transient or dynamic form of alopecia ($p < 0.05$, 8.5 times more likely to exhibit AA vs Control), with outcomes ranging from spontaneous recovery, including hair regrowth, in a subset of the affected cohort, while other mice demonstrated persistent alopecia.

Conclusion

Our result indicates that a new mouse model of transient patchy Alopecia Areata (Dynamic) with a high probability of subsequent development of stable AA to AU. This novel AA model could potentially identify a new mechanism of AA susceptibility in C3H/HeJ mice and might model a feature of human AA that has not been previously modeled in animals.

Disruption of MICOS Drives Mitochondrial Dysfunction and Retinal Ganglion Cell Degeneration in Glaucoma

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Introduction

Glaucoma, a major cause of irreversible blindness affecting over 80 million people worldwide, is characterized by the progressive degeneration of retinal ganglion cells (RGCs) and their axons. Although elevated intraocular pressure (IOP) is a major risk factor, many patients continue to lose vision despite adequate IOP control, underscoring the need for novel neuroprotective strategies beyond IOP reduction. Mitochondrial dysfunction, particularly reduced respiration and mitochondrial DNA mutations is a hallmark of glaucomatous neurodegeneration; however, the upstream mechanisms remain unclear. The mitochondrial contact site and cristae organizing system (MICOS) is essential for maintaining cristae architecture, respiration, and cellular homeostasis. We hypothesized that elevated IOP disrupts MICOS integrity, driving mitochondrial disorganization and RGC degeneration.

Methods

Glucocorticoid-induced ocular hypertension (OHT) mouse model and age-matched human normal and glaucoma donor tissues were analyzed for MICOS disruption. Mitochondrial ultrastructure was assessed by TEM and 3D serial block-face SEM. Expression of MICOS subunits (Mic60, Mic26), mitochondrial stress signaling (ATF5), oxidative stress (8-OHdG, SOD2), membrane integrity markers (cardiolipin, VDAC, Calbindin) was analyzed by immunostaining. Pharmacological inhibition of Mic60 with Miclxin was used to probe MICOS function in vivo.

Results

TEM revealed accumulation of damaged mitochondria in OHT optic nerves, while 3D SBF-SEM showed collapsed cristae. In both OHT mice and age-matched human glaucoma donor retinas, expression of Mic60 and Mic26 was significantly reduced, accompanied by increased mtUPR activation, oxidative stress, and impaired RGC membrane integrity. Inhibition of Mic60 with Miclxin further exacerbated mitochondrial disorganization and caused RGC's structural and functional deficits, including reduced pattern electroretinogram amplitudes, impaired anterograde axonal transport, diminished synaptic function, and reactivation of astrocytes in central visual targets.

Conclusion

These findings identify MICOS disruption as a critical upstream driver of mitochondrial collapse, impaired axonal and synaptic function, and RGC degeneration in glaucoma, highlighting MICOS as a novel therapeutic target for neuroprotection beyond IOP lowering.

Downregulation of Kupffer Cell TIM4 Promotes the Development of MASH

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Introduction

Metabolic dysfunction-associated steatohepatitis (MASH) is a subtype of MASLD characterized by chronic inflammation. The proinflammatory environment in MASH is driven by the classical activation of Kupffer cells (KCs; resident liver macrophages). TIM4, a KC receptor that promotes tissue resolution and an anti-inflammatory phenotype helps mitigate MASH. We hypothesize that the loss of KC-TIM4 contributes to MASH progression through regulating KC activation.

Methods

Liver biopsies were obtained from patients with obesity and varying stages of MASLD. KCs were isolated from C57BL/6 mice and treated with siRNA to silence TIM4 in culture. Another cohort was injected with AAV8-Clec4f-mTIMd4 to overexpress TIM4 and fed either a control diet (CD) or Western diet (WD) for four weeks. Lastly, separate cohorts of C57BL/6 mice were fed a WD across 4-24 weeks to assess time course changes of TIM4 gene expression throughout MASH. qPCR was used to assess gene expression in whole liver and isolated KCs.

Results

We observed a 50% reduction in liver TIM4

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gene expression in patients with obesity and MASH compared to patients with obesity without MASH (p=0.03). Our results in cultured KCs revealed that TIM4 silencing increased iNOS mRNA expression by 8-fold (M1 pro-inflammatory marker; p=0.004), decreased CD163 (M2 anti-inflammatory marker; p=0.04), and decreased caspase 9 by 50% (apoptosis marker, p=0.08). TIM4 overexpression in liver reduced inflammation and overall NAFLD activity score (p=0.002). Four weeks of WD increased whole liver TIM4 (p=0.02), with a trending decrease after 24 weeks (p=0.09) compared to CD.

Conclusion

Collectively, the loss of TIM4 promotes a pro-inflammatory KC phenotype. These data suggest that TIM4 initially increases in early stages of MASLD and eventually loses expression throughout disease progression. Thus, TIM4 may have a key role in the pathogenesis of MASH. Therapeutic avenues aimed at maintaining or enhancing TIM4 may be an important target in preventing and treating MASH.

Altered Lipid Metabolism Modulates Fibrosis and Contractility of Trabecular Meshwork (TM), Leading to TM Dysfunction in Glaucoma

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Introduction

Glaucoma is a neurodegenerative disease and one of the leading causes of irreversible blindness among aging adults. Although various risk factors, such as age, race, genetic predispositions, and environmental factors, contribute to glaucoma pathogenesis, elevated intraocular pressure (IOP) is the only treatable risk factor known for this disease. IOP is regulated by the trabecular meshwork (TM). TM dysfunction leads to increased aqueous humor outflow resistance, resulting in IOP elevation. However, the mechanism of TM dysfunction remains poorly understood. In one of our recent studies, we identified severe metabolic dysregulation in glaucoma patients affecting critical biological functions, including lipid and energy metabolism. Here, we investigated the role of lipid metabolism in TM dysfunction.

Methods

We collected aqueous humor and blood plasma (paired samples, n=100) from the glaucoma (n=30) and healthy (n=20) subjects undergoing cataract or glaucoma surgery. Untargeted metabolomics analysis was performed via LC-MS/MS analysis. Some key altered metabolites were used for in vitro studies to delineate their role in TM pathophysiology. TM fibrosis and contractility were assessed using qPCR, immunofluorescence, and immunoblotting assays for fibrotic/ECM/cytoskeletal (αSMA, MYOC, Fn, ColIV) and Rho/ROCK/MLC proteins, respectively.

Results

The metabolomics analysis from aqueous humor and plasma samples revealed dysregulation of lipid metabolism in glaucoma subjects. We observed significantly increased levels of saturated and unsaturated fatty acids in glaucomatous conditions. Our in vitro studies on HTMC show that fatty acid challenge significantly increased the ECM deposition and cytoskeletal alterations, as indicated by increased expression of αSMA, MYOC, Fn, and ColIV. Fatty acid challenge further showed modulation of Rho/ROCK/MLC pathways, implicating the role of lipids in TM contractility.

Conclusion

Our findings indicate a significant dysregulation of lipid metabolism in glaucoma patients. Fatty acids can modulate TM fibrotic and contractile response, leading to TM dysfunction and IOP elevation.

Zika Virus Triggers Golgiphagy and Remodels the Golgi Apparatus to Facilitate Viral Replication in Human Trabecular Meshwork Cells

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Introduction

Zika virus (ZIKV) exposure during pregnancy can cause severe ocular abnormalities, including congenital glaucoma. However, the molecular mechanisms underlying ZIKV-induced glaucoma remain unclear. This study investigates the role of Golgiphagy, a selective form of autophagy targeting the Golgi apparatus in ZIKV replication and pathogenesis using human primary trabecular meshwork (TM) cells and IFNAR1-/- mouse model of ZIKV infection.

Methods

Primary human trabecular meshwork cells (HTMCs) were infected with ZIKV (MOI:1) and analyzed at various time points. Golgi and autophagy-related markers were assessed via transcriptomics (RNA-seq), immunofluorescence, and immunoblotting analysis. Pharmacological modulators of autophagy [an activator: rapamycin and an inhibitor: hydroxychloroquine (HCQ)] were used to evaluate the role of Golgiphagy in ZIKV replication and transmission. Viral titers were determined via plaque assays, and innate antiviral responses were assessed via qPCR. The gross ocular pathology was evaluated using fundoscopy and OCT exams.

Results

ZIKV infection disrupted the integrity of the Golgi apparatus in HTMCs. Our RNA-seq analysis revealed dysregulation of multiple Golgi-associated genes, including GM130, MYH10, GOLGA3, GOPC, and GOA8R by ZIKV in HTMCs. Immunoblot analysis further confirmed dysregulation of several golgins and Golgi-associated proteins such as GM130, TGOLN2, YIPF4, MYH10, GOLGA3, and RAB3D. ZIKV induced Golgiphagy as their survival mechanism, which was confirmed by increased WIPI2 recruitment to the Golgi, enhanced LC3B lipidation, and decreased SQSTM1/p62 and YIPF4 expression. Pharmacological inhibition of Golgiphagy by HCQ preserved the Golgi structure, significantly reduced the ZIKV replication and transmission, and suppressed the ZIKV-induced inflammatory immune response. Golgiphagy inhibition in mice aggravated the ZIKV-induced ocular pathology.

Conclusion

Our study is the first to demonstrate the mechanistic insight by which ZIKV modulates the Golgi apparatus for its replication benefits and transmission. Golgiphagy modulation could offer a novel therapeutic avenue to treat or prevent ZIKV-induced ocular complications.

Impact of Cadmium and Lead on RCC Progression

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Introduction

Lead and cadmium are environmental contaminants that have become a major concern in society due to their potential to cause several health problems. Recently, it has been shown that both tissue and blood lead levels are elevated in renal cell carcinoma (RCC) and a meta-analysis indicates a link between cadmium exposure and RCC. Metal exposure can occur via smoking, ingestion, or occupational exposure. Kidney cancer is a major leading form of cancer with RCC being the most common type. Interestingly, men are twice as likely to develop RCC and having larger tumors than women. The pathways underlying this are unclear. The expression of the androgen receptor (AR) and estrogen receptors ERα and ERβ have been studied, but there is uncertainty as to their role in the sex differences associated with RCC.

Methods

To investigate the mechanism behind these sex differences, these studies assessed the impact of sub chronic lead challenge on Renca cells. Confluent Renca cells were treated with either lead or cadmium for several passages and cell proliferation and sex hormone receptor expression was measured. More recently, a 3-D model - slices of tumors grown in mice - were harvested and treated

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with either lead or cadmium to further investigate the impact of metal exposure on sex hormone receptor expression.

Results

Sub chronic exposure of Renca cells with cadmium or lead increases cell proliferation. Cadmium, but not lead, increased ERα gene expression.

Conclusion

Cadmium and lead can enhance RCC proliferation and may influence the expression of sex hormone receptors.

Co-mutations of CTNNB1 and PTEN Synergistically Promote EMT and Drive Aggressive Tumor Progression in Endometrial Cancer

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Introduction

Endometrioid endometrial cancer (EEC) is the most prevalent gynecological malignancy. While early-stage EEC typically carries a favorable prognosis, late-stage disease is associated with significantly poorer outcomes, with a five-year survival dropping to 17–19%. Although co-occurring mutations in PTEN and CTNNB1 (encoding β-catenin) are frequently observed and linked to poor prognosis, the tumorigenic consequences of these co-mutations remain poorly understood.

Methods

To investigate their functional impact, we generated uterine-specific *Pten* knockout ($Pgr^{cre/+}Pten^{f/f}$; $Pten^{d/d}$) and mouse harboring both *Pten* deletion with dominant stabilized β-catenin mutant mice ($Pgr^{cre/+}Pten^{f/f}Ctnnb1^{f(ex3)/+}$; $Pten^{d/d}Ctnnb1^{f(ex3)/+}$). First, the β-catenin activation was verified at 1-month of age of the double mutants by immunohistochemistry (IHC). The histopathological changes were observed at 1- and 3-months of age for both genotypes (n = 5/group). To understand the molecular changes, RNA-seq analysis was performed at 2 weeks of age of both groups (n = 4/group) and interactions were subsequently validated by IHC.

Results

The results revealed double-mutant mice had a significantly ($p < 0.05$) reduced survival rate compared to $Pten^{d/d}$ mice. Histopathological analysis revealed aggressive, metastatic endometrioid adenocarcinoma in $Pten^{d/d}Ctnnb1^{f(ex3)/+}$ mice by 3-months of age. Unlike the $Pten^{d/d}$ mice, the double mutant mice developed endometrial cancer with myometrial invasion by 1-month of age. Transcriptomic analysis identified activation of multiple oncogenic pathways, including WNT/catenin, basal cell carcinoma, sonic hedgehog signaling, and the epithelial-mesenchymal transition (EMT). IHC further confirmed hallmark features of EMT in the double-mutant uteri, including a significant ($p < 0.05$) upregulation of the EMT regulator SNAIL and downregulation of E-cadherin expression compared to $Pten^{d/d}$ mice. Together, these results demonstrate that PTEN and CTNNB1 co-mutations synergistically drive aggressive tumor progression through EMT, consistent with poor prognosis in EEC.

Conclusion

Our study highlights the distinct molecular and phenotypic consequences of these co-mutations and underscores their critical role in driving the pathogenesis of EEC.

Epigenomic Profiling by ATAC-Seq Uncovers Novel Motifs Linked to Corneal Fibrosis

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Introduction

Corneal fibrosis poses a significant burden, impacting vision and quality of life of millions globally. It is associated with significant dysregulation of wound healing cascade. Epigenetic regulators in corneal wound healing and fibrosis, that reprogram fibroblast activation to myofibroblasts, are less understood. In this study, we explored the epigenomic landscape in alkali-induced fibrosis in rabbit cornea to identify key fibrotic regulators.

Methods

An established in vivo alkali-injury rabbit model for corneal fibrosis was used. New Zealand white rabbits (n=3) were exposed to 0.5N NaOH for 30 sec, unexposed eyes served as naïve group (n=3). Clinical eye examination in live rabbits was done periodically, and corneal tissues were collected 14 days after injury. 50mg tissues were subjected to ATAC-sequencing to explore the role of chromatin remodeling in corneal fibrosis. Chromatin accessible regions (peaks) were identified by MACS2, and peaks were annotated relative to genomic features using ChIPseeker. HOMER identified known and de novo motif enriched in the two groups. Differentially accessible regions (DARs) were quantified with csaw and edgeR followed by pathway enrichment analysis using clusterProfiler.

Results

A total of 121,305 peaks were identified among naïve and fibrotic samples; promoter regions in fibrotic corneas showed distinct chromatin condensation (5%) compared to the naïve (15%). A total of 5,890 DARs (FDR<0.05) were identified, functional enrichment showed differential accessibility of genes involved in cell cycle, metabolism, stress response regulation. Sp1, KLF9, NFY, KLF4, and ETV4 were the key known fibrosis-related motifs identified along with 14 de novo motifs. The top de novo motifs showed high similarities to KLF17, NRF, and ETV6 ($p<1e^{-200}$) may serve as a potential fibrosis regulator.

Conclusion

The present study highlights the crucial role of epigenetics in corneal fibrosis identifying novel motifs regulating the differentiation of fibroblasts into myofibroblasts that may serve as potential target for managing corneal fibrosis.

Early Postnatal Estrogen Exposure Induces Hypospadias in Female Mice: Morphological and Molecular Insights

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Introduction

Hormone signaling plays a critical role in organ morphogenesis, with hormonal disruptions leading to birth defects. Hypospadias is a birth defect characterized by incomplete urethral closure and is mainly reported in males but is likely underreported in females due to lack of awareness. Female hypospadias causes recurrent urinary tract infections, dyspareunia and secondary infertility. The etiology of female hypospadias is largely unknown. Some studies identified that altered hormone signaling causes female hypospadias. In this study we investigate how early-life estradiol exposure influences female urethra closure in mice.

Methods

C57BL/6J female pups were administered daily subcutaneous injections of estradiol (8μg/gm body weight) from postnatal days (PND) 1 to 5. Control mice received vehicle control (ethanol in sesame oil). External genitalia were collected on PND 5, 15, 40 and processed for whole-mount imaging, immunofluorescence, and single-cell mRNA sequencing.

Results

Estradiol-treated pups developed severe hypospadias as early as PND5 and persisted through

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PND40. All estradiol-treated pups had urethras that opened into the vaginal canal, while control pups had separate urinary and vaginal canals. To better determine which genital cell populations were disrupted by estradiol treatment we investigated single cell mRNA data at PND5. Cell populations between the two treatment groups were mostly conserved, however one population was unique to treated group. Upon validation, the estradiol-specific population was part of the peri-urethral mesenchyme, with 5866 differentially expressed genes. The peri-urethra of estradiol-treated pups exhibited elevated expression of *Pgr*, immune-related genes (*Ccl7, Ccl11, Il6ra*), and retinoic acid metabolism (*Cyp26a1, Adh7*) while having lower gene expression in WNT signaling genes (*Wnt11, Apc2, Rspo2, Wnt2b*).

Conclusion

Our results indicate that early-life estradiol exposure derailed urethral morphogenesis in female mice, likely by altering peri-urethral mesenchyme differentiation and function. These findings improve our understanding of female urogenital malformations and how early hormonal disruptions cause birth defects.

Association Between Weight Loss Interventions and Patulous Eustachian Tube

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Introduction

Patulous Eustachian tube (PET) is a rare disorder involving the Eustachian tube's failure to close properly, leading to symptoms such as autophony, aural fullness, and tinnitus. While its exact cause is unclear, PET has been associated with weight loss. Given increasing obesity rates and popularity with the use of weight loss treatments, this study assessed the relationship between PET and bariatric surgery, GLP-1 receptor agonists (GLP-1RA), and phentermine.

Methods

This retrospective study used de-identified electronic health records from approximately 118.3 million patients in the TriNetX US Collaborative Network and was deemed non-human subjects research, with data curated on May 4, 2025. Patients ≥18 years with diagnoses of overweight or obesity (ICD-10 E66) and PET (ICD-10 H69.00–03) from 1/1/2006 to 12/31/2024 were identified. Demographics and comorbidities were extracted. Patients who underwent bariatric surgery, received GLP-1RA, or used phentermine were matched to untreated control groups. PET frequency was compared between each treatment group and its matched controls.

Results

A total of 1,321 patients with both obesity and PET were identified (mean age 53.0, 63.1% female, mean BMI 32.7 kg/m^2). Common comorbidities included GERD (47.6%), hyperlipidemia (41.1%), rhinitis (33.4%), type 2 diabetes (26.3%), and chronic sinusitis (23.8%). Abnormal weight loss was reported in 9.1%. Bariatric surgery was associated with increased PET risk (OR=2.30, 95% CI=1.50–3.53, p<.001). Phentermine use was also linked (OR=1.44, 95% CI=1.00–2.07, p=.046). No significant association was found with GLP-1RA (p=.11).

Conclusion

Bariatric surgery and phentermine were associated with higher PET risk, potentially due to rapid weight loss. Our study was first to show that GLP-1RA showed no significant association with the diagnosis of PET. Further studies are needed to explore causative mechanisms.

Rural – Urban Otolaryngology Workforce Analysis: The State of Missouri

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Introduction

Many studies have established a disparity in rural access to otolaryngologists (OTOs). We aim to investigate the distribution of OTO workforce in the state of Missouri and highlight possible disparities in access to OTO care between rural and urban areas.

Methods

We performed a cross-sectional study investigating the distribution of OTOs in Missouri. Counties were classified based on the 2023 National Center for Health Statistics (NCHS) Urban-Rural Classification Scale with I (most urban) to IV defined as urban and V to VI (most rural) defined as rural. The name and practice location of all registered OTOs in Missouri were collected using the American Academy of Otolaryngology website (ENTnet.org) and the 2022 Missouri licensure data provided by the Board of Healing Arts. These were confirmed by searching online directories of each hospital listed in MO Hospital Profiles By County database (Missouri Department of Health and Senior Services). OTOs with locations in multiple counties were included in each respective county during data analysis.

Results

We identified 209 unique licensed OTOs mostly centered in urban counties, some of which had secondary locations in other counties. Collectively, urban counties (NCHS levels I-IV) were served by 243 OTOs, and rural counties (NCHS levels V-VI) were served by 32 OTOs ($p < 0.001$). Per 100,000 population, urban counties averaged 2.8 OTOs versus 2.0 OTOs in rural counties ($p = 0.22$). The number of OTOs per 100 square miles was 3.4 in urban counties and 0.1 in rural counties ($p = 0.04$).

Conclusion

The OTO distribution in Missouri revealed a disparity between rural and urban counties. OTOs of Missouri are heavily concentrated in larger urban counties with a lack of OTOs in many rural counties. Addressing this issue will require an effort to investigate, standardize, and make available the many different factors affecting access to OTO care.

Motor Cortex Selective Neurodegeneration in Amyotrophic Lateral Sclerosis

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Introduction

Amyotrophic lateral sclerosis (ALS) targets motor neurons (MNs); some MNs deteriorate faster than others in ALS animal models. Whether the upper MNs are affected equally in patients is still unknown. We used a high-resolution anatomical image to investigate whether MNs in the primary (Brodmann area-BA4) and secondary (BA6) motor cortices have different susceptibility to neurodegeneration in ALS.

Methods

Five patients (mean±SD, 55.4±15.0 years old; two males; 39.1±32.9 months post-diagnosis; three on riluzole/radicava; mildly-to-moderately disabled, 37.2±7.3 on revised ALS Functional Rating Scale) and ten matched controls underwent high-resolution structural MRI (Siemens 3T Prisma). The thickness (mm) and the ratio between the volumes across hemispheres and the total intracranial volume (%) were measured in two BA4 cytoarchitecturally/neurochemically distinct regions (anterior-BA4a, posterior-BA4b) and BA6 (Freesurfer).

Results

Relative to controls, the thickness of BA4 was significantly decreased in patients (BA4a: 2.4±0.1mm vs. 2.6±0.2mm, $p=0.005$; BA4b: 2.2±0.1mm vs. 2.4±0.1mm, $p=0.04$); the BA4b thickness was related to the clinical severity ($p=0.04$), indicating greater neurodegeneration in those in more advanced stages of disease. No significant changes were found in BA6 thickness ($p=0.2$). Patients also exhibited significantly lower BA4a volume (0.19±0.01% vs. 0.21±0.01%, $p=0.04$) but no changes in BA4b ($p=0.2$) or BA6 ($p=0.8$) volumes. The BA4a volumes were related to ALS treatment ($p=0.03$), with larger volumes in those on riluzole/radicava vs. untreated ones.

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Conclusion

Our results suggested that MNs are more vulnerable in BA4 than those in BA6, with BA4b MNs modulating complex motor actions impacted by the disease severity and BA4a MNs modulating more automatic, unattended actions likely being protected by the treatment. If our future results with a larger sample size confirm these findings, they will deliver valuable clues about selective upper MNs degeneration in ALS. This would aid our understanding of the progression and symptom variability of this incurable disease, leading to the development of reliable ALS biomarkers.

Success and Sustainability of Peer Support Programs for Healthcare Workers: Review

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Introduction

Healthcare workers are frequently exposed to adverse and traumatic clinical events that can lead to significant emotional distress. Peer Support Programs have emerged as effective interventions that promote and enhance well-being and contribute to the protection of patient outcomes.

Methods

A narrative review was conducted to identify factors that enhance and hinder the sustainability of peer support programs in healthcare organizations. The databases CINAHL, PubMed, and PsycINFO were searched to locate articles that reported outcomes of peer support programs and discussed facilitators or barriers to success and sustainability.

Results

Limited resources, inconsistent leadership support, and the absence of formal program evaluation were found to undermine the sustainability of peer support programs. Key barriers to success and sustainability included a lack of protected time for peer support roles and persistent stigma and confidentiality issues that hindered participation. Some programs operate without consistent funding or meaningful integration into the organization's broader wellness and support strategies, which also limits their sustainability.

Conclusion

The findings of this review highlight the need for greater transparency in program outcomes, shared learning, and rigorous evaluation of peer support programs, including the systematic use of cost-benefit analyses and validated measures of individual well-being and program effectiveness.

Improving Pneumococcal Immunization Rates in Patients with COPD

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Introduction

By June 2026, a group of Family Medicine Residents plan to increase the number of patients diagnosed with COPD who are immunized with conjugated pneumococcal immunizations (PCV20/PCV21). Improving rate of immunization is an evidenced based and cost-effective way to reduce morbidity and mortality of patients with COPD who are at increased risk of intrapulmonary infections and associated complications (hospitalizations, hypoxia, death).

Methods

Using the HealtheRegistries in Power Chart, we identified that only 30% of COPD at South Providence Family Medicine were up to date on pneumococcal immunization. We will increase rates of immunization by creating a detailed but concise EMR Power Chart message or patient letter reminding them why they are being contacted, the evidence to support immunization, and steps they can take to get the updated immunization. We will then re-evaluate the data

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Results

Data collection is currently ongoing, we anticipate revisiting the registries in the spring of 2026 to determine the impact of our intervention. Preliminary data is anticipated to be available in November 2025 with plans to complete additional plan, do, study, act (PDSA) cycles.

Conclusion

Although data collections remain ongoing, by June 2026 we plan to increase the number of patients diagnosed with COPD who are immunized with conjugated pneumococcal immunizations (PCV20/PCV21) with a goal of at least 5% improvement rate.

Cost Analysis for Blood Glucose Monitoring in Pre-Term Infants

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Introduction

Studies have shown pre-term infants are at increased risk for hypoglycemia and hyperglycemia, necessitating frequent blood glucose monitoring. While clinically important, excessive checks increase hospital costs, patient charges, staff workload, and unnecessary blood draws. To address this, a unit-specific policy was developed to standardize glucose monitoring. This study evaluates cost reduction before and after implementation.

Methods

A retrospective electronic chart analysis was conducted on 100 otherwise healthy preterm infants born at 34 weeks or greater gestation and admitted to the NICU Children's Hospital and Birthing Center at UMHC. Infants were excluded if they were <34 weeks' gestation, had comorbidities, or were not receiving at least 150 mg/kg/day of enteral feeds after 48 hours of life. Patients included in the pre-intervention data were admitted on or before the policy implementation time of December 2024. Post-intervention data was collected on patients admitted on or after January 2025.

Results

Each glucose estimation costs the hospital $7.56–$10.59, with an additional $36.25 charged to patients. Following policy implementation, the average glucose testing cost per patient decreased by 5.22–5.26% in the low-risk group depending on nursing pay rates. In high-risk patients, reductions were more pronounced, with up to a 45.35% decrease in costs at maximum nursing pay rates. Additional benefits included fewer blood draws, lower patient charges, and reduced staff workload.

Conclusion

A standardized glucose monitoring policy significantly decreased costs for both the hospital and patients while reducing invasive blood draws and staff demands. Continued adherence to this policy is recommended to sustain improvements in quality, efficiency, and patient care.

Middle Ear Rhabdomyosarcoma Masquerading as Petrous Apicitis: A Case Report

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Introduction

Rhabdomyosarcoma (RMS) is a malignant soft tissue tumor comprising 4.5% of childhood cancers, with the middle ear subsite representing only ~1% of RMS cases. Early diagnosis is essential, as survival and treatment depend on diagnosis and staging. We report a case of middle ear RMS initially presenting as presumed petrous apicitis.

Methods

An 8-year-old previously healthy girl presented with one month of pharyngitis, otalgia, and headache unresponsive to oral antibiotics, followed

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by two weeks of ocular asymmetry. Examination revealed a dull bulging right tympanic membrane, right abducens nerve palsy, and subjective V2/V3 numbness. CT of the temporal bones was concerning for right coalescent otomastoiditis with petrous apex involvement, and MRI revealed right petrous region/carotid canal phlegmonous tissue extending into the cavernous sinus, nasopharynx, and parapharyngeal spaces. Intraoperative myringotomy revealed a white lesion with initial biopsies inconclusive. She subsequently progressively developed House-Brackmann grade 3/6 right facial weakness and anisocoria.

Results

Middle ear exploration with complete mastoidectomy identified a mass extending from the cochlear promontory toward the protympanum and eustachian tube, with no obvious osseous erosion and a healthy appearing mastoid cavity. Biopsies pathologically confirmed embryonal subtype RMS subsequently staged as II/III, Clinical Group III (resection with residual disease), intermediate risk group. ARST1431 protocol chemotherapy (Vincristine, Dactinomycin, Cyclophosphamide alternating with Vincristine/Irinotecan) was started. Restaging PET-CT showed near-complete response with no avid disease. Definitive treatment with proton therapy was completed (50.4 Gy in 28 fractions), with maintenance Vinorelbine and Cyclophosphamide planned following completion of induction therapy.

Conclusion

Middle ear RMS is exceedingly rare and can mimic petrous apicitis or complicated middle ear infection. High suspicion and timely biopsy are critical for appropriate diagnosis and to optimize outcomes.

Improving Pneumococcal Vaccination at Callaway Physicians Family Medicine Clinic

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Introduction

Streptococcus pneumoniae causes substantial disease and death nationwide related to respiratory infections, bacteremia, & meningitis. ACIP recommends a single pneumococcal conjugate vaccine (PCV) dose for all adults 50 years or older, and for children and adults up to age 49 with specified risk conditions. Coverage remains suboptimal nationally per NHIS. Aim: by 2026-03-31 increase the immunization percentage of eligible patients from 14% to 19%.

Methods

Inclusion criteria included eligible adults & adolescents ages 6 to 50 with specified risk conditions such as chronic kidney or liver disease, moderate to severe persistent asthma, COPD or chronic lung disease, diabetes, cochlear implantation, immunodeficiency. Exclusions: documented severe allergy, hospice or comfort care, transfer out, refusal within prior 6 months. Education to include role-based training provided to clinic staff. Resident and Attending physicians will be provided with ACIP updates and brief counseling script. Nurses and CMAs to be provided with an eligibility algorithm to assess eligibility and vaccinate per protocol, which has strong evidence to increase adult vaccination. This will augment pre-visit planning to add pneumococcal eligibility to chart prep. Implement documentation tools including smart phrases for counseling, contraindications, refusal reasons for providers.

Results

Preliminary data to be available November 2025 with final data available Spring 2026 with 1 PDSA cycle completed by Spring 2026.

Conclusion

This project aims to improve PCV vaccination rates at Callaway Physicians in qualifying patients by 5% by March 2026, with 1 PDSA cycle completed by Spring 2026.

The Effect of Offering Colon Cancer Screening Options on the Number of Patients Over 45 That

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Complete Screening

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Introduction

Colon cancer screening is an important tool for early detection of colon cancer. It is increasingly important as colon cancer becomes more prevalent at younger ages. Despite the importance, we noticed that adherence rates for colon cancer screening at Compass Health (a federal FQHC in Columbia MO) were low. Data pulled from the quality metric data at Compass as of January 2025 showed a colon cancer screening rate ranging from 35-46% with our personal patient panels of patients ages 45-75. Based on CDC reports, increasing colon cancer screening to 80% can reduce the total number of people diagnosed with colon cancer by 22% and deaths from colon cancer by 33%. Our goal was to increase the percentage of patients older than 45 who complete colon cancer screening by 10% by October 2025 through offering FIT vs cologuard vs colonoscopy and providing instructions on how to complete each test to increase adherence.

Methods

We will address each patient who is due to colon cancer screening on each visit and help to provide detailed instructions on how to complete screening and the different options available for screening. At the end of October 2025, we will compare the quality metric data from January to October.

Results

Data collection is currently ongoing with plans to finish data collection at the end of October 2025. Planned data collection is going to include total prevalence of screening based on patient panel quality metric data with plans to identify potential barriers to screening throughout the process.

Conclusion

Colon Cancer screening is an important tool to reduce the risk and death rates of colon cancer. Improving adherence is vital to improving outcomes and ascertaining if offering different types of screening methods while offering instructions on how to complete screening in the exam room increases adherence rate.

Improving Annual Albumin-Creatinine Ratio Screening in CKD Patients at a Family Medicine Residency Clinic

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Introduction

Albuminuria is a strong predictor of chronic kidney disease (CKD) progression, cardiovascular disease, and mortality, and it is required by KDIGO criteria to classify CKD. Despite this, rates of annual albumin-creatinine ratio (ACR) screening remain low. Additionally, protein-creatinine ratio (PCR) is sometimes incorrectly used as a screening metric instead of ACR. This quality improvement (QI) project aims to increase the percentage of CKD patients receiving recommended annual ACR screening in a family medicine residency clinic.

Methods

We used Health eRegistries, a function of PowerChart, to gather data on patients from the SPMB Blue Team. Inclusion criteria was age greater than 18 and CKD. Exclusion criteria was ESRD and age less than 18. Eligible patients were assessed for ACR or protein-creatinine ratio (PCR) testing in the previous 12 months. Our intervention consists of an educational handout summarizing guideline recommendations and emphasizing the importance of annual ACR screening for patients with CKD. Handouts will be distributed by email to all resident physicians at the SPMB Blue Team. We plan to monitor rates of ACR screening one month following the distribution of handouts to clinic resident physicians.

Results

Of 424 patients labeled with CKD, 12 with ESRD were excluded, leaving 412 eligible patients.

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Among these, 137 (33.3%) had ACR testing in the past year, 16 (3.9%) had PCR only, and 259 (62.9%) had neither test. Thus, only one in three CKD patients currently meet guideline-based annual ACR screening. This identifies a significant opportunity for improvement. Data collection is currently ongoing and will be completed in a term of 12 weeks.

Conclusion

Data collection is currently ongoing. The goal of this quality improvement (QI) project is to improve the outcomes of CKD patients by monitoring the progression of diabetic nephropathy and identifying points for early intervention. By Spring 2026 we plan to have one PDSA cycle completed.

Tracking Day-to-Day ALS Progression Between Clinic Visits Using In-Home Sensor Monitoring

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Introduction

Routine ALSFRS-R assessments in clinics are typically performed every few months and may overlook daily changes in ALS progression. With the increasing availability of in-home monitoring technologies, there is potential to generate more frequent data that could enhance disease tracking and early detection of changes in functional status. We evaluated semi-supervised machine learning (ML) approaches to predict daily ALSFRS-R component scores using in-home sensor data. We compared batch learning, transfer learning, and incremental transfer learning models to assess their ability to capture ALS progression trends at the individual level.

Methods

This case series included three ALS participants who completed regular in-clinic ALSFRS-R assessments alongside continuous in-home sensor monitoring. XGBoost regression models were trained for each ALSFRS-R component using iterative feature selection and hyperparameter tuning. Pseudo-labels for daily ALSFRS-R scores were generated using linear and cubic interpolation methods, as well as with a self-attention transformer network. Mean Squared Error (RMSE), correlation (r), and prediction variability (SD) were computed within participants and learning approaches.

Results

Individual batch learning models showed reduced day-to-day prediction variability and higher correlation to estimated ALSFRS-R composite scores compared to transfer learning approaches. Incremental transfer models improved RMSE for respiratory and fine motor domains across all interpolation types. Batch learning models with self-attention estimates outperformed others for swallowing and turning components. Non-linear interpolation improved prediction accuracy and correlation versus linear methods, indicating day-to-day functional changes are better captured with non-linear trends.

Conclusion

Preliminary findings suggest functional changes in ALS may be highly individual and vary by domain. Individual-level models, especially those using self-attention estimates and non-linear interpolation, appear promising for detecting subtle day-to-day changes from in-home sensor data. These results support the development of personalized ML approaches for continuous ALS monitoring beyond clinic visits.

Improving Pneumococcal Vaccination Rates

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Introduction

Pneumoccocal disease is often caused by a

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bacteria called Streptococcus pneumoniae and can lead to serious infections such as pneumonia, meningitis, and bacteremia. All of these can be life-threatening illnesses, particularly in vulnerable populations such as children, older adults, and immunosuppressed individuals. Pneumococcal vaccinations play a crucial role in preventing these life-threatening infections. By significantly lowering the incidence of invasive pneumococcal disease and complications, vaccination helps reduce hospitalizations, long-term health complications, and healthcare costs.

Methods

Data will be collected from Powerchart EHR registeries for clinical providers at Fayette Medical Clinic in Fayette, MO. A handout of simplified updated clinical pneuomoccal vaccination guidelines for 2025 will be created and distributed amongst clinical providers to improve pneumococcal vaccination rates. Handout will include information regarding current 2025 pneuomoccal vaccine guidelines for age related screenings, listing of risk factors for early age <65 years old pneumococcal vaccinations, and recommended vaccinations for patient's at higher risk >65 years old.

Results

Data collection is ongoing over the next several months, with plans to finish the first PSDA cycle of the project in Spring 2026. Preliminary data will be available in November 2025.

Conclusion

Vaccination for pneumococcal disease is an important aspect of preventative medicine in primary care. Interventions to help providers be more effective at vaccinating eligible patients may have important impacts on patient health.

Dual-Species Ehrlichiosis Triggering Hemophagocytic Lymphohistiocytosis in an Adolescent with Inflammatory Bowel Disease on Immunomodulation

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Introduction

Hemophagocytic lymphohistiocytosis (HLH) is a rare, life-threatening syndrome characterized by hyperinflammation. Primary HLH occurs in childhood due to genetic defects in immune regulation, whereas secondary HLH is triggered by infections, rheumatologic disease, or malignancy at any age. Patients present with nonspecific findings such as fever, cytopenias, hepatosplenomegaly, and elevated inflammatory markers. In the Midwestern United States, tick-borne diseases, Ehrlichiosis and Rocky Mountain Spotted Fever are recognized infectious triggers.

Methods

We describe the clinical presentation of secondary HLH in an immunocompromised adolescent triggered by co-infection with two bacterial species, *E chaffeensis* and *E ewingii*, treated in our health system.

Results

A 17-year-old female with ulcerative colitis and juvenile arthritis in remission on infliximab presented with one week of fever, myalgia, back pain, headache, sore throat, nausea, and vomiting. She reported a tick bite five weeks earlier in Arkansas and outdoor exposure in Missouri two weeks prior to symptom onset. Upon arrival, she was in septic shock and admitted to the intensive care unit. Laboratory evaluation revealed leukopenia, thrombocytopenia, hyponatremia, elevated transaminases, and marked hyperferritinemia (20,830 ng/mL; normal 15-200 ng/mL), consistent with HLH.

Empiric antibiotics vancomycin, cefepime, and doxycycline for suspected endemic tick-borne infections were started along with corticosteroids to treat hyperinflammation. Whole-blood PCR confirmed *E. chaffeensis* and *E. ewingii*, establishing diagnosis of dual-species Ehrlichiosis. Having improved, she was discharged a week later, on doxycycline and steroid taper. Two days later, patient was readmitted for dehydration. Repeat PCR was positive at low-level for *E. chaffeensis*. She

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eventually completed 17-days of doxycycline with complete recovery.

Conclusion

Ehrichiosis triggering secondary HLH should be suspected in the US Mid-West in patients presenting with hyperferritinemia and cytopenias. In this immunocompromised patient, infection was the trigger rather than underlying rheumatologic disease. This case represents, to our knowledge, the first report of dual-species Ehrlichiosis causing secondary HLH.

Gaps in Laceration Care and Antibiotic Use in Orthopedic Consults: A Quality Improvement Study

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Introduction

Traumatic lacerations around large and medium joints require meticulous irrigation and debridement (I&D) to prevent complications, with antibiotic prophylaxis being controversial. Inconsistent I&D documentation and variable antibiotic use in patients consulted by orthopedics may compromise outcomes. This quality improvement project aimed to identify gaps in care to inform standardized protocols, with plans to expand to all ED-treated lacerations.

Methods

A retrospective review of 20 patients with lacerations consulted by orthopaedics in the ED from July 2024 to August 2025 was conducted. Data included laceration characteristics (location, size), I&D details (saline volume, closure/suture type), risk factors (e.g., smoking, comorbidities), antibiotic use (type, dose, duration), and 2-week follow-up outcomes. Gaps were defined as missing saline volume documentation or vague terms (e.g., "copious amounts").

Results

Lacerations primarily involved the knee (30%), elbow (25%), and leg/ankle (20%), ranging from 0.5 to 12 cm. All patients underwent I&D, but 25% (5/20) lacked proper saline volume documentation, including two noting "copious amounts." Antibiotic prophylaxis occurred in 95% of cases, with Ancef (1–2g IV/IM) universal and oral antibiotics (e.g., Bactrim, Cephalexin) prescribed for 7–14 days in 65%. Risk factors included smoking (40%) and chainsaw injuries (15%). Follow-up occurred in 55% of cases; complications included purulent drainage (1 case) and prolonged healing (1 case).

Conclusion

Inadequate I&D documentation and routine antibiotic prophylaxis highlight care gaps. A PDSA cycle will address these. Plan: standardized I&D templates and antibiotic guidelines; Do: a 3-month ED pilot; Study: documentation completeness and antibiotic appropriateness; Act: refine and scale protocols to all ED lacerations to enhance care quality and reduce complications.

The Role of Treatment Recall in Predicting Outcomes Among Veterans with AUD and Insomnia

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Introduction

Insomnia is present in alcohol use disorder (AUD) at rates up to 91%. Among those with insomnia, improvements in sleep have been linked to improvement in memory, and recall of treatment concepts has been linked to better treatment outcomes. However, studies to date have not tested these associations in samples with substance use disorders. This study tested the hypothesis that those who remembered more about sleep and alcohol treatment would demonstrate lower rates of insomnia and alcohol use, respectively, at follow-up.

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Methods

Veterans with insomnia receiving treatment for AUD (*N*=50; 92% male; 84% White) were randomly assigned to Cognitive Behavioral Therapy for Insomnia (CBT-I; *n*=27) or sleep hygiene control (*n*=23). Memory of treatment was assessed at baseline and post-treatment using 10-item "quizzes" of AUD and insomnia treatment concepts, generated by the providers of each treatment. Sample items included, "*What I think impacts how I feel*," and, "*You should not take naps after 3pm*," with response options of true, false, or unsure (coded as incorrect). Responses were scored to indicate percent correct (0-100%). T-tests were used to compare those who did/did not drink and did/did screen positive for insomnia.

Results

Participants who did and did not drink at follow-up did not differ at post-treatment on alcohol [both 74%; $t(47)=0.05$, $p=.961$] or sleep quiz scores [66% vs 67%; $t(47)=0.14$, $p=.890$].Those who no longer screened positive for insomnia at follow-up achieved higher scores on the alcohol quiz [80% vs 71% correct; $t(40)=2.361$, $p=0.012$] and marginally higher scores on the sleep quiz [74% vs 64% correct; $t(40)=1.639$, $p=0.055$].

Conclusion

Memory of treatment concepts was not associated with return to alcohol use. However, those who maintained improvements in insomnia at follow-up reported better memory for core treatment concepts at the end of treatment.

Late Extrusion of Silastic Implant after Type I Laryngoplasty: A Case Report

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Introduction

Implant extrusion is a rare complication of Type I laryngoplasty, typically occurring within the first few months postoperatively. Extrusion of Silastic implants, in particular, is seldom reported. We present an unusual case of delayed Silastic implant extrusion three years after laryngoplasty.

Methods

A 48-year-old woman with a 30+ pack year smoking history and multiple thyroid surgeries for goiter developed left vocal fold paralysis due to recurrent laryngeal nerve injury. She subsequently underwent a Type I laryngoplasty with a Silastic implant under local anesthesia. Three years later, she presented with progressive voice changes and was still smoking significantly at that time. Laryngoscopic examination revealed a large polypoid mass in the posterior left true vocal fold and fullness of the false vocal fold. Cross-sectional imaging demonstrated implant migration with thinning of the overlying mucosa.

Results

One month later, the patient experienced a sudden twinge of pain while speaking on the phone, followed by coughing up a small plastic-like object, confirmed to be the extruded Silastic implant. Laryngoscopy at that time demonstrated a persistent left true vocal fold paralysis and a polypoid lesion on the left false vocal fold. Operative direct laryngoscopy with excisional biopsy of this lesion revealed the lesion to be moderate dysplastic with reactive atypia. Office and operative laryngoscopy images, along with photographs of the extruded implant, are included.

Conclusion

We report a rare case of delayed Silastic extrusion after Type I laryngoplasty. Although uncommon and rarely reported, implant extrusion should remain a consideration in long-term follow-up of laryngoplasty patients with Silastic implants.

Fostering Interdisciplinary Cancer Research Education: Collaboration Networks and Productivity Analysis from an Inaugural Research Day

Okunsogie Jessica Osaze[1], Robin Dianic[1,2], Zaw Htet

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Introduction

The inaugural 2023 Ellis Fischel Cancer Center (EFCC) Research Day was a platform to showcase institutional cancer research and foster collaboration. Understanding the distribution of research activity across EFCC's four thematic program areas and the extent of interdisciplinary engagement is important for assessing the event's impact and guiding future initiatives.

Methods

We analyzed all 78 abstracts presented at EFCC Research Day 2023. Abstracts were categorized by program affiliation: Cancer Prevention, Control, Outreach & Engagement (CPCOE), Theranostics & Molecular Imaging (TMI), Immunomodulation & Regenerative Medicine (IRM), and Comparative Oncology & Translational Medicine (COTM). We quantified program contributions, co-authorship patterns, cross-programmatic collaborations, and early career researcher participation. We also identified subsequent peer-reviewed publications to assess research progression.

Results

Program contributions included 13 CPCOE, 26 TMI, 28 IRM, and 11 COTM abstracts. Collaborative authorship was evident, with an average of five co-authors per abstract, frequently spanning departments and occasionally institutions. Thematic overlaps emerged, such as immunotherapy studies bridging IRM and COTM, while programs also maintained unique foci. Early career researchers were prominently represented, contributing substantially to abstracts across all programs. Nine of the 78 studies (11.5%) subsequently advanced to peer-reviewed publications, emphasizing the translational trajectory of presented work.

Conclusion

The EFCC Research Day fostered a collaborative and interdisciplinary research environment, engaging investigators at multiple career stages. The event highlighted both programmatic strengths and opportunities for integration and advancing research across prevention, imaging, immunology, and translational oncology. Monitoring outcomes such as subsequent publications and new collaborations can help refine strategic planning, enhance mentorship, and accelerate the translation of cancer research into improved prevention, treatment, and survivorship outcomes in Missouri and beyond.

Practices and Perceptions of Alcohol Screening Among Orthopaedic Clinicians Treating Older Adults

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Introduction

Alcohol misuse is associated with higher rates of complications, prolonged hospital stays, and increased mortality following elective orthopaedic procedures; however, screening for alcohol misuse, especially in older adults (≥65 years), is rarely performed. The goal of this study was to understand incidence and barriers to screening for alcohol misuse in orthopaedic patient populations, with an emphasis on older adults.

Methods

To understand current incidence, medical records were reviewed for patients flagged as "at-risk" for alcohol misuse on intake forms, and notes were reviewed to determine if an orthopaedic team member discussed alcohol use with the flagged patient. To understand current perceptions of screening and feasibility, a survey was administered to the clinical team members at the Missouri Orthopaedic Institute to assess current screening practices, familiarity with validated tools, perceptions of responsibility, and barriers and facilitators to screening implementation.

Results

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Survey responses indicated the healthcare team agreed alcohol use affects orthopaedic outcomes (98.6%) and screening should occur (72%), and 60% of team members reported routine screening. However, of the 719 (17.8%) patients flagged for AUD, only 80 patients (11.1%) had documented conversations about the risks associated with AUD and their orthopaedic care.

Confidence and motivation to initiate screening varied, and knowledge of validated geriatric-specific tools was limited. Reported barriers included time constraints, uncertainty about whose responsibility screening should be, and lack of training in how to respond to positive screens. Participants identified clinician and patient education, workflow integration, and clear role delineation as critical supports.

Conclusion

Despite the incidence of alcohol use reported in older adults, routine implementation of screening and discussion remains inconsistent in orthopaedic settings. Addressing clinician training needs, clarifying team roles, and integrating validated screening tools into clinical workflows may increase feasibility and uptake to improve identification and management of alcohol use among older orthopaedic patients.

Successful Utilization of Laser Sheath Photoablation in the Removal of Permanent Greenfield IVC Filters: A Case Series

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Introduction

The indication for inferior vena cava (IVC) filter placement is to prevent the development of a potentially fatal pulmonary embolism (PE) in patients with venous thromboembolism (VTE) who have a contraindication to, or have failed anticoagulant therapy. There are two categories of IVC filters, permanent and retrievable. Permanent IVC filters lack an inherent retrieval mechanism as part of their design.

Unretrieved and permanent IVC filters alike have many well-known long-term complications including increased risk of lower extremity deep vein thrombosis (DVT), IVC thrombus/occlusion and strut penetration beyond the caval walls.

Despite their permanent classification, there are reports of successful permanent IVC filter removal using advanced endovascular techniques including laser sheath photoablation.

Methods

We conducted a retrospective case series of three patients who underwent removal of permanent Greenfield IVC filters using laser-sheath photoablation at our institution. The cases were identified and data was collected from electronic medical records, imaging archives and direct patient encounters.

Inclusion criteria included:

1) Presence of a permanent Greenfield IVC filter
2) Documented clinical indication for filter removal
3) Technical feasibility of retrieval based on pre-procedural imaging

Variables collected included patient comorbidities, indications for initial placement and removal, filter dwell time and preoperative image findings.

Results

Three patients (2 female, 1 male; mean age 58 years) underwent removal of permanent Greenfield IVC filters using photoablation (mean filter dwell time of 16 years). Laser-sheath photoablation assisted retrieval was successful in all three cases. No cases of post-procedural recurrent thromboembolic events, vessel rupture/delayed vessel injury or need for re-intervention were noted. Post-procedural imaging demonstrated intact caval patency in all cases.

Conclusion

The utilization of laser-sheath photoablation is a safe and efficacious method for the removal of permanent Greenfield IVC filters, despite classic literature suggesting they cannot be removed.

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A Case of Adult-onset Inherited Bone Marrow Failure Syndrome with a Germline MPL Mutation

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Introduction

A 33-year-old male presented with recent onset of fatigue, easy bruising and petechiae. On further work up, his labs showed pancytopenia. He has no significant past medical history but family history notable for leukemia and laryngeal cancer. A bone marrow biopsy was performed to rule out acute leukemia.

Methods

A peripheral blood smear, bone marrow biopsy, flow cytometry, cytogenetics and next-generation sequencing (NGS) were performed. The biopsy showed a markedly hypocellular marrow (<5% for patient's age) with trilineage hypoplasia. CD34 immunohistochemistry revealed no increase in blasts (~1%). Flow cytometry detected no abnormal cell population. Cytogenetics demonstrated a normal male karyotype. NGS identified an alteration in MPL gene (NM_005373.2:c.305G>C, p.R102P) with 49.3% variant allele frequency (VAF).

Results

Given the pancytopenia, marrow with aplastic anemia-like picture (with marked hypocellularity at ~5%) and NGS with alteration in MPL geneC.305G>C (pR102P) at~49.3% VAF, the findings are most compatible with a germline alteration indicating an inherited bone marrow failure syndrome such as congenital amegakaryocytic thrombocytopenia (CAMT type 2).

Conclusion

CAMT is a rare autosomal recessive disorder characterized by severe thrombocytopenia presenting in infancy and progressing to pancytopenia and bone marrow failure in childhood. It is caused by mutations in MPL, the gene encoding the thrombopoietin receptor. Unlike the activating MPL mutations seen in myeloproliferative neoplasms, CAMT mutations result in reduced or absent thrombopoietin receptor signaling. CAMT type 1, caused by loss-of-function mutations, presents with severe thrombocytopenia and early pancytopenia, while CAMT type 2, due to missense mutations like the common c.305G>C, shows a milder course with delayed pancytopenia. This case highlights that inherited bone marrow failure syndromes considered pediatric can manifest in adulthood with delayed onset. Accurate diagnosis requires integrating clinical presentation, morphology, and molecular data. Further assessment, including plasma thrombopoietin levels and genetic counseling, is recommended.

Diagnostic Enhancement in Indeterminate Thyroid Nodules Through Multimodal Integration

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Introduction

Indeterminate thyroid nodules, particularly those classified as Atypia of Undetermined Significance/Follicular Lesion of Undetermined Significance (AUS/FLUS) or Follicular Neoplasm (FN), remain diagnostically challenging. While BSRTC cytology, ACR TIRADS imaging, and molecular testing each contribute to risk stratification, their combined utility in predicting risk of malignancy (ROM) has not been fully validated.

Methods

We retrospectively reviewed 87 thyroid FNA cases (75 AUS/FLUS and 12 FN) between 2018 and 2022. TIRADS classifications (TR4/TR5) and gene mutation results (ThyGeNEXT® panel) were correlated with BSRTC categories. ROM was calculated based on final surgical pathology. Combinations analyzed included: BSRTC alone, BSRTC + TIRADS, BSRTC + gene mutations, and BSRTC + both modalities.

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Results

As shown in Table 1 and Figure 1, for AUS/FLUS, BSRTC alone yielded a ROM of 29.3% (22/75), aligning with published rates of 13-30%. ROM increased to 46.7% (7/15) with TR4 and 60.0% (6/10) with TR5. With gene mutations, ROM reached 58.6% (17/29). Combining BSRTC + TR4 + gene mutations raised ROM to 62.5% (5/8), and BSRTC + TR5 + gene mutations resulted in 100% ROM (5/5).

In the FN group (n=12), BSRTC alone produced a ROM of 50.0% (6/12). Combinations involving TR4 (1/1), TR5 (2/2), or gene mutations (4/4) all yielded 100% ROM. Full integration of BSRTC + TR4 + gene mutation also resulted in 100% ROM (1/1). However, these FN subgroup analyses were based on small numbers (1-4 cases per combination), and results should be interpreted with caution.

Conclusion

Multimodal integration of cytology, imaging, and molecular testing improves malignancy risk prediction in indeterminate thyroid nodules. In AUS/FLUS cases, ROM increased with each added modality, reaching 100% with full integration. Similar trends were seen in FN cases, though limited by small sample size. These findings support a tiered diagnostic approach to guide surgical decisions and avoid unnecessary procedures.

Hidden No More: Two Decades of Empirical Evidence on Health-Data Re-identification and the Technologies That Tame It

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Introduction

Health data de-identification is a necessity that allows research efforts, but the risk of re-identification has been on the rise. "De-identified" health data can often be traced back to the people they describe. Reported re-identification risk varies widely because it depends on data type, granularity, release context, and the sophistication of the method.

Methods

We conducted a comprehensive systematic review and screened 896 identified papers for eligibility. We eventually included 34 primary studies published between 2003 and 2024 that (a) executed or simulated a concrete re-identification attack on real-world medical data and (b) reported a measurable success rate or uniqueness proportion.

Results

Across the included studies, four cross-cutting themes emerged: (1) Context matters – risk estimates assuming a worst-case omniscient attacker overstate danger for many real deployments, yet genomics, rare-disease, image, and speech data remain highly vulnerable to re-identification. (2) Granularity dominates – fine-grained dates, postcodes, or full laboratory panels drive uniqueness; coarser generalization can drop risk by one to two orders of magnitude. (3) Modern linkages – multistage linkage, social-media mining, and deep-learning face/speaker recognition create new risks that legacy standards (e.g., HIPAA Limited Dataset) do not anticipate. (4) No single silver bullet – reversible encryption, balanced Bloom filters, synthetic data generation, and clinically aware perturbation each suppress risk to ≤5 % in their target domain, but must be paired with continuous risk audits.

Conclusion

Re-identification risk is neither negligible nor uniform. Classical de-identification can still deliver legally acceptable protection for many tabular EHR datasets, yet high-dimensional genomics, imaging, and speech data require stronger, context-specific defenses. Future policy should mandate explicit adversarial modelling, quantitative risk estimation, and layered technical controls, combining granular generalization, modern linkage-resistant transforms, and privacy-enhanced synthetic data, to balance patient privacy with the growing imperative to share health data for scientific progress.

Assessment of OAd Encoding

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CD137 (4-1BB) Agonist in Murine TNBC Models

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Introduction

Triple-negative breast cancer (TNBC) has no broadly useful receptor targets; and its varied biology, plus an immunosuppressive tumor microenvironment (TME), make responses to immunotherapy inconsistent. Oncolytic adenoviruses (OAds) can kill tumor cells and also carry immune-stimulating signals into tumors. CD137 (4-1BB) costimulation boosts the function and survival of activated CD8+ T cells. Because the natural 4-1BB ligand is embedded in cell membranes, we used a soluble engineered agonist (SA-4-1BBL) and encoded it in an OAd (OAdSA-4-1BBL). We aim to test this virus in TNBC models looking at infection, cell killing, cell-death markers, and tumor burden by bioluminescence imaging (BLI).

Methods

TNBC cell lines (4T1, E0771, AT3) were infected with OAdSA-4-1BBL or controls (OAdSA, OAd-mCherry [replication-competent], AdGFP [non-replicating]) at MOIs 0–200. We measured cell viability at 72 h (alamarBlue), tracked infection by fluorescence, and checked LC3-II and cleaved caspase-3 by immunoblot at 48 h. In vivo, orthotopic 4T1/Luc2 tumors in BALB/c mice received intratumoral PBS or OAdSA-4-1BBL (1×10^8 IFU in 50 µL) on days 0, 3, and 6; n=4 per arm (N=8). Tumor burden (to day 19) and organs ex vivo were assessed by BLI.

Results

Replication-competent OAds caused dose-dependent loss of tumor cell viability; OAdSA-4-1BBL reduced viability across cell lines. Fluorescence showed MOI-dependent infection progression (OAd-mCherry > AdGFP). In 4T1 and E0771, blots showed more LC3-II and detectable cleaved caspase-3 at MOI 100. In mice, OAdSA-4-1BBL led to lower tumor signal over 19 days and less lung signal ex vivo compared to PBS.

Conclusion

A CD137-agonist OAd kills TNBC cells, triggers cell-death markers, and reduces tumor BLI signals in vivo. These findings support larger, powered studies with dose optimization and immune profiling.

Gut Metabolite Urolithin A Attenuates Pyroptosis and Kidney Injury in a Swine Model of Fecal Peritonitis

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Introduction

Fecal peritonitis (FP) is a life-threatening condition that often precipitates sepsis. Sepsis-induced acute kidney injury (AKI) remains a leading cause of morbidity and mortality in critically ill patients, yet effective treatments are lacking. Pyroptosis—a proinflammatory form of programmed cell death driven by NLRP3 inflammasome activation—has emerged as a key contributor to septic kidney dysfunction. Urolithin A (UA), a gut microbiota-derived metabolite, exhibits anti-inflammatory and cytoprotective properties; however, its efficacy in septic AKI is unknown. This study evaluated the therapeutic potential of UA in a clinically relevant swine model of FP-induced sepsis and examined its effects on pyroptosis.

Methods

Six- to eight-week-old pigs were randomized to receive vehicle or UA following sepsis induction via intraperitoneal instillation of autologous fecal slurry under general anesthesia. After 24 hours of recovery, animals were re-anesthetized and

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mechanically ventilated for an assessment of systemic and renal function, including mean arterial pressure (MAP), cardiac output (CO), renal blood flow, renal vascular resistance, and transdermal glomerular filtration rate (GFR). Biochemical markers of kidney injury were analyzed, and kidney tissues were harvested post-mortem. In vitro experiments using primary porcine proximal tubule epithelial cells assessed UA's effects on lipopolysaccharide (LPS)-induced caspase-1 activation.

Results

FP significantly elevated plasma procalcitonin, impaired systemic and renal hemodynamics, increased renal vascular resistance, reduced GFR and worsened renal injury markers. UA treatment significantly ameliorated these effects by preserving MAP, CO, and GFR and lowering plasma creatinine, BUN, cystatin C, and urinary NGAL. UA also suppressed NLRP3 inflammasome activation and downstream pyroptosis mediators, including gasdermin D and interleukin-18, and reduced renal oxidative stress. In vitro, UA inhibited LPS-induced caspase-1 activation.

Conclusion

UA confers renoprotective effects in septic AKI by improving renal hemodynamics, reducing oxidative stress, and inhibiting pyroptosis. These findings support the translational potential of UA as a therapeutic strategy for sepsis-associated AKI.

Harnessing Attenuated Bacterial Therapeutics (SPIKE) for the Treatment of Epithelial Ovarian Cancer

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Introduction

Ovarian cancer remains a devastating gynecological malignancy, ranking as the second leading cause of death in women with reproductive cancers. Despite advances in surgery and platinum-based chemotherapy, outcomes for advanced-stage disease remain dismal, with 5-year survival rates below 40% for stage III and below 20% for stage IV. These poor outcomes are compounded by late diagnosis, lack of effective screening strategies, and rapid disease progression. Overcoming the immunosuppressive tumor microenvironment and resistance to therapy remains an urgent unmet need.

We investigated a novel bacterial therapeutic, SPIKE (Synthetic Programmable bacteria for Immune-directed Killing in tumor Environments), an attenuated Brucella melitensis 16M ΔvjbR strain, for ovarian cancer treatment. SPIKE has previously demonstrated safety in animal models, tumor-homing ability, macrophage reprogramming toward a pro-inflammatory M1 phenotype, enhanced CD8+ T cell activity, tumor suppression in colon adenocarcinoma models, including overcoming resistance to chimeric antigen receptor T-cell therapy.

Methods

To evaluate its potential in ovarian cancer, we employed the MOE PTENshRNA/KRASG12V model in the FVB/NJ background, which mimics high-grade serous ovarian cancer. Both the SPIKE chassis and the SPIKE engineered to express Ovarian cancer Tumor-associated antigens (TAA) were tested. Treatment was initiated seven days post-tumor transplantation, with a booster dose administered one week later. Tumor burden was measured using the In Vivo Imaging System.

Results

Our results show that SPIKE significantly suppressed tumor growth and improved survival in tumor-bearing mice. Notably, SPIKE engineered to express the TAA further extended survival, highlighting the therapeutic promise of antigen-specific immune priming.

Conclusion

This work underscores the potential of SPIKE as a novel and durable immunotherapy strategy against ovarian cancer.

The Mental Health Impact of

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Digital Media and Technology on Children 3-10 Years

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Introduction

The prevalence of pediatric mental health conditions—including depression, anxiety, attention-deficit/hyperactivity disorder (ADHD), body dysmorphic disorder, and autism spectrum disorder—has increased globally in recent decades. Excessive exposure to technology and digital media has been implicated as a contributing factor influencing brain development, emotional well-being, and behavioral regulation in children. This study aimed to examine the impact of digital media and technology use on child mental health.

Methods

A systematic scoping review was conducted on literature published between 2015 and 2025. Searches were performed across Web of Science, Scopus, ScienceDirect, APA PsycInfo, and PubMed. Fifty-two studies met inclusion criteria and were synthesized following PRISMA-ScR guidelines, with a focus on diverse forms of digital technology use and pediatric populations.

Results

Excessive digital media exposure was significantly associated ($p < 0.05$) with compulsive social media use, heightened body dissatisfaction from unrealistic beauty standards, exposure to substance-related content, and increased risk of cyberbullying. Neurobiological findings highlighted dopaminergic pathway activation driving compulsive behaviors, as well as alterations in the amygdala and prefrontal cortex—regions critical for emotional regulation and executive function.

Conclusion

Children aged 3–10 years who engaged heavily with digital media demonstrated higher susceptibility to low self-esteem, anxiety, depressive symptoms, and other mental health concerns.

Targeted strategies such as school-based education, digital detox programs, cognitive-behavioral therapy, stronger privacy protections, and active parental monitoring may help mitigate risks and foster responsible engagement with digital technology.

Biophysical Characterization of a Recombinant Fusion Protein to Assess Aggregation Propensity and Its Impact on Vaccine Efficacy

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Introduction

Recombinant protein-based vaccines require thorough biophysical characterization to ensure their stability, efficacy, and suitability for large-scale manufacturing. L-PaF is a chimeric antigen composed of PcrV and PopB from Pseudomonas aeruginosa, together with the A1 subunit of heat-labile enterotoxin from E. coli. It was successfully expressed and purified for subsequent formulation. This report presents a detailed structural evaluation of L-PaF, emphasizing its conformational integrity as a critical determinant for downstream vaccine efficacy studies.

Methods

Protein aggregation was monitored via dynamic light scattering (DLS) at different temperatures. Secondary structure was analyzed by FTIR (Fourier-Transform Infrared) spectroscopy in the amide I spectral region (1600–1700 cm^{-1}). Thermal stability was evaluated using Differential Scanning Calorimetry (DSC).

Results

Dynamic light scattering (DLS) measurements revealed an increase in hydrodynamic radius at 42 °C relative to 4 °C, suggesting temperature-induced protein aggregation. Differential scanning calorimetry (DSC) analysis indicated thermal stability up to approximately 40 °C, with unfolding

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initiated between 40–70 °C and a melting temperature near 70 °C. The sharpness of the DSC peak denotes a cooperative unfolding transition. Fourier-transform infrared (FTIR) spectroscopy showed an elevated proportion of β-helix content at 42 °C compared to 4 °C, further supporting the aggregation-prone behavior of the protein under thermal stress.

Conclusion

These biophysical analyses demonstrate that L-PaF undergoes temperature-dependent aggregation, with significant structural changes observed, at 42 °C. The increase in hydrodynamic radius, cooperative unfolding behavior, and elevated β-helix content collectively indicate a propensity for aggregation under thermal stress. These aggregated species may influence antigen presentation and immunogenicity, making them valuable for assessing the impact of protein stability on vaccine efficacy. Future preclinical studies in animal models can leverage these findings to optimize formulation conditions and evaluate the immunological consequences of aggregation, ultimately guiding the development of a stable and effective L-PaF-based vaccine.

Comparative Immunological Profiling of BECC438 and BECC470 Adjuvants in a Vaccine Targeting Pseudomonas aeruginosa

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Introduction

Pseudomonas aeruginosa is an extremely adaptable, multidrug-resistant pathogen that causes severe hospital-acquired infections and for which no vaccine is available. The development of effective vaccines is a global priority, yet progress is often hindered by the lack of potent and safe adjuvants. BECC adjuvants are modified lipid A analogues designed to enhance immune responses while minimizing endotoxicity. This study compares the immunogenicity and protective efficacy of BECC438 and BECC470 in a vaccine targeting *P. aeruginosa*.

Methods

C57BL/6 mice were immunized intranasally or intramuscularly with L-PaF formulated with either BECC438 or BECC470 on days 0, 14, and 28. Serum and organ samples were collected at designated times. Humoral responses were assessed by ELISA, and cytokine profiles were used to evaluate cellular immunity. Opsonophagocytic activity was measured using J774.1 macrophages and *P. aeruginosa* strain mPa08-31. Protective efficacy was tested in a murine lung challenge model.

Results

Both immunization routes significantly enhanced antigen-specific IgG and IgA responses. Intranasal administration elicited stronger IFN-γ and IL-17A responses in lung and spleen cells compared to intramuscular delivery. All adjuvanted groups demonstrated robust opsonophagocytic activity. Notably, only the intranasal BECC438 adjuvanted groups showed a significantly reduced lung bacterial burden post-challenge. BECC438 group also exhibited elevated IL-17A levels in post challenged lung cells, while TNF-α and IL-6 remained consistent across all immunization routes.

Conclusion

This study demonstrates that BECC438, particularly when administered intranasally, elicits superior immunogenicity and protective efficacy against *Pseudomonas aeruginosa* compared to BECC470. Enhanced mucosal and systemic immune responses, including elevated IL-17A and robust opsonophagocytic activity, underscore the importance of both adjuvant selection and route of administration in vaccine design. The significant reduction in lung bacterial burden following challenge further validates BECC438s potential as a next-generation adjuvant. These findings support further preclinical and clinical development to combat multidrug-resistant *P. aeruginosa* infections.

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An Artificial Intelligence-based Automated Tool for Grading Corneal Fibrosis

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Introduction

Corneal fibrosis is a major cause of vision impairment worldwide, yet clinical and grading of opacity severity often relies on subjective human assessment. Objective, reproducible, and automated approaches are essential to standardize disease evaluation, reduce variability, and accelerate translational research. The goal of this study was to develop and validate an artificial intelligence (AI)-based automated model for grading the severity of corneal fibrosis in live rabbits using clinical imaging data.

Methods

A total of 401 corneal images were collected from live rabbits using slit-lamp biomicroscopy and stereo microscopy under standardized imaging conditions. Corneal pathology was classified into four clinically relevant categories: healthy, mild fibrosis, moderate fibrosis, and severe fibrosis. Image preprocessing and segmentation were performed using Mask-RCNN to accurately localize the corneal region of interest. Extracted image features were subsequently classified using a convolutional neural network (CNN) baseline and multiple advanced transfer learning models, including VGG16, ResNet101, DenseNet121, InceptionV3, and ResNet50. Model performance was comprehensively evaluated using seven metrics: accuracy, sensitivity, specificity, Hamming distance, F1 score, area under the receiver operating characteristic curve (AUROC), and area under the precision–recall curve (AUPRC).

Results

Among all tested models, ResNet50 demonstrated superior performance, achieving an overall training accuracy of 87%. Validation on two independent test sets produced prediction accuracies of 85% and 83%, respectively. The average sensitivity and specificity of the ResNet50 classifier were 84% and 94%, indicating robust ability to distinguish between different grades of corneal fibrosis.

Conclusion

This study demonstrates that deep learning algorithms can be successfully applied to automate the grading of corneal fibrosis in preclinical models. The ResNet50-based model provides reliable, noninvasive, and standardized assessment of opacity severity, offering a powerful tool for corneal fibrosis research. The algorithm and codebase are made openly available to the research community at https://github.com/12rajnish/CPC for reproducibility and future development.

Probiotic Bacteria L. lactis-iRFP Exhibit Predilection to Target Orthotopic Colorectal Tumors Evaluated by Advanced Molecular Imaging

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Introduction

Colorectal cancer (CRC) is the third most diagnosed cancer and has the second highest mortality of all cancers. These patients suffer from significant toxic side effects, develop resistance to the therapies, and experience recurrence and metastasis.

Methods

In this study we simultaneously image orthotopic CRC tumors with biolumniscence (BLI) and the probiotic *L. lactis* expressing infrared

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fluorescent protein (*L. lactis*-iRFP), respectively. CRC cells expressing luciferase (CT26/luc) were inoculated subcutaneously in the right flank of 6-week-old BALB/c mice. After the tumor reached a volume of 500 mm^3, $1x10^{11}$ cfu/50 µL of *L. lactis*-iRFP was injected intratumorally.

Results

We found that BL and iRFP signals colocalized at the tumor site and could be detected for up to 5 days post-injection. After confirming the BL from the tumors, we established an orthotopic CRC mouse tumor model in 6-weeks-old BALB/c mice inoculating the cancer cells by a colonoscopy guided technique. We included two controls without tumors, one administered with non-fluorescent *L. lactis*, and the other with *L. lactis*-iRFP. On day 11, when the orthotopic CRC tumor was well-established, the animals were administered with $1x10^{12}$ cfu/200 µL of *L. lactis*-iRFP or wild type via oral gavage and imaged by BL and fluorescence. The imaging revealed a stronger iRFP signal coming from the tumor-bearing animals, up to 5 days post *L. lactis*-iRFP inoculation, in contrast with only 1 day from non-tumor bearing mice. The colons were scanned *ex vivo* to detect the BL signal from the CRC tumor. Interestingly, only the colons with tumors showed iRFP signal, suggesting that *L. lactis*-iRFP preferentially targets the CRC tumor microenvironment.

Conclusion

Hereby we demonstrated that simultaneous detection of BL and iRFP signals is feasible and this imaging technology could be potentially implemented for preclinical real-time evaluation of the capability of other bacteria to preferentially target solid tumors.

Developing Probiotic L. lactis as Contrast Agent and Molecular Probe for the In Vivo Study of the Gastrointestinal Tract Using Multispectral Optoacoustic Tomography

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Introduction

Gastrointestinal diseases (GI) affect millions of people in the US; the difficulty, costly diagnosing and monitoring urge the development of *in vivo*, in real time, non-invasive and in situ/high resolution imaging. In this regard, the probiotic bacterium *L. lactis* is being intensively investigated as a delivery system at the mucosal level. Therefore, we explored the feasibility of *L. lactis* as a contrast agent/ molecular probe to study its transit through the GI tract and predilection to home colitis using multispectral optoacoustic tomography (MSOT).

Methods

Recombinant *L. lactis* expressing β-galactosidase (β-gal) were developed to keep its production under stress stimuli related to GI pathologies (acidic pH=5, biliary salts, and human physiological temperature, 37°C). Different substrates were tested for β-gal activity including X-gal, Salmon-gal, X-gal + tetranitro blue tetrazolium (TNBT), and Salmon gal +TNBT, the chromogenic products were detected as blue, marron, dark and marron-dark colors respectively. *L. lactis* producing β-gal were detected first in tissue mimicking phantoms and were orally administered to BALB/c mice to determine their transit through the GI tract by MSOT. Parallelly, a DSS-colitis model was established by the addition of 2.5% of DSS in drinking water.

Results

We first verified the β-gal production by western blot (as a 75kDa protein); only the acidic pH affected the bacterial growth and activity. We used *L. lactis* producing β-gal + every substrate to establish every specific spectrum in phantoms and for the imaging of mice using MSOT; strong, well-localized and specific signals were detected in real time after oral gavage. We established a DSS-colitis induced model to colocalize the inflammation with *L. lactis* producing β-gal.

Conclusion

L. lactis producing β-gal could be an excellent translational model to monitor the bacterial presence through the GI tract and to test the

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hypothesis of preferential location in inflamed/damaged areas or cancer.

Clozapine Use in the Management of Benzodiazepine and ECT Resistant Catatonia

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Introduction

Catatonia is a complex movement disorder often associated with schizophrenia and characterized by dysfunction in gamma-aminobutyric acid (GABA), glutamate, and dopamine neurotransmission. It may also occur in the context of metabolic, infectious, autoimmune, neurological, or endocrine disorders. Benzodiazepines and electroconvulsive therapy (ECT) are considered first-line treatments; however, a subset of patients remains resistant, posing significant therapeutic challenges. This study aimed to evaluate the role of clozapine, an atypical antipsychotic, in the management of treatment-resistant catatonia.

Methods

A review of original research articles published in English was conducted, including cases where at least one individual with catatonia was treated with clozapine. Clozapine's mechanisms of action—through titration up to 200 mg—were examined, highlighting its modulation of serotonergic, dopaminergic, GABAergic, and glutamatergic neurotransmission, all implicated in catatonia pathophysiology.

Results

Clinical case reports and observational studies suggest that clozapine is associated with significant improvement in catatonic symptoms ($p < 0.05$), particularly within schizophrenia spectrum disorders, after titration to 200 mg. These findings support clozapine as a viable option in treatment-resistant cases. Notably, clozapine withdrawal should be gradual to minimize risk of withdrawal-related catatonia recurrence.

Conclusion

Evidence remains limited, but emerging data indicate that clozapine may be an effective therapeutic strategy for benzodiazepine- and ECT-resistant catatonia. Further research, including randomized controlled trials and systematic investigations, is warranted to establish its efficacy and safety profile in this population.

From Barriers to Bridges: Increasing APRN Attendance in the Show-Me ECHO Program

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Introduction

Despite the availability of diverse Extension for Community Healthcare Outcomes (ECHO) topics, Advanced Practice Registered Nurses (APRNs) have historically participated in MU Show-Me ECHO sessions at lower rates than physicians and other healthcare professionals. This is surprising given that the program is free, offers continuing education credits, supports synchronous learning, and enhances clinical competency. The purpose of this study was to explore factors contributing to low APRN attendance and identify opportunities to increase engagement.

Methods

An investigator-developed survey was distributed to three groups of Missouri-licensed APRNs: recent graduates of the University of Missouri Sinclair School of Nursing (≤10 years), registered Show-Me ECHO participants, and MU APRN preceptors. Prior attendance was not required. Descriptive statistics were used to analyze survey responses, and findings informed the development of semi-structured interview guides for Phase II. This explanatory sequential mixed methods design allowed qualitative interviews to enrich and contextualize the quantitative results.

Results

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After excluding incomplete responses (n = 13), 115 surveys were analyzed. Fourteen follow-up interviews provided deeper insight. While APRNs expressed interest in peer learning and collaboration, barriers such as scheduling conflicts and limited awareness of the program contributed to low participation. Those who had attended reported improved clinical practice and patient care.

Conclusion

Show-Me ECHO participation benefits APRNs, but awareness and access remain challenges. Employers should consider allowing protected time for attendance, and program organizers should enhance outreach efforts to better inform APRNs of available resources.

Accelerating Therapeutic Peptide Discovery with a Universal Ribozyme Platform for Inserting Non-canonical Amino Acids into Proteins In Vivo

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Introduction

Therapeutic peptides often include non-canonical amino acids (ncAA) to enhance their stability and bioactivity. Genetic Codon Expansion (GCE) technologies greatly accelerate ncAA exploration. We propose that several limitations of current GCE tools can be overcome with engineered ribozymes. We recently established Specific tRNA Aminoacylating Ribozymes (STARzymes) that transfer chemically activated AA to a tRNA specified by a tRNA-binding module. The AA on the charged tRNA can then be incorporated into proteins by cell-free translation in vitro. Adapting this system for use in cells would enable bioproduction of therapeutic peptides and evolutionary optimization of ribozyme function.

Methods

We engineered a bacterial host to express i) STARzymes, ii) an archaeal amber suppressor tRNA, and iii) a beta lactamase (*bla*) reporter gene carrying an Amber stop codon in place of an essential glycine. Bla rescue and bacterial growth in the presence of beta-lactam antibiotics requires glycine insertion translational readthrough at the Amber stop codon.

Results

We observed Bla rescue and bacterial growth when STARzyme and suppressor tRNA are both expressed and chemically activated glycine was provided. Omitting any component prevented growth in the presence of beta-lactams. Translational readthrough to produce full-length Bla was confirmed by immunoblotting. When hosts were transformed with STARzyme variant libraries and selected with beta-lactams, STARzymes that supported superior growth emerged to dominate the population; no change in ribozyme populations was observed in the absence of antibiotic selection. Selected STARzymes included mutations that were predicted to weaken tRNA binding, suggesting increased product release that might enhance enzymatic turnover.

Conclusion

Our ribozyme platform inserts user-defined ncAA into peptides or proteins at genetically defined positions. We anticipate that this universal STARzyme system will accelerate production and discovery of superior therapeutic peptides with non-canonical chemistries that are beyond the reach of engineered aminoacyl synthetase enzymes and other current GEC tools.

Molecular Alterations in the Eutopic Endometrium of Women with Endometriosis: Dysregulation of STMN1 and YWHAZ

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Introduction

Endometriosis is a chronic, estrogen-dependent, and progesterone-resistant disease that affects ~10% of women of reproductive age, often leading to pelvic pain and infertility. Although the disease is well recognized clinically, its molecular basis remains poorly understood. Increasing evidence suggests that altered gene regulation in the eutopic endometrium contributes to impaired endometrial function in endometriosis-related infertility. Elucidating these molecular alterations is essential for advancing understanding the pathophysiology of endometriosis.

Methods

We performed RNA-seq analysis to identify differentially expressed genes (DEGs) in proliferative-phase endometrium samples from infertile women with endometriosis and fertile controls (n=4 per group). DEGs were defined as those with fold change (FC) >2 or <−2 and false discovery rate (FDR) < 0.05. Among the DEGs, Stathmin 1 (STMN1; FC>2 and FDR<0.05) and 14-3-3 ζ (YWHAZ; FC<−2 and FDR<0.05) were selected for validation by immunohistochemistry (IHC). IHC for the progesterone receptor (PGR) was also performed. H-scores were calculated, and Student's t-test compared control and endometriosis groups.

Results

We identified 44 DEGs in eutopic endometrium from infertile women with endometriosis compared to fertile women without endometriosis, including 13 upregulated and 31 downregulated genes. IHC confirmed that STMN1 expressions were significantly increased (p<0.05) in both the epithelium (222 ± 10.51) and stroma (199.7 ± 15.06) of endometrium from endometriosis group compared to controls (epithelium: 50.90 ± 17.15, stroma: 57.66 ± 18.81). Conversely, epithelial YWHAZ expression was significantly reduced (p<0.05) in endometriosis (23.91 ± 20.68) compared to controls group (108.8 ± 18.04), consistent with transcriptomic findings. Stromal PGR expression was significantly reduced (p<0.05) in endometriosis group (146.4 ± 19.59) compared to controls (240.9 ± 12.12).

Conclusion

Our study identifies distinct molecular alterations in the eutopic endometrium of infertile women with endometriosis. Dysregulation of STMN1 and YWHAZ, validated at protein levels, supports our findings and suggests impaired endometrial function. This work was supported by NIH P01HD106485 and R01HD102170.

Dissecting the Immunopathology of Endometriosis through Transcriptomic and Pathway Analysis

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Introduction

Endometriosis is a chronic, estrogen-dependent inflammatory disorder that affects approximately 10% of women of reproductive age and is strongly associated with infertility and chronic pelvic pain. Emerging evidence indicates that dysregulated immune responses, along with aberrant cellular interactions, play a critical role in the initiation and progression of the disease. However, the pathophysiological role of immune cells in endometriosis remains poorly understood. Our aim is to identify the specific molecular pathways and immune cell populations that shape its pathophysiology.

Methods

Endometriosis was induced in 8-weeks old female (*Rosa26*$^{mTmG/+}$) recipient mice by transplanting endometrial fragments from *Pgr*$^{cre/+}$*Rosa26*$^{mTmG/+}$ donor mice, with sham-operated animals serving as controls. 1month after induction, GFP-positive ectopic lesions were collected from endometriosis mice, and uterine tissue was obtained from sham

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mice. RNA sequencing was performed on ectopic lesions and sham uteri (n=5 per group) to identify differentially expressed genes (DEGs) and associated pathways. Ingenuity Pathway Analysis (IPA) was conducted to determine dysregulated immune-related pathways and networks in endometriosis.

Results

The transcriptomic analysis revealed a total of 2,314 upregulated and 860 downregulated genes (FDR<0.05; FC>±2). IPA identified 294 significantly dysregulated canonical pathways (-log(p-value) > 1.3, z-score > ±2), the majority of which were immune-related and broadly classified into macrophage, dendritic cell, cytokines, and T and B-cell regulatory pathways. Macrophage-associated signatures indicated enhanced immune activation through polarization, inflammatory signaling, and cytokine signaling, while dendritic cell pathways highlighted active antigen presentation to T cells, driving T helper responses and sustaining chronic inflammation and immune tolerance in ectopic lesions. Additionally, pathways related to T- and B-cell interactions, lymphocyte activation, and autoimmune signaling underscored the contribution of adaptive immune dysregulation.

Conclusion

Collectively, our findings suggest that immune-related mechanisms-particularly those involving macrophages, dendritic cells, and adaptive lymphocytes-play critical roles in the pathophysiology of endometriosis. This work was supported by NIH R01HD112332, R01HD102170, and P01 HD106485.

Overcoming the Challenges of Integrating Diverse EM Tools into a Unified Research Framework

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Introduction

Despite rapid advances in electron microscopy (EM) imaging, researchers often specialize in a single technique and overlook the value of complementary approaches. From a core facility perspective, introducing users to suitable EM tools and helping them overcome initial barriers is key to maximizing their utility.

Methods

Here, we present how diverse branches of electron microscopy, commonly available in a university EM core, can be integrated to address a complex biological question effectively.

Results

A workflow is designed to meet the needs of users studying a diverse range of biological samples. The process begins with chemical fixation and embedding, followed by 2D thin-section TEM imaging, which serves as an initial screening step. This step involves iterative optimization through active collaboration with users. Next, several advanced electron microscopy strategies are available to pursue the 3D reconstruction of cells or tissues. This can be achieved through either microtome-based serial block-face imaging using VolumeScope or focused ion beam scanning electron microscopy (FIB-SEM). Alternatively, cryo-FIB, combined with correlative light and electron microscopy (cryo-CLEM), allows for the guided milling of thin lamellae, enabling users to study cellular ultrastructure in its native state.

Conclusion

In conclusion, we presented a multidisciplinary approach leveraging diverse electron microscopy techniques to reconstruct the ultrastructure of a variety of biological samples, highlighting the critical role of core facilities in guiding researchers to select and effectively utilize appropriate EM techniques, ultimately advancing our understanding of disease mechanisms at multiple scales.

Dissecting the Immunopathology of Endometriosis through Transcriptomic and Pathway Analysis

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Introduction

Endometriosis is prevalent among women at reproductive age, with 30-50% experiencing infertility. Progesterone resistance is a known pathologic condition in endometriosis caused by aberrant progesterone signaling, however, its underlying mechanisms remain unclear.

Methods

In this study, we identified highly conserved target genes of histone deacetylase 3 (HDAC3) and progesterone receptor (PGR) in the mouse uterus using integrated transcriptomic and ChIP-seq analyses, as well as knockout models of *Hdac3* and *Pgr*.

Results

Our immunoprecipitation assay revealed a protein-protein interaction between HDAC3 and PGR. Furthermore, PRKO and *Hdac3*-knockout mice exhibited a significant attenuation of HDAC3 and PGR expression in the uterus, respectively. To determine the colocalization and correlation of HDAC3 and PGR in endometrial epithelial and stromal cells, we performed multiplex immunofluorescence. Importantly, their expression levels showed a significant positive correlation in stromal cells in both the control and infertile women with endometriosis group. However, in epithelial cells, this correlation was observed only in the infertile endometriosis group. This finding demonstrates the cooperative interactions of HDAC3 and PGR in nuclear hormone receptor-dependent epigenetic regulation.

Conclusion

Our study enhances the understanding of progesterone resistance in endometriosis-related infertility and reveals PGR/HDAC3 interactions as critical regulator of endometrial receptivity. This work was supported by NIH R01HD101243, and R01HD102170.

Sodium Channel with Amiloride Reduces Arterial Stiffness and Blood Pressure Independent of Sex in Adults with Obesity and Insulin Resistance

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Introduction

In women with obesity and insulin resistance, the cardiovascular protection usually provided by estrogen is lost, leading to a higher risk of arterial stiffening and adverse cardiovascular events. In earlier preclinical work, we found that females with obesity exhibited greater activation of the endothelial cell epithelial sodium channel (ENaC) than males. We therefore hypothesize that blocking ENaC with amiloride would have a more substantial de-stiffening effect in females than in males.

Methods

In this Phase II, 24-week, single-center, randomized, double-blind, placebo-controlled trial, we enrolled 137 individuals aged 30-70 years with overweight or obesity and at least one characteristic of metabolic syndrome. Individuals were randomized in a 2:1 ratio to amiloride (5 mg) or placebo. Carotid femoral pulse wave velocity, blood pressure, and brachial and popliteal artery flow-mediated dilation were assessed at baseline, week 12, and at week 24 (final visit). Femoral blood flow was evaluated during a 75-gram oral glucose tolerance test at baseline and final visits.

Results

Twenty-four weeks of treatment with amiloride resulted in a lowering of arterial stiffness assessed via carotid femoral pulse wave velocity, and systolic and diastolic blood pressure (SBP and DBP). These changes paralleled an increase in serum potassium and a lowering in fasting glucose in the amiloride-treated cohort. Intervention with amiloride resulted in an average 5.6 mmHg reduction of SBP,

Inhibition of the Epithelial

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2.3 mmHg in DBP, and 6.1 mg/dl in fasting glucose at the 24-week visit. No severe adverse effects were associated with the use of amiloride.

Conclusion

In this trial, amiloride improved arterial stiffness, blood pressure, and fasting glucose in adults with overweight or obesity and metabolic syndrome features, without safety concerns. These improvements were seen in both women and men, suggesting that ENaC inhibition may be a useful approach for reducing cardiometabolic risk in this population.

Feasibility And Safety Of 4D Intracardiac Echocardiography Guided Left Atrial Appendage Closure

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Introduction

Endometriosis is a chronic, estrogen-dependent inflammatory disorder that affects approximately 10% of women of reproductive age and is strongly associated with infertility and chronic pelvic pain. Emerging evidence indicates that dysregulated immune responses, along with aberrant cellular interactions, play a critical role in the initiation and progression of the disease. However, the pathophysiological role of immune cells in endometriosis remains poorly understood. Our aim is to identify the specific molecular pathways and immune cell populations that shape its pathophysiology.

Methods

Endometriosis was induced in 8-weeks old female (*Rosa26*$^{mTmG/+}$) recipient mice by transplanting endometrial fragments from *Pgr*$^{cre/+}$*Rosa26*$^{mTmG/+}$ donor mice, with sham-operated animals serving as controls. 1month after induction, GFP-positive ectopic lesions were collected from endometriosis mice, and uterine tissue was obtained from sham mice. RNA sequencing was performed on ectopic lesions and sham uteri (n=5 per group) to identify differentially expressed genes (DEGs) and associated pathways. Ingenuity Pathway Analysis (IPA) was conducted to determine dysregulated immune-related pathways and networks in endometriosis.

Results

The transcriptomic analysis revealed a total of 2,314 upregulated and 860 downregulated genes (FDR<0.05; FC>±2). IPA identified 294 significantly dysregulated canonical pathways (-log(p-value) > 1.3, z-score > ±2), the majority of which were immune-related and broadly classified into macrophage, dendritic cell, cytokines, and T and B-cell regulatory pathways. Macrophage-associated signatures indicated enhanced immune activation through polarization, inflammatory signaling, and cytokine signaling, while dendritic cell pathways highlighted active antigen presentation to T cells, driving T helper responses and sustaining chronic inflammation and immune tolerance in ectopic lesions. Additionally, pathways related to T- and B-cell interactions, lymphocyte activation, and autoimmune signaling underscored the contribution of adaptive immune dysregulation.

Conclusion

Collectively, our findings suggest that immune-related mechanisms-particularly those involving macrophages, dendritic cells, and adaptive lymphocytes-play critical roles in the pathophysiology of endometriosis. This work was supported by NIH R01HD112332, R01HD102170, and P01 HD106485.

Effect of Nanoceria on endometriosis-related infertility

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Introduction

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Endometriosis is characterized by the presence of endometrial tissue outside the uterine cavity and is commonly associated with infertility. We showed that cerium-oxide nanoparticles (nanoceria) selectively accumulate in ectopic lesions and suppress their growth. To further explore this therapeutic potential, the present study evaluated the effect of nanoceria on endometriosis-related infertility.

Methods

To assess potential toxicity, 8-week-old female mice were treated with vehicle or nanoceria (120 μg/kg; n=5) twice weekly for 4 weeks, and fertility was assessed by the number of pups delivery after mating with fertile males. Next, endometriosis was induced in adult female *Rosa26*$^{mTmG/+}$ recipient mice by transplanting donor *Pgr*$^{cre/+}$*Rosa26*$^{mTmG/+}$ endometrial fragments, with sham-operated mice serving as controls. The mice with endometriosis were treated with vehicle or nanoceria (120 μg/kg; n=5) twice weekly for 4 weeks, beginning 3 months post-induction. Fertility was assessed by mating with fertile males and recording the number of pups delivered.

Results

In the toxicity test, both vehicle- and nanoceria-treated mice exhibited similar litter sizes (5.4±2.26 vs 5.4±2.26; p=0.7108), indicating no detectable reproductive toxicity associated with nanoceria treatment. In surgically induced endometriosis mice, nanoceria treatment significantly reduced ectopic lesion weight (0.038 ± 0.009 g vs. 0.078 ± 0.013 g), number (8.38 ± 1.51 vs. 9.91 ± 2.96), and GFP radiant efficiency (52.3 ± 9.1 million vs. 79.7 ± 9.5 million [(p/s/cm²/sr)/(μW/cm²)]) compared with vehicle treatment ($p < 0.05$). Importantly, mice treated with nanoceria significantly increased average litter size (7.67±0.802) compared to mice treated with vehicle (4.33± 0.494) ($p < 0.05$).

Conclusion

These results demonstrates that nanoceria provides dual benefits in the treatment of endometriosis-related infertility: it suppresses ectopic lesion growth and enhances fertility. These findings highlight the potential of nanoceria as a non-hormonal, fertility-enhancing therapeutic option for endometriosis and infertility. This work was supported by NIH R01HD108895.

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