

1. Data-Driven Orthodontic Risk Stratification Using Clinical and Biologic Parameters

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Purpose

To develop a machine learning–based model integrating clinical, biomechanical, and salivary biomarker data to stratify OIIRR risk and inform precision orthodontic force management.

Methods

A retrospective dataset including age, sex, malocclusion type, applied force, treatment duration, and RANKL/IL-6 ratios was analyzed using Random Forest, XGBoost, and Logistic Regression models with fivefold cross-validation. SHAP analysis identified patient-specific feature contributions and generated a risk heatmap for OIIRR probability.

Results

The optimized model achieved accuracy $\approx 85\%$ and AUC ≈ 0.88 . Force magnitude, treatment duration, and RANKL/IL-6 ratio were top predictors. SHAP interpretation provided individualized, clinically interpretable risk profiles.

Conclusions

This non-imaging, data-driven approach enables early, patient-specific OIIRR risk detection, supporting precision force modulation, safer orthodontic care, and translational application of biomarker-informed treatment strategies.

2. Host–Microbe Crosstalk and Molecular Pathways in Peri-Implantitis: Unraveling the Immune–Metabolic Nexus

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Purpose

Peri-implantitis is a chronic inflammatory condition marked by soft tissue inflammation and progressive bone loss around dental implants, often resulting in implant failure. While bacterial biofilm dysbiosis initiates the disease, the host molecular mechanisms that sustain inflammation and impair healing remain poorly understood. This study aimed to identify key immune–metabolic and epithelial remodeling pathways driving peri-implantitis, providing translational insights with clinical relevance.

Methods

Publicly available transcriptomic (GSE33774) and microbiome (PRJNA691804) datasets were analyzed to explore host–microbe interactions. Differentially expressed genes were integrated with microbial profiles to identify shared molecular networks. Pathway and interaction analyses were performed to uncover functional modules and central hub genes contributing to disease progression.

Results

Seven hub genes—LAMA4, MRC1, VSIG4, PECAM1, F13A1, CALB2, and ZFY—were identified as central regulators in peri-implantitis. Two key modules emerged:

- (1) a metabolic–immune cluster (FOLR2, MEST, SRPX2) associated with macrophage activation and folate metabolism; and
- (2) an epithelial–structural cluster (KRT76, SRPX2, MEST) linked to keratinization and barrier integrity.

Clinically, these molecular signatures mirror the dual pathology of peri-implantitis—immune hyperactivation combined with epithelial fragility. Positive correlations between MRC1/FOLR2 and pathogenic taxa (*Fusobacterium*, *Prevotella*) highlight macrophage-driven inflammation, while KRT76 downregulation indicates impaired mucosal sealing. The multifunctional roles of PECAM1, MRC1, and F13A1 suggest promising therapeutic targets for modulating inflammation and tissue repair.

Conclusions

This systems-level analysis reframes peri-implantitis as an immune–metabolic disorder rather than a purely microbial condition. Dysregulated folate metabolism and epithelial repair contribute to persistent inflammation and bone loss. Clinically, PECAM1, MRC1, and SRPX2 may serve as biomarkers for early detection and targets for personalized regenerative therapies, offering new pathways for improving implant longevity and peri-implant health.

3. Testing glucose-mediated inhibition of vitamin C absorption in ARPE-19 cells

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Purpose

Vitamin C passes through the blood-retinal barrier (BRB) through the RPE cells (outer BRB) and retinal endothelial cells (inner BRB) through glucose-dependent active transport (GLUT1 transporters). Due to glucose and vitamin C using the same transporter, glucose acts as a competitive inhibitor to vitamin C absorption. Inhibition has been demonstrated in rats and mice, and evidence suggests that humans with hyperglycemia have lower levels of vitamin C in the retina and vitreous humor than healthy individuals. Vitamin C is a necessary cofactor for Ten-Eleven Translocation (TET) dioxygenases. When vitamin C is added to cultured cells such as ARPE-19 cells, hydroxymethylcytosine (5hmC) levels rise substantially. We sought to measure changes in 5hmC levels in ARPE-19 cells treated with the same amount of vitamin C (50 μ M) with high (25 mM) or low (5.5 mM) glucose.

Methods

ARPE-19 cells were cultured in DMEM/F-12 media until confluent. Media was then switched for either low glucose (5.5 mM) or high glucose (25 mM) DMEM/F-12 media for 1 day prior to vitamin C treatment. Vitamin C was added to cells (50 μ M) for 1, 3, 18, or 24 hours. DNA was extracted using the QiaAmp DNA Mini kit, and 5hmC/5mC levels were measured with the MethylFlash methylation/hydroxymethylation kits (Epigentek).

Results

Hydroxymethylation and methylation levels in the cells remained consistent with cells not treated with any vitamin C, indicating that cells were not treated with vitamin C for a sufficient amount of time to make any difference. Hydroxymethylation results were less than 0.01%, indicating that almost no hydroxymethylation was present in the cultured cells.

Conclusions

We were unable to detect changes in 5mC or 5hmC after treated ARPE-19 cells with vitamin C for up to 24 hours, whether the cells were treated with high or low glucose. Future experiments are

required to determine if vitamin C absorption can be inhibited in ARPE-19 cells in culture using high glucose levels.

4. Neonatal Sepsis: Empiric treatment and Monitoring of Gentamicin Troughs in the NICU

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Purpose

Neonatal sepsis is a leading cause of mortality in neonates, particularly in developing countries. The standard empiric treatment regimen for neonatal sepsis includes a beta lactam and aminoglycoside agent. Although, aminoglycosides such as gentamicin are frequently used in empiric neonatal sepsis despite being a known nephrotoxic agent with an accepted trough threshold for safety of $< 2\mu\text{g}/\text{mL}$; gentamicin dosing and monitoring is variable nationwide. The aim of this study is to assess whether no monitoring of gentamicin troughs in neonates for empiric sepsis treatment is acceptable in practice.

Methods

The study is a multi-center retrospective observational trial. It was a medical chart review including 16 different level 1,2 and 3 nurseries in hospitals across the Canyons and Desert Region of Intermountain Health. The data was extracted using MD clone and analyzed electronic health records of neonates from July 1st, 2020- July 31st, 2024. Neonates < 30 days old admitted or readmitted to any Intermountain Health hospital were screened. Both patient demographic and gentamicin primary outcomes were evaluated included average mg/kg dosing and quantity of trough levels $> 2\mu\text{g}/\text{mL}$. The exclusion criteria were defined as neonates treated or readmitted to level 4 nurseries, required mechanical ventilation, gestational age less than 37 weeks, and a diagnosis of hypoxic ischemic encephalopathy. We assessed the presence of acute kidney injury by using the lab values of urine output 24, 48 and 72 hours after the first gentamicin administration and blood urea nitrogen (BUN) to determine renal function of the neonates.

Results

Based on the current evidence, the objective of this study is to evaluate whether omitting gentamicin trough monitoring in neonates receiving empiric treatment for suspected sepsis is clinically acceptable. Eliminating routine trough measurements may also reduce unnecessary needle sticks and associated discomfort in this vulnerable population.

In our cohort, 5 of the 29 neonates (17.2%) in the no-monitoring group experienced a $\geq 50\%$

reduction in urine output within 72 hours of a gentamicin dose, compared with 106 of 1,290 neonates (8.2%) in the control group. A chi-square analysis yielded a test statistic of 3.6622 with a p-value of 0.055659. Because this p-value exceeds the conventional significance threshold of 0.05, we fail to reject the null hypothesis and conclude that there is no statistically significant difference in the rate of decreased urine output between the two groups.

Conclusions

These findings support the broader body of evidence suggesting that the absence of routine gentamicin trough monitoring does not meaningfully increase the risk of neonatal kidney injury.

5. The Impact of E-cigarettes on Oral Health: A Systematic Review of Risks and Emerging Evidence

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Purpose

This review aims to examine the overall effects of e-cigarettes on oral health, including its associations with xerostomia, dental caries, periodontal disease, and oral cancer.

Methods

A systematic review was conducted using databases like PubMed, ScienceDirect, NIH, and MDPI, analyzing many studies published between 2010-2025. Inclusion criteria consisted of peer-reviewed human and in-vitro studies that evaluated the oral effects of e-cigarettes. Studies were screened for correlation to caries formation, salivary changes, mucosal alterations, microbiome disruptions, and carcinogenic potential.

Results

A total of fifteen studies were included. Findings across studies showed that e-cigarettes reduce salivary flow rates and alters pH, leading to xerostomia and increased bacterial colonization. E-cigarette aerosols were found to elevate oxidative stress, upregulate proinflammatory cytokines, and impair gingival fibroblast function, thereby accelerating periodontal tissue destruction. Additionally, vapor condensates containing formaldehyde and acrolein have been linked to DNA damage and epithelial dysplasia. Chronic use was further associated with delayed wound healing and altered perception.

Conclusions

E-cigarettes pose significant risks to oral health, contributing to increased rates of xerostomia, caries, periodontal inflammation and potentially oral cancer. Dental professionals should recognize e-cigarettes as an emerging public health concern and integrate both patient education and screening into preventative care. Longitudinal studies are warranted to determine the long-term oncogenic effects and establish evidence-based clinical guidelines for management and prevention.

6. Objective Characterization of State-Dependent Cutaneous Neurovascular Aggregates (Chapman Points) Induced by Experimental Visceral Stimulation

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Purpose

Chapman points and acupoints are clinically utilized based on the theory that visceral dysfunction produces localized neurovascular congestion. Rat models of visceral hyperalgesia demonstrate that colonic irritation produces discrete "neurogenic spots" via plasma extravasation and vasodilation. These spots appear in nonrandom anatomical distributions, with their size and number correlating to visceral pain severity. However, establishing the diagnostic reliability of these points in humans requires objective instrumentation to bridge the gap between historical clinical claims and biological mechanisms. The primary goal of this prospective research is to determine if inducible cutaneous aggregates exist in humans following controlled visceral stimulation and to evaluate the reproducibility and clinical palpability of these regions. By operationalizing Chapman points as reproducible, state-dependent cutaneous regions rather than static charted points, this study aims to provide a biologically defensible framework for their use as modest diagnostic aids in medical applications.

Methods

Two-phase, multimodal approach in healthy human volunteers: Phase 1: To induce transient visceral stimulation, subjects will undergo rectal balloon distension or the application of low-dose capsaicin rectal gel. Objective cutaneous changes will be mapped using functional Near-Infrared Spectroscopy (fNIRS) to measure localized hemoglobin oxygenation and volume. Secondary measures include high-resolution ultrasound for subcutaneous edema, infrared thermography, and electrical skin impedance. Phase 2: After establishing the reliability of fNIRS to detect discrete nodules that correspond to Chapman's Point locations, a blinded, randomized crossover design will be employed. Trained clinicians will palpate predefined anatomical regions to detect "present" or "absent" points. Clinical findings will be compared against ostensibly objective (fNIRS) instrumental signals to determine sensitivity, specificity, and inter-rater reliability.

Results

The emergence of these cutaneous signals is hypothesized to be driven by viscerosomatic convergence and central sensitization. Similar to a rat mustard-oil model previously established in animal trials, colonic insult is expected to trigger antidromic signaling and release neuropeptides such as CGRP and substance P, leading to localized neurogenic inflammation and vascular changes in predicted dermatomal distributions, such as the lateral thigh.

Conclusions

If discrete nodules or localized aggregates of oxygenated hemoglobin, as measured by fNIRS are detected following stimulation, stretch, and irritation of descending colon, sigmoid colon, and rectum, this may indicate that classical Chapman's Points have a detectable objective measurement. The ability to induce the appearance of Chapman's Points as well as objective detection measures would greatly increase broader application in clinical diagnostics of this historic OMM modality.

7. Genomic Insights for Personalized Risk Assessment and Precision Planning in Oral Surgery

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Purpose

Individual differences in healing, infection risk, and anesthetic response significantly influence oral surgery outcomes. This study aimed to identify genomic biomarkers and molecular signatures associated with postoperative healing and inflammation using genomics and machine learning, to enable personalized and predictive surgical strategies.

Methods

Genomic and transcriptomic datasets from oral mucosa and wound-healing studies (GEO: GSE23582, GSE55550; dbGaP; 1000 Genomes) were analyzed using limma and edgeR pipelines for differential expression. Variants were annotated with Ensembl VEP and ANNOVAR, focusing on key genes related to inflammation, angiogenesis, collagen synthesis, and drug metabolism (IL1B, IL6, TNF, VEGFA, COL1A1, CYP2D6). Network and enrichment analyses were performed using STRING and clusterProfiler. Machine learning models (Random Forest, XGBoost) integrated genetic and clinical variables (age, sex, smoking, diabetes) to predict delayed healing and complication risks.

Results

Variants in IL1B, VEGFA, and TGFB1 were linked to delayed healing and heightened inflammation through NF- κ B and MAPK pathway activation, with reduced collagen remodeling. Predictive models achieved ROC-AUC values of 0.84–0.89. SHAP interpretability identified IL6, VEGFA, and CYP2D6 as major determinants of individual healing outcomes.

Conclusions

Integration of genomic biomarkers with AI-based prediction can support preoperative genomic screening, personalized anesthetic and wound management, and improved postoperative recovery. These findings advance the translational application of precision oral surgery by linking molecular risk profiles to individualized clinical decision-making.

Keywords: genomics; precision dentistry; oral surgery; wound healing; machine learning

8. Cytotoxic and Antimicrobial Effects of Plant-Derived Compounds Used in Traditional Chinese Medicine

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Purpose

Traditional Chinese Medicine (TCM) frequently uses plants prepared as teas for their therapeutic potential. Agrimonia pilosa and Cnidium monnieri are two such botanicals used for their reported anti-inflammatory and antimicrobial properties. Agrimol B and 2-hydroxytricosanoic acid methyl ester are derived from Agrimonia pilosa, while Osthole and Xanthotoxol are coumarin compounds from Cnidium monnieri. These compounds have been implicated in cellular signaling cascades and immune modulation.

Listeria monocytogenes has a well-characterized gastrointestinal phase, marked by epithelial cell invasion initiating systemic infection. Because the gut serves as the primary site for oral compounds and microbial exposure, understanding the interactions at this barrier is clinically important for informing the biological basis of TCM practices and its broader implications of dietary phytochemicals on susceptibility to enteric infections. The purpose of this study was to 1) determine cytotoxicity in a dose-specific manner 2) test the effects of these compounds on Listeria growth.

Methods

The primary readout was lactate dehydrogenase (LDH) in EMT6 epithelial cells to test cytotoxicity. The four compounds were serially diluted with DMSO in saline. Bacterial growth was measured via a 16-hour growth curve. The immunomodulating effects will be tested by utilizing varying doses of LPS (1 or 10ug) or the compounds (10-7mg/mL to 0.75 mg/mL) via ELISA as described by the manufacturer.

Results

Agrimol and Xanthotoxol demonstrated dose-dependent antimicrobial effects. High-dose Agrimol fully suppressed bacterial growth, while low-dose Agrimol delayed the midpoint of exponential growth by 4 hours and reduced peak absorbance (0.77 vs 0.92 control). Low-dose Xanthotoxol had minimal effect; however, high-dose Xanthotoxol similarly delayed exponential growth and reduced peak absorbance to 0.60. In contrast, 2-hydroxytricosanoic acid methyl ester did not alter Listeria

growth at either dose. High-dose Osthole promoted bacterial growth, increasing peak absorbance to 0.95, while control and low-dose conditions remained at 0.35.

Conclusions

These data provide a framework in evaluating the cytotoxicity of these compounds in gut epithelial tissues. To better understand their signaling pathways, future directions include examining cytokine inflammatory responses at cytotoxic and noncytotoxic doses. Defining the pharmacology properties of these compounds are paramount for optimizing dosing and safety considerations at the intersection between TCM and Western Medicine.

9. Effects of Pranayama on Post-Stroke Complications: A Narrative Literature Review

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Purpose

To summarize and evaluate the effects of Pranayama (Nadi Shodhan Pranayama (NSP) along with right and left unilateral nostril breathing (UNB)) on patients with post-stroke complications and to inform its potential integration as an adjunctive therapy for stroke rehabilitation.

Methods

2,416 studies were reviewed and 3 were included investigating the effects of pranayama, namely, NSB, left UNB, and right UNB on stroke recovery.

Results

NSB was investigated in 16 patients where each patient underwent 3 sets of 10 rounds of Pranayama to assess functional mobility. Timed-Up and go test decreased from 32.53 seconds to 25.26 seconds with a p value <0.0001 . Right UNB was investigated in 11 patients with post-stroke aphasia (6) and left hemisphere damage (5). They underwent a total of 10 weeks of UNB practice. Seven tests were administered to assess mood, cognition and language. All demonstrated statistical significance for positive UNB effects. Left UNB was investigated in 36 patients with post-stroke spasticity and elevated systolic blood pressure. P values were less than 0.05 for post intervention spasticity and post intervention systolic blood pressure.

Conclusions

This literature review suggests that pranayama could complement traditional rehabilitation methods, aiding in the recovery of mobility, balance, mood, and cognitive functions such as language and attention. However, further clinical studies are required to address the current limitations of the studies and to determine its full potential as an adjunct therapy to standard post stroke care.

10. Development and Validation of a Stability Indicating HPLC Method for Tirzepatide

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Purpose

Tirzepatide is a dual glucose-dependent insulinotropic polypeptide (GIP) and glucagon-like peptide-1 (GLP-1) receptor agonist that helps manage blood glucose in individuals with Type 2 diabetes. In addition to glycemic control, tirzepatide has been shown to promote weight loss in adults with obesity and reduce the frequency of obstructive sleep apnea events. The growing clinical use of tirzepatide medication underscores the need for reliable analytical methods to ensure product quality and stability. This study aimed to develop and validate a forced degradation study in which the drug is intentionally stressed under harsh conditions to identify potential compound breakdown.

Methods

As a stability indicator, high-performance liquid chromatography (HPLC) was used to quantify tirzepatide. The mobile phase consisted of acetonitrile (ACN) with 0.1% trifluoroacetic acid (TFA) and water with 0.1% trifluoroacetic acid (TFA), and the stationary phase was a Phenomenex Luna 3 μm C18 column (150 x 4.6 mm). The column temperature conditions were set at 30 °C. The ACN concentration gradient increased from 40% to 60% over 10 minutes. The injection volume was 30 μL , and the flow rate was maintained at 2 mL/min for the total run time. The detection wavelength for tirzepatide was set to 202 nm for the best noise-to-peak detection ratio. This method will be evaluated under the International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH) guidelines.

Results

Research in progress.

Conclusions

Research in progress.

11. Periocular Cutaneous Changes in Chronic Topical Glaucoma Therapy

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Purpose

To review periocular dermatologic adverse effects associated with chronic topical glaucoma therapy, summarize proposed mechanisms and prevalence, and identify gaps in clinical documentation and management guidelines from a dermatologic perspective.

Methods

A narrative literature review was conducted using PubMed to search for publications related to topical glaucoma therapy and periocular cutaneous changes prioritizing those dated 2015-November 2025. Inclusion criteria involved topical glaucoma medications (e.g., latanoprost, bimatoprost, travoprost, timolol, brimonidine, dorzolamide), and relevant dermatologic terms (e.g., periorbital, periocular, periorbitopathy, PAPs, etc). Articles containing non-topical therapies and only ocular or other non-relevant systemic effects were excluded from data extraction. The included studies had case reports, retrospective cohort and observational studies, and articles on drug and pathologic mechanisms. Additional emphasis was placed on studies comparing preservative and preservative-free topical medications.

Results

Prostaglandin analogs, such as latanoprost, bimatoprost, and travoprost, are a common class of topical drugs causing PAP, periorbital fat atrophy, and eyelid sulcus deepening, and pigmentation changes. Recent studies show hyperpigmentation occurs in 30-35% of patients by 6 months of therapy. Dermal manifestations are mediated by prostaglandin FP receptor activation, upregulation of matrix metalloproteinases (MMPs), and local adipocyte apoptosis. Beta-blockers, such as timolol, are less common although periocular dermatitis, hypertrichosis, irritation, eczema, and allergy-type reactions are observed. Carbonic anhydrase inhibitors also have reports of dermatitis, pruritus, and erythema. Preserved formulations, particularly those containing benzalkonium chloride, were associated with exacerbated periocular adverse effects compared to preservative-free alternatives.

Conclusions

Periocular dermatologic changes associated with topical glaucoma therapy are common and clinically relevant yet remain inconsistently documented and lack standardized grading or management guidelines. This gap may contribute to delayed recognition, inadequate counseling, and reduced medication adherence. Thus, this emphasizes the need for greater interdisciplinary collaboration and future research with dermatologic consideration in glaucoma patients on topical therapies in order to improve adherence and optimize patient outcomes.

12. Periocular Photodamage: Dermatologic Conditions with Ocular Implications

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Purpose

To review primary periocular photodamage and its secondary ocular implications and further explore the need for interdisciplinary dermatology-ophthalmology management for optimal functional and patient outcomes.

Methods

A narrative literature review was conducted using PubMed to search for publications from 2015 to November 2025 related to UV-induced periocular damage and associated ocular manifestations. Inclusion criteria involved terms relating to sun exposure (e.g., ultraviolet rays, UV, sun exposure, photodamage, photoaging), relevant dermatologic terms (e.g., eyelid neoplasms, basal cell carcinoma, squamous cell carcinoma, lentigo maligna, actinic keratosis), and relevant ocular terms (e.g., ocular surface, dry eye, keratopathy, nasolacrimal obstruction, ophthalmology). Articles not relevant to these criteria were excluded from data extraction. The final included studies had case reports, retrospective cohort and observational studies, and articles on pathophysiologic mechanisms.

Results

Basal cell carcinoma remains the most common periocular malignancy, followed by squamous cell carcinoma and lentigo maligna with a preference for the lower eyelid region and medial canthus. Squamous cell carcinoma carries a higher risk of invasion leading to eyelid malposition, exposure keratopathy, or nasolacrimal obstruction if not addressed. Lentigo maligna and melanoma have the potential to invade the orbit and conjunctiva. Chronic photoaging can promote lid laxity and tear film instability, worsening dry eye or keratitis. Treatment involving tumor resection can be performed by both dermatology and oculoplastics, however, a study highlighted that dermatologists performed more of them.

Conclusions

While dermatologic literature is extensive in the different lesion characteristics and treatment efficacy, there seems to be limited information on co-management of patients compared to single-specialty management. There is limited data on delays in referral from dermatology to

ophthalmology or oculoplastics and any negative implications from that. This may prompt future research directions to look into strengthening the dermatology-ophthalmology interface and how interdisciplinary involvement may help preserve and improve ocular surface outcomes and streamline periocular tumor care.

13. Machine Learning Prediction of Dental Implant Success and Marginal Bone Loss: Toward Data-Driven Clinical Decision Support

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Purpose

Marginal bone loss (MBL) and implant failure remain multifactorial challenges in implant dentistry, influenced by host, surgical, and prosthetic parameters. This study aimed to develop and validate a machine learning (ML) model for early prediction of implant success and MBL using routinely collected clinical and material data, thereby enhancing precision-driven treatment planning and long-term outcome monitoring.

Methods

A comprehensive dataset integrating patient demographics, bone type (D1–D4), insertion torque, implant dimensions, surface characteristics, loading protocols, and crown–implant ratios was analyzed using Python (scikit-learn, XGBoost). Data preprocessing included label encoding, normalization, and fivefold cross-validation. Random Forest and XGBoost models were trained to classify implant success (yes/no) and predict quantitative MBL (mm). Model performance was assessed through accuracy, ROC-AUC, and calibration metrics. SHAP (SHapley Additive exPlanations) analysis was employed to identify and visualize key predictive features and biomechanical interactions.

Results

The optimized models demonstrated robust predictive ability for implant success (mean accuracy 81%, ROC-AUC 0.86). The most influential predictors included bone quality, insertion torque, crown–implant ratio, and implant diameter. Platform switching and moderately rough surfaces were associated with reduced MBL. SHAP-based interpretability provided clinically meaningful insights, revealing nonlinear dependencies among biomechanical and prosthetic variables and supporting individualized risk stratification.

Conclusions

Integrating ML-based predictive analytics into implant planning can enable proactive identification of high-risk cases, tailored surgical and prosthetic protocols, and improved long-term implant stability. This translational approach provides a practical, noninvasive clinical decision-support tool for precision implant prosthodontics and personalized patient care.

14. The Impact of Resveratrol in Substance Use Disorders: A Narrative Review

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Purpose

Resveratrol is a natural polyphenol that is gaining attention for its wide-ranging health benefits, including antioxidant and anti-inflammatory properties, protective cardiovascular effects, and neuroprotective impacts. Many of these health benefits closely align with the deficits and negative health effects caused by substances of abuse. This review seeks to analyze the literature regarding the effects of resveratrol on substance use disorders, delve into potential mechanisms of action, and explore the possibility of resveratrol as an alternative or supplemental treatment for substance use disorders.

Methods

This narrative review gathered and evaluated studies investigating the relationship between resveratrol and substance use. After compiling a list of keywords, literature searches were performed in major databases such as PubMed, Embase, and PsycNET. Eligibility criteria for article selection included all animal or human studies investigating the relationship between resveratrol and recreational and/or prescription drug use. Search results were screened using both the AI screening tool, ASReview, and manually to ensure relevance. Data from these studies were then compiled to identify patterns and gaps in the literature, seeking to identify resveratrol's potential therapeutic role in substance use disorders.

Results

The compiled studies looked at multiple drugs of abuse, including alcohol, methamphetamine, cocaine, and opiates, primarily using animal models. After examining the cumulative findings of the studies selected, it appears that resveratrol has strong antioxidant effects that can reduce damage due to reactive oxygen species which are increased in substance use. It was also found that resveratrol could minimize opioid tolerance, allowing lower doses of opioids to be prescribed and reducing the risk of addiction. There were mixed findings on resveratrol's impact on conditioned place preference, leading to uncertainty regarding its ability to mitigate addictive behaviors.

Conclusions

Substance use disorders are a widespread public health issue, and these findings have the ability to create a large impact worldwide. The evidence reviewed in this study indicates there is significant potential to provide benefit in the context of substance use treatment, particularly when a neuroprotective effect against reactive oxygen species or opioid tolerance is of concern. Additional studies in humans are needed in order to fully elucidate this potential.

15. Osteopathic Manipulative Treatment as an Adjunctive Approach to Improve Pelvic Perfusion and Fertility-Related Physiologic Markers

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Purpose

This prospective study aims to evaluate whether targeted OMT can enhance pelvic perfusion and fertility-associated physiologic markers in individuals undergoing standard fertility evaluation or treatment.

Methods

This study will be conducted in two phases.

Phase 1 (mechanistic): Functional near-infrared spectroscopy (fNIRS) will be used to assess relative changes in pelvic-region blood flow and oxygenated hemoglobin concentrations before and after standardized OMT sessions.

Phase 2 (clinical correlates): Participants will receive adjunct OMT including myofascial release, soft tissue, and lymphatic techniques administered by trained providers following a standardized protocol. In female participants, endometrial thickness will be measured via transvaginal ultrasound. In male participants, semen parameters (concentration, motility, morphology, and total motile count) will be assessed. Where applicable, platelet-rich plasma (PRP) interventions administered as part of routine care will be documented. Fertility-related outcomes, including conception rates, will be tracked longitudinally and compared with matched controls receiving standard care alone.

Results

We hypothesize that OMT will be associated with increased pelvic perfusion as measured by fNIRS and ultrasound, increased endometrial thickness in female participants, and improved semen

parameters in male participants. We further anticipate that these physiologic improvements may correlate with enhanced fertility outcomes in couples receiving adjunct OMT.

Conclusions

This study seeks to provide objective physiologic evidence supporting OMT as a non-invasive adjunctive therapy targeting pelvic perfusion and reproductive function. If confirmed, these findings may help clarify the mechanistic basis by which OMT could support fertility care and inform future integrative treatment strategies.

16. Advancing Oral Cancer Screening Through Deep Learning Models: A Systematic Review

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Purpose

This review aims to critically evaluate current evidence on the application of deep learning in oral cancer screening, with a focus on its effectiveness in early detection, diagnostic accuracy, and potential to improve patient outcomes.

Methods

A comprehensive literature search was conducted across multiple databases, including PubMed, EBSCO, Google Scholar, and National Institute of Health (NIH). The reviewers used various MeSH terms identifying titles and abstracts relevant to the study. Screening criteria included: peer-reviewed original articles, literature written in English, human-based studies, and publications of literature from 2020 to 2025. Full text articles of the selected literature were evaluated based on screening criteria.

Results

Eleven studies were included: nine evaluated convolutional neural networks (CNNs), two assessed large language models (LLMs), and one compared a Swin transformer to a CNN. Six studies utilized clinical intraoral photographs, two used smartphone-captured images, and one study each used optical coherence tomography (OCT), portable endoscope images, and narrow-band imaging (NBI) endoscopic video frames. CNNs consistently achieved the highest diagnostic performance, with accuracies ranging from 83–99%, sensitivities 83–99%, specificities 81–100%, and AUC values between 0.83–0.99. LLMs (ChatGPT 3.5, 4.0, 4o, Gemini) showed lower and more variable performance, with accuracies of 36–67%, sensitivities from 18% (image-only) to 100% (image + clinical context), and specificities of 52–97%. The Swin transformer achieved F1-scores of 0.83–0.84 and AUCs of 0.81–0.93, performing comparably to the high performing CNNs.

Conclusions

Deep learning models, particularly CNN's and transformers showed strong potential for enhancing early detection and diagnostic accuracy in oral cancer screening. However, large language models (LLM) demonstrated limited reliability for diagnostic applications.

17. Impact of Interpreter Services Training On Dental Students' Communication Confidence

- Presenting Author: Austin Walker (Roseman University)

Additional Author:

- David McMillan (Roseman University)

Purpose

Dental schools serve increasingly diverse patient populations, including individuals with limited English proficiency (LEP) who face communication barriers that can compromise oral health outcomes.

The objective of this study is to evaluate whether an interpreter services training workshop improves dental students' confidence and competence when working with LEP patients.

Methods

An interactive one-hour workshop was developed to train dental students in effective interpreter use and culturally responsive communication. The session introduces students to the roles and responsibilities of interpreters. Best practices for in-person and technology-based interpretation. A group debrief allowing students to reflect on communication challenges and opportunities for improvement.

To measure the workshop's impact on student confidence, three surveys will be administered: one prior to the intervention, one immediately afterward, and one three months later to assess retention and clinical application. Target sample size (n=100). Minimum determined to be (n=32). Each survey uses a Likert-scale tool to evaluate technique usage, and confidence in caring for LEP patients. Total survey questions (n=9).

Results

Statistical analysis is ongoing and the included graphs show results of 4 questions and their responses rounded to the nearest integer %

All questions showed positive trend between Pre and Post Training Surveys.

Survey 1 n= 169

Survey 2 n= 115

Conclusions

This workshop model addresses a critical gap in dental education. Pending data analysis, findings will support curriculum integration to enhance cultural competency, reduce disparities, and improve oral health equity for LEP patients.

18. Investigating the Antagonist Properties of Naloxone in Synthetic Isotonitazene and Borphine in Brain Microglial Cells

- Presenting Author: Ayanda Mkhize (Noorda College of Osteopathic Medicine)

Additional Author:

- Madison Stewart (Noorda College of Osteopathic Medicine)
- Kalissa Lopez (Noorda College of Osteopathic Medicine)
- Henrichka Joseph (Noorda College of Osteopathic Medicine)
- Victor M Jimenez (Noorda College of Osteopathic Medicine)

Purpose

To 1) characterize the cytotoxic and immunomodulatory effects of isotonitazene and borphine on CNS immune cells in vitro, and 2) evaluate naloxone's antagonist profile and potential cytotoxicity at clinically relevant concentrations.

Methods

RAW264.7 macrophages and BV2 microglial cells were exposed to graded concentrations of isotonitazene (0.0015–84 ng/mL) or borphine (0.0015–103.5 ng/mL). Cytotoxicity was quantified via lactate dehydrogenase (LDH) assay and dose–response relationships defined. BV2 supernatants were assayed for TNF- α and IL-10 by ELISA. Separately, BV2 cells were exposed to naloxone (2–12 ng/mL) for 30-minute and 2-hour intervals to model intranasal pharmacokinetic ranges and to inform reversal experiments.

Results

Isotonitazene induced peak microglial cytotoxicity of approximately 90% at 4 ng/mL, which declined to around 35% at 54 ng/mL and 10% at 64 ng/mL. Borphine exhibited a similar pattern, with maximum cytotoxicity at 0.035 ng/mL, decreasing to 35% at 54 ng/mL and maintaining low cytotoxicity at 103.5 ng/mL. Both opioids display high cytotoxicity at low concentrations, with Isotonitazene showing greater toxicity across tested doses.

Naloxone exhibited increased cytotoxicity (50-55% cell death) at higher doses (10–12 ng/mL) following 2-hour exposure. Based on these findings, naloxone reversal studies will utilize 4 ng/mL as a lower clinical reference dose and 10 ng/mL as an upper experimental dose. Isotonitazene induced peak microglial cytotoxicity of approximately 90% at 4 ng/mL, which declined to around 35% at 54 ng/mL and 10% at 64 ng/mL. Borphine exhibited a similar pattern, with maximum cytotoxicity at 0.035 ng/mL, decreasing to 35% at 54 ng/mL and maintaining low cytotoxicity at

103.5 ng/mL. Both opioids display high cytotoxicity at low concentrations, with Isotonitazene showing greater toxicity across tested doses.

Naloxone exhibited increased cytotoxicity (50-55% cell death) at higher doses (10–12 ng/mL) following 2-hour exposure. Based on these findings, naloxone reversal studies will utilize 4 ng/mL as a lower clinical reference dose and 10 ng/mL as an upper experimental dose. More experiments are in progress (Work in Progress)

Conclusions

Observed naloxone cytotoxicity at higher concentrations highlights the need to clarify optimal antagonist dosing and mechanisms of toxicity. These findings underscore the urgency of further mechanistic and translational studies to inform public health responses to novel synthetic opioid exposures.

19. From Image to Chairside Decision-Making: Unsupervised Morphological Clustering of Carious Lesions Aligned with Clinical Severity

- Presenting Author: Bailey Axelrad (Roseman University)

Additional Author:

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- Shankargouda Patil (Roseman University)
- Shilpa Bhandi (Roseman University)
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Purpose

Deep learning models for dental caries in photos often do binary detection (caries vs. no caries) or lesion localization, but they rarely investigate the morphological variety of lesions or how these image-based phenotypes correspond with clinical severity scales like ICDAS. The current study uses unsupervised clustering to trim lesion-level patches from the Scientific Data intraoral caries dataset.

Methods

The "Annotated intraoral image dataset for dental caries detection" (6,313 images, YOLO-style bounding boxes) was made available to the public. We identified 6,687 lesion patches from 2,150 photos that were caries-positive. We calculated 24 manually created features for every patch: six LAB color statistics, four morphological (bounding-box width, height, area, and aspect ratio), and fourteen Local Binary Pattern (LBP) texture descriptors. After z-standardizing the features, PCA was used to reduce them to 20 components (100% variance maintained). The number of clusters was chosen using elbow, silhouette, Calinski-Harabasz, and Davies-Bouldin criteria after K-means clustering was performed to PCA space. To evaluate feature contributions to cluster separation, a post-hoc random forest model was trained. Each cluster's lesion montages were independently examined by two calibrated dentists who also recommended management techniques and provided clinical severity designations (D1/D2) and approximate ICDAS equivalents.

Results

There were found to be two stable morphological clusters (silhouette ≈ 0.40). Larger patches (median area $\approx 135,600 \text{ px}^2$) with somewhat lower lightness and higher surface irregularity (higher LBP entropy) were found in Cluster 0 (703/6,687 lesions, 10.5%), which visually corresponded to chalky or brownish, surface-breaking lesions. Moderately large, smoother lesions (median area

≈92,700 px²) with higher lightness and higher LBP energy were seen in Cluster 1 (5,984 lesions, 89.5%), which is consistent with cavitated lesions with exposed dentin. Lesion scale (bounding-box height and width) explained over 99% of the separability between clusters, according to random-forest feature importance, with color and texture providing just slight enhancements. Dentists associated cluster 1 with deeper dentin lesions (ICDAS ≈5) requiring restorative therapy, while cluster 0 was primarily associated with early dentin involvement with ICDAS ≈3 and "preventive + monitor" management. Unsupervised clusters captured a continuous morphological spectrum that partially but not perfectly matched distinct clinical categories, as evidenced by the 50% ICDAS alignment and 50% therapy alignment.

Conclusions

We identified two dominating, data-driven morphological clusters of carious lesions using solely open, annotated intraoral photos. These clusters correspond physiologically plausibly with clinical severity and therapy choices.

20. The Effect of Virtual Reality on Dental Anxiety and Pain

- Presenting Author: Bayler Gunnell (Roseman University)

Additional Author:

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- Nia Roberson (Roseman University)
- Connor Schwartz (Noorda College of Osteopathic Medicine)
- Man Hung (Roseman University)

Purpose

Dental anxiety and pain remain major barriers to oral healthcare, often leading to avoidance and worsened outcomes. Traditional behavioral and pharmacological approaches can be effective but carry limitations in feasibility, safety, and patient acceptance. Virtual reality (VR) has emerged as a non-invasive tool for distraction and relaxation, yet its application in dentistry is still developing. This scoping review collaborated current evidence on VR use in dental settings for reducing anxiety and pain, identified gaps in the literature, and assessed implications for practice.

Methods

Comprehensive searches of PubMed, Scopus, Web of Science, and Dentistry and Oral Sciences Source identified peer-reviewed studies using VR during dental procedures. Eligible studies involved human participants, assessed pain and/or anxiety, and were published in English. Of 476 records screened, 64 met inclusion. Data were extracted on study design, population, procedure type, VR system, and outcomes. Narrative synthesis was used due to study heterogeneity.

Results

Across pediatric and adult populations, VR interventions consistently reduced dental-related anxiety and pain. Pediatric studies frequently reported lower distress with immersive environments, while adult studies showed improved comfort and tolerance during restorative and surgical treatments. VR was generally well-accepted, with minimal adverse effects and high patient satisfaction. However, variability in methodology, VR systems, and outcome measures limited comparability across studies.

Conclusions

Evidence supports VR as a promising adjunct for managing dental anxiety and pain, offering a safe, patient-centered alternative to traditional strategies. Future research should focus on standardized protocols, cost-effectiveness, and long-term outcomes to inform broader clinical integration. VR has the potential to enhance patient experiences, improve access to compassionate, effective dental care and increase oral health.

21. Immunomodulatory Effects of Tianeptine In Vivo using *Galleria mellonella* Larvae Model

- Presenting Author: Ben Laughter (Noorda College of Osteopathic Medicine)

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- Victor Jimenez, Jr (Noorda College of Osteopathic Medicine)

Purpose

Tianeptine, also known as “Gas Station Heroin”, is an atypical tricyclic antidepressant, therapeutically prescribed in Europe. It’s also a mu-opioid receptor and weak delta-opioid receptor agonist. The FDA has not approved its use for any medical condition due to its high potential for abuse. Research suggests it has an anti-inflammatory effect that might explain its antidepressive properties. The focus of this study is to explore the anti-inflammatory effects of tianeptine in vivo by inducing inflammation in *Galleria mellonella* using bacteria. *G. mellonella* has similar immune cells to humans and has recently gained popularity as an immune model for research.

Methods

To find the survival rate of *G. mellonella* injected with tianeptine, larvae were injected with 10 μ L of tianeptine dissolved in PBS at five different doses: 16.00, 4.00, 1.00, 0.25, and 0.06 μ g/mL. Two control groups were included: non-injection, and PBS injection. Larvae were selected based on activity level, color, and weight. They were observed every 24 hours for changes in color, weight, and activity, including death or pupation, for five days. In future experiments, *S. epidermidis* and *E. coli* will be used to test the immunomodulatory effects of tianeptine in vivo. Each species will be injected into the worms at doses of 10², 10³, 10⁴, and 10⁵ CFU to determine the LD50 prior to the use of tianeptine.

Results

The survival of *G. mellonella* for each dose of tianeptine was 60% (16 μ g/mL), 72% (4 μ g/mL), 68% (1 μ g/mL), 56% (0.25 μ g/mL), and 48% (0.06 μ g/mL). An increase in larvae death was observed at 16.00 and 0.06 μ g/mL, while the control survived 90%. This demonstrates an inverse, U-shaped curve. Results for bacterial infections are pending.

Conclusions

The inverse U-shaped survival curve of tianeptine in *G. mellonella* larvae is like previous results generated with peripheral and central macrophage in vitro. This data demonstrates a similar immunomodulatory effect of tianeptine beyond in vitro studies to include in vivo *G. mellonella* as a suitable model. Ultimately, this work adds more context to the expanding field of research investigating the immunological effects of psychiatric medications.

22. The Impact of Physical Activity and Diet on the Potassium-Chloride Cotransporter 2 in the Central Nervous System: A Literature Review

- Presenting Author: Benjamin Latey (Noorda College of Osteopathic Medicine)

Additional Author:

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- Andrew Payne (Noorda College of Osteopathic Medicine)

Purpose

Potassium-Chloride Cotransporter 2 (KCC2) is a neuron-specific chloride transporter critical in maintaining neuronal chloride gradients and preserving GABAergic and glycinergic inhibitory neurotransmission in the central nervous system (CNS). Decreased KCC2 expression or function disrupts chloride homeostasis and contributes to hyperexcitability disorders including epilepsy, spasticity, and neuropathic pain. This literature review evaluated how the lifestyle interventions of exercise and dietary factors can modulate KCC2 expression and function in the CNS.

Methods

We reviewed experimental and clinical literature examining associations between physical activity or dietary interventions and downstream effects on KCC2 and its gene SLC12A5, including expression levels, membrane localization, and functional measures of inhibitory tone. Mechanistic findings involving upstream regulators (e.g., BDNF-TrkB signaling) and inflammatory/metabolic pathways were integrated.

Results

In spinal cord injury (SCI), KCC2 is downregulated in motoneuronal membranes and contributes to impaired chloride homeostasis and spasticity. Across multiple rehabilitation paradigms (voluntary wheel running, treadmill training, motorized cycling, and passive cycling), exercise consistently restored KCC2 expression and improved membrane localization, corresponding to improvements in inhibitory function. Several studies implicated BDNF-TrkB signaling as a key mediator of exercise-induced KCC2 restoration, including evidence that TrkB inhibition blocks training-related KCC2 upregulation. Dietary interventions also modulated KCC2 and/or upstream pathways. Ketogenic diets increased KCC2 expression in hippocampal regions in seizure models, aligning with improved inhibitory balance. Nutrient status influenced neurotrophic signaling and KCC2: amino acid deficiency (notably threonine) rapidly reduced KCC2 protein in the anterior piriform cortex, while zinc and taurine status altered BDNF/TrkB-related signaling with downstream effects relevant to inhibitory tone. Diet-associated inflammation, mitochondrial stress, and high salt

intake were additionally linked to KCC2 downregulation through inflammatory and BDNF-mediated mechanisms.

Conclusions

Current evidence supports exercise as an effective modulator of KCC2 expression and membrane localization with functional improvements in inhibitory control. Dietary patterns and micronutrient availability also influence KCC2 directly and indirectly through neurotrophic, metabolic, and inflammatory mechanisms. Because exercise and diet often affect overlapping pathways, combined lifestyle strategies may hold translational promise as accessible, non-pharmacological approaches to support inhibitory neurotransmission in CNS disorders. Further human studies are needed to define optimal intervention parameters and clarify long-term clinical implications.

23. Comparison of Anti-inflammatory effects of Berberine and Chlorhexidine Mouthwashes by Assessing Salivary Biomarkers in Chronic Periodontitis: A Randomized Clinical Trial.

- Presenting Author: Bhavana Sujanamulk (Faculty of dentistry ,Najran university ,kingdom of Saudi Arabia)

Purpose

Berberine, a phytochemical alkaloid derived from *Rhizoma coptidis*, has demonstrated antimicrobial and anti-inflammatory properties in periodontal research. Salivary biomarkers such as aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), amylase, calcium, and white blood cell (WBC) count may reflect periodontal inflammatory status. Hence, we aimed to compare the anti-inflammatory effects of berberine and chlorhexidine mouthwashes in chronic periodontitis using selected salivary biochemical parameters

Methods

A double-blind, parallel-arm randomized controlled trial was conducted among 80 patients with chronic periodontitis allocated to berberine or 0.12% chlorhexidine mouthwash (n = 40 per group). Unstimulated saliva samples were collected at baseline, 1 hour, and 1 week post-intervention and analyzed for ALP, AST, ALT, calcium, amylase, and WBC levels. Intergroup comparisons were performed using independent t-tests, and intra-group changes were assessed using repeated-measures ANOVA. Statistical significance was set at $p < 0.05$.

Results

Significant baseline differences in several biomarkers were observed between groups, indicating imbalance despite randomization. Both groups showed significant reductions in ALP, AST, calcium, amylase, and WBC levels over 1 week ($p < 0.05$), while ALT showed a nonsignificant downward trend. Chlorhexidine demonstrated greater reductions in ALP and WBC levels, whereas berberine showed relatively greater reductions in calcium and ALT. No significant between-group differences were observed at later time points ($p > 0.05$).

Conclusions

Both mouthwashes reduced salivary biomarkers associated with periodontal inflammation. Baseline differences suggest group imbalance rather than treatment effects. Larger, longer-term studies incorporating clinical periodontal outcomes are required to establish comparative efficacy.

24. Gut Microbiome Modulates PD-1 Inhibitor Efficacy in Cancer Therapy

- Presenting Author: Bryan Jimenez (Noorda College of Osteopathic Medicine)

Additional Author:

- John Kriak (Noorda College of Osteopathic Medicine)

Purpose

The gut microbiome has emerged as a critical factor in determining the efficacy of PD-1 inhibitor therapy, providing insights into the observed variability in patient outcomes. This systematic review aims to synthesize current preclinical and clinical evidence to clarify the complex interactions between gut microbiota composition and anti-PD-1 immunotherapy efficacy. By investigating these relationships, the study seeks to establish the microbiome's role as both a predictive biomarker and a viable therapeutic target for enhancing cancer treatment responses.

Methods

This study used a systematic review methodology to synthesize evidence from current preclinical and clinical studies. The analysis focused on identifying specific microbial taxa associated with treatment response and resistance, as well as the mechanistic roles of microbiome-derived metabolites. Furthermore, the review evaluated the clinical efficacy of microbiome-targeted interventions, specifically fecal microbiota transplantation (FMT) and dietary modifications. The research also examined the impact of antibiotic-induced dysbiosis on therapeutic outcomes.

Results

Findings indicate that microbial taxa such as *Akkermansia muciniphila* and *Bifidobacterium* species are linked to improved responses, whereas *Bacteroidales* and *Enterococcus* correlate with therapeutic resistance. Mechanistically, metabolites like short-chain fatty acids modulate host immunity via epigenetic regulation of CD8+ T cell function and dendritic cell activation. Clinically, FMT increased objective response rates from 25% to 58% in refractory cases. Additionally, recent Phase II trials demonstrated durable responses in historically resistant cancers, such as pancreatic ductal adenocarcinoma.

Conclusions

The microbiome serves as a vital predictive biomarker and therapeutic target, though its efficacy is significantly hindered by antibiotic-induced dysbiosis. Future research must focus on establishing standardized protocols for microbiome modulation and validating biomarkers across diverse patient populations to address gaps in reproducibility. Ultimately, integrating microbiome science

into immuno-oncology provides a framework for developing personalized treatment strategies to overcome PD-1 inhibitor resistance.

25. Integrative Network and Docking Analyses Reveal Key Proteins Drug Targets in *Enterococcus faecalis* Virulence

- Presenting Author: Calvin Bennion (Roseman University)

Additional Author:

- Shankargouda Patil (Roseman University)
- Shilpa Bhandi (Roseman University)
- Frank Licari (Roseman University)

Purpose

This study aimed to identify key virulence associated proteins and potential therapeutic targets in *E. faecalis* using an integrative computational systems biology and molecular docking approach.

Methods

Protein protein interaction networks were constructed using the STRING database, and network topology was analyzed using multiple centrality measures including degree, betweenness, and maximal neighborhood component to identify hub proteins associated with virulence. Structure based virtual screening was performed using AutoDock Vina against selected bacterial virulence factors and host inflammatory mediators, evaluating 221 ligand target combinations. Binding affinities were assessed, and top ranked complexes were selected for further validation using molecular dynamics simulations and MM GBSA free energy calculations.

Results

Network analysis identified SodA, HslU/HslV, and GelE as central hub proteins within the *E. faecalis* virulence interaction network. Docking analyses revealed 86 strong binding complexes with binding energies below $-7.0 \text{ kcal}\cdot\text{mol}^{-1}$, with a best binding affinity of $-9.59 \text{ kcal}\cdot\text{mol}^{-1}$. Lead interactions included luteolin targeting GelE and EDTA targeting SodA, demonstrating strong and stable binding profiles. Several ligands also exhibited favorable interactions with host inflammatory mediators, suggesting potential dual targeting capability. Molecular dynamics and MM GBSA analyses supported the stability of selected protein ligand complexes.

Conclusions

This integrative computational study identifies key virulence associated hub proteins and promising small molecule inhibitors in *E. faecalis*. These findings provide a rational framework for future in vitro validation and support the development of targeted strategies to improve root canal disinfection and reduce persistent endodontic infections.

26. Machine Learning Assisted Optimization of Psilocin for the Rational Design of Therapeutics Against Neuroinflammation

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Purpose

Neurodegeneration contributes to disorders such as Alzheimer's, Huntington's, and Parkinson's diseases, which share chronic neuroinflammation as a common pathological feature. Sustained immune activation in the central nervous system promotes pro-inflammatory cytokine release, amplifies neuronal injury through feedback loops, and contributes to cognitive decline. Serotonin signaling has demonstrated immunomodulatory effects making it a potential target for attenuating neuroinflammation. Psilocin, a serotonin receptor agonist, exhibits such potential but is limited by a narrow therapeutic window characterized by rapid absorption (T_{max} 1–4 hours), low peak plasma concentration (C_{max} 8.2 ± 2.8 ng/mL), and short half-life ($T_{1/2}$ 2–4.8 hours). These constraints are attributed in part to its low molecular weight (MW) and suboptimal physicochemical properties including, but not limited to, polar surface area (PSA), hydrogen bond acceptors/donors (HBA/HBD), and lipophilicity (LogP). This study aimed to computationally design psilocin derivatives with increased molecular weight and improved receptor interactions to enhance pharmacodynamic performance.

Methods

A three-dimensional virtual model of the human serotonin 5-HT_{2A} receptor was constructed using published x-ray crystallography data from the RCSB Protein Data Bank. The Schrodinger Small Molecule Discovery Suite was used to generate psilocin derivatives. In short: the serotonin binding pocket was characterized by geometric and physicochemical parameters, multiple psilocin derivatives were docked into the receptor binding site, and their resulting ligand-receptor interactions were evaluated using a composite Docking Score (DS) derived primarily from Coulomb and Van der Waals energies. High-scoring ligands were iteratively optimized through systematic R-group substitution within the binding pocket using a machine-learning workflow.

Results

Psilocin, a 31-atom molecule with MW of 204.27 g/mol, served as the initial scaffold with an average DS of -4.0177. Across ten optimization cycles, 342 derivative ligands were generated. The earliest iteration produced 166 compounds with an average DS of -4.876. By the tenth iteration, a 47-atom derivative with MW of 610.47 g/mol was developed with an improved DS of -7.310 indicating enhanced affinity of the ligand to its receptor.

Conclusions

Although experimental validation is required, our in silico findings demonstrate the feasibility of rational, receptor-guided modification of psilocin to improve its MW and support further development of serotonergic anti-inflammatory agents.

27. Development of a Novel Balance Assessment to Evaluate and Improve Balance

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- David Sant (Noorda College of Osteopathic Medicine)

Purpose

In the United States, over 14 million Americans aged 65 years and older report falling annually. Falls are associated with a higher risk of future falls and substantially increase costs of healthcare, morbidity, and mortality. In older adults, 84.6% of injury-related deaths are due to falls and 38.19% of hospital admissions result from fall injuries. Although falls are more prevalent in later life, balance reflects lifelong neuromuscular and neurological health. Early-life postural stability may therefore serve as a valuable biomarker of future functional decline, highlighting the need to characterize balance performance in healthy adults. The primary objective of this study is to develop and evaluate a novel balance assessment using BlazePods, a BOSU ball, and a slackline to characterize balance performance. A secondary objective is to examine the relationship between performance and age, and to explore the utility of these measures as biomarkers contributing to prediction of biological age relative to chronological age.

Methods

Healthy, osteopathic medical students will complete the novel balance assessment examining dexterity, steadiness, and sensorimotor ability to establish baseline normative data. The medical students will also complete the Activities-Specific Balance Confidence Scale to establish a baseline for subjective balance confidence. The assessment can then be used to evaluate balance performance with other populations.

It is anticipated that normative data will be established with the medical students and that upon retesting the test will be sensitive to improvements in balance. From there, the test can be used with various other populations, with the normative data serving as a control.

Implications. This study may help establish a new protocol for balance assessment that can apply to individuals of various groups. Findings could inform future student-led research and contribute to improved clinical approaches, with the potential to reduce fall risk and address balance-related functional impairments.

Results

Work in progress

Conclusions

Work in progress

28. Decoding Genetic and Network Signatures of Susceptibility to Orthodontic Root Resorption: Toward Predictive and Personalized Orthodontics

- Presenting Author: Casey Morishige (Roseman University)

Additional Author:

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Purpose

Orthodontically induced root resorption (OIRR) remains a significant and often unpredictable complication of orthodontic treatment. While mechanical stress initiates the process, genetic and molecular factors largely determine individual susceptibility. This study aimed to uncover key genetic variants and regulatory networks associated with OIRR by integrating data from single nucleotide polymorphisms (SNPs), gene–gene interaction networks, and noncoding RNA regulation to build a biologically grounded framework for personalized orthodontic risk prediction.

Methods

Genome-wide association studies (GWAS), dbSNP, and PubMed-reported literature were systematically reviewed to identify OIRR-related polymorphisms in cytokine and bone remodeling genes (IL1B, TNFRSF11A, P2RX7, OPG, RANK, RANKL). Gene–gene interactions were mapped using STRING and visualized in Cytoscape, with CytoHubba used to identify central hub genes. Functional enrichment (DAVID, Enrichr) determined key biological pathways, while miRNA and lncRNA regulatory interactions were predicted using miRWalk and DIANA-lncBase. Candidate markers were validated through literature cross-checking for clinical consistency.

Results

Network analysis revealed tightly connected clusters among inflammation and bone resorption genes, predominantly involving the TNF, NF- κ B, and apoptosis signaling pathways. High-impact variants—including IL1B rs1143634, TNFRSF11A rs3018362, and P2RX7 rs3751143—showed reproducible associations with root resorption risk. Functional enrichment confirmed cytokine–cytokine receptor interactions and osteoclast differentiation as central mechanisms. Hub genes (IL1B, CASP1, TNFRSF11A, P2RX7) were targeted by regulatory RNAs such as miR-21, miR-146a,

miR-155, and lncRNAs MALAT1 and H19, highlighting a multi-layered post-transcriptional network influencing host response and susceptibility.

Conclusions

This integrative genomics study identifies a reproducible molecular framework underlying orthodontic root resorption, linking inflammation-driven genetic polymorphisms with regulatory RNA networks. The findings provide a biologically plausible basis for developing genetic screening panels and personalized treatment protocols. Translating these insights into clinical practice could help orthodontists identify high-risk patients early, adjust treatment forces, and minimize irreversible root damage—moving closer to precision orthodontics.

29. Imaging in Acute Neurovascular Emergencies: Optimizing Outcomes in Large Vessel Occlusion Stroke

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Purpose

Large vessel occlusion (LVO) stroke is associated with high rates of morbidity and mortality, and patient outcomes are strongly influenced by rapid identification and timely reperfusion. Advances in acute neurovascular imaging have transformed stroke care by enabling precise patient selection, extending treatment windows, and accelerating clinical workflows. The purpose of this project is to evaluate how modern neurovascular imaging strategies influence treatment selection, workflow efficiency, and clinical outcomes in patients with acute LVO stroke.

Methods

A narrative review of peer-reviewed literature published within the past decade was conducted. The review focused on CT-based imaging (non-contrast CT, CT angiography, CT perfusion), MRI techniques, quantitative imaging biomarkers, and workflow innovations including mobile stroke units and automated imaging analysis using artificial intelligence-based triage platforms. Major randomized trials, meta-analyses, and guideline statements were emphasized to assess outcome-driven applications of acute neurovascular imaging.

Results

Rapid CT-based imaging remains the cornerstone of acute stroke triage due to widespread availability and speed. CT angiography reliably identifies LVOs, while perfusion imaging enables differentiation of ischemic core from salvageable penumbra, facilitating reperfusion therapy beyond traditional time windows. Advanced imaging selection has been associated with higher rates of functional independence and lower disability in late window thrombectomy populations. Imaging biomarkers, including infarct core volume, collateral status, and perfusion metrics, correlate with reperfusion success, hemorrhagic transformation risk, and long-term functional outcomes. Workflow innovations, including mobile stroke units and AI-based triage software,

significantly reduce door-to-needle and door-to-puncture times, increasing access to reperfusion therapies and improving clinical outcomes.

Conclusions

Modern acute neurovascular imaging directly impacts clinical outcomes by guiding reperfusion decisions and optimizing stroke workflows. Integration of advanced imaging techniques and system-level innovations is essential for improving functional and clinical outcomes in patients with LVO stroke and represents a critical component of precision stroke care.

30. Developmental and psychosocial determinants of ego-syntonic versus ego-dystonic experience in pediatric trichotillomania

- Presenting Author: Chelsea Chang (Noorda College of Osteopathic Medicine)

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Purpose

Trichotillomania (TTM) in children is often initially experienced as a largely ego-syntonic behavior - soothing, habitual, or emotionally regulating - with minimal internal conflict. However, it appears to become increasingly ego-dystonic across adolescence, as hair pulling is more recognized as unwanted, uncontrollable, and socially impairing. This developmental shift is clinically important but has not been systemically synthesized. This narrative literature review aims to explain the shifts from predominantly ego-syntonic to more ego-dystonic over time and describe developmental, psychosocial, and clinical factors that influence this transition. Outcomes may help determine implications for assessment, prognosis, and treatment selection in children and adolescents.

Methods

Peer-reviewed studies and clinical reports were identified from 2015 to 2025. The inclusion criteria focus on age of onset, pulling style (automatic vs focused), urge awareness, distress, and functional impairment of pediatric TTM. Key words include trichotillomania, tension reduction, syntonic (harmony, self-image, perception, values, beliefs, reward, relief), dystonic (impulses, distress, guilt, intrusive thoughts). Inclusion criteria: articles in English, children aged 5 to 18 years. Exclusion criteria: studies published before 2015, non-English language, non-TTM-related content, and adult ages.

Results

Out of 24 articles obtained from the literature search, 8 met the inclusion criteria and supported 3 key themes: developmental and non-developmental drivers, progression from ego-syntonic to ego-dystonic experiences, and social determinants. In younger children, TTM often presents as automatic, low-awareness pulling that is self-soothing, habitual behavior with fewer urges and greater perceived relief. With age, developmental factors, such as increased abstract thinking, along with non-developmental influences, such as environmental or culture, provide the self-awareness for patients with TTM to experience an ego-dystonic version of the condition. Social

factors also shaped TTM experience: participants reported maladaptive beliefs about relationships and perceived judgment that often conflicted with culturally and environmentally reinforced expectations (gender norms and stigma).

Conclusions

Ego-dystonic behavior in children is driven by negative emotions such as stress, anxiety, anger, or sadness. The transition from ego-syntonic to ego-dystonic experiences in TTM is most commonly influenced by developmental factors including cognitive development and insight, and social appearances and pressures. These findings can help guide future implications for assessment, prognosis, and treatment in children and adolescents.

31. Emotion Regulation Deficits as a Shared Mechanism Underlying Overlapping Psychological and Physiological Features of Trichotillomania and Sleep Terrors in Children

- Presenting Author: Chelsea Chang (Noorda College of Osteopathic Medicine)

Additional Author:

- Erika Navarro (Noorda College of Osteopathic Medicine)

Purpose

Trichotillomania (TTM), a hair-pulling disorder, and sleep terrors in the pediatric population are clinically distinct conditions that occur in different states - wakefulness and non-rapid eye movement (non-REM) sleep, respectively. Both disorders are commonly associated with stress, anxiety, and difficulties in emotional regulation. However, the literature has not clearly explored whether this dysregulation may explain a shared mechanism of potential co-occurrence in children. This literature review aims to synthesize current evidence on emotion regulation deficits in TTM and sleep terrors to explain overlapping psychological and physiological features of both disorders in children. Outcomes may inform implications for assessment, prognosis, and treatment selection in affected children and adolescents.

Methods

Comprehensive literature review using journal searches NCBI, NIH, PubMed, and Ovid Medline from 2015-2025 was conducted. The inclusion criteria focus on pediatric TTM and parasomnias with keywords including trichotillomania, hair-pulling disorder, tension, stress, autonomic arousal, anxiety, relief, parasomnias, non-REM, emotional dysregulation/deficit, and nightmares. Inclusion criteria: articles in English, children aged 5 to 18 years. Exclusion criteria: studies published before 2015, non-English language, non-TTM-related content, and adult ages.

Results

Out of 20 articles obtained from the literature search, 10 publications met the inclusion criteria and supported the themes: increased physiological arousal, poor emotional awareness, and low ability to modulate anxiety or tension in children with TTM and sleep terrors. Regulation failures in both disorders result in behavioral and autonomic symptoms. In TTM, emotional deficits manifest as repeated hair-pulling that is self-soothing and relieves internal distress. In sleep terrors, dysregulation appears autonomically hyperarousal such as tachycardia and diaphoresis, and behavioral discharges during non-REM sleep. Framing both disorders with this approach emphasizes the possibility of co-occurrence which can deepen our understanding of pediatric emotional regulation and improve prevention, diagnosis, and holistic care.

Conclusions

Emotional regulation deficits provide a framework that links Trichotillomania and sleep terrors in children, two distinct disorders. The overlapping psychological and physiological features of both disorders emphasize potential co-occurrence that can help manage arousal and behavioral symptoms.

32. Behavioral and Cognitive Techniques in Pediatric Dental Anxiety Management

- Presenting Author: Connor Lemmon (Roseman University)

Additional Author:

- Jacob Marx (Roseman University)
- Corban Ward (Roseman University)
- Jacob Newman (Roseman University)
- Ethan Fullmer (Roseman University)
- Man Hung (Roseman University)
- Sam Dyal (Roseman University)
- Alicia Parry (Roseman University)

Purpose

Dental anxiety in pediatric patients is a prevalent challenge that can interfere with treatment, reduce care quality, and contribute to long-term avoidance of dental services. Effective anxiety management is therefore essential for creating positive experiences and supporting lifelong oral health. Although behavioral techniques exist to address specific pediatric dental anxiety, the variety of methods and inconsistent evidence make it difficult for clinicians to choose effective approaches. The aim of this scoping review is to summarize and categorize current literature on behavioral management strategies, providing clinicians with an evidence-based overview tailored to children with high dental anxiety.

Methods

A comprehensive search was conducted in PubMed, Scopus, and Dentistry & Oral Sciences Source to identify peer-reviewed articles published in English between 2015 and 2025. Screening was independently completed by five reviewers using predefined eligibility criteria, and eligible studies were subsequently subjected to thematic extraction synthesis and analysis.

Results

Of the 959 records identified in the search, 44 met all eligibility criteria. The studies examined a range of behavioral and cognitive interventions, such as tell-show-do, distraction techniques (e.g., audiovisual aids, music therapy), modeling, positive reinforcement, and cognitive-behavioral training. The key themes identified throughout the included studies were the predominant efficacy of audiovisual distraction, gamification and technological engagement as emerging tools, and the

cognitive foundation of pre-operative familiarization.

Conclusions

This review demonstrates that non-pharmacological interventions are vital for managing pediatric dental anxiety. Behavioral and cognitive strategies, such as distraction, modeling, and positive reinforcement, contribute to more cooperative behavior and improved treatment outcomes. Continued exploration and integration of innovative approaches, particularly technology-driven and interactive methods, hold strong potential to further enhance patient comfort and promote positive dental experiences from an early age.

33. Digital Platforms and Orthodontic Decision-Making

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Additional Author:

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Purpose

Social media now shapes how people find information, connect and form identity. It increasingly influences cultural standards around health and appearance. In orthodontics, these platforms are reshaping public perceptions, attitudes and treatment decisions. This review synthesizes existing research on social media's impact on how people view and choose orthodontic care.

Methods

A PRISMA guided review searched PubMed, Scopus, and Web of Science for peer-reviewed English-language studies published between 2015 and 2025. Using terms such as “social media,” “orthodontic treatment,” “dental esthetics,” “perception,” we included studies assessing how social media shapes public beliefs, behaviors, and self-perception related to orthodontic care.

Results

From over 450 records, 10 studies met criteria. Social media use was widespread (~60%), led by Facebook and Instagram (>50%), with Snapchat (29.7%) and TikTok (27.2%) rising. For 50–75% of patients, reviews, visibility, and before-and-after images shaped provider choice, and 60–80% of orthodontists agreed social media strongly drives decisions. Popularity often outweighed proximity (60.5%), though family and friend recommendations still mattered.

Conclusions

Social media now plays a substantial role in influencing public perceptions of orthodontic care and dental esthetics. The findings highlight the importance for orthodontic professionals to understand and strategically engage with social media as a tool for patient education and communication. More research is needed to assess the long-term effects of social media-driven esthetic ideals on oral health decisions and to support ethical, patient-centered orthodontic practice.

34. Osteoimmune Target Prioritization for Accelerated Orthodontics: Public Transcriptome Reanalysis Identifies an ATF6-TNF α Macrophage Module and State-Transition Markers

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Additional Author:

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- Frank Licari (Roseman University)
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Purpose

To computationally prioritize actionable osteoimmune targets for accelerated orthodontics by reanalyzing publicly available transcriptomic datasets and identifying macrophage regulatory modules linked to inflammatory remodeling.

Methods

Publicly available gene-expression datasets associated with corticotomy-assisted acceleration were reanalyzed, including RNA-seq with supporting regulatory evidence (e.g., chromatin profiling) in macrophages. Differential expression and pathway enrichment were performed to identify dominant cytokine and stress-response programs. Macrophage inflammatory-state scoring was conducted using curated pro-inflammatory and resolution-associated gene sets, and cross-study triangulation was performed against prior mechanistic evidence describing macrophage polarization dynamics and TNF- α involvement during corticotomy-assisted acceleration.

Results

Reanalysis converged on a macrophage-centered inflammatory module characterized by activation of ATF6 and increased TNF- α transcriptional activity as a prominent axis linked to accelerated remodeling. The underlying study evidence indicates that macrophage ATF6 activation is accompanied by elevated ER-stress markers and that macrophage-specific ATF6 deletion reduces pro-inflammatory macrophage proportions and attenuates the acceleration effect, while ATF6 overexpression exaggerates acceleration; mechanistically, RNA-seq and chromatin profiling support ATF6 interaction with the TNF- α promoter to augment transcription. Independently, prior work reports that macrophages exhibit an early M1-like polarization immediately after corticotomy followed

by an M2-like shift during the course of movement, with TNF- α implicated in macrophage recruitment/polarization and downstream remodeling processes. Together, these data support a concise target shortlist centered on the ATF6-TNF α module and macrophage state-transition markers as biologically grounded levers for non-surgical acceleration strategies.

Conclusions

Public transcriptomic and mechanistic evidence supports an ATF6-TNF α macrophage regulatory module as a reproducible osteoimmune “switch” associated with accelerated orthodontic remodeling, with computationally defined state-transition markers providing a practical framework for biological stratification and therapeutic prioritization.

Keywords: accelerated orthodontics; macrophage polarization; ATF6; TNF- α ; transcriptomics; osteoimmunology; target prioritization

One sentence summary: Reanalysis of public transcriptomic evidence highlights a macrophage ATF6-TNF α regulatory module and polarization state-transition markers as a compact, biologically grounded target framework for accelerated orthodontics.

35. Magnesium Intake and Periodontal Health in Adults

- Presenting Author: Dana Faghieh (Roseman University)

Additional Author:

- Man Hung (Roseman University)
- Amir Mohajeri (Roseman University)

Purpose

Periodontitis is a chronic condition that can damage the supporting tissues of the teeth and is influenced by both oral bacteria and systemic factors. Magnesium supports immune function and bone health, but its relationship with periodontitis in non-diabetic adults is not well defined.

Methods

Using cross-sectional data, we evaluated associations between dietary and supplemental magnesium intake and periodontitis in non-diabetic U.S. adults. Multivariable logistic regression adjusted for key demographic, socioeconomic, behavioral, and biological covariates.

Results

Periodontal outcomes and magnesium intake patterns varied across participant characteristics. In adjusted models, magnesium adequacy showed an inverse association with periodontitis.

Conclusions

In this cross-sectional analysis, magnesium adequacy was inversely associated with periodontitis among non-diabetic adults. Further studies are needed to clarify interpretation and potential pathways.

36. A Mushroom-Derived Antioxidant as a Potential Chemopreventive Agent in Pancreatic Cancer

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Purpose

Pancreatic cancer is a deadly form of cancer that develops in the tissues of the pancreas. This disease often remains asymptomatic during early growth and is not typically diagnosed until later. Further, pancreatic cancer is the third most common cause of cancer death in the United States. In 2025, it was estimated that 67,440 people would be diagnosed with the disease, and of those, 51,980 were expected to die. There are limited treatment options available, such as surgical resection and chemotherapy, yet these tend not to be curative. Therefore, there is a high demand for the development of new drug therapies. Vialinin A is a compound isolated from the Chinese mushroom *Thelephora vialis*, which exhibits anti-inflammatory and antioxidant properties; however, its anti-carcinogenic effects have not been well studied.

Methods

In this study, we investigated these potential anti-cancer effects in pancreatic cancer cells. Human Pancreatic adenocarcinoma cells (MIA PaCa-2) were treated with various concentrations (0-100 μ M) of Vialinin A for 24 hours. Cell viability was assessed through the MTT assay, as well as live and dead cell staining. Specific antibody arrays were used to measure the expression of various apoptotic proteins, oncogenes, tumor suppressor proteins, and other carcinogenic markers. Scratch and transwell migration assays were used to detect the invasion and migration of cancer cells.

Results

Our results suggest that Vialinin-A was effective in dose-dependently reducing the viability of pancreatic cancer cell growth. Vialinin A prevents EGF-induced production of reactive oxygen species and increased caspase-3 activity. Further, Vialinin-A also regulated the expression of various apoptotic proteins, such as TRAIL R1, TRAIL R2, and Cleaved Caspase-3 and oncogenic proteins, such as ERBB2, Survivin, and E-Cadherin in pancreatic cells. Further, Vialinin-A inhibited the migration and invasion of EGF-induced MIA PaCa-2 cells.

Conclusions

In conclusion, our data indicate that Vialinin-A can inhibit the growth and migration of pancreatic cancer cells, suggesting its chemopreventive potential.

37. Mapping the Unexpected: Aberrant Celiac Trunk Origination With Atypical Splenic Artery Bifurcation

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Purpose

Each year around 25,000 individuals undergo a splenectomy in the United States. An understanding of the vascular supply of the spleen and its surrounding structures is critical for successful surgical outcomes. However, only a few publications have described anomalous vascular supply of the spleen through an accessory splenic artery.

Methods

During a cadaveric dissection we observed an anatomical variation of these arterial structures. Measurements were taken of the anomalous branches.

Results

We found an accessory branch of the splenic artery that supplied the inferior pole of the spleen. The accessory splenic artery also gave rise to three short gastric branches. We also observed an abnormal branching pattern for the celiac trunk. The celiac trunk typically divides into three main branches: the splenic artery, common hepatic artery, and left gastric artery. During the dissection, we found five branches arising from the celiac trunk. The two additional branches were identified as the left and right inferior phrenic arteries which normally arise from the aorta.

Conclusions

The presence of arteries originating from atypical sites invites further discussion regarding their developmental basis and the potential surgical implications to avoid iatrogenic vascular injury.

38. Laxogenin, a plant-based natural steroidal compound, prevents colon cancer growth

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Purpose

Laxogenin, also known as 5 α -hydroxy-laxogenin, is a steroidal saponin initially isolated from the berries of *Solanum unguiculatum*. It has garnered interest for its potential as a plant-based anabolic agent and dietary supplement. Although the dietary supplement data has been inconclusive on its positive effects as a prework out supplement, the use of anabolic steroids like laxogenin in previous studies on breast cancer has been shown to reduce the level of estrogen within the body. These elevated levels of estrogen were often seen to aid in the growth and proliferation of cancer cells. Similarly, extracts of the genus *Allium* contain laxogenin and have been recognized for their antioxidant effects and properties against bacteria, fungi, and viruses. Most notably, *Allium* agents have been used for cancer treatments due to their cytotoxic properties and antiproliferative characteristics. Other related steroidal saponins, such as methyl protogracillin, have also demonstrated significant cytotoxic activity against various cancer cell lines. The chemopreventive role of laxogenin against colon cancer has not been well explored. In the proposed study, we would like to investigate the chemopreventive effects of laxogenin against colon cancer growth and spread.

Methods

Human colon cancer cells including Caco-2 will be treated with epidermal growth factor (EGF) in the absence and presence of various concentrations of laxogenin. Cell viability and apoptosis will be determined using MTT assay and Annexin-V staining, respectively. We will examine how laxogenin prevents EGF-induced invasion and migration of colon cancer cells. Further, we will also investigate how laxogenin regulates the expressions of various apoptotic proteins and inflammatory and carcinogenic markers using specific antibody arrays.

Results

Our preliminary studies indicate that laxogenin prevents EGF-induced growth of colon cancer cells. Further, our studies have indicated that Laxogenin helps to regulate the expression of various anti-apoptotic and pro-apoptotic proteins, as well as regulating expression of several oncogenic proteins. Additional mechanistic studies are in progress.

Conclusions

Laxogenin may prevent the growth of colon cancer cells by upregulating pro-apoptotic proteins. Additional studies are being undertaken to identify its chemopreventive efficacy in vitro and in vivo in secondary colon cancer cell lines line SW-480.

39. A Randomized, Sham-Controlled Trial Evaluating the Efficacy of Osteopathic Manipulative Treatment (OMT) for Plantar Fasciitis with Delayed Access to Biologic Therapies

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Purpose

Plantar fasciitis is a prevalent cause of chronic heel pain and functional impairment, with a multifactorial pathophysiology involving repetitive microtrauma, plantar fascial thickening, altered lower extremity biomechanics, and chronic degenerative changes. Osteopathic Manipulative Treatment (OMT) is commonly employed in clinical practice to address musculoskeletal and biomechanical contributors to plantar fasciitis. However, high-quality sham-controlled trials evaluating its efficacy remain limited. Biologic therapies, including prolotherapy and platelet-rich plasma (PRP), have demonstrated benefit, yet direct comparisons with OMT and evaluation of sequential or additive treatment effects are lacking. The primary objective of this study is to evaluate the efficacy of OMT compared to sham OMT for improving pain and function in patients with plantar fasciitis, while secondarily examining structural changes in plantar fascia thickness and outcomes following biologic therapies.

Methods

This study is a prospective, randomized, sham-controlled, single-blinded clinical trial with a two-phase design. Adults aged 18–65 with clinically and ultrasound confirmed plantar fasciitis (plantar fascia thickness ≥ 4.0 mm at the calcaneal insertion and symptom duration ≥ 6 weeks) will be enrolled. Participants will be randomized 1:1 to receive either OMT or sham OMT. Phase 1 will consist of weekly treatments for six weeks. The OMT intervention will follow a standardized protocol targeting the foot and ankle, plantar fascia, posterior chain, and lower-extremity biomechanics using muscle energy, myofascial release, balanced ligamentous tension, and articular techniques. Sham OMT will mimic treatment duration, contact and patient positioning without therapeutic force, joint loading, or end range positioning.

Participants will be blinded to treatment allocation, and outcome assessors will be blinded to group assignment. Primary outcomes include pain (Visual Analog Scale) and function (Foot Function Index), with secondary outcomes including ultrasound-measured plantar fascia thickness, Patient Global Impression of Change (PGIC), ankle dorsiflexion range of motion, and time-to-first-step pain improvement. Mixed effects of repeated-measures ANOVA will be used for analysis under an intention-to-treat framework.

Following completion of the primary endpoint, participants will be offered optional delayed access to randomized PRP or prolotherapy injections over a 12-week extension phase.

Results

It is hypothesized that participants receiving OMT will demonstrate significantly greater improvements in pain and functional outcomes compared to sham OMT. Additionally, OMT is expected to result in measurable reductions in plantar fascia thickness on ultrasound, reflecting structural improvement. These benefits are anticipated to persist over time, indicating durability of treatment effects. Patients receiving delayed biologic therapies may experience further symptomatic improvement, particularly in cases with residual pain following conservative treatment.

Conclusions

This study aims to provide high quality sham-controlled evidence for the efficacy of Osteopathic Manipulative Treatment in the management of plantar fasciitis. Demonstration of both symptomatic and structural improvements would support OMT as an effective conservative intervention and clarify its role relative to biologic therapies. Evaluation of delayed access to PRP and prolotherapy may further inform sequential treatment strategies and optimize patient centered care for chronic plantar fasciitis.

40. Inadvertent Intra-Arterial Cannulation in a Resource Limited Environment

- Presenting Author: Dustin Edmonds (Noorda college of osteopathic medicine)

Additional Author:

- Dr. Andrew Fisher (Mountain West Anesthesia)
- Dr. David Sant (Noorda College of Osteopathic Medicine)
- Nicholas Hill (Noorda College of Osteopathic Medicine)

Purpose

Purpose: Inadvertent intra-arterial cannulation during routine anesthetic care is uncommon but may result in serious complications depending on the medications administered. Recognition is typically rapid, yet certain factors, such as atypical symptoms, technical challenges, or resource limitations, can delay detection. Early identification is critical to prevent vascular injury, tissue ischemia, and other adverse outcomes. In this paper we look to spread awareness of the dangers of intra-arterial cannulation in order to prevent future incidents.

Methods

Methods: For this project we interviewed the attending doctor on the case, Dr. Andrew Fisher D.O, researched past incidents of accidental intra-arterial cannulation and researched medications that could have been dangerous in this case.

Results

Results: We report the case of a healthy 23-year-old woman undergoing outpatient right anterior cruciate ligament reconstruction who was inadvertently cannulated in the left brachial artery rather than the antecubital vein. Due to a state-wide intravenous fluid shortage, no maintenance fluids were administered. All medications, including anesthetic and adjunct, were given manually through the arterial catheter. During induction, the patient reported burning pain at the injection site, and delayed onset of sedation and an occlusion alarm on the propofol infusion pump were noted. At the conclusion of surgery, erythema, swelling, and violaceous skin discoloration were observed distal to the catheter site. Intra-arterial placement was confirmed by aspiration of pulsatile, bright red blood. The catheter was removed, and the patient was admitted for observation. Distal perfusion, sensation, and pulses remained intact, and skin findings resolved within 24 hours. The patient was discharged without complications.

Conclusions

Conclusion: This case highlights early warning signs of intra-arterial cannulation and emphasizes the need for vigilance during manual medication administration, particularly in resource-limited settings. It also highlights the importance of protocols for inadvertent intra-arterial cannulations.

41. Efficacy of Very Low Carbohydrate Diet on Glucose Dysregulation in Chronic Migraine

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Purpose

Data from a prior study (Nelson et al., 2026) showed that subjects with chronic migraine (>8 migraines per month) showed significant glucose dysregulation indicative of greater glycemic variability and postprandial dysregulation. In this study, we investigate the efficacy of a very low carb diet (VLCD) (<15g carbs per day) to correct this glucose dysregulation in subjects with chronic migraine.

Methods

This prospective, longitudinal study evaluates continuous glucose monitoring (CGM) data from subjects with chronic migraines for 3 months while on a VLCD and post-VLCD and compared them to their pre-VLCD data and migraine-free controls. We analyzed the data using multiple metrics including inter/intraday standard deviation (SD), average daily risk range (ADRR), mean amplitude of glycemic excursion (MAGE), and post-prandial area under the curve (PP-AUC). These measures gauge glucose dysregulation in terms of variability and post-prandial response. Preliminary data is from <10 subjects who had prior chronic migraine and received 3 months of treatment with VLCD.

Results

Treatment with VLCD reduced glucose variability of both day-to-day (inter-day SD) and within the day (intraday SD) values in subjects with chronic migraines during treatment. After treatment, these values were also similar to non-migraine controls. The measure of risky hypoglycemic and hyperglycemic values (ADRR), post-prandial glycemic variability (MAGE), and post-prandial hypoglycemia (PP-AUC) values were all reduced in subjects with chronic migraines during and after treatment with VLCD.

Conclusions

Our preliminary results show that glycemic variability and postprandial dysregulation are reduced with treatment with VLCD in chronic migraine subjects. Furthermore, these effects are sustained after discontinuing a VLCD. Although these results are gathered from preliminary data, the changes in a positive direction support the continuation of this study.

42. Hunter Syndrome – Caretaker Needs Assessment

- Presenting Author: Elizabeth Attarian (Noorda COM)

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Purpose

Hunter Syndrome (HS) is a rare X-linked lysosomal storage disorder caused by deficiency in enzyme iduronate-2-sulfatase, leading to the progressive accumulation of glycosaminoglycans. The disease significantly affects both the physical and neurological functioning of patients, placing substantial burden on caregivers. Current treatments include enzyme replacement therapy, hematopoietic stem cell transplantation, and emerging gene-based therapies, though limitations remain, particularly in addressing neurological involvement. In collaboration with Project Alive, we aim to conduct a comprehensive needs assessment of caregivers of individuals with Hunter syndrome to better understand daily life burden, treatment priorities, and barriers to clinical trial participation. This is an exploratory qualitative study based on the idea that caregivers of children with Hunter syndrome experience the disease and its treatments in ways that aren't always reflected in standard clinical trial outcomes, and that their perspectives can highlight important unmet needs.

Methods

Primary caregivers (>21 years old) of patients with Hunter's Syndrome will be recruited via a flyer, through Project Alive's database and virtual means such as Facebook. They will then complete an informed consent form. Caregivers will include both those who have and have not participated in clinical trials; the latter will also answer questions regarding why they did not participate in the trials. Participants will answer a pre-survey questionnaire for demographic and other information. After, open-ended questions will be asked to cohorts of 5 to 8 caregivers via a Zoom meeting, and responses will be recorded.

Results

Work in Progress. We hypothesize caregivers to prioritize improvements in behavior, cognition, and daily functioning over laboratory or disease-specific clinical markers when evaluating treatment effectiveness for Hunter syndrome. Additionally, caregivers with clinical trial experience are expected to report perceived therapeutic benefits alongside significant logistical, financial, and emotional challenges.

Conclusions

This needs assessment seeks to inform the development of caregiver centered support strategies and treatment approaches for families affected by Hunter syndrome. Identifying caregiver defined outcomes and barriers to clinical trial participation may help guide future therapeutic development and improve engagement in Hunter syndrome research.

43. What We Know—and Still Need to Learn—About Physical and Neuromodulatory Approaches to Prevent Postoperative Ileus: A Narrative Review

- Presenting Author: Erica Tutuwan (Noorda College of Osteopathic Medicine)

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Purpose

Postoperative ileus (POI) is a common complication after abdominal surgery, marked by delayed return of bowel function, patient discomfort, and prolonged hospitalization. Although intraoperative bowel handling is known to worsen POI through inflammatory and neural mechanisms, interest is growing in non-pharmacologic strategies that may help, prevent, or shorten POI. In particular, manual and neuromodulatory therapies, such as osteopathic manipulative treatment (OMT), are being explored as potential adjuncts to standard perioperative care.

Methods

A narrative review of published literature to summarize current evidence on physical, mechanical, and neuromodulatory interventions relevant to POI was conducted using several databases within the Noorda College of Osteopathic Medicine library. Sources were identified using structured keyword searches related to postoperative ileus, OMT, mechanical stimulation, manual therapy, abdominal massage, vagus nerve stimulation, electroacupuncture, transcutaneous electrical acupoint stimulation (TEAS), and related neuroimmune mechanisms. Animal studies, clinical trials, systematic reviews, and mechanistic investigations were included to provide a broad translational perspective.

Results

Existing literature consistently shows that mechanical stimulation of the bowel during surgery—such as direct manipulation—triggers postoperative ileus by activating inflammatory pathways, including macrophage-driven cytokine release and inhibitory neural reflexes that suppress gastrointestinal motility. In contrast, several neuromodulatory interventions have demonstrated potential benefits. Vagus nerve stimulation, TEAS, and transcutaneous electrical nerve stimulation have been associated with reduced intestinal inflammation and earlier recovery of bowel function in animal models and human studies. These effects are thought to occur through activation of the cholinergic anti-inflammatory pathway and related neuroimmune signaling. Early mobilization also

appears to support bowel recovery, though underlying mechanisms are less clearly defined. One study reported reduced time to flatus and hospitalization with postoperative OMT. However, direct evidence of evaluating OMT and other forms of manual therapy for POI still remains limited.

Conclusions

Current evidence suggests that while mechanical bowel stimulation during surgery contributes to POI, targeted neuromodulatory interventions may counteract inflammatory and neural inhibition of gut motility. The limited data on manual therapy highlights a critical knowledge gap. Understanding existing mechanisms and related interventions is crucial for informing the design of future clinical trials that evaluate manual or non-invasive physical therapies for preventing POI.

44. Exploring Osteopathic Manipulative Treatment as an Adjunct for Postoperative Pain Management in Pediatric Patients

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Purpose

Postoperative pain management in pediatric patients presents unique challenges, including concerns regarding opioid exposure and increasing parental hesitancy toward pharmacologic analgesics. While multimodal pain strategies are standard in pediatric surgical care, interest in non-pharmacologic adjuncts continues to grow. Osteopathic manipulative treatment (OMT) has been proposed as a complementary approach for pain management and recovery; however, its role in pediatric postoperative settings remains unclear. This review aims to evaluate existing literature on the use of OMT for postoperative pain management, with a primary focus on pediatric populations.

Methods

A narrative literature review was conducted using databases including PubMed, Google Scholar, and relevant reference chaining to identify studies evaluating OMT or osteopathic-based manual therapies in postoperative contexts. Studies involving pediatric patients were prioritized, while adult postoperative studies were included only to provide contextual and mechanistic insight. Extracted data included surgical context, patient population, OMT protocols, pain-related outcomes, analgesic use, length of hospital stay, and reported adverse events.

Results

The literature reveals a limited amount of pediatric-specific evidence evaluating OMT for postoperative pain management. One pediatric clinical study in postoperative appendectomy patients demonstrated clinically meaningful reductions in pain scores and a shorter hospital length of stay following adjunctive OMT, although statistical significance was limited by the small sample size. Broader pediatric OMT literature outside postoperative contexts shows inconclusive and heterogeneous findings. Adult postoperative and musculoskeletal pain studies suggest small-to-moderate improvements in pain, function, and recovery metrics with OMT, supporting biological plausibility but not direct extrapolation to pediatric populations.

Conclusions

Current evidence supporting the use of OMT for postoperative pain management in pediatric patients is sparse but emerging. Preliminary findings suggest potential benefit as an adjunctive, opioid-sparing intervention within multimodal pain management frameworks. However, the heterogeneity of study designs, small sample sizes, and lack of standardized protocols limit definitive conclusions. Well-designed, pediatric-focused randomized controlled trials are needed to evaluate the safety, efficacy, and optimal application of OMT in postoperative pediatric care.

45. Epimedin A, a plant-based flavonoid, prevents glioblastoma growth and invasion.

- Presenting Author: Erick Zecena (Noorda College of Osteopathic Medicine)

Additional Author:

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Purpose

Glioblastomas (U87) are an aggressive brain tumor that arises from glial cells and invades surrounding parts of the brain. The prognosis for glioblastoma is poor, with a median survival rate of 15 months with treatment. Treatments are aggressive with severe side effects. Molecular therapeutics are required to control U87 cell growth with a better safety profile. Several plant-derived compounds were tested for chemo preventive effects against glioblastoma. However, the role of Epimedin A, isolated from plants known as Epimedium (Horny Goat Weed), in preventing cancer growth is not clear. We examined the chemo preventive effects of Epimedin A in U87 cells. We specifically investigated the effects it has on cell proliferation, apoptosis, oxidative signaling, and migration.

Methods

U87 cells obtained from ATCC were treated with an increasing concentration of Epimedin A (0-100 μM) \pm EGF. Cell viability was examined using the MTT assay, while invasion and migration were assessed by scratch and Transwell migration assays, respectively. Expression of various apoptotic proteins was measured by an antibody array. Reactive oxygen species levels were measured using fluorescence-based assay. Statistical comparisons were performed using one-sided t test for a prespecified directional hypothesis and reported using mean \pm standard deviation.

Results

Our results suggest that Epimedin A prevents the growth of U87 cells in a dose-dependent manner, with 60 μM producing the greatest reduction in cell proliferation under EGF stimulation. Furthermore, Epimedin-A also prevented the invasion and migration of U87 cells. Additionally, Epimedin A increased caspase-3 expression, as measured by PARP cleavage under EGF stimulation, and reduced the formation of reactive oxygen species. Epimedin A also regulates the expression of various pro- and anti-apoptotic proteins such as Bcl-x, HIF-1 α , Bad, Bax, Caspase-3, Cytochrome C, SMAC/Diablo.

Conclusions

Epimedin A has displayed inhibitory effects on U87 cells' viability. Specifically, studies showed inhibitory effects on proliferation, migration, and ROS. Epimedin A regulates the expression of various pro- and anti-apoptotic factors and inflammatory markers in cancer cells. We next planned to examine its in vivo efficacy using nude mice xenografts. Thus, our results indicate that Epimedin A inhibits the growth of U87 cells and may act as a chemo preventive agent.

46. Automated AI-Based Classification of Malocclusion from Panoramic Radiographs: Orthodontic Screening

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- Casey Morishige (Roseman University)
- Morgan Mecham (Roseman University)
- Shilpa Bhandi (Roseman University)
- Frank Licari (Roseman University)
- Shankargouda Patil (Roseman University)

Purpose

To develop and validate a lightweight, explainable AI model for automated classification of malocclusion (Class I, II, III) from panoramic radiographs, enabling rapid and accessible orthodontic screening in diverse settings.

Methods

A dataset of 300+ annotated panoramic radiographs was preprocessed using OpenCV (224×224 px, rotation $\pm 10^\circ$, zoom 0.1, flip). Two AI architectures were tested: a custom CNN and MobileNetV2 pretrained on ImageNet. Models were trained (70%), validated (15%), and tested (15%) in TensorFlow. Accuracy, precision, recall, and F1-score assessed performance; Grad-CAM visualizations evaluated interpretability.

Results

The optimized model achieved high accuracy, focusing on key anatomical landmarks, including the condylar region, occlusal plane, and mandibular angle.

Conclusions

This interpretable, low-cost AI model enables efficient malocclusion classification and shows promise for rapid orthodontic screening in limited-resource settings.

47. AI Applications in Assessing Risk for Periodontal Disease: A Systematic review

- Presenting Author: Grant Korte (Roseman University)

Additional Author:

- Claudia Freitas (Roseman University)

Purpose

The goal of this systematic review is to examine the impact of using artificial intelligence (AI) to predict a patient's risk level for periodontal disease by analyzing proven systemic health diseases linked to periodontitis. This is being done by primarily focusing on prevention and early diagnosis using machine learning programs that have been proven effective in other fields of periodontitis research.

Methods

To conduct this study, a comprehensive literature review of journals published after 2020 was performed through four databases: PubMed, Scopus, Web of Science and Dentistry and Oral Science Source. The search was completed in adherence to PRISMA guidelines, and inclusion criteria comprised of peer-reviewed journals which assessed AI applications in periodontitis and its impact on preventing periodontal disease in patients with linked systemic diseases. Risk of bias assessment is in progress by using Cochrane RoB tools, and data will be synthesized narratively and quantitatively where applicable.

Results

An initial search across four databases yielded over 200 potentially relevant studies. To date, 10 studies have been selected that met both the predefined inclusion and exclusion criteria. Early data analysis shows artificial intelligence as a promising tool for assessing patients' risk of periodontitis by creating a fuzzy logic system based on significant biomarkers of systemic health diseases.

Conclusions

Artificial Intelligence is an extremely powerful and rapidly advancing technology that has seen increasing use in healthcare and patient care. This review highlights one important application of AI in assessing a patient's risk for periodontitis, enabling quicker and more accurate diagnosis and treatment of the disease. Further research is needed to improve the models currently being used for risk assessment and to ensure they are being used in an ethical and beneficial manner.

48. Modulation of High-Glucose–Induced Endothelial Injury by 7-Hydroxyflavone

- Presenting Author: Gursimran Kaur (Noorda College of Osteopathic Medicine)

Additional Author:

- Syeda Khalil (Noorda College of Osteopathic Medicine)

Purpose

Uncontrolled long-term diabetes is generally associated with the risk of developing secondary vascular complications. Diabetics have a higher atherosclerotic disease burden and a higher risk of myocardial infarction. In addition, in diabetics, increased inflammation and oxidative stress have been shown to be highly deleterious for endothelial dysfunction. Nevertheless, the mechanisms underlying diabetes-induced endothelial dysfunction remain unclear, and there is no effective therapy to specifically prevent endothelial dysfunction in diabetic patients. In this study, we examined the potential role of 7-Hydroxyflavanone (7-HF), a natural antioxidant, in preventing the hyperglycemia-induced endothelial dysfunction.

Methods

Human umbilical vein endothelial cells (HUVECs) obtained from ATCC were grown and maintained in DMEM media. The cells were treated with 7-HF (0-10 μ M) in the absence or presence of high glucose (25 mM) or normal glucose (5.5 mM). Cell viability was quantified using the MTT assay. Monocyte (Thp1) adhesion to HUVEC was measured using a monocyte adhesion assay, and reactive oxygen species (ROS) and nitric oxide (NO) levels were measured using specific kits. Activation of NF- κ B, adhesion molecules, and caspase-3 was measured by specific kits from Cayman. An antibody array was used to measure various apoptotic and inflammatory markers.

Results

Our results suggest that 7-HF prevents hyperglycemia-induced decrease in cell viability. Further, 7-HF also prevented the generation of ROS and NO levels in endothelial cells. Similarly, 7-HF also prevented high-glucose-induced monocyte adhesion, activation of adhesion molecules, and NF- κ B. Further, studies are underway to understand the molecular mechanism by which 7-HF prevents high-glucose-induced endothelial dysfunction.

Conclusions

So far, our results indicate that 7-HF, through its anti-oxidative and anti-inflammatory actions, prevents hyperglycemia-induced endothelial dysfunction.

49. Modulating the placebo effect using an fNIRS-based neurofeedback training program: a literature review

- Presenting Author: Hayden McAfee (Noorda College of Osteopathic Medicine)

Additional Author:

- Sarah Weber (Noorda College of Osteopathic Medicine)
- John Terry (Noorda College of Osteopathic Medicine)
- Tyler Blanchard (Noorda College of Osteopathic Medicine)
- Osmond Lu (Noorda College of Osteopathic Medicine)
- Tyler Sanchez (Noorda College of Osteopathic Medicine)
- Cisco Badar (Noorda College of Osteopathic Medicine)
- Andrew Payne (Noorda College of Osteopathic Medicine)

Purpose

We aim to harness the positive benefits of the placebo effect through PFC training. The present work represents a literature review designed to inform a randomized-controlled trial that will assess the potential of neurofeedback-based PFC training to intentionally elicit placebo-like enhancements to physical and mental functioning as well as measure PFC activity during the placebo effect. Given the role of the PFC in the placebo effect, we propose that a neurofeedback-based PFC training regime will modulate the placebo effect and open doors to conscious avenues for accessing placebo-like benefits. The placebo effect is a phenomenon in which outcomes occur in the absence of an intervention's active variables or techniques. In other words, an individual's beliefs and expectations of a treatment can produce measurable effects. The placebo effect is a well-documented phenomenon and is a cornerstone of modern clinical studies. Strong evidence links placebo responses to activity in the prefrontal cortex (PFC). Recent advances in functional near-infrared spectroscopy (fNIRS) have made non-invasive cortical neuroimaging accessible to consumers. fNIRS can be used to measure PFC activity by using near-infrared light to assay cortical blood oxygen saturation. In the consumer space, this technology often uses cortical activity to create a neurofeedback-based training program that increases PFC activity and strength. While the placebo effect is well-documented, little is known about how to intentionally harness its benefits.

Methods

We reviewed the available literature on topics including the neural pathways involved with placebo, clinical applications of placebo, neuroimaging techniques measuring placebo, and the relationship between PFC activity and a resultant placebo effect. Studies that used placebo only as part of a methodology were not included.

Results

Preliminary results suggest that placebo-integrated medicine could provide potential relief from pain and affective disorders via well-established neural pathways. Neuroimaging studies connect the dorsolateral and ventromedial regions of the prefrontal cortex to the expectations, belief, and pain modulation that underpin placebo. MRI has previously mapped these pathways while emerging evidence opens the door to using fNIRS clinically. Together, these findings encourage further research with hope of leveraging the power of the prefrontal cortex, placebo, and portable neuroimaging.

Conclusions

Work in progress

50. Development of an HPLC Analytical Method for Semaglutide

- Presenting Author: Huan Tran (Roseman University)

Additional Author:

- Sam Perez (Roseman University)
- Andrea Bui (Roseman University)
- Casey Sayre (Roseman University)
- Scott Shipley (Roseman University)

Purpose

Purpose: Semaglutide is a glucagon-like peptide-1 (GLP-1) receptor agonist that is found significantly effective in treating type 2 diabetes as well as weight management by increasing insulin secretion, decreasing glucagon release, reducing appetite for less food consumption, and slowing gastric emptying to help stay full longer.

As there is a significant increase in manufacture and consumption of semaglutide for both clinical and weight management purposes, there must be valid methods for excipients testing to ensure that the drug is safe to use after being exposed to certain conditions. The purpose of this study is to validate a stability study through forced degradations where the drug will go under stressed conditions for compound breakdown detection. High-performance liquid chromatography (HPLC) technique was used to quantify semaglutide.

Methods

Methods: The mobile phase is composed of acetonitrile (ACN) with 0.1% tetra-fluor acetic acid (TFA) and water with 0.1% tetra-fluor acetic acid (TFA). The stationary phase was a Phenomenex Luna 3 μ m C18 column (150 x 4.6 mm). The column temperature was 30 °C. The ACN concentration gradient increased from 40% to 55% over 10 minutes. The injection volume was 30 μ L while the gradient flow rate was 2mL/ minute. The detection wavelength was set to 205 nm. This method will be evaluated under standard guidelines of the United States Pharmacopeia (USP).

Results

Results: Semaglutide eluted at 2.4 minutes with a sharp, symmetrical peak. No interfering peaks were seen during the elution window of semaglutide, indicating specificity of the assay. Six-point standard curves of semaglutide demonstrated linearity, with correlation coefficients of 0.998.

Conclusions

Conclusion: An optimized method of semaglutide separation was developed. The method is specific and reproducible and will be subjected to forced degradation and validation for application to stability studies.

51. Ethanol Acutely Attenuates N-Methyl-D-Aspartate (NMDA) Induced Calcium Signaling Hypersensitization in Mouse Ventral Tegmental Area

- Presenting Author: Isaac Wilcox (Noorda College of Osteopathic Medicine)

Additional Author:

- Muzzammil Ahmed (Noorda College of Osteopathic Medicine)
- Scott Steffensen (Brigham Young University)
- Andrew Payne (Noorda College of Osteopathic Medicine)

Purpose

The Ventral Tegmental Area (VTA) is central to the formation of addiction and reward-seeking behaviors. The N-methyl-D-aspartate (NMDA) receptor is a key driver of this process. Enhanced long term potentiation of NMDA, beyond the normal response to glutamate, leads to subsequently stronger reward seeking and addiction feedback. This appropriation of neuroplastic abilities is mediated through enhanced stimulatory calcium influx, upregulating NMDA and associated receptors. These changes have been well established in other neurons, but the impact of ethanol (EtOH) on this process has not been well characterized in the VTA. The purpose of this study is to examine whether EtOH modulates repeated NMDA exposure induced calcium signaling hypersensitization in VTA neurons.

Methods

The calcium-sensitive fluorophore GcAMP6f was expressed using a viral vector in the VTA of GAD65 mCherry+ transgenic mice. Following an incubation period, horizontal brain slices containing the VTA were collected and recorded at 37° C. Calcium-dependent fluorescence was recorded in presence of 100 μ M NMDA, and following a rest period, a second pulse of NMDA was administered to the slices, and the change in response between the two exposures was recorded. In separate slices, the procedure was replicated with the second pulse occurring following an incubation in 30 μ M EtOH. Slices were imaged using standard fluorescence microscopy.

Results

NMDA elicited a greater response in the second pulse than that of the first, suggesting a priming effect. This added effect was not only eliminated, but the overall pulse amplitude was diminished in the presence of EtOH. This indicates a suppressive effect of EtOH on the second pulse of NMDA dependent signaling.

Conclusions

These data suggest that within the VTA, the activity of a sensitized NMDA response is attenuated by EtOH. Though this effect has been well documented in other neurons, these results highlight the ability of EtOH to modulate NMDA-dependent calcium signaling and plasticity in a key reward related region of the brain. Further studies should explore the effects of acute and chronic exposure as well as downstream addictive behaviors.

52. Could Dietary Zinc Protect Your Gums? Insights from Non-Diabetic Adults

- Presenting Author: Jacob Kelly (Roseman University)

Additional Author:

- Hayden DeHoyos (Roseman University)
- Man Hung (Roseman University)
- Amir Mohajeri (Roseman University)

Purpose

Zinc plays an important role in enzymatic and inflammatory processes that may influence periodontal health. The relationship between zinc intake and periodontitis remains insufficiently characterized in adults without diabetes.

Methods

A population-based adult sample was analyzed to examine the association between zinc intake from dietary and supplemental sources and periodontal disease, adjusting for relevant demographic, socioeconomic, behavioral, and health-related factors.

Results

Zinc intake patterns varied across population subgroups and were associated with periodontal outcomes after accounting for potential confounders. Adequate zinc intake was consistently linked to more favorable periodontal status.

Conclusions

These findings suggest that sufficient zinc intake may be associated with reduced risk of periodontitis and highlight the potential relevance of nutritional factors in periodontal disease prevention.

53. Evaluation of Sphenopalatine Ganglion OMT Release and Anesthetic Block in Refractory Migraine

- Presenting Author: Jacob Warner-Palacio (Noorda College of Osteopathic Medicine)

Additional Author:

- Aurora Jeanes (Noorda College of Osteopathic Medicine)
- Ashton Dodd (Noorda College of Osteopathic Medicine)
- Marsha Chevalier (Noorda College of Osteopathic Medicine)
- Yanielisse Rivera Arocho (Noorda College of Osteopathic Medicine)
- Christina Nelson (Noorda College of Osteopathic Medicine)
- Kyle Bills (Noorda College of Osteopathic Medicine)
- Nathan Nakken

Purpose

Chronic migraine is associated with dysregulation of the trigeminovascular system and parasympathetic outflow, contributing to intracranial vasodilation, neurogenic inflammation, and central sensitization. The sphenopalatine ganglion (SPG) serves as a critical autonomic relay, and has emerged as a therapeutic target. Transnasal SPG local anesthetic blocks demonstrate variable clinical efficacy, while osteopathic manipulative treatment (OMT)-based SPG release techniques are widely taught, but lack robust comparative and physiologic evaluation. Recent advances in SPG-targeted neuromodulatory stimulation further suggest that nonpharmacologic approaches may influence autonomic tone and migraine physiology. However, comparative studies integrating clinical outcomes with objective autonomic measures remain limited. This study aims to evaluate and compare clinical efficacy and autonomic effects across multiple SPG-targeted neuromodulation strategies in patients with refractory chronic migraine.

Methods

We will conduct a prospective, randomized, controlled study enrolling adults with chronic migraine meeting ICHD-3 criteria for ≥ 12 months and refractory to at least two standard preventive medication classes or interventions. Participants will be randomly assigned and blinded to one of four intervention groups: (1) OMT-based SPG release, (2) transnasal SPG local anesthetic block (e.g., lidocaine or bupivacaine), (3) SPG-targeted neuromodulatory stimulation, or (4) sham/control intervention. Primary clinical outcomes include migraine frequency, intensity, and duration measured over an 8-week follow-up period. Secondary outcomes will assess autonomic function using objective physiologic measures, including heart rate variability, pupillary reactivity, and skin conductance, obtained pre- and post-intervention. Patient-reported disability (HIT-6, MIDAS), medication utilization, and quality-of-life measures will also be collected. All measurements and outcomes will be evaluated via ANOVA. Following completion of primary outcome assessment, all

participants, regardless of randomized assignment, will be offered access to their preferred active intervention.

Results

Work In Progress. We hypothesize that all active intervention groups will demonstrate greater reductions in migraine frequency and severity compared with sham controls. Pharmacologic SPG block is anticipated to produce more immediate symptom relief, while OMT-based SPG release and SPG-targeted stimulation may result in more sustained autonomic modulation and functional improvement. Objective autonomic metrics are expected to differentiate responders from non-responders and provide insight into mechanistic pathways underlying clinical improvement. Exploratory analyses will examine baseline predictors of response, including migraine duration and autonomic profile.

Conclusions

This study seeks to provide a comparative evaluation of manual, pharmacologic, and neuromodulatory SPG-targeted interventions in refractory chronic migraine, integrating clinical outcomes with objective autonomic measures. By characterizing both efficacy and physiologic mechanisms, this work aims to clarify the therapeutic potential and limitations of SPG-directed therapies. Findings may inform personalized treatment strategies, guide future mechanistic research, and support evidence-based integration of nonpharmacologic neuromodulation approaches in headache management.

54. Appropriateness of Root Canal Therapy Referrals in Medicaid-Insured Pediatric Patients

- Presenting Author: Jacob Marx (Roseman University)

Additional Author:

- Alice Chen (Roseman University)
- Civon Gewelber (Roseman University)
- Helpis Youssef (Roseman University)
- Man Hung (Roseman University)

Purpose

Timely dental care is necessary to prevent disease progression and preserve permanent teeth. Inefficient referral systems, low reimbursement rates, and structural barriers continue to disproportionately affect children enrolled in Medicaid. This study evaluated the appropriateness of referrals for root canal therapy (RCT) to a university-based Advanced Education in General Dentistry (AEGD) program and described the diagnostic findings and treatment outcomes of referred cases.

Methods

A retrospective review was conducted of patients aged 6 to 17 years who were referred by outside dental providers to two AEGD clinics in Nevada, United States, between February and August 2024 for endodontic evaluation of carious permanent teeth. Data collected included patient demographics, tooth type, pulpal diagnosis, and treatment status. Analyses included descriptive statistics, chi-square tests, Kruskal–Wallis tests, and multivariable logistic regression.

Results

A total of 154 patients were included, of whom 96.8% (n = 149) were insured through Medicaid. Two hundred forty-seven teeth were evaluated, and 74.1% were molars. Pulp testing showed that 41.3% of teeth were vital and 16.6% had reversible pulpitis. Only 37.2% of teeth required RCT. Patient age differed significantly across pulpal diagnoses (p = 0.0012), and increasing age independently predicted an appropriate RCT referral (adjusted OR = 1.18, 95% CI 1.07 to 1.31). Gender was not associated with follow-up compliance (p = 0.47). By November 2024, treatment was completed for 53.4% of referred teeth, and 9.3% had no documented follow-up.

Conclusions

Many referred teeth did not meet clinical criteria for RCT, suggesting a high rate of potentially unnecessary referrals and limited diagnostic certainty in general practice. Improved diagnostic education and clinical decision support for general dentists, particularly in the management of vital

pulp therapy for immature permanent teeth, may reduce inappropriate referrals. Reforms to Medicaid reimbursement and standardized referral guidelines may further improve efficiency and access to timely and equitable pediatric dental care.

55. Use of KCC2 DNA plasmid transfection to modulate chloride homeostasis in cultured dopamine-neuron-like cells

- Presenting Author: Jacqueline Farolan (Noorda College of Osteopathic Medicine)

Additional Author:

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- Dario Mizrachi (Noorda College of Osteopathic Medicine)
- Andrew Payne (Noorda College of Osteopathic Medicine)

Purpose

Potassium-chloride cotransporter 2 (KCC2) works in opposition to Na-K-Cl cotransporter 1 (NKCC1) to maintain low intracellular chloride concentrations in neurons. In immature neurons, there are high levels of NKCC1 and low levels of KCC2, which creates a high intracellular chloride concentration. Increased KCC2, therefore decreased chloride concentration, creates a GABA switch, switching immature neurons to mature neurons. This changes the activity of GABA from excitatory to inhibitory. Decreased KCC2 has been found to be correlated with reward seeking behaviors in the dopaminergic circuitry. Our study aims to artificially upregulate KCC2 and therefore decrease chloride concentrations in neurons. In the future, we hope to propel this study into animal research, as a potential therapy for substance use disorder.

Methods

We are utilizing DNA plasmid transfection to achieve our goal of upregulating KCC2 expression in our cells of interest, SH-SY5Y neuroblastoma cells and HEK 293 cells differentiated into a dopaminergic phenotype. We have created two mutant types of KCC2 protein. One of our mutant types has no inhibitory domain, and the other has no intracellular inhibitory domains and a short extracellular loop 3. We aim to get these mutant types into mammalian cells. These mammalian cells should then be able to upregulate the expression of the KCC2 transport protein themselves due to the DNA plasmid transfection. Cells receiving this engineered protein are expected to mimic the physiological response associated with endogenous KCC2 activation. SH-SY5Y cells were chosen for their ability to differentiate into neuron-like phenotypes. HEK 293 cells were chosen due to their high transfection efficiency, rapid growth, and versatility. Patch clamp electrophysiology using a gramicidin perforated patch modality will be used to assay the intracellular chloride concentration in both groups. We anticipate that this artificial KCC2 upregulation will decrease intracellular chloride levels like native increases in KCC2 expression. With this decrease in intracellular chloride levels, we expect to see an inhibitory GABA switch occur which decreases reward seeking behavior.

Results

Work in progress

Conclusions

Work in progress

56. The Impact of the Method of Loci as a Forgetting Curve Intervention

- Presenting Author: James Pike (Noorda College of Osteopathic Medicine)

Additional Author:

- Ashton Pike (Noorda College of Osteopathic Medicine)
- Andrew Payne (Noorda College of Osteopathic Medicine)

Purpose

Hermann Ebbinghaus's work on memory loss over time helped define what is now called the forgetting curve. The Method of Loci (MoL), also known as a mind palace, is a well-known mnemonic that may improve retention, but prior studies are often limited by sample size, inconsistent methods, and elevated risk of bias. This research aims to learn whether a standardized Method of Loci protocol improves recall across pre-specified forgetting-curve timepoints compared with usual memorization strategies.

Methods

Participants (approximately 51 enrolled to date) are randomized to an experimental group, trained in a uniform Method of Loci procedure, or a control group permitted to memorize using any self-selected method. Participants are randomized using Power Automate, also used for all communication automated after consent to participate. All participants study the same 25-word list for thirty minutes, and recall performance is measured repeatedly at five planned assessment intervals spanning the forgetting curve. The primary outcome measurement is a change in recall of the word list between groups at each time-point, with secondary analyses examining the correct word position in the word list sequence.

Results

Preliminary results suggest participants using the MoL had better recall of list items as well as a greater number of words in the correct position. Individual data shows no variation in the MoL group until the day thirty-one recall test. Variation in the control group was much more significant, with many different learning methods reported.

Conclusions

These results overall support the hypothesis that a standardized Method of Loci intervention may meaningfully improve delayed recall relative to other memorization techniques. The MoL demonstrated a more significant impact on recalling the word list in sequential order. Notably, the MoL showed very little decline in forgetting even on day thirty-one. Future research could focus on

more challenging memorization parameters, for example, shorter memorization time or an increased number of words in the word list.

57. Computational Network Biology of Host Microbe Crosstalk in Persistent Endodontic Inflammation

- Presenting Author: Janaki O'Callaghan (Roseman University)

Additional Author:

- Frank Licari (Roseman University)
- Shilpa Bhandi (Roseman University)
- Shankargouda Patil (Roseman University)

Purpose

Persistent endodontic infections can endure despite technically adequate root canal treatment, reflecting a biological transition from microbial invasion to a host-driven chronic inflammatory state. This study applied a computational network biology approach to model host–microbe molecular interactions in chronic apical periodontitis and to identify key network hubs sustaining inflammation and periapical bone resorption.

Methods

Virulence factors from *Enterococcus faecalis*, *Candida albicans*, and *Parvimonas micra* were curated from VFDB and PATRIC databases. Host inflammatory and oxidative stress–related genes (TLR2, TLR4, NLRP3, MyD88, SOD1, PON1, IL1B, TNF, IL6, IL17, RANKL) were retrieved from GeneCards and validated using GEO dataset GSE42655. Host–pathogen protein–protein interactions were predicted via InterSPPI and PHISTO, followed by bipartite network construction in Cytoscape. Central hubs were identified using CytoHubba, and functional enrichment was performed through Reactome, Enrichr, and DisGeNET.

Results

The integrated interactome revealed cross-talk between *E. faecalis* lipoteichoic acid and *C. albicans* enolase with host receptors TLR2 and NLRP3. Enrichment analyses indicated persistent activation of NF- κ B, JAK–STAT, and MAPK pathways, alongside oxidative stress dysregulation via PON1 and SOD1. Reciprocal signaling between IL1B and NLRP3 emerged as a key amplifier of chronic “silent inflammation,” maintaining lesion activity post-microbial clearance.

Conclusions

This systems-level model redefines persistent endodontic disease as a network pathology maintained by self-perpetuating host–microbe immunoinflammatory loops. Targeting NF- κ B– and ROS-mediated pathways offers potential for adjunctive anti-inflammatory and redox-modulating therapies to enhance periapical healing and endodontic retreatment outcomes.

58. Efficacy of the AI-powered research platform Elicit in generating systematic literature reviews

- Presenting Author: Jasmine Pannu (Noorda College of Osteopathic Medicine)

Additional Author:

- Alfred Amendolara (Noorda College of Osteopathic Medicine)
- Andrew Payne (Noorda College of Osteopathic Medicine)

Purpose

Elicit is an artificial intelligence (AI) platform used by researchers that can facilitate tasks such as providing literature summaries, extracting data from manuscripts, and writing systematic literature reviews. Given that Elicit shows significant potential to assist researchers in quickly finding and summarizing the peer-reviewed Literature, and since AI-powered tools have a reputation of questionable accuracy and reproducibility, external validation is needed to assess the accuracy and validity of the results that the platform outputs. More specifically, we aim to assess the quality of the systematic reviews Elicit generates. Here we attempt to estimate review quality by comparing them to human-generated systematic reviews on the same subject. We hypothesize that Elicit generates reviews that are roughly equivalent to human-generated narrative reviews and that are non-comprehensive by the standards applied to systematic reviews.

Methods

Using the National Library of Medicine's PubMed platform, we selected 15-20 human-generated systematic reviews. Based on each review, we extracted what appeared to be the primary research question for that manuscript and then used Elicit to generate a review based on the same research question. We compare the results of the human-generated and AI-generated reviews using agreement of works cited and accuracy and completeness of findings cited from each reference. When comparing citations included in one review but not the other, we evaluate the discrepancies for relevance to the selected review topic. We also test each publicly-accessible step of the Elicit platform, including replicability of the search algorithm, accuracy and replicability of article screening, and accuracy of data extraction while manipulating all publicly-available tunable parameters.

Results

Work in progress.

Conclusions

Work in progress.

59. Detoxing from Fentanyl: The Role of Short-Acting Opioid Agonists

- Presenting Author: Jason Major (Roseman University)

Additional Author:

- CL Canfield (White Tree Medical)
- Brandon Dunn (White Tree Medical)
- Chuck Canfield (White Tree Medical)
- Shanda Clark (Roseman University)

Purpose

Fentanyl-related overdose deaths continue to rise in the United States, creating a public health crisis. Effective outpatient detoxification methods with minimal side effects and disruption to daily life are urgently needed. This study aimed to evaluate the efficacy of using a short-acting opioid agonist, oxycodone, to reduce withdrawal symptoms and improve the success rate of buprenorphine initiation among individuals with fentanyl use disorder.

Methods

A retrospective chart review was conducted on 40 patients enrolled in an outpatient treatment program. These patients underwent fentanyl detoxification using oxycodone to facilitate the transition to buprenorphine.

Results

Of the 40 patients, 21 (52.1%) successfully completed buprenorphine induction with the aid of oxycodone. Notably, no cases of precipitated withdrawal were observed. Among those who successfully transitioned, 83% attended at least one follow-up appointment post-induction.

Conclusions

This study highlights the potential effectiveness of a short course of a short-acting opioid agonist, such as oxycodone, in facilitating the transition from fentanyl to buprenorphine. The approach may increase the rate of successful outpatient detoxification and reduce the risk of precipitated withdrawal, supporting improved patient outcomes in the treatment of fentanyl use disorder.

60. Investigating Biomarkers of Anxiety Amelioration with Heterodyned Whole-Body Vibration using EEG

- Presenting Author: Jaxson Bowen (Noorda College of Osteopathic Medicine)

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- Mary Bradford (Noorda College of Osteopathic Medicine)
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- Erik Gardner (Noorda College of Osteopathic Medicine)
- Christina Nelson (Noorda College of Osteopathic Medicine)
- Kyle Bills (Noorda College of Osteopathic Medicine)

Purpose

A novel technology, coined heterodyned whole-body vibration (HWBV) has shown potential in treating anxiety associated with opioid withdrawal. This technology utilizes specific activation of cervical mechanoreceptors to enhance mesolimbic dopamine. Impact of HWBV on typical cortical indices of anxiety remains to be characterized. This study aims to utilize electroencephalography (EEG) to characterize emotional affective states following HWBV-induced anxiety amelioration. Analyzing the EEG data obtained in conjunction with HWBV may identify specific markers and underlying mechanisms important for understanding how HWBV and cervical mechanoreceptor activation impacts brain function and the hallmarks of its induced reduction of anxiety.

Methods

EEG recordings of each participant will be obtained. Recordings will include (in this fixed order) a baseline EEG recording with eyes open, an Eriksen flanker task, 8 minute recording eyes open with the chair on, a follow up Eriksen flanker task with the chair off, and a follow up EEG recording with eyes open. Collected data will be compared against known biomarkers of both trait and state anxiety. These biomarkers include theta/beta ratios, total beta power in the frontal and parietal lobes, trends of beta power in all brain regions and whole head delta power for the trait anxiety state. For the state anxiety state we will investigate gamma power, the theta/beta ratio in the frontal lobes, beta power in the parietal lobes, and the alpha/beta ratio in the frontal lobes. This data will provide us insight into the acute effects of HWBV on typical anxiety biomarkers shown with EEG.

Results

Early Flanker data shows a decrease in ERN (error-related negativity) amplitude suggesting a decrease in anxiety state within 10 minutes of the HWBVC.

Conclusions

We anticipate that the data collected from test trials will show a significant change in EEG biomarkers of anxiety, thus providing us with more insight on the possible mechanisms and results of HWBV.

61. From Microbiome Discovery to Clinical Screening: Replicated Oral Microbial Signatures in Early Childhood Caries

- Presenting Author: Jazmine Gill (Roseman University)

Additional Author:

- Uswa Asad (Undergraduate student at University of Texas at Arlington)
- Shilpa Bhandi (Roseman University)
- Frank Licari (Roseman University)
- Shankargouda Patil (Roseman University)

Purpose

To identify microbial features consistently associated with early childhood caries (ECC) across independent cohorts by reanalyzing publicly available microbiome datasets using a unified analytic pipeline and applying replication-focused criteria rather than single-cohort statistical significance.

Methods

We developed a retrospective cross-cohort reanalysis framework using publicly available ECC microbiome datasets, including dental plaque and saliva studies with accessible sequencing data and case-control phenotypes. Cohorts were harmonized based on available metadata (age, sampling site, sequencing platform and 16S rRNA region, where applicable). Within-cohort differential abundance analyses were conducted, followed by cross-cohort replication filtering. Replication-grade signals were defined a priori as microbial features demonstrating consistent direction of association across cohorts with acceptable between-study heterogeneity. Generalizability was further evaluated using leave-one-cohort-out validation with a constrained, interpretable classifier.

Results

Prior ECC microbiome studies have repeatedly implicated a limited set of taxa as prominent disease-associated signals, including *Streptococcus mutans*, *Scardovia wiggisiae*, *Veillonella parvula*, and *Actinomyces*-associated taxa, providing biologically plausible anchors for replication testing. Existing next-generation sequencing meta-analyses support increased *Veillonella* abundance in ECC compared with caries-free controls, while also highlighting substantial methodological heterogeneity across studies. More recent cross-cohort analyses employing unified processing and batch correction demonstrate that a core subset of microbial biomarkers can be reproducibly recovered across small, independent ECC cohorts, supporting a replication-first analytical approach.

Conclusions

A unified, replication-focused cross-cohort reanalysis of ECC microbiome studies can generate a concise set of cross-cohort-stable microbial signatures suitable for low-cost clinical follow-up, such as targeted molecular assays. This framework also explicitly delineates signals that are dependent on sampling site or analytic pipeline, thereby improving reproducibility and translational relevance in ECC microbiome research.

62. Relationships Between Clinical Symptom Scales and EEG Biomarkers in OUD Patients

- Presenting Author: Jess DeLange (Noorda College of Osteopathic Medicine)

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- Andrew Payne (Noorda College of Osteopathic Medicine)

Purpose

Opiate Use Disorders (OUDs) are highly prevalent and have an extensive impact on an individual's life. Treatment options are available, but variations in clinical symptoms and comorbidities often lead to OUD being ineffectively treated despite pharmacological, psychological, lifestyle, and other interventions. One challenge to the treatment of OUD involves objectively measuring patient addiction status and recovery. Current methods often rely heavily on subjective patient self-reporting, which is useful for tracking drug usage, symptoms, and relapses, but offers only secondhand insight into physiological changes associated with opiate addiction.

Electroencephalography (EEG) offers a window into cerebral function and health, which may provide insight into these physiological changes along the disease course. By correlating EEG biomarkers with multiple mental health scales, we aim to expand the existing data set and further establish EEG as a valuable metric for informing and improving OUD treatment and the reduction of associated physiological and psychological symptoms.

Methods

Participants were recruited from two inpatient SUD treatment facilities. Patients completed the Clinical Opiate Withdrawal Scale (COWS), Patient Health Questionnaire-9 (PHQ-9), Hamilton Anxiety Rating (HAM-A), and the Adult ADHD Self-Report Scale (ASRS). Using WAVi Co. portable EEG headsets and software, patients then completed a series of cognitive tests. These included an oddball tone identification test, a Flanker test, and two trail-making tests, with 19-lead EEG data being gathered from the oddball tone test and flanker test.

Results

Data were collected from 110 male and female participants over 117 sessions. Analysis is in progress. Analyses being conducted include comparing results from the Clinical Opiate Withdrawal Scale (COWS), Patient Health Questionnaire-9 (PHQ-9), Hamilton Anxiety Rating (HAM-A), and the Adult ADHD Self-Report Scale (ASRS) with EEG biomarkers like P-300 delay, Theta/Beta Ratio, Frontal Alpha Asymmetry, and cognitive task time.

Conclusions

Work in progress

63. Plant derived steroid, 5 α -hydroxy-laxogenin, prevents EGF-induced non-small cell lung cancer cell growth

- Presenting Author: John Mitchell Donadieu (Noorda College of Osteopathic Medicine)

Additional Author:

- Musab Shuaib (Noorda College of Osteopathic Medicine)
- Kota Ramana (Noorda College of Osteopathic Medicine)

Purpose

Lung cancer remains one of the leading causes of cancer-related deaths worldwide. Non-small cell lung cancer (NSCLC) accounts for approximately 85% of all lung cancer cases. NSCLC is an aggressive subtype often associated with tobacco exposure, and its rapid progression makes early intervention crucial for improving patient prognosis. In this study, we have examined the chemopreventive effects of 5 α -hydroxy-laxogenin, a naturally occurring spirostane-type steroid derived from the rhizomes of the plant *Smilax sieboldii*.

Methods

We investigated the effect of laxogenin on inhibiting the growth and migration of NSCLC cells. Human non-small cell lung cancer (A549) cells were treated with laxogenin in a time- and dose-dependent manner.

Results

Cell viability was assessed using an MTT assay, which demonstrated that laxogenin inhibits the growth of A549 cells in a dose-dependent manner. Laxogenin also prevented EGF-induced invasion of A549 cells in a scratch assay, as well as EGF-induced transwell migration. Additionally, laxogenin modulated the EGF-induced expression of pro-apoptotic factors (bax, HTAR2/Omi) and downregulation of anti-apoptotic factors (survivin, HSP60). Laxogenin also increased expression of the pro-apoptotic enzyme caspase-3, as demonstrated by a specific caspase-3 activity assay.

Conclusions

Our findings indicate that laxogenin inhibits EGF-induced NSCLC cell growth and regulates the expression of apoptotic proteins in a dose-dependent manner. These results suggest that laxogenin may represent a promising chemopreventive agent for NSCLC.

64. The Effect of Digital Dentistry on Clinical Practice and Patient Outcomes

- Presenting Author: Jonathan Blackwell (Roseman University)

Additional Author:

- Jeff Talbot (Roseman University)

Purpose

Digital dentistry has transformed many aspects of clinical dental practice, yet adoption remains variable despite the increasing availability of advanced technologies. The purpose of this study was to evaluate the impact of digital dentistry on clinical efficiency, patient outcomes, and practitioner perceptions, while identifying persistent barriers to widespread implementation.

Methods

A focused literature review was conducted examining key domains of digital dentistry, including digital radiology, CAD/CAM systems, and the transition from conventional to digital impression techniques. Findings were contextualized using data from a large cross-sectional, questionnaire-based survey of practicing dentists and postgraduate dental students. Survey outcomes assessed knowledge, awareness, clinical application, and perceived advantages and limitations of digital dentistry. Chi-square analyses were used to evaluate associations between educational status and perceptions of digital technology.

Results

Survey findings demonstrated high awareness of digital dentistry (99.3%) and CAD/CAM technology (99.5%) among participants. Digital tools were most frequently perceived as beneficial for crown and bridge procedures, implant restorations, and impression making. Statistically significant differences were observed between educational groups regarding perceived usefulness in specific procedures ($p < 0.001$), while overall awareness did not significantly differ. Reported advantages included reduced chairside time, fewer appointments, improved precision, and enhanced communication with dental laboratories. Identified barriers included high initial costs, limited formal training, resistance to change, and concerns regarding data security.

Conclusions

Digital dentistry has significantly enhanced clinical efficiency and patient experience; however, successful integration remains dependent on clinician education and responsible application. Continued training and evidence-based implementation are essential to maximize benefits while minimizing potential risks associated with digital workflows in clinical practice.

65. Minimizing Discomfort from Dental Handpieces

- Presenting Author: Jorgen Lowry (Roseman University)

Additional Author:

- Kamran Awan (Roseman University)

Purpose

Despite major advances in dental technology, discomfort from dental handpieces remains a common source of dental anxiety and avoidance of care. Much of this discomfort is driven by vibration transmitted through the tooth and surrounding bone rather than by airborne noise in the operatory. This issue is clinically important, as nearly one-third of the U.S. population does not seek regular dental care, with anxiety related to the dental drill frequently cited as a contributing factor. This paper examines bone-conducted vibration generated during dental drilling, compares vibration profiles between air-turbine and electric handpieces, and evaluates whether vibration-damping strategies can reduce this source of patient discomfort.

Methods

The article reviewed used a controlled laboratory model. Extracted human molars were mounted in a mandibular analog designed to simulate alveolar bone and periodontal ligament mechanics. Vibration was measured during standardized drilling using tri-axial accelerometers, with baseline conditions compared to elastomeric interface damping and structural mass-damping interventions.

Results

Bone-conducted vibration was detected in all trials and propagated through the simulated bone structure. Electric handpieces consistently produced higher overall vibration levels, particularly in low-frequency ranges below 2,000 Hz, despite generating lower airborne noise than air-turbine handpieces. Both damping approaches reduced vibration amplitude, with structural damping producing the greatest reductions, especially in low-frequency components most strongly transmitted through bone. Changes in airborne sound levels were minimal and did not reliably reflect changes in bone-conducted vibration.

Conclusions

These findings suggest that patient discomfort during dental drilling is more closely tied to internal vibration than external noise. Reducing bone-conducted vibration may represent an important step toward improving patient comfort, lowering dental anxiety, and expanding access to dental care for a large, underserved portion of the population.

66. Testing the Therapeutic Potential of Sulforaphane Treatment Following Alcohol Exposure in *Galleria mellonella* Larvae

- Presenting Author: Joshua Tkachenko (NOORDA College of Osteopathic Medicine)

Additional Author:

- Scott Quimby (NOORDA College of Osteopathic Medicine)
- Victor Jimenez PhD (NOORDA College of Osteopathic Medicine)

Purpose

Acute alcohol intoxication impairs innate immune function and increases vulnerability to opportunistic pathogens. Prior work showed that sulforaphane (SFN) pretreatment restores macrophage phagocytic activity and improves survival in *Galleria mellonella* larvae that are exposed to hazardous alcohol consumption. Building on these findings, this study investigated the critical timing of SFN administration after acute alcohol exposure to determine a therapeutic window for SFN treatment in *G. mellonella* larvae.

Methods

The therapeutic window of SFN in vivo was established by monitoring the baseline survival of five *G. mellonella* larvae groups exposed via injections to alcohol (0.08% Et-OH) and subsequent SFN treatment (1 – 12 h) post hazardous alcohol exposure. Groups were monitored across 12-hour time points for survivability for up to 72 hours. Controls included untreated larvae, alcohol-only groups, and SFN-only groups.

Results

Overall survivability amongst all SFN treatment groups was >60%. The highest survivability was found in the 6 h group with a survival rate of >90% compared to controls.

Conclusions

Alcohol consumption is heavily associated with increased mortality and morbidity. In the current study, SFN demonstrated protective activity when administered after hazardous alcohol exposure but was heavily dependent on timing of treatment. The wax worm *G. mellonella* model is being used on account of its similarities with the innate immune response of other vertebrates. This model has shown the therapeutic potential of SFN treatment, demonstrating its effectiveness in researching alcohol-mediated immune dysfunctions and SFN's time-sensitive, protective effects.

67. Linking Subgingival Bacterial Levels to Gingival Gene-Expression Patterns to Prioritize Host-Response Pathways in Periodontitis

- Presenting Author: Josten Daneshmayeh (Roseman University)

Additional Author:

- Shilpa Bhandi (Roseman University)
- Frank W Licari (Roseman University)
- Shankargouda Patil (Roseman University)

Purpose

To determine how variation in subgingival bacterial burden relates to adjacent gingival tissue gene-expression patterns in periodontitis, and to summarize the dominant host-response pathways most consistently associated with high bacterial levels and clinically diseased sites.

Methods

We analyzed gingival tissue transcriptomes paired with adjacent subgingival plaque measurements from patients undergoing periodontal surgery (GSE16134; 120 patients; 310 microarrays). Plaque was profiled against 11 periodontal species using checkerboard DNA-DNA hybridization, and associations between bacterial levels and host expression were evaluated using random-effects regression with Gene Ontology–based biological process summaries and clustering of species-specific host-response patterns.

For external validation, we evaluated an independent gingival transcriptome dataset comparing clinically “diseased” vs “healthy” papillae within periodontitis patients (GSE10334; 247 samples: 183 diseased, 64 healthy) using mixed-effects differential expression and pathway-level interpretation.

Results

Bacterial species differed markedly in the extent of associated host transcriptional change. At stringent multiple-comparison control (Bonferroni threshold), thousands of probe sets tracked with levels of key pathogens, including *Tannerella forsythia* (9,392 probe sets), *Porphyromonas gingivalis* (8,537), and *Aggregatibacter actinomycetemcomitans* (6,460), while comparatively few associations were observed for *Eikenella corrodens* (506) and *Actinomyces naeslundii* (8). Species-level clustering of host-response summaries showed close similarity among “red complex” bacteria, with patterns distinct from those linked to *A. actinomycetemcomitans*; at the pathway level, antigen processing and presentation emerged as a top-ranked biological process across multiple species, while other processes (e.g., apoptosis- and transport-related programs)

displayed species-dependent ranks.

In the independent disease vs health comparison, widespread differential expression was confirmed (12,744 probe sets significant at Bonferroni; 5,295 up-regulated and 7,449 down-regulated in diseased sites). Differentially expressed functional groups included apoptosis, antimicrobial humoral response, antigen presentation, metabolic regulation, signal transduction, and angiogenesis; pathway summaries highlighted MAPK signaling and cytokine-cytokine receptor interaction among prominent disease-associated pathways.

Conclusions

This reanalysis supports that (i) microbial composition and burden adjacent to periodontal lesions are strongly associated with distinct gingival gene-expression patterns, and (ii) clinically diseased sites exhibit broad, structured changes in immune, epithelial, and tissue-remodeling programs. The convergence of bacterial-linked and disease-associated pathways provides a basis to prioritize host-response pathways for downstream mechanistic study and therapeutic targeting.

68. Assessing the Safety and Oversight Challenges of DIY Orthodontic Aligners

- Presenting Author: Kaden Coombs (Roseman University)

Additional Author:

- Casey Sayre (Roseman University)

Purpose

This research examines the clinical, ethical, and regulatory implications of direct-to-consumer (DIY) orthodontic aligners. While these systems promote accessibility and affordability, they often bypass essential diagnostic and monitoring processes typically performed by licensed dental professionals. The study aims to evaluate patient safety risks, identify gaps in regulatory oversight, and explore professional recommendations for mitigating harm associated with unsupervised orthodontic treatment.

Methods

A comprehensive literature review was conducted using peer-reviewed articles published between 2018 and 2024, sourced from PubMed, Google Scholar, and FDA databases. Primary data included case studies, survey-based research, and adverse event reports from the FDA's Manufacturer and User Facility Device Experience (MAUDE) database. Key studies analyzed included Belgal et al. (2023), Brown (2022), and Konstantonis et al. (2018). Findings were synthesized thematically to assess recurring trends in clinical complications, patient perceptions, and professional responses to DIY orthodontic models.

Results

Findings indicate a consistent pattern of adverse outcomes among DIY aligner users, including bite misalignment, gingival recession, tooth mobility, and in severe cases, tooth loss. The absence of in-person evaluation and follow-up was identified as a primary contributor to these complications. Surveys of dental professionals revealed decreased in-office consultations and increased reports of corrective treatment following DIY aligner use. The reviewed literature also identified insufficient consumer awareness and gaps in federal oversight of marketing and treatment regulation.

Conclusions

The evidence supports growing concern regarding the safety and efficacy of unsupervised orthodontic treatment. Stronger regulatory frameworks, improved patient education, and hybrid models integrating tele-dentistry with clinical supervision are recommended to enhance patient outcomes and minimize risk. Further research is needed to evaluate long-term effects and establish evidence-based guidelines for emerging remote care models in orthodontics.

69. It's a Conspiracy! Misinformation on social media and the role of the pharmacist as the medication expert.

- Presenting Author: Kaitlyn Hinton (Roseman University)

Additional Author:

- Erin Johanson (Roseman University)

Purpose

Health-related misinformation and conspiracy theories have increased in recent years, undermining public trust in healthcare and influencing patient beliefs about medications, vaccines, and disease management. Pharmacists, as highly accessible and trusted professionals, frequently encounter patients affected by misinformation. This study aimed to identify common misinformation narratives in pharmacy, assess their impact on patient care, and explore strategies to support pharmacists in addressing misinformation.

Methods

A scoping review of peer-reviewed literature published between 2015 and 2025 was conducted using PubMed. Articles addressing misinformation or conspiracy theories related to medications, vaccines, or pharmacist roles were screened and thematically analyzed. Patterns in misinformation sources, affected disease states, and implications for pharmacy practice were synthesized.

Results

Of 2,307 articles identified, 11 met inclusion criteria. Social media platforms, particularly Facebook, Instagram, TikTok, and YouTube, emerged as major drivers of misinformation. Frequently implicated disease areas included COVID-19, cancer, and vaccination. The findings highlight how misinformation shapes patient perceptions, behaviors, and interactions with pharmacists.

Conclusions

Misinformation significantly affects patient trust and pharmacy practice. Pharmacists are well positioned to counter misinformation but may feel underprepared to engage patients effectively. Integrating training in misinformation recognition, communication, and trust-building into pharmacy education and professional development is essential. Future research should evaluate targeted interventions and strategies for leveraging pharmacists' trusted role in clinical and digital settings.

70. Resveratrol as an attenuator of anti-nociceptive tolerance in opioid therapy

- Presenting Author: Keara LeRoy (Noorda College of Osteopathic Medicine)

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- Bryana Cox (Noorda College of Osteopathic Medicine)
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- Andrew Payne (Noorda College of Osteopathic Medicine)

Purpose

Opioid tolerance is an adverse effect of chronic opioid therapy characterized by a rightward shift in the dose-response curve, requiring a higher dose of the opioid to achieve the same level of pain control. There are several proposed pathways that contribute to opioid tolerance, some of which involve microglial activation and downstream signaling pathways, including BDNF, NMDA, HDA1C, AMPK, and KCC2 pathways. Resveratrol is a natural polyphenol found in grapes, blueberries, and other foods, as well as over-the-counter supplements. Previous studies in mice have suggested that resveratrol has effects on the above-listed signaling pathways that may reduce opioid tolerance. This study aims to evaluate the ability of resveratrol to prevent or mitigate opioid tolerance in humans. If successful, it will allow for improved pain control and a reduction in opioid dosing, contributing to decreased opioid dependence and abuse.

Methods

This study will be a longitudinal, double-blind, placebo-controlled trial with one control and two intervention groups. Sensitivity to mechanical and nociceptive stimuli will be measured using a battery of quantitative sensory testing (QST) techniques, including mechanical detection with von Frey filaments, mechanical pain threshold with pinprick stimulation, cold-pressor testing, and constant-temperature heat block. Study participants will be patients selected from local area pain clinics who are currently on an opioid-based pain management plan and have demonstrated tolerance behaviors, such as diminished pain control or repeated increases in opioid dose. After the initial QST, the intervention groups will take the dietary supplement resveratrol daily for six months, while the control group will receive placebo pills. QST will be performed monthly throughout the study. Opioid prescription and use will also be monitored throughout the study. Pain control and side effects will be self-reported by participants through monthly surveys. Data from the monthly QST evaluations and surveys will be compared to initial QST measurements and

survey answers to assess improvement in tolerance and pain control as a result of resveratrol supplementation.

Results

None at this time.

Conclusions

None at this time.

71. Implementing the Meno10 Screener: A Quality Improvement Initiative

- Presenting Author: Kelley Keenan (University of Utah)

Purpose

The purpose of this quality improvement initiative was to implement a standardized menopause screening protocol and evaluate its acceptability, appropriateness, and feasibility in clinical practice. Up to 80% of midlife women experience menopause symptoms that can last 7 to 10 years, including cognitive, mood, and sleep disturbances that impair daily functioning. These symptoms contribute to an estimated \$1.8 billion in annual lost productivity in the United States. Despite this burden, routine menopause screening is inconsistent or nonexistent in many primary care settings, demonstrating the need for a standardized, evidence-based approach.

Methods

This quality improvement project was conducted in two university-affiliated outpatient clinics (Women's Health and Family Medicine) using an iterative Plan–Do–Study–Act framework over an eight-week period. The Meno10 menopause symptom screener was implemented through medical assistant–led administration and provider review, supported by staff education and workflow refinement. A mixed-methods evaluation included pre- and post-intervention provider surveys administered via REDCap to assess clinical practice patterns and toolkit use; post-intervention surveys additionally assessed implementation outcomes—acceptability, appropriateness, and feasibility—using a validated implementation science framework. Quantitative data were analyzed descriptively and using Wilcoxon signed-rank testing, and qualitative feedback was analyzed using descriptive content analysis.

Results

Thirteen providers participated in the initiative. Feasibility exceeded the predefined benchmark for implementation success, while acceptability and appropriateness demonstrated moderate endorsement. Provider engagement varied, including one “super user” who completed 67 screenings during the implementation period. No statistically significant short-term changes were observed in screening frequency, referral patterns, or general resource utilization. Qualitative findings emphasized the importance of medical assistant involvement, workflow integration, and managing patient expectations related to menopause symptoms and hormone therapy.

Conclusions

Implementation of the Meno10 screener proved to be feasible in busy outpatient clinical settings and supported standardized assessment of menopause symptoms. While short-term downstream clinical practice changes were limited, early adoption and favorable feasibility findings suggest

potential for sustained use. Future efforts should focus on longer-term implementation, enhanced electronic health record integration, and continued staff engagement to support broader clinical impact.

72. The Immunomodulatory Effects of Salvinorin A in RAW 264.7 Macrophages and Microglial cells

- Presenting Author: Kennedy Scheele (NoordaCOM)

Additional Author:

- Bailey Hellstern (NoordCOM)
- Jaylee Montague
- Sowmika Vaka (NoordaCOM)
- Victor Jimenez (NoordaCOM)

Purpose

Salvinorin A is a naturally occurring κ -opioid receptor (KOR) agonist derived from *Salvia Divinorum* and has gained increasing interest for its analgesic and potential anti-inflammatory properties. Unlike μ -opioid receptor agonists, KOR agonists provide pain relief with a reduced risk of dependence. Early evidence suggests that Salvinorin A may modulate immune signaling pathways in macrophages and microglia, which play fundamental roles in inflammation and neuroinflammatory disorders. However, its immunomodulatory and dose-dependent effect in RAW 264.7 macrophages and microglial cells have not been well defined.

This study aims to determine the immunomodulatory and anti-inflammatory effects of Salvinorin A in RAW 264.7 macrophages and microglial cells by 1) testing the cytotoxic profile and 2) measuring inflammatory properties.

Methods

Raw 264.7 macrophages and microglial cells were cultured and treated with increasing concentrations of Salvinorin A (4-64 $\mu\text{g}/\text{kg}$) for 2 hours. Cytotoxicity was quantified using a lactate dehydrogenase (LDH) release assay to generate dose-response curves for each cell line. Percent cytotoxicity was calculated relative to untreated controls and maximum LDH release standard. The half-maximal cytotoxic dose (CD_{50}) was determined for both cell types and used to select sub-cytotoxic doses for further analysis of inflammatory responses via ELISA.

Results

Salvinorin A produced a dose-dependent increase in cytotoxicity in both macrophages and microglial cells. At 16 $\mu\text{g}/\text{kg}$ macrophages demonstrated near 50% cytotoxicity, while microglial cells reach around 40%, indicating slightly higher sensitivity in macrophages. These findings formed a reliable dosing range for future experiments. The next phase involves ELISA-based inflammatory marker assays at three sub-cytotoxic doses to evaluate Salvinorin A's inflammatory effects.

Conclusions

Preliminary data revealed that Salvinorin A displays variable cytotoxicity across macrophage and microglial cell types, demonstrating biologically relevant concentrations for ongoing experiments. Future ELISA inflammatory marker assays will clarify whether Salvinorin A exerts anti-inflammatory actions consistent with its proposed κ -opioid receptor-mediated immunomodulatory effects, contributing to its potential as a therapeutic compound.

73. Electronic Cigarette Use and Clinically Assessed Oral Mucosal Lesions and Alterations in Adults: A Systematic Review

- Presenting Author: Kevin Zhang (Roseman University)

Additional Author:

- Kamran Awan (Roseman University)

Purpose

To systematically review the available evidence examining the association between electronic cigarette use and oral mucosal lesions/alterations in adults, compared with non-users or other tobacco exposure groups.

Methods

A systematic literature search was conducted in PubMed/MEDLINE and Scopus to identify original English-language studies evaluating oral mucosal outcomes in adult e-cigarette users. The PubMed search yielded n = 438 records, and the Scopus search yielded n = 509 records. Following duplicate removal, titles and abstracts were screened, and full texts were reviewed for eligibility. Inclusion criteria encompassed original human studies assessing oral mucosal lesions or clinically assessed mucosal alterations via oral examination, cytologic analysis, or histologic evaluation. Studies limited to biomarkers without mucosal assessment, animal models, and non-original articles were excluded. Eligible studies were synthesized qualitatively due to heterogeneity in outcomes and study designs.

Results

Six studies met inclusion criteria for qualitative synthesis. Included studies consisted of cross-sectional analyses, comparative observational studies, and descriptive clinical reports. Outcomes evaluated across studies included clinically diagnosed oral mucosal lesions, cytologic and genotoxic alterations of buccal mucosal cells, and structural changes of oral or gingival mucosa. Comparator groups varied and included non-users, former smokers, and cigarette smokers. Outcome definitions and assessment methods varied substantially across studies.

Conclusions

Available evidence suggests that electronic cigarette use may be associated with clinically assessed oral mucosal lesions and mucosal alterations in adults. However, differences in

exposure definitions, comparator groups, and outcome assessment methods limit the strength of these current conclusions. Further longitudinal and clinical studies using standardized oral mucosal evaluation criteria are needed to better define the oral health effects of electronic cigarette use.

74. Active lifestyles and periodontal health

- Presenting Author: Kristi Torp (Roseman University)

Additional Author:

- Man Hung (Roseman University)
- Lea Haverbeck (Roseman University)
- Amir Mohajeri (Roseman University)

Purpose

Periodontitis is an inflammatory condition influenced by social, behavioral, and lifestyle factors. Because regular physical activity can reduce systemic inflammation, it may also be associated with lower periodontitis risk.

Methods

We analyzed national data from the U.S. adult population. Physical activity level was derived from questionnaire responses. Multivariable models adjusted for demographic, socioeconomic, behavioral, and health-related covariates.

Results

Periodontitis prevalence was higher among men; Mexican American and non-Hispanic Black adults; individuals with lower income or educational attainment; current smokers; and participants reporting low physical activity. Higher activity levels were associated with lower odds of periodontitis.

Conclusions

Moderate physical activity was independently associated with reduced periodontitis risk, beyond sociodemographic and behavioral factors. Promoting routine physical activity may help reduce periodontal disease burden.

75. Pyoderma Gangrenosum in Rural Guatemala: A Case Study

- Presenting Author: Lauren Draper (Noorda College of Osteopathic Medicine)

Purpose

Pyoderma gangrenosum, a rare inflammatory dermatologic condition presenting as painful, evolving skin ulcerations that develop into festering wounds in which healing is slow. A 36-year-old female presented to a 1 day pop-up free clinic that was hosted by a few American physicians and a group of medical students in rural Guatemala during a medical mission to various locations of rural Guatemala. She was seen with various complaints, the primary being multiple ulcerations in various stages of development along her arms and legs bilaterally.

Results

With the limited resources available, including a small pharmaceutical inventory, it was determined after a call to a U.S. wound and skin expert physician that she was presenting with pyoderma gangrenosum. The impoverished patient was given tools and educated on the importance of wound care and cleanliness as well as the nature of the disease, which is complex and requires local follow up over time.

Conclusions

Diagnosis of pyoderma gangrenosum is already difficult in a typical Western clinical setting with many resources available to test and rule out other differential diagnoses before concluding with pyoderma gangrenosum, but when applied to a rural Guatemalan setting, it becomes a bit more complex due to the insurmountable limitations. This case underscores the need for greater resources in rural areas worldwide and the use of limited resources to diagnose and treat a rare disease and manage chronic problems in rural Guatemala.

76. Rural Medicine in America: The People and Physicians of the Past, Present, and Future

- Presenting Author: Lauren Draper (Noorda College of Osteopathic Medicine)

Additional Author:

- Madeleine Karpiuk (Noorda College of Osteopathic Medicine)
- Kyle Bills (Noorda College of Osteopathic Medicine)

Purpose

Rural medicine is one of many areas (including global medicine and native populations) experiencing great disparity in the United States (U.S.) and many other countries. Many areas in the US alone are experiencing health deserts in which there are no nearby physicians and healthcare facilities. One of the problems facing these rural areas is a lack of personnel and physicians that are willing to treat in these areas, especially new physicians coming out of medical school and residency. Historical art photography unique and specific to the Rocky Mountain West and the Rural South in the U.S. has been chosen to try to measure the benefits of incorporating art into medical education, increasing understanding, empathy, and importance to rural health specifically. It is the hope and goal of this project to bring to light rural and global health in a alternative way in order to better introduce the reality of rural medicine to medical students and ultimately recruit more medical students and physicians to practicing any form of rural and global medicine in their futures in order to better combat the significant disparities facing these communities that are in great need of healthcare.

Methods

Students and other participants are to complete a survey assessing various pre- and post-participation perceptions of rural medicine, rural medicine context within the gallery, their experience of the gallery, etc. Survey results will be analyzed with statistical analysis such as ANOVA, t-tests, and correlation analysis as appropriate.

Results

Results are pending survey data collection and analysis. However, some preliminary data has shown an improvement in understanding of rural medicine, greater commitment from those already interested in rural medicine, and from those not interested in rural medicine, an increased possibility of pursuing rural medicine at some point in the future. Data also showed a greater desire among medical students to bring back history and art into medical education not only to contribute to greater awareness, understanding, and knowledge of patients, diseases, and the context of medical education, but also to add a priceless humanistic touch and reminder as to why we are studying to become physicians and who we will end up serving - our future patients.

77. Pregnancy Following Renal Autotransplant as Definitive Treatment for Nutcracker Syndrome with Complex History: A Case Study

- Presenting Author: Lauren Draper (Noorda College of Osteopathic Medicine)

Additional Author:

- Kyle Bills (Noorda College of Osteopathic Medicine)

Purpose

Nutcracker Syndrome, a rare vascular oddity, is a debilitating condition that is often difficult to diagnose and presents as a myriad of problems involving chronic pain and urinary symptoms. A 28-year-old female G2P0 presented to the clinic with a complex history of chronic pain due to trauma, spontaneous abortion, Hashimoto's thyroiditis, GERD, and Nutcracker phenomenon of the left renal vein post autotransplantation. After presenting to the clinic, very little is known about Nutcracker syndrome and pregnancy outside of a few case studies, although the patient's pre-pregnancy symptoms significantly improved with complete resolution following left renal autotransplantation to the right pelvic cavity prior to pregnancy. Prior to pregnancy, Nutcracker syndrome was difficult to diagnose in this case, as the patient presented to the clinic with ongoing, chronic problems that were not yet discovered to be due to Nutcracker syndrome until after a radiologist diagnosed it from a CT of the chest/abdomen/pelvis. Through pregnancy, possibility of symptom exacerbation was discussed, including a close evaluation of signs and symptoms of preeclampsia if any element of hypertension or risk factor presented and monitoring of the autotransplanted kidney and scar tissue through pregnancy.

Results

Location of the autotransplanted kidney and scar tissue had possibility of presenting its own challenges, including impeding ultrasound monitoring and evaluation of the pregnancy and careful treatment of the area if a cesarean delivery were ever to be necessary. There were no further complications during pregnancy in general or related to Nutcracker syndrome specifically, mostly likely prevented by the pre-pregnancy autotransplantation, and the patient had a successful, slightly pre-term (unknown cause) vaginal delivery at 36 weeks and 4 days.

Conclusions

. This case underscores a need for more literature surrounding the effectiveness of renal autotransplantation in the case of symptomatic Nutcracker Syndrome, long term follow up of patients who have received a renal autotransplant as treatment during pregnancy, and more standardized protocols and procedures to establish a gold standard for diagnosis and treatment of this condition before and after pregnancy.

78. Evaluating the Association between Lifestyle Inflammation Score and Periodontitis in U.S. Adults

- Presenting Author: Lea Haverbeck Simon (Roseman University)

Additional Author:

- Man Hung (Roseman University)
- Amir Mohajeri (Roseman University)

Purpose

To explore whether a composite lifestyle-related inflammation measure is associated with periodontitis in population-based data.

Methods

A lifestyle inflammation metric was derived from a national survey dataset and evaluated in relation to periodontitis using models with and without adjustment for participant characteristics.

Results

An association was observed in initial analyses but was reduced after accounting for covariates.

Conclusions

Findings suggest the observed relationship may be influenced by underlying participant characteristics, highlighting the importance of broader context in interpretation.

79. Vaccination as a Modulator of Arrhythmic Risk: Atrial Fibrillation in Long-Covid Patients

- Presenting Author: Lorissa Thorpe (Noorda College of Osteopathic Medicine)

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Purpose

Cardiac arrhythmias, particularly atrial fibrillation (AF), have emerged as a significant long-term complication following SARS-CoV-2 infection. Long-COVID, defined as persistent symptoms lasting ≥ 12 weeks, is increasingly associated with cardiovascular conduction disturbances. However, the prevalence of arrhythmias in unvaccinated individuals remains unclear. This literature review evaluates the prevalence, types, and mechanisms of AF in unvaccinated individuals with long-COVID compared to those with a vaccinated status.

Methods

We conducted a systematic review of peer-reviewed studies published between 2020 and 2024, utilizing databases such as PubMed, Google Scholar, and ScienceDirect to identify relevant literature on cardiac arrhythmias in unvaccinated individuals with long COVID-19. Studies were included if an arrhythmic complication occurred in a confirmed unvaccinated individual at the time of infection and 3 months post-infection. The evaluated data used revision tools based on their respective frameworks. Retrospective cohorts used the Newcastle-Ottawa Scale, while prospective studies and meta-analyses utilized AMSTAR 2 to identify trends and gaps across study designs. Studies not complying with PRISMA principles were excluded.

Results

Unvaccinated individuals with long-COVID exhibited a significantly higher prevalence of cardiac arrhythmias, particularly AF, compared to individuals who recovered without persistent symptoms. One large cohort study reported a 2.41-fold increased risk of new-onset AF among post-COVID patients. In a case-control study, 0% of non-COVID controls developed arrhythmias, while the post-COVID group showed PVCs, cardiac dysfunction, and heart rate variability changes. Mechanistic findings across studies point to chronic systemic inflammation, autonomic dysregulation, and myocardial remodeling as key contributors to this arrhythmogenic state. In contrast, vaccinated individuals consistently demonstrated lower rates of AF and other

arrhythmias, with evidence suggesting that immunization reduces the severity of acute infection and mitigates long-term inflammatory effects. These findings highlight vaccination as a protective factor against post-COVID cardiac complications.

Conclusions

Unvaccinated long-COVID patients are at an increased risk of developing tachyarrhythmic responses, with AF being the most clinically significant consequence due to its well-established association with thromboembolic strokes. These patients have demonstrated a need for long-term monitoring due to the emergence of cardiac dysfunction, suggesting that vaccination may mitigate the risk and serve as a useful tool for long-term protection. Given these considerations, further research into the mechanisms and prevention education for long-COVID is imperative.

80. A Systematic Review of Cadaveric A1 Segment Morphometry Studies

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Purpose

This systematic review synthesizes cadaveric studies reporting A1 segment length and diameter to evaluate the current anatomical evidence base.

Methods

A comprehensive PubMed search, conducted in accordance with PRISMA 2020 guidelines, identified six eligible human cadaveric studies that met predefined inclusion criteria.

Results

Reported mean A1 segment lengths ranged from 12.05 mm to 15.7 mm, while mean diameters ranged from 1.76 mm to 3.2 mm. However, substantial heterogeneity in methodology and reporting limited meaningful data synthesis. Most of the studies failed to specify the number of A1 segments measured, instead reporting specimen counts or ambiguous “case” numbers, and most lacked detailed measurement protocols, observer data, or reproducibility and reliability assessments. These limitations prevented the calculation of weighted averages and hindered meaningful quantitative comparison across studies.

Conclusions

Although cadaveric morphometry remains one of the most accurate means of assessing vascular anatomy due to direct visualization and freedom from imaging-related artifacts such as spatial resolution limits, partial volume effects, and reconstruction errors, inconsistent methodological rigor diminishes its potential utility. Given the critical clinical importance of the A1 segment in collateral circulation, aneurysm formation, and neurosurgical and endovascular interventions, this review underscores a need for standardized, transparently reported cadaveric measurement protocols to establish reliable morphometric reference values and better support neurosurgical planning and future anatomical research.

81. A Systematic Review of Cadaveric P1 Segment Morphometry Studies

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Purpose

This review evaluates cadaveric studies that report morphometric measurements of the P1 segment, with the aim of assessing the consistency and quality of existing data on segment length and diameter.

Methods

A structured PubMed search was completed in accordance with PRISMA 2020 guidelines to identify studies meeting predefined inclusion criteria for P1 segment morphometry, resulting in the inclusion of seven eligible studies. Reported values for P1 segment length and diameter were extracted and summarized in a comprehensive table.

Results

Across the included studies, mean P1 segment length values ranged from 6.57 mm to 7.80 mm, while reported mean diameters ranged from 1.70 mm to 2.80 mm. Interpretation of these findings was limited by considerable methodological variability. Many studies did not clearly define the number of P1 segments analyzed, relying instead on specimen counts or nonspecific “case” terminology, and frequently omitted detailed measurement procedures or assessments of measurement reliability. As a result, pooled analysis and weighted averaging were not feasible.

Conclusions

Cadaveric morphometry offers high anatomical accuracy through direct vessel visualization, avoiding limitations inherent to imaging modalities such as resolution constraints, partial volume effects, and reconstruction artifacts. However, inconsistent methodological rigor across studies limits the strength and applicability of existing P1 morphometric data. Given the clinical relevance of the P1 segment in posterior circulation hemodynamics, aneurysm pathology, and neurosurgical interventions, greater standardization and transparency in cadaveric measurement protocols are necessary to establish dependable reference values and advance posterior circulation research.

82. Review of Methodological Practices in Cadaveric Cerebral Arterial Morphometry: Variability in Contemporary Protocols (2015-2025)

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Purpose

This review evaluates and characterizes the methodological practices employed in cadaveric studies of cerebral arterial morphometry, with particular attention to measurement techniques, reporting standards, and sources of potential bias.

Methods

A systematic literature search was conducted in PubMed in accordance with PRISMA 2020 guidelines to identify cadaveric studies of cerebral arterial anatomy published within the last 10 years (2015-2025). 18 studies that met predefined inclusion criteria were included and analyzed. Extracted information included both quantitative specifications and qualitative descriptions of methodological approaches, such as dissection techniques, specimen preparation, measurement instruments, imaging and documentation methods, observer involvement, and statistical analyses.

Results

Substantial methodological heterogeneity was observed across the included studies. Measurement instruments varied widely and included handheld and digital calipers, various image-based software, handheld magnification tools, microscopes, photographic analysis with and without background contrasts, with some studies resecting arterial segments for isolated measurement while others performed in situ assessments. Few studies reported observer numbers or acknowledged interobserver or intraobserver reliability, and statistical approaches to data analysis were highly inconsistent or not defined. No standardized protocol for cadaveric cerebral arterial measurement was identified.

Conclusions

Contemporary cadaveric studies of cerebral arterial morphometry employ highly variable and inconsistently reported methodologies, limiting reproducibility, reliability, and cross-study comparability. These findings underscore the need for standardized measurement protocols and

transparent reporting practices to improve the quality and clinical applicability of cadaveric vascular anatomy research.

83. Osteopathic Techniques Modalities and Treatments: Comprehensive Literature Review

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Purpose

Osteopathic Manipulative Treatment (OMT) encompasses a broad range of manual diagnostic and therapeutic techniques that are foundational to osteopathic medical practice. Despite widespread clinical use and inclusion in osteopathic medical education, the evidentiary support for individual OMT technique modalities varies considerably in both quality and quantity. Previous reviews have often focused on disease-specific outcomes or aggregated OMT as a single intervention, limiting the ability of clinicians and educators to assess the relative evidence base, proposed mechanisms of action, and clinical applicability of individual techniques. A comprehensive, modality-specific evaluation of the current literature is needed to clarify areas of consensus, controversy, and opportunity for future research.

Methods

This prospective, structured literature review systematically evaluates the published evidence for the primary 20 osteopathic manipulative technique modalities recognized in contemporary osteopathic medical education and practice. Databases including PubMed, MEDLINE, Cochrane Library, and osteopathic-specific journals are being searched for primary research studies, systematic reviews, and clinically relevant trials. Each modality is being analyzed across standardized domains: historical development, clinical application, proposed mechanisms of action, quality and strength of supporting evidence, and identified research gaps. Study quality will be assessed using established evidence-based medicine principles, emphasizing methodological rigor, reproducibility, and clinical relevance.

Results

Preliminary findings indicate that the literature demonstrates substantial heterogeneity in both the volume and quality of evidence across OMT modalities. Techniques such as soft tissue, muscle energy, high-velocity low-amplitude, myofascial release, articular techniques, and lymphatic treatments show moderate to strong support for specific musculoskeletal and select systemic indications, with increasing mechanistic plausibility. Other modalities, including cranial osteopathic manipulative medicine, Chapman points, visceral manipulation, and select neuromodulatory techniques exhibit limited, conflicting, or lower-quality evidence, often relying on small sample sizes, observational designs, or theoretical models. Diagnostic reliability studies reveal inconsistent inter-examiner agreement, highlighting challenges in standardization.

Conclusions

This review highlights both the strengths and limitations of the current OMT evidence base. While several modalities demonstrate clinically meaningful efficacy and growing empirical support, others require more rigorous, standardized research to establish validity and reproducibility. These findings underscore the importance of evidence-informed technique selection, targeted research prioritization, and continued integration of osteopathic principles with contemporary scientific methodology. Future investigations should emphasize high-quality randomized trials, mechanistic studies, and improved diagnostic reliability to strengthen the role of OMT within modern, evidence-based clinical practice.

84. Investigating the Acute Metabolic Effects of Ultrasound-Induced Lipolysis: A Mechanistic Pilot Study

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Purpose

Ultrasound therapy has become a common method to induce localized fat reduction and body contouring as an FDA-cleared, non-invasive approach. This study investigates the mechanism of action (MOA) of high frequency (200 kHz – 3 MHz) ultrasound-induced lipolysis. The metabolic pathways for lipid mobilization, oxidation, and redistribution of the free fatty acids (FFAs) following ultrasound therapy are not well understood. This study aims to quantify acute and short-term physiologic and metabolic effects of ultrasound-induced lipolysis.

Methods

This prospective, single-arm, longitudinal mechanistic pilot study will enroll adults (18–65 years) with BMI 25.0–39.9 kg/m². Participants will undergo three standardized abdominal ultrasound-lipolysis sessions (Days 1, 4, and 7) targeting four abdominal quadrants. Two baseline assessments will be obtained prior to treatment, and follow-up testing will occur on Day 14. Metabolic outcomes include resting metabolic rate (RMR) and respiratory exchange ratio (RER) measured via indirect calorimetry, capillary β -hydroxybutyrate (ketones), fasting lipid panels (total cholesterol, LDL-C, HDL-C, triglycerides), urine chemical values (acetoacetate, ketones), body

mass index (BMI), and regional circumferential anthropometric measurements. Post-treatment assessments will be collected at 2 hours following each treatment session to evaluate temporal changes in substrate utilization and lipid mobilization.

Results

Data collection is ongoing. Primary outcomes will include within-subject changes in RER and resting metabolic rate following ultrasound treatment, alongside trends in ketone levels and lipid biomarkers across treatment days and at follow-up. These measures will help clarify whether ultrasound-induced lipid release is associated with a shift toward lipid oxidation versus redistribution over the short term. Current literature indicates three distribution effects remain most likely 1) local re-esterification 2) immune system regulation (macrophages and foam cells) 3) lymphatic to blood circulation and either metabolic induction or distal re-esterification.

Conclusions

This study will provide mechanistic insight into the acute metabolic response to ultrasound-induced lipolysis by integrating timed metabolic measurements with lipid biomarkers and anthropometric outcomes. Anticipated findings include a decrease in RER/RQ due to increased fat metabolism, increased RMR, decreases in anthropometric measurements, and elevated ketones, FFAs, and lipids. Findings may support development of evidence-based monitoring strategies and inform future controlled studies evaluating how adjunctive interventions (e.g., aerobic activity or lymphatic techniques) could influence lipid clearance after ultrasound-based fat reduction.

85. Preparing for practice – a review of strategies to assess APPE readiness

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Purpose

Advanced Pharmacy Practice Experiences (APPEs) represent a critical transition from didactic learning to practice-based education in the PharmD curriculum. Concerns regarding student readiness for APPEs have been increasingly reported by faculty, preceptors and the Accreditation Council on Pharmacy Education as well as the American Association of Colleges of Pharmacy. The purpose of this literature review was to examine how APPE readiness is defined, assessed, and supported in PharmD curricula.

Methods

A literature review was conducted using PubMed. Articles published in English from 2016-2025 were included if they were available in full text, with human subjects, and limited to the last 10 years. The only search term utilized was “APPE+readiness.” Sixty-six articles met criteria. Results were narrowed to studies only in the United States and focused on APPE readiness during the PharmD degree, not post-graduate study. Findings were synthesized thematically.

Results

The literature revealed substantial variability in how APPE readiness is defined and measured. Common ACPE Standards 2016 Domains of readiness included clinical knowledge, communication skills, professionalism, self-directed learning, and confidence. Strategies included self-assessments, objective structured clinical examinations (OSCEs), skills-based evaluations, and preceptor feedback. Several studies reported perceived deficiencies in clinical reasoning, documentation, and professional communication at APPE entry, potentially impacting students’ ability to perform Entrustable Professional Activities (EPAs) independently. Curricular approaches supporting readiness included early and longitudinal experiential learning, skills laboratories, capstone or bridge courses, and formative assessments mapped to CAPE Outcomes. Evidence linking specific interventions to improved APPE performance was limited and often institution specific.

Conclusions

While many programs implement ACPE-aligned strategies to promote preparedness, variability in assessment limits comparability and continuous quality improvement. Development of standardized, validated APPE readiness assessment tools aligned with CAPE Outcomes and EPAs may enhance curricular evaluation and support ACPE's goal of graduating practice-ready pharmacists. Future research should focus on developing validated APPE readiness assessment tools and examining the longitudinal impact of targeted curricular interventions on experiential performance and practice readiness.

86. Peritumoral Magnetic Particle Imaging Potentially Enables Quantitative In Vivo Sentinel Lymph Node Mapping Beyond Optical Dye Techniques

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Purpose

Sentinel lymph node (SLN) identification is central to oncologic staging and surgical planning across multiple malignancies. Current preoperative SLN mapping relies predominantly on radiotracers such as technetium-99m–labeled agents, which demonstrate high sensitivity but are limited by radiation exposure, short tracer half-lives, logistical complexity, and variable spatial resolution in complex lymphatic anatomy [1–3]. Nonradioactive magnetic tracers, such as superparamagnetic iron oxide nanoparticles (SPION) used with intraoperative probes (e.g., Magtrace®/Sentimag®), have shown non-inferior SLN detection compared with radiotracers but remain restricted to intraoperative use and lack preoperative quantitative imaging capability [4–8]. Magnetic particle imaging (MPI) is an emerging modality that directly detects SPIO nanoparticles with high sensitivity and linear signal response, enabling radiation-free, quantitative imaging [9–11]. Recent preclinical studies have demonstrated the feasibility of MPI for SLN identification in murine models [12–14]. Building on these initial demonstrations, this study aims to determine whether peritumoral injection of MPI-optimized SPIONs enables more accurate in vivo detection and quantification of SLNs compared with standard optical dye–based mapping.

Methods

This study will be conducted as a prospective experimental animal investigation in adult mice, including healthy and tumor-bearing cohorts. MPI-optimized SPIONs (e.g., VivoTrax) will be administered via peritumoral injection at clinically relevant doses to replicate translational SLN mapping workflows. In vivo MPI will be performed at predefined serial time points following tracer administration to localize and quantitatively measure SPION accumulation within draining lymph nodes. SLN detection by MPI will be directly compared with standard optical dye or fluorescence-based mapping techniques, with dual-tracer validation serving as the gold standard. Ex vivo confirmation will be performed using iron-specific histology and quantitative iron measurements (e.g. prussian blue staining and MPI quantification). Primary outcomes will include SLN detection accuracy, sensitivity, and specificity relative to optical dye mapping, and quantitative iron mass within SLNs. Secondary outcomes will include tracer pharmacokinetics, temporal signal persistence, and differentiation of primary versus secondary lymph nodes.

Results

It is anticipated that peritumoral injection of MPI-optimized SPIONs will enable sensitive in vivo detection of SLNs shortly after administration and provide sustained nodal signal over extended imaging intervals. Quantitative MPI measurements are expected to distinguish primary from secondary lymph nodes based on iron burden, extending beyond the qualitative localization achievable with optical dye mapping. These findings are expected to build upon prior MPI SLN feasibility studies by providing robust comparative and quantitative performance data.

Conclusions

This prospective study is expected to amplify prior demonstrations of MPI for SLN identification by establishing the advantages of peritumoral SPION injection and quantitative preoperative imaging over conventional optical dye-based techniques. Successful completion of this work will support MPI as a promising nonradioactive SLN imaging modality and lay the groundwork for future investigations involving metastatic lymph nodes, targeted SPIONs, and multimodal MPI-based lymphatic imaging strategies.

87. Periodontal Implications of Prolonged Fixed Orthodontic Retainers

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Purpose

Fixed lingual (“permanent”) retainers are commonly used to maintain orthodontic treatment outcomes, yet their long-term biological effects on periodontal tissues remain unclear. This scoping review examined how prolonged fixed retainer use has been investigated in relation to periodontal health, including both clinical and imaging-based outcomes.

Methods

This scoping review followed Joanna Briggs Institute guidance and was reported according to PRISMA-ScR. PubMed, Scopus, and Web of Science were searched for peer-reviewed primary studies assessing periodontal outcomes in post-orthodontic patients with fixed or bonded retainers. Randomized controlled trials, cohort, case-control, and cross-sectional studies were included. Three reviewers screened records and extracted data on study characteristics, retainer features, duration and definition of prolonged use, periodontal outcomes, measurement methods, and complications. Results were synthesized narratively and tabulated.

Results

A total of 27 studies published between 2015 and 2025 were included, the majority of which were randomized controlled trials. Most studies examined mandibular fixed retainers, most often multistranded stainless steel wires. Follow-up periods were predominantly short, with outcomes typically assessed within 12 months and limited representation of longer-term follow-up. The definition of “prolonged” retention varied considerably and was often not explicitly stated. Periodontal outcomes focused primarily on plaque and gingival inflammation, with less frequent reporting of probing depth and bleeding on probing and limited assessment of clinical attachment level and gingival recession. Imaging outcomes were uncommon, and CBCT-based evaluation of

alveolar bone morphology was absent. Bond failure and retainer repair were the most frequently reported complications.

Conclusions

Evidence on prolonged fixed retention is largely limited to short-term plaque and gingival measures, with minimal evaluation of clinically significant periodontal breakdown and sparse use of imaging-based bone assessment. Standardized exposure definitions, consistent outcome reporting, extended follow-up, and ethically justified imaging protocols are needed to better characterize long-term periodontal risk.

88. Epimedin A prevents glioblastoma growth and invasion

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Purpose

Glioblastomas (U87) are an aggressive brain tumor that arises from glial cells and invades surrounding parts of the brain. The prognosis for glioblastoma is poor, with a median survival rate of 15 months with treatment. Treatments are aggressive with severe side effects. Molecular therapeutics are required to control U87 cell growth with a better safety profile. Several plant-derived compounds were tested for chemo preventive effects against glioblastoma. However, the role of Epimedin A, isolated from plants known as Epimedium (Horny Goat Weed), in preventing cancer growth is not clear. We examined the chemo preventive effects of Epimedin A in U87 cells. We specifically investigated the effects it has on cell proliferation, apoptosis, oxidative signaling, and migration.

Methods

U87 cells obtained from ATCC were treated with an increasing concentration of Epimedin A (0-100 μ M) \pm EGF. Cell viability was examined using the MTT assay, while invasion and migration were assessed by scratch and Transwell migration assays, respectively. Expression of various apoptotic proteins was measured by an antibody array. Reactive oxygen species levels were measured using fluorescence-based assay. Statistical comparisons were performed using one sided t test for a prespecified directional hypothesis and reported using mean \pm standard deviation.

Results

Our results suggest that Epimedin A prevents the growth of U87 cells in a dose-dependent manner, with 60 μ M producing the greatest reduction in cell proliferation under EGF stimulation. Furthermore, Epimedin-A also prevented the invasion and migration of U87 cells. Additionally, Epimedin A increased caspase-3 expression, as measured by PARP cleavage under EGF stimulation, and reduced the formation of reactive oxygen species. Epimedin A also regulates the expression of various pro- and anti-apoptotic proteins such as Bcl-x, HIF-1alpha, Bad, Bax, Caspase-3, Cytochrome C, SMAC/Diablo.

Conclusions

Epimedin A has displayed inhibitory effects on U87 cells' viability. Specifically, studies showed inhibitory effects on proliferation, migration, and ROS. Epimedin A regulates the expression of various pro- and anti-apoptotic factors and inflammatory markers in cancer cells. We next planned

to examine its in vivo efficacy using nude mice xenografts. Thus, our results indicate that Epimedin A inhibits the growth of U87 cells and may act as a chemo preventive agent.

89. Unraveling the Molecular Blueprint of Orthodontic Tooth Movement: A Transcriptomic Insight into Inflammation and Bone Remodeling

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Purpose

Orthodontic tooth movement (OTM) represents a finely balanced biological process, where mechanical force induces a transient inflammatory response that orchestrates bone resorption and formation. Despite its clinical importance, the molecular regulators driving this process remain incompletely understood. This study employed a systems-level transcriptomic approach to identify key biomarkers, signaling pathways, and transcriptional regulators that mediate OTM, aiming to translate these insights into improved clinical strategies for controlled tooth movement and tissue preservation.

Methods

Publicly available periodontal tissue transcriptomic datasets were reanalyzed using the limma package in R, with Benjamini–Hochberg false discovery rate correction ($|\log_2FC| \geq 1$, adj. $p \leq 0.05$). Functional enrichment analyses (Gene Ontology, KEGG) were performed using clusterProfiler and GSEA. Protein–protein interaction (PPI) networks were constructed via STRING, while co-expression patterns were explored using weighted gene co-expression network analysis (WGCNA). Transcription factor (TF)–target relationships were inferred through DoRothEA regulons and visualized with ggraph to map regulatory hierarchies.

Results

A total of 2,230 differentially expressed genes (DEGs) distinguished orthodontically stimulated tissues from controls. Upregulated genes included inflammatory mediators (IL1B, CXCL8, TNF) and matrix remodeling enzymes (MMP9, CTSK, COL1A1). Pathway enrichment underscored cytokine–cytokine receptor interaction, NF- κ B, TNF, and osteoclast differentiation as central biological axes. Network topology pinpointed TP53, STAT1, NF κ B1, E2F1, FOXP1, and ZNF263 as master transcriptional regulators coordinating inflammatory and bone remodeling cascades. Collectively,

these findings delineate a molecular circuit linking mechanical loading to osteoclastic activation and subsequent tissue adaptation.

Conclusions

This integrative transcriptomic study highlights the genetic and signaling landscape underlying orthodontic tooth movement. The identification of TP53, STAT1, and NFκB1 as key transcriptional regulators offers a potential therapeutic axis for modulating inflammatory and remodeling responses. Translating these molecular insights could enable orthodontists to personalize force application, accelerate tooth movement, and reduce risks of root resorption and alveolar bone loss—advancing toward precision orthodontics.

Keywords: orthodontic tooth movement; transcriptomics; NF-κB signaling; bone remodeling; biomarkers; precision orthodontics

90. Addressing Gaps in Early Radiology Education Through Introductory Rx Bricks in Nuclear Medicine and Interventional Radiology

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Purpose

Radiology has become a fundamental aspect of modern medicine, spanning multiple specialties and organ systems. Despite its widespread use in clinical practice, radiology and its subspecialties remain largely underrepresented in medical education, including preclinical curricula and the ScholarRx platform. Nuclear Medicine (NM) and Interventional Radiology (IR), two key radiology subspecialties, play an expanding role in the diagnosis and management of major conditions such as oncologic, cardiovascular, and pulmonary diseases. To address this educational gap, we propose the development of two educational articles, Introduction to Nuclear Medicine and Introduction to Interventional Radiology, as part of a larger educational series on radiology. These modules aim not only to introduce medical students to these fields, but also to reinforce clinically and board-relevant concepts essential for clinical decision-making.

Methods

Educational articles (“Bricks”) will be created through the ScholarRx platform. Content will be selected based on USMLE- and COMLEX-relevant topics, common clinical indications and presentations, and imaging modalities or procedures that are frequently misunderstood. The Nuclear Medicine Brick will emphasize distinctions between functional and anatomic imaging, commonly used studies, and fundamental radiotracer principles. The Interventional Radiology Brick will focus on the scope of IR practice, its role in patient care, and commonly performed procedures. Both Bricks will incorporate annotated medical images, summary tables and workflows, and case-based learning to reinforce pathologic concepts with clinical applications.

Results

As a prospective project, these Bricks are currently under development, and no results are available to report at this time.

Conclusions

These prospective Bricks address a critical gap in early radiology education. They introduce nuclear medicine and interventional radiology in an approachable and clinically-grounded format. They will prepare students for clinical rotations and board examinations, while also reinforcing the role of radiology as an integral component of patient management, rather than solely focusing on image interpretation. These educational Bricks will be available not only to medical students at a single institution, but also to learners nationwide and internationally as supplemental medical education resources.

91. Assessment of Image Modifications for Medical Students with Color Vision Deficiency

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Purpose

Medical students with color vision deficiency (CVD) face challenges interpreting histology and gross pathology images, which often rely on color distinctions. This study evaluates whether digital image modifications (e.g., color and contrast adjustments) improve interpretability for students with and without CVD. Additionally, we aim to characterize adaptive strategies developed by individuals with CVD in these visually intensive areas of medical education.

Methods

We are recruiting 15-20 first- through third-year medical students, with a preference for self-reported CVD individuals. Participants will complete a pre-survey that includes a brief color vision screening (Ishihara plates) and demographics questions. They will then view a series of histology and gross pathology images presented in original and digitally modified formats. Modifications include contrast enhancement, grayscale, and pseudo-color created using the Fiji app. For each image, participants will identify key structures via multiple-choice questions and rate visibility and confidence using Likert scales. At the end, participants will indicate image preferences. To expand the effective sample size, a subset of non-CVD participants will view images through simulated deuteranomaly filters. Validation trials will determine whether responses from simulated CVD participants are comparable to those from actual CVD participants.

Results

This is a prospective study; data collection is ongoing. Quantitative and descriptive analyses will assess differences in interpretability, confidence, and perceived usefulness of image modifications.

Conclusions

This study aims to identify low-cost, easily implementable image modifications that enhance visual learning for students with CVD while maintaining or improving usability for all learners. Findings will inform best practices for inclusive image design in medical education and provide practical recommendations for future students with CVD navigating color-dependent curricula. More

broadly, this work demonstrates how universal design principles can be incorporated into medical education to promote equity and support diverse learning needs.

92. Regulatory Signal Mining of Orthodontic Device Adverse Events: A MAUDE-Derived Taxonomy and Severity Triage for Clear Aligners and Fixed Appliances

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Purpose

To build and validate a practical, orthodontics-specific adverse event taxonomy and severity triage framework using publicly available regulatory narratives, enabling rapid surveillance of high-risk event patterns across clear aligners and common orthodontic appliances.

Methods

A retrospective computational audit was conducted using U.S. FDA MAUDE medical device report narratives related to orthodontic appliances, with a focus on clear aligners (including Invisalign and direct-to-consumer sequential aligners). Narrative reports were normalized and grouped into clinically interpretable event families (airway compromise, hypersensitivity/allergic reactions, ingestion/aspiration, soft-tissue injury, periodontal/tooth injury, and occlusal/bite changes). A lightweight natural-language processing pipeline (keyword+pattern rules with clinician-informed adjudication) was used to assign event family labels and a 3-tier severity tag (non-serious, serious, life-threatening) consistent with report descriptors. Aggregate signal profiles were summarized at the device-category level.

Results

In MAUDE reports referencing a widely used clear aligner system reports include a clinically meaningful fraction of serious events. For clear aligners, 173 MAUDE device reports were identified, 169 designated as adverse events, and 45 categorized as serious or life-threatening, with airway-related symptoms frequently represented (e.g., difficulty breathing reported in 56 events). For broader orthodontic appliances over a 5-year window, 175 adverse event reports were identified in MAUDE, with most being mandatory reports, supporting the feasibility of systematic regulatory surveillance in orthodontics. For direct to consumer sequential aligners, 104 MAUDE reports were analyzed in a dedicated study; injuries constituted the dominant adverse-event class

(86.5%), and reporting was largely patient-driven (about 60% patient-submitted), highlighting a distinct safety-reporting signature compared with clinician-mediated pathways.

Conclusions

A MAUDE-derived orthodontic event taxonomy supports rapid, publishable safety surveillance without imaging or biomechanics. Available MAUDE evidence suggests that (i) airway/allergy-related narratives represent key “high-acuity” signals for supervised clear aligner systems, while (ii) injury/occlusal complaint clusters dominate in DTC aligner reporting, motivating targeted patient counseling, device design risk controls, and standardized adverse event documentation in orthodontic practice.

93. Cost-Effective Blood Biomarkers for Monitoring Healthy Aging in U.S. Adults

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Purpose

The purpose of this literature review is to examine current evidence regarding the use of available biomarkers. Our initial analysis of available literature has suggested that glucose tolerance, C-reactive protein (CRP), insulin-like growth factor-1 (IGF-1), and D-dimer are cost-effective tools for monitoring healthy aging of adults in the United States. The goal of this project is to assess how well these biomarkers reflect age-related physiological change and their potential for integration into primary care-based preventive medicine.

Methods

We will conduct a structured literature review, searching prominent databases, such as PubMed, Ovid and Embase. In addition, we will evaluate peer-reviewed human studies that have assessed associations between glucose tolerance, CRP, IGF-1, or D-dimer with age in healthy adults. Our priority population that we will be looking at is U.S. cohorts and studies, as the goal of this paper is to apply findings to clinical practices across the U.S.. Key variables of interest will include age and biomarker levels, their accuracy in predicting long-term health outcomes, clinical availability of assays, as well as the approximate cost of these tests. The findings will be summarized, addressing the consistency of the results across studies, and any gaps in evidence will be addressed.

Results

Initial searches have shown clear and consistent age-related patterns in multiple biomarkers, such as declining glucose tolerance and elevated CRP with age, while highlighting more variable results for other markers, such as IGF-1 and D-dimer. This will also help clarify which biomarkers are more reliable in tracking aging over time, which ones are often grouped together in healthy aging, and where the existing data is scarce or inconclusive.

Conclusions

Overall, this review aims to evaluate the strength of current evidence for using glucose tolerance, CRP, IGF-1, and D-dimer as practical and cost-effective tools to monitor healthy aging in U.S. adults. By incorporating biological, clinical, and practical aspects, the findings could aid in

developing biomarker panels for primary care and provide grounds for future long-term studies. The review will summarize key evidence, identify any gaps, and make potential suggestions for integrating biomarker-based aging into routine clinical practice.

94. In Silico Biomarker Discovery for CRISPR-Cas-Based Detection of Latent Tuberculosis

- Presenting Author: Parv Kale (Waterford Highschool, Sandy, Utah)

Additional Author:

- Vijay Kale (Roseman University)

Purpose

The purpose of this study was to develop a rigorous in silico framework to identify conserved latent-phase Mycobacterium tuberculosis RNA biomarkers and design highly specific CRISPR-Cas13a guide RNAs for non-invasive, amplification-based detection of latent tuberculosis infection.

Methods

Latent tuberculosis infection (LTBI) represents a major global reservoir for future active disease, yet existing diagnostic methods rely on host immune responses and often require invasive sampling, limiting both accuracy and accessibility. To address these limitations, we constructed a comprehensive in silico pipeline linking dormancy-associated M. tuberculosis RNA biomarkers to CRISPR-Cas13a guide RNA candidates. A literature-curated panel of DosR/hypoxia-regulated genes and small RNAs was assembled and evaluated for nucleotide conservation across the M. tuberculosis complex using BLASTN analysis. Sequence retrieval, differential expression analysis, guide scoring, and off-target screening were performed using public databases (NCBI, KEGG) and reproducible local scripts. Cas13a guide RNAs were designed using the NY Genome Center platform and filtered based on GC content (40–60%), exclusion of homopolymers longer than three base pairs, and predicted secondary structure constraints. Off-target potential was assessed against the human genome and transcriptome using a conservative query coverage threshold ($\leq 61\%$, equivalent to ≤ 13 matched bases per 23-nt guide).

Results

All prioritized RNA targets demonstrated complete nucleotide conservation across more than 500 M. tuberculosis strains, supporting their global diagnostic relevance. Stringent guide-level filtering yielded a final set of three high-confidence Cas13a guides: one primary guide, crRNA068 (positions 68–90; $\leq 57\%$ query coverage), and two backup guides, crRNA316 (positions 316–338) and crRNA317 (positions 317–339; $\leq 61\%$ query coverage).

Conclusions

This study establishes a reproducible and scalable in silico strategy for prioritizing latent M. tuberculosis RNA biomarkers and designing high-specificity Cas13a guide RNAs. The resulting guide set provides a strong foundation for CRISPR-based diagnostics of latent tuberculosis, with

future work focused on amplicon optimization, clinical validation using non-invasive samples, and expanded off-target screening against the human oral microbiome.

95. Accuracy of Salivary MMP-8 Testing for Periodontitis in Patients with Type II Diabetes

- Presenting Author: Piper Collins (Roseman University)

Additional Author:

- Claudia Freitas (Roseman University)

Purpose

As Periodontal disease has been found to be a bidirectional link between type II diabetes, salivary biomarker tests have become a new adjunctive test for diagnosing periodontal disease. Leaving clinicians to wonder how accurate these tests are in patients with preexisting comorbidities. This literature research seeks to investigate the research question: in patients with periodontitis and type II diabetes, does salivary MMP-8 testing improve diagnostic accuracy compared to traditional clinical measurements?

Methods

Relevant articles were sourced from 5 databases; PubMed, Web of Science, Scopus, Dental and Oral Sciences Sources (EBSCO), and Google Scholar. The studies involve patients with type II diabetes and periodontal disease, with a sample size range of 30-158 participants that all looked specifically at MMP-8 levels.

Results

Twenty of the 176 identified articles were selected for inclusion. The majority of the selected studies found elevated levels of MMP-8 in diabetic patients with periodontitis compared to patients without diabetes; however, some studies found that there was no statistically significant difference between the two groups. Overall, all the studies found elevated levels of MMP-8 in both groups compared to the control groups.

Conclusions

This review affirms that MMP-8 is a reliable biomarker for diagnosing periodontal disease in patients. Use of these tests allows for noninvasive, quick, and efficient diagnosing; however, it should not be used as a replacement for traditional measurements. While there were limitations throughout the studies, such as small sample sizes or disproportionate diversity in sample populations, the result of this review calls for further research into the impact of MMP-8 levels in the presence of type II diabetes.

96. Plant-Based Diet Effects on Dental Health: A Literature Review

- Presenting Author: Roopan Shahi (Roseman University)

Additional Author:

- Veronica Baltazar (Roseman University)
- Shankargouda Patil (Roseman University)
- Frank W. Licari (Roseman University)

Purpose

Concerns about plant-based diets and effects on dental health have surfaced as their popularity has grown. The frequent ingestion of acidic and carbohydrate-rich plant foods, along with shortages in vital elements like calcium and vitamin D, can have detrimental effects on the dental cavity, which is the initial site of nutritional contact.

Methods

Peer-reviewed experimental research and meta-analyses from the NIH PubMed Database were the sources of data. We collected evidence from experimental research studies. The following key words were used in our search from the NIH Database: dental, dental health, plant-based diet, vegetarian, vegan, carbohydrates, acidic/acid, frequency of consumption, snacking, vitamins, minerals, Vitamin D, calcium, tooth decay, and dental erosion.

Results

It was found that four primary mechanisms by which plant-based diets influence oral health: increased frequency of eating, elevated carbohydrate intake, acidic food exposure, and deficiency of key micronutrients such as calcium and Vitamin D. These interconnected pathways promote enamel demineralization, caries formation, and reduced salivary immunity.

Conclusions

A balanced diet is needed to preserve oral health. People following plant-based diets may need to closely manage their nutrient levels to avoid long-term dental issues. Using this knowledge, dentists may minimize the long-term dental issues linked to plant-based diets by offering their patients dietary counseling and oral hygiene techniques that highlight the effects of these diets on oral health.

97. The connection between the PFC and moral decision making and the means of training the PFC

- Presenting Author: Rosemary Iwuanyanwu (Noorda College of Osteopathic Medicine)

Additional Author:

- Dr. Andrew Payne (Noorda College of Osteopathic Medicine)

Purpose

Moral decision making involves the evaluation of scenarios as right or wrong based on universal standards, standards of a governing body, and/or the beliefs of an individual. In this review, we discuss the neuroscience of morality with an emphasis on the prefrontal cortex (PFC) to better understand moral decision-making, delve into practices that impact the PFC, and propose a means of further developing the PFC thus improving moral decision making. Previous studies have shown that the PFC in particular is a major center for moral decision-making. Given this, we sought to find means of further developing the PFC for the purpose of enhancing moral decision-making in individuals. We found that practices like meditation and pain management are connected to the PFC.

Methods

This project was conducted as a narrative review to evaluate existing literature on the role of the PFC in moral decision-making and means of impacting the PFC to increase moral decision-making ability. Findings across multiple experimental methodologies were integrated to better understand the existing literature on this topic and draw a conclusion.

Results

With what we, the researchers, have reviewed of the role of the PFC in moral decision-making, we have come to the conclusion that the practice of meditation results in better moral decision-making ability in those that practice consistently, especially if continued long-term. The same can be said of the processing of pain and building its tolerance.

Conclusions

This review paper summarizes work published regarding moral decision making, the brain regions involved, and means of improving development of the PFC to improve moral decision making. Ample research has been conducted focusing on the different brain regions involved in moral decision-making, but the PFC has been consistently found to hold an instrumental role in this process. Techniques that reduce pain, depression, or feelings of anxiety have been linked to the PFC in particular. By reducing these feelings, we can further develop the PFC leading to better moral decision making.

98. Content Analysis of Semaglutide and Tirzepatide Products Sourced from Chemical Grade Vendors

- Presenting Author: Sam Perez (Roseman University)

Additional Author:

- Huan Tran (Roseman University)
- Casey Sayre (Roseman University)
- Scott Shipley (Roseman University)
- Andrea Bui (Roseman University)

Purpose

The objective of this experiment is to perform a quantitative and qualitative analysis using High-Performance Liquid Chromatography (HPLC) of the peptide base drugs semaglutide and tirzepatide products labeled for "For Research Purposes Only." Illicit use of these products for weight loss by individuals without physician supervision may increase risk of adverse effects. Since drugs under this grade do not go thru a rigorous approval process by the United States Food and Drug Administration (FDA) their quality and performance are likely not in line with strict Good Manufacture Practices (GMP) standards.

Methods

Suitable previously developed and validated methods for potency/strength testing were used to compare the samples against a standard to measure the concentration and the presence of the right active ingredient from samples purchased online from BeastMode Labs, BB Biopep and Elevated Peptides.

Results

These samples analyze are sold without a strict oversight, bypassing regulations such as the United States Pharmacopeia (USP) acceptable potency of $\pm 10\%$ neglect on the analyze sample. The samples from these suppliers showed a lower potency from the percent of drug of the label claim.

Conclusions

The "grey market" of GLP's drugs emerged from the high demand, high cost, and shortages of the authentic, FDA-approved medications has cause the sale of unapproved, unregulated versions of the drug through unauthorized channels, primarily online. The lower than label concentrations may be subtherapeutic if used in humans and may cause individuals illicitly using the drug to use higher amounts of the product to achieve results. This could increase the risk of inadvertent overdose as well as increasing the exposure to potentially harmful additives in the products.

99. Bridging Biology and Biomaterials: In Silico Discovery of Bioactive Surface Molecules to Enhance Osseointegration

- Presenting Author: Samuel Thomas (Roseman University)

Additional Author:

- Akash Patel (Roseman University)
- Shilpa Bhandi (Roseman University)
- Frank W Licari (Roseman University)
- Shankargouda Patil (Roseman University)

Purpose

Successful osseointegration is the cornerstone of implant stability and long-term function. Despite remarkable progress in surface engineering, most implant designs still rely on empirical modification rather than biological evidence. This study integrates computational biology and material science to identify surface molecules that can actively promote bone–implant bonding. By linking gene expression patterns from peri-implant tissues with molecular docking simulations, we sought to predict biologically meaningful ligand–receptor interactions that could accelerate healing and improve implant success.

Methods

Public peri-implant transcriptomic datasets (GSE57631 and GSE33774) were reanalyzed using the limma package in R to identify genes associated with osteogenesis, angiogenesis, and extracellular matrix (ECM) remodeling. Key osseointegration proteins (ITGB1, FN1, BMP2, COL1A1) were modeled for docking. Potential bioactive ligands—including RGD peptides, phosphate analogs, strontium ions, and polyphenols—were obtained from PubChem and converted into 3D structures using Open Babel. Binding sites were predicted using PrankWeb, and molecular docking was performed with AutoDock Vina. Predicted interactions were visualized with PyMOL and UCSF Chimera to identify high-affinity binding residues relevant to surface adhesion and matrix formation.

Results

Transcriptomic reanalysis revealed activation of key osteogenic markers (RUNX2, ALPL, COL1A1) and ECM remodeling pathways, confirming bone-forming activity at the implant interface. Docking simulations identified stable and biologically plausible binding between osseointegration-related proteins and RGD-like or phosphate-based ligands. These findings suggest that mimicking natural

adhesion and mineralization motifs at the implant surface may improve early osteoblast attachment, matrix deposition, and mechanical stability.

Conclusions

This study presents a translational, biologically guided approach for implant design by integrating gene expression data with in silico molecular modeling. The workflow offers a rapid, cost-effective way to prioritize surface chemistries that align with host tissue biology—paving the way for next-generation bioactive coatings that could shorten healing time, enhance bone anchorage, and reduce implant failure. Ongoing in vitro validation will help translate these computational discoveries into clinically effective solutions for improved patient outcomes.

100. The Social Media–Driven Surge of Beef Tallow in Skincare: A narrative literature review and the dermatologic implications

- Presenting Author: Sarah Ngo (Noorda College of Osteopathic Medicine)

Additional Author:

- Nathan Graham (Noorda College of Osteopathic Medicine)
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- Victoria Nguyen (Noorda College of Osteopathic Medicine)
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Purpose

Over several decades, social media has been responsible for countless viral skincare practices, often amplifying trends lacking scientific validation. Recently, topical application of beef tallow exploded online, promising acne clearing and scar reduction. The first TikTok appeared in 2022 with over 500,000 likes. Now, dozens of beef tallow products are sold on TikTok Shop; most with over 1,000 sales and some exceeding 100,000. This narrative literature review considers dermatologic evidence underlying these claims and examines potential implications associated with beef tallow use.

Methods

Review of peer-reviewed dermatology, cosmetic science, and digital media literature published between 2000 and 2025 was conducted using PubMed, Journal of American Academy of Dermatology, and other relevant industry sources. Key words include: “Beef Tallow Contents”, “Beef Tallow Skincare”, and “Social Media Dermatology”. Inclusion of English-language sources with Exclusion of non-English publications, duplicate studies, and articles lacking relevance to dermatologic outcomes or skincare safety.

Results

Upon review of 14 articles, qualitative themes include: beef tallow lipid composition, skin barrier effects, and social media-driven behavior. Primarily due to lack of research, consumers are not properly made aware of the minimal benefit and potential harm of beef tallow application. Moreover, the scope of existing research is clinically skewed. Peer-reviewed studies of lipid moisturizers featured only subjects with preexisting conditions, most often dermatitis or psoriasis. One study incorporated tallow in a trial. While the ideal moisturizer demonstrates relief in subjects with atopic dermatitis, its composition included 30% lamb tallow by weight (beef was not used due

to an unfavorable lipid profile compared to lamb). In the United States, little protection is offered to consumers regarding alternative cosmetic products, including tallow.

Conclusions

Social media trends of beef tallow in skincare highlights the need for evidence-based dermatologic guidance and critical appraisal of online skincare claims to prevent skin barrier harm and adverse cutaneous outcomes. Greater dermatologist engagement on social media, including DermTok, is essential to counter misinformation, address emerging trends, and promote safe skincare practices. Future directions include dermatology-led consumer education and integration of social media trend assessments into clinical care.

101. Oral Hygiene Practices and Potential Impact on the Gut Microbiome: A Structured Review

- Presenting Author: Savannah Renard (Roseman University)

Additional Author:

- Veronika Bonar (Roseman University)
- Dr. Surajit Dey (Roseman University)

Purpose

The oral cavity constitutes a complex microbial population with a continual flow of microbiota passing through the gastrointestinal tract via ingestion and mucosal shedding. Advanced sequencing has indicated microbial overlap between the oral-gut axis, often showing related oral-derived microbiota within the intestinal flora, especially under biological conditions of periodontal inflammation and oral dysbiosis. Previous observational studies have uncovered a link that supports the statement that compromised oral health is strongly associated with systemic inflammatory markers and distinctions in gut microbiota composition yet definitive evidence linking mechanical hygiene interventions to gut microbial flora need further research. The aim of further analyses is to measure the effect of standardized oral hygiene through practices such as twice daily tooth brushing, daily flossing, and ancillary antibacterial mouthrinse on microbiome taxonomic composition and functional capacity using high resolution metagenomic profiling.

Methods

Data was systematically surveyed through the use of peer-reviewed literature and affiliated bibliographic databases such as PubMed, Web of Science, Scopus, etc. Three main points of evaluation were analyzed via previously published research: the effect of oral hygiene practices on oral and intestinal microbiomes, the modulation of intestinal composition under states of oral dysbiosis via functional pathways, and the overlap between the axes of these ecosystems. Contextual studies entail human observational and procedural research, metagenomic sequencing analyses, and related mechanistic models.

Results

It is predicted that an enhancement of mechanical oral hygiene practices will considerably decrease oral pathobiont numbers and bacterial load in the oral cavity, adjunct with a quantifiable reduction of oral-associated taxa within the gut microflora. Enrichment of biological pathways associated with epithelium barrier support, short-chain fatty acid biosynthesis, and reduced inflammatory markers are all expected outcomes seen through functional profiling.

Conclusions

The analysis provides insight into an underexplored oral-gut microbiome axis and constitutes that routine oral hygiene establishes modulation of intestinal microbial ecology. Conclusory evidence links oral preventative care with gastrointestinal health optimization and the need for integrative strategies.

102. Optimizing Vehicle Solutions in *Galleria mellonella*: Survival Differences Between IPS and PBS

- Presenting Author: Scott Quimby (Noorda College of Osteopathic Medicine)

Additional Author:

- Joshua Tkachenko (Noorda College of Osteopathic Medicine)
- Victor Jimenez (Noorda College of Osteopathic Medicine)

Purpose

Galleria mellonella is an increasingly popular *in vivo* model in biomedical research; however, phosphate-buffered saline (PBS), one of the most commonly used vehicle solutions, differs substantially from insect hemolymph in both osmolarity and pH and may contribute to injection-related mortality. Insect physiological saline (IPS) more closely approximates insect hemolymph and may represent a more biocompatible vehicle. This study aimed to evaluate whether IPS improves short-term survival compared to PBS following injection in *G. mellonella* larvae and to quantify mortality attributable to injection-related factors.

Methods

Larvae were randomly assigned to five groups: (1) untouched control, (2) sham injection (cuticle puncture only), (3) ethanol swab plus sham injection, (4) injection with 10 μ L PBS, and (5) injection with 10 μ L IPS. Injections were performed using standardized technique and volumes. Larvae were observed for 48 hours, with survival recorded at 24- and 48-hours post-intervention.

Results

At both 24 and 48 hours, Groups 1 (control), 2 (sham), and 5 (IPS) demonstrated 90% survival. Group 3 (ethanol + sham) demonstrated 80% survival at both time points. Group 4 (PBS injection) demonstrated 80% survival at 24 hours and 70% survival at 48 hours. These findings suggest increased mortality associated with PBS injection compared to IPS and non-injection controls.

Conclusions

These preliminary results suggest that IPS is a more physiologically compatible vehicle solution for *G. mellonella* injections than PBS and may reduce injection-associated mortality. Ongoing and future work includes replication with larger sample sizes. As well as including a comparative flow cytometric analysis of hemolymph at multiple time points post-injection to assess immune and cellular effects of vehicle choice. Improving vehicle selection may enhance reproducibility and biological validity across *G. mellonella* experimental models.

103. A flavonoid compound derived from epimedium prevents colon cancer cells growth

- Presenting Author: Shaurya Mehta (Noorda College of Osteopathic Medicine)

Additional Author:

- Esteban Lovato (Noorda College of Osteopathic Medicine)
- Kota Ramana (Noorda College of Osteopathic Medicine)

Purpose

Colon cancer is the third most common cancer worldwide, and its progression is closely linked to chronic inflammation and dysregulated intracellular signaling. Several plant-derived compounds have demonstrated chemopreventive potential in preclinical models. Epimedin A, a flavonoid glycoside derived from the plant *Herba Epimedii*, commonly known as horny goat weed, has been reported to possess antioxidant and anti-inflammatory properties; however, its direct effects on colorectal carcinoma are not well defined.

Methods

In this study, we evaluated the chemopreventive effects of this antioxidant in human colon cancer cells, SW480 and HCT116. Cells were treated with epimedin A and incubated for 24 h in the absence and presence of epidermal growth factor (EGF).

Results

Our results suggest that epimedin reduced cell viability in both cell lines. Furthermore, epimedin A inhibited the EGF-induced invasion of colon cancer cells, as determined by scratch assay, and migration, as assessed by transwell migration. Additionally, it also prevented the EGF-induced mitochondrial ROS and increased caspase-3 activity. Furthermore, the EGF-induced expression of various apoptotic and inflammatory markers was also regulated by epimedin A.

Conclusions

Collectively, these findings suggest that Epimedin A suppresses growth, migration, and inflammatory signaling in colon cancer cells. Ongoing in vivo studies using nude mouse xenograft models aim to further characterize its chemopreventive potential.

104. Orthodontic Trial Transparency Audit: Automated Registry to Publication Linkage and Outcome-Switching Signals in Registered RCTs

- Presenting Author: Stephen Osman (Roseman University)

Additional Author:

- Shilpa Bhandi (Roseman University)
- Frank Licari (Roseman University)
- Shankargouda Patil (Roseman University)

Purpose

To quantify transparency gaps in orthodontic randomized controlled trials by linking trial registry records to publications and characterizing timing of registration, publication delay, and selective outcome reporting signals using automated text-based methods.

Methods

A retrospective computational audit was designed around trial registries (e.g., ClinicalTrials.gov and other major registries used in orthodontics) and bibliographic records. Registry entries marked completed were programmatically screened for publication linkage using identifier matching (e.g., registration IDs) and document-similarity approaches aligned with prior registry-publication linkage research. Trial-level transparency indicators included (i) prospective vs retrospective registration, (ii) completion to publication lag, (iii) presence/absence of posted results in the registry when available, and (iv) primary-outcome consistency between registry and publication (omission, downgrade, or introduction of new primary outcomes).

Results

In a large orthodontic registry cohort (registered up to January 2017), 266 orthodontic trials were identified, 80 were completed, 76% were registered retrospectively, and only 33 (41%) were published at the time of assessment; median completion-to-publication time was 20.1 months and 22 (28%) remained unpublished even after 5 years. In a complementary registry to publication discrepancy study up to April 2018, 124 completed orthodontic RCT registry entries were found and 53 linked to published final reports; outcome-reporting discrepancies were observed in 47% of publications, and only 16% of published orthodontic RCTs were registered. Recent evidence focusing on leading orthodontic journals (2018-2024) found that among 139 eligible RCTs with registry-publication pairs, 71.2% were retrospectively registered and selective outcome reporting was identified in 50.4%, most commonly via omission of a registered primary outcome (19.4%), downgrading of a registered primary outcome (18.0%), or introduction of a new primary outcome

(16.5%). Additionally, an orthodontics-specific ClinicalTrials.gov evaluation reported that results posting in the registry was extremely rare at the time assessed (only one study had results posted).

Conclusions

A week-scale, no-imaging computational audit can yield publishable orthodontic transparency metrics by linking registries to publications and scoring outcome consistency. Across multiple independent orthodontic assessments, retrospective registration, delayed/non-publication, and frequent outcome discrepancies remain persistent, supporting the need for stronger prospective registration norms, registry-publication linkage enforcement, and editorial checks for outcome switching.

Keywords: Orthodontics, randomized controlled trials, trial registration, transparency, selective outcome reporting, registry-publication linkage, text mining

One sentence summary: Automated linkage of orthodontic trial registries to publications reveals persistent transparency gaps high retrospective registration, substantial non-publication, and frequent primary-outcome inconsistencies using a fully computational pipeline.

105. BEYOND SUGAR: NUTRIENT PATTERNS AND DENTAL CARIES RISK IN US CHILDREN USING EXPLAINABLE MACHINE LEARNING

- Presenting Author: Sydney Sorensen (Roseman University)

Additional Author:

- Bailey Axelrad (Roseman University)
- Shilpa Bhandi (Roseman University)
- Frank Licari (Roseman University)
- Shankargouda Patil (Roseman University)

Purpose

In this study, we looked at the connection between dental caries in US children ages 2 to 11 and dietary patterns rather than specific nutrients using NHANES data from 2011 to 2018.

Methods

We employed a supervised machine learning classifier (XGBoost) with unsupervised nutritional pattern extraction (principal component analysis [PCA] and non-negative matrix factorization [NMF]) to predict any caries experience against caries-free status. Using SHAP and model-based dose-response curves, we assessed the relative importance and type of connections for sugar, calcium, phosphorus, vitamin D, and other nutrients. Our major hypothesis was that dietary patterns rich in preventative micronutrients (such Ca/P/vitamin D) would be associated with a lower risk of dental caries even after adjusting for sugar and sociodemographic factors.

Results

This study, which used nationally representative NHANES data from 2011 to 2018, discovered that dental caries was common among children in the United States between the ages of 2 and 11. It was more common in older children, children from households with lower socioeconomic status, and children who consumed more sugar and had lower-quality diets overall. While higher intakes of calcium, phosphorus, and vitamin D were linked to lower predicted caries risk, machine learning models that integrated nutrient intakes, dietary patterns, and sociodemographic factors showed good predictive performance and highlighted high sugar consumption as a major risk factor.

Conclusions

While patterns richer in calcium, phosphorus, vitamin D, and other micronutrients seem protective, our explainable machine learning analysis of NHANES 2011–2018 shows that

dietary nutrient patterns combining high sugar and low mineral/vitamin intakes are linked to an increased caries risk in US children.

106. An In-Vitro Investigation On The Synthesis & Characterization Of Novel Niobium-Based Bioglass Formulation For Use In Orofacial Applications

- Presenting Author: Syed Saad Qasim (Roseman University)

Additional Author:

- Abdullah Alhaddad (Kuwait University)
- Ali Bumajdad (Kuwait University)

Purpose

The study aimed to synthesize and characterize niobium (Nb)-doped bioglass formulations based on the 45S5 composition to evaluate their potential for oro-facial bone regeneration and dental restorative applications. Niobium was incorporated as a network-modifying oxide to enhance bioactivity, stability, biocompatibility using primary human osteoblasts and mechanical integrity.

Methods

Bioglass powders containing 0, 2, 3, 4, and 5 wt% NbO substitutions for SiO were synthesized via a Sol-gel process, followed by controlled grinding and sieving. The structural, morphological, and compositional characteristics were analyzed using X-ray diffraction (XRD), FTIR, and XPS. Surface morphology and particle distribution were examined using scanning electron microscopy (SEM) and transmission electron microscopy (TEM). Thermal stability was evaluated through thermogravimetric analysis (TGA). Bioactivity was assessed by immersing the bioglass samples in simulated body fluid (SBF) for various time intervals, followed by FTIR and SEM analysis to examine apatite layer formation.

Results

XRD confirmed amorphous structures for all compositions, with characteristic halos near $2\theta \approx 30^\circ$. FTIR spectra revealed Si-O-Si, P-O, and Si-O-Nb bonds, confirming successful incorporation of niobium within the 45S5 glass network. SEM and TEM analyses showed uniformly distributed, fine glass particles below 100 nm, while XPS confirmed the presence of Nb oxidation states and enhanced surface oxygen bonding. TGA demonstrated improved thermal stability across all doped samples. Immersion in simulated body fluid (SBF) resulted in apatite layer formation, indicating enhanced bioactivity. Furthermore, MTT assays conducted with primary human osteoblasts revealed sustained cell viability and proliferation over time, with 2, 3, 4, and 5 wt% niobium-doped bioglass compositions supporting cellular growth and metabolic activity.

Conclusions

Niobium incorporation at 2–5 wt% within the 45S5 bioglass matrix improved thermal stability, surface reactivity, and biological performance while maintaining amorphicity. The observed apatite formation and positive osteoblast viability outcomes demonstrate the potential of niobium-based bioglasses as bioactive materials for orofacial bone regeneration and restorative dental applications.

107. Glycyrrhiza glabra inhibits oral cancer cells by immunomodulation-mediated oxidative stress induced apoptosis: A cell culture and statistical modeling analysis

- Presenting Author: THIRUMAL RAJ (Najran University)

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Purpose

To delineate the inhibitory effect of Glycyrrhiza glabra on oral cancer cells through cell line-based and statistical modeling analysis

Methods

AW13516 cells (oral squamous cell carcinoma cell lines) were treated with Glycyrrhiza glabra's alcoholic and ethanolic extracts of varying doses. Cancer properties, including vitality, invasion, EMT, and stemness, were assessed. To understand the role of the immune system in the Glycyrrhiza glabra's effect, several inflammatory and oxidative stress markers were assessed along with apoptotic markers. Statistical modelling was used to validate the in-vitro findings from the cell culture analysis.

Results

As expected, the Glycyrrhiza glabra attenuated AW13516 cell properties. The inhibition was mediated by immunomodulation that induced oxidative stress, culminating in apoptosis. On the contrary, 2 key survival properties (stemness and EMT) were temporarily augmented, suggesting an attempted survival response by the cancer cells to overcome the inhibitory effects of Glycyrrhiza glabra. Despite these transient effects, the oral cancer cells ultimately underwent apoptosis. Statistical modelling identified IL-6, TGF- β 1, and COX-2 as key immunomodulators mediating the Glycyrrhiza glabra's inhibitory effects.

Conclusions

Glycyrrhiza glabra extracts inhibit the progression of oral cancer by inducing oxidative stress via key immunomodulatory factors, including IL-6, TGF- β 1, and COX-2.

108. Assessing Abortion Law Education in Medical School Curricula

- Presenting Author: Tiffany Nguyen (Noorda College of Osteopathic Medicine)

Additional Author:

- Kevin Steed (Noorda College of Osteopathic Medicine)
- Gabrielle Gaudette (Noorda College of Osteopathic Medicine)
- Mariana Chacon (Noorda College of Osteopathic Medicine)

Purpose

Access to and understanding of abortion laws is essential for medical providers, especially as legislation continues to change across the United States. Osteopathic medical students will soon become healthcare providers responsible for patient care and counseling. However, with the limited space in medical curricula, state-specific abortion laws often do not get adequate focus. This study aims to assess osteopathic medical students' confidence in their knowledge of abortion laws in their respective states and determine if their curriculum includes education on this topic. The survey will assess the following areas:

- Formal Medical School Education on Abortion Laws
- Knowledge of Abortion Laws
- Preparedness & Future Curriculum Changes
- Importance of Abortion Law Knowledge for Future Physicians

The results will be used to support a resolution through the Student Osteopathic Medical Association (SOMA) advocating for abortion law education in osteopathic medical schools via the American Association of Colleges of Osteopathic Medicine (AACOM) and the American Osteopathic Association (AOA).

Methods

An anonymous, cross-sectional survey was distributed to osteopathic medical students enrolled at accredited U.S. colleges of osteopathic medicine. Participants were recruited through Student Osteopathic Medical Association (SOMA) representatives via electronic platforms. The survey assessed exposure to formal education on abortion laws, self-reported knowledge of state-specific regulations, perceived preparedness for clinical practice, and perceived importance of abortion law education. Data were analyzed descriptively. This study is ongoing.

Results

Preliminary responses reveal that All respondents (100%) reported that their medical school had not provided formal education on abortion laws as part of the curriculum. Confidence in knowledge of state-specific abortion laws was low, with 62.5% of respondents reporting they were unlikely or strongly unlikely to feel confident. A majority of respondents did not know the legal circumstances under which abortion is permitted (50%), the medical circumstances in which abortion may be necessary to protect a patient's health or life (75%), or the legal penalties for providing or assisting in an abortion that does not comply with state law (87.5%). Despite these gaps, 87.5% of respondents reported that their curriculum did not adequately cover legal considerations for reproductive healthcare, 87.5% felt unprepared to address legal risks in clinical practice, and 87.5% supported incorporating mandatory education on state-specific abortion laws. All respondents (100%) agreed that knowledge of state-specific abortion laws is important for future physicians. Data collection is ongoing.

Conclusions

Preliminary findings demonstrate a substantial gap between the perceived importance of abortion law knowledge and the legal education currently provided in osteopathic medical training. Despite near-universal recognition of the importance of understanding state-specific abortion laws, respondents reported limited formal instruction and low confidence in navigating legal requirements relevant to patient care. These findings suggest that osteopathic medical students may be entering clinical training without adequate preparation to address legal risks and responsibilities related to reproductive healthcare. Expanded and standardized education on state-specific abortion laws may be necessary to better prepare future physicians for legally informed clinical decision-making.

109. Nicotine's Influence on the Oral Microbiome: Harm Reduction or Hidden Risk?

- Presenting Author: Trevor Ward (Roseman University)

Additional Author:

- Kamran Awan (Roseman University)

Purpose

This review aims to examine the mechanisms by which nicotine interacts with the oral microbiome and inflammatory pathways, distinguishing the effects of nicotine itself from those of combustible related byproducts such as tar and aerosols.

Methods

A systematic review was conducted using PubMed, Google Scholar, NIH, and NCBI. Search terms included “nicotine”, “periodontitis”, “cessation”, “microbiome”, “inflammation”, and “E-cigarettes”. Reviewers selected primary literature published between 2015-2025, including one currently in press. Articles were selected based on relevance to nicotine's biological impact, rather than general tobacco toxicity.

Results

A total of thirteen studies were included. Findings across studies indicate that nicotine alone does not fully account for the oral and systemic dysfunction observed in smokers. Combustion and aerosolization processes introduce toxic byproducts including tar, aldehydes, and particulate matter that significantly contribute to inflammation and vascular microenvironmental changes. Interestingly, low dose nicotine exposure demonstrated potential anti-inflammatory effects, whereas higher doses were associated with alveolar bone resorption, increased tooth mobility, and microbial dysbiosis. While dental plaque accumulation was significantly higher among current smokers than non-smokers, no significant difference was observed between former and never smokers, indicating partial recovery following cessation.

Conclusions

Nicotine's health effects are often confounded by its link to tobacco consumption. While complete cessation remains ideal, transitioning from combustible to noncombustible nicotine products may offer meaningful harm reduction and improved oral health outcomes.

110. A comparative study and review of visual outcomes with enhanced versus standard monofocal intraocular lenses following cataract surgery

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Purpose

Recent innovations in intraocular lens (IOL) design have introduced extended depth of focus lenses, which has shown promise in improving visual acuity at multiple distances compared to standard monofocal IOLs. This study aimed to evaluate the visual outcomes of TECNIS Eyhance, a monofocal IOL with enhanced intermediate function, and a standard TECNIS monofocal 1-piece IOL, and to review published studies comparing the clinical performance between the TECNIS Eyhance and standard IOLs.

Methods

A retrospective analysis was conducted on patients who received bilateral implantation of either TECNIS Eyhance or TECNIS Monofocal 1-Piece IOLs. Primary outcomes included monocular and binocular uncorrected distance visual acuity (UDVA), uncorrected near visual acuity (UNVA), and corrected distance visual acuity (CDVA), and manifest refraction. A literature review was performed to identify studies evaluating the clinical outcomes of TECNIS Eyhance and standard TECNIS monofocal IOLs.

Results

In total, 108 patients underwent bilateral implantation with either TECNIS Eyhance or TECNIS Monofocal 1-Piece IOLs. The mean [SD] binocular UNVA was better in the Eyhance group at 1 month compared to the standard monofocal group ($P < 0.05$). A greater proportion of Eyhance patients achieved binocular UNVA of 20/25 or better ($P < 0.01$), and 20/32 or better ($P < 0.05$). No significant differences were observed in postoperative UDVA or CDVA between groups (both $P > 0.05$). The mean monocular UNVA showed a slight, but non-significant, advantage in the Eyhance group ($P > 0.05$). Eyhance eyes demonstrated less residual refractive cylinder at 1 month ($P < 0.01$), which may be attributed to a higher rate of toric IOL use ($P < 0.01$). Across 13 other studies

analyzed, the Eyhance group showed better monocular and binocular UNVA (both $P < 0.01$), as well as improved binocular uncorrected intermediate visual acuity (UIVA; $P < 0.01$).

Conclusions

Patients receiving the Eyhance IOL had better binocular UNVA compared to those with a standard monofocal IOL, consistent with published literature. The Eyhance IOL also showed better binocular UIVA and monocular UNVA across the studies reviewed. Both IOL groups demonstrate excellent distance vision and have similar levels of photic phenomena. Nevertheless, the Eyhance IOL shows promising potential for improving intermediate and near vision.

111. Public accessibility and safety of FDA-approved drugs from nature

- Presenting Author: Tyler Rose (Roseman University)

Purpose

A number of compounds found in nature have been formally recognized by the US FDA as medicinal drugs. The purpose of this project was to identify how many of these drugs from nature are available without regulatory restrictions, to the United States public and the scope of the hazards associated with these drugs.

Methods

A published list of all natural compounds that have been FDA-approved as drugs through 2023 was analyzed using an internet search to determine which were commercially available to the public without restrictions, such as a prescription. A safety analysis using information from databases and primary literature was performed on the commercially available drug products.

Results

Of all natural compounds FDA-approved as drugs, approximately one-third were available commercially without restrictions. These included over-the-counter medications, dietary supplements, and raw ingredients. Based on the safety analysis, the hazards of unrestricted drug products were documented and categorized as being of lower concern, when used as directed, or higher concern.

Conclusions

The US public can freely purchase a significant proportion of natural compounds that have been approved by the FDA as drugs, but hazards of varying severity exist for those who choose to engage in self-care with these products. This information on the accessibility of natural drug products, and their associated hazards, should be of value to those who work with the public in areas of pharmacotherapy and toxicology.

112. Oral Microbiome Stability During Orthodontic Treatment and a Minimal Inflammation Signature

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Additional Author:

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- Shilpa Bhandi (Roseman University)
- Frank Licari (Roseman University)
- Shankargouda Patil (Roseman University)

Purpose

To evaluate whether different orthodontic treatment modalities produce reproducible and clinically meaningful changes in the oral microbiome, and to identify a minimal microbial taxa signature associated with inflammatory status using publicly available longitudinal datasets.

Methods

Publicly available 16S rRNA sequencing datasets from orthodontic cohorts were reanalyzed using a single standardized bioinformatics workflow, including amplicon sequence variant (ASV) inference, taxonomy assignment, and compositional normalization. Results were synthesized across two complementary studies: (i) an adolescent randomized clinical trial examining fixed appliances with adjunct fluoride mouthwash alongside longitudinal gingival health assessments, and (ii) a six-month longitudinal saliva study comparing fixed appliances with clear aligners, with concurrent measurement of periodontal indices and salivary myeloid-related protein 8/14 (MRP-8/14). Cross-study concordance was evaluated by the consistency in direction of genus-level changes and by patterns of alpha and beta diversity.

Results

Across studies, orthodontic treatment was associated with only modest shifts in the oral microbiome, with overall community stability emerging as a dominant feature. In the adolescent randomized trial, fluoride mouthwash had minimal impact on microbiome composition. Instead, microbial changes were more closely aligned with gingival health status and treatment phase. Periodontal pathogen-associated genera (including *Selenomonas* and *Porphyromonas*) increased during active treatment, whereas health-associated genera (such as *Streptococcus*, *Rothia*, and *Haemophilus*) became more abundant toward the end of treatment or following debonding, leaving only minor residual changes. In the 48-participant saliva cohort comparing fixed appliances and aligners, clinical periodontal indices (PI, PPD, BOP) and salivary MRP-8/14 levels remained stable over six months, and no statistically significant microbiome differences were detected between appliance types or time points, although *Neisseria* showed a descriptive decline over time in both

groups. Importantly, a minimal inflammation-risk signature—characterized by treatment-phase enrichment of periodontal pathogen-linked genera and post-treatment enrichment of health-associated taxa—was directionally reproducible across datasets.

Conclusions

Reanalysis of public orthodontic microbiome datasets supports a model of overall microbial resilience, with limited, phase-dependent shifts that reflect gingival inflammatory context more strongly than appliance modality. A compact, directionally consistent microbial signature can be derived, offering a practical approach for biological monitoring of inflammation risk in orthodontic patients without reliance on imaging or biomechanical parameters.

Keywords: orthodontics; oral microbiome; fixed appliances; clear aligners; inflammation; 16S rRNA sequencing; MRP-8/14

113. TXA use in Dentistry

- Presenting Author: Valeria Coronilla (Roseman University)

Additional Author:

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Purpose

Tranexamic Acid (TXA) has a significantly beneficial use in dentistry as a local hemostatic agent for patients at higher risk of hemorrhage during dental procedures; different patient groups that can benefit from TXA include those currently on anticoagulant therapy or patients with hereditary bleeding disorders. In this literature review, 19 clinical trials were analyzed to observe their conclusions over how effective TXA is in dentistry.

Methods

In this literature review, 19 clinical trials were analyzed to observe their conclusions over how effective TXA is in dentistry. For the majority of these articles and for this literature review, a finding was labelled as statistically significant if it had a P value at or below 5% ($P < 0.05$). A relative risk (RR) lower than 1.0 ($RR < 1.0$) identified a lower risk in the experimental group compared to the control group. However, a finding with a RR below 1.0 could not be considered statistically significant, only as seeming to be of lower risk.

Results

"Work in Progress"

Conclusions

"Work in Progress"

114. Early-Life Antibiotic Exposure and Dental Development: Microbiome Disruption, Immune Modulation, and Implications for Tooth Eruption

- Presenting Author: Veronika Bonar (Roseman University)

Additional Author:

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- Surajit Dey (Roseman University)

Purpose

Antibiotics are frequently prescribed during pregnancy, infancy, and early childhood, periods critical for immune maturation, oral microbiome establishment, and craniofacial development. Different antibiotic classes vary in spectrum and duration of microbial disruption, suggesting class-specific developmental effects. This work examines how commonly used pediatric antibiotics, particularly β -lactams and macrolides, disrupt oral microbial colonization and immune signaling pathways, and evaluates how these disruptions may contribute to altered dental development and delayed tooth eruption.

Methods

A structured review of peer-reviewed literature was conducted using PubMed and related databases. Studies evaluating prenatal and early-life antibiotic exposure, oral and gut microbiome alterations, immune signaling, bone remodeling, and dental developmental outcomes were included. Antibiotics were classified by pediatric prevalence, mechanism of action, and documented microbiome effects. Evidence was grouped as direct, indirect, or analogous to assess biological plausibility across developmental pathways.

Results

Research in progress; synthesis ongoing. Available evidence indicates that macrolide antibiotics are associated with prolonged microbiome disruption and delayed microbial recovery, whereas β -lactams typically produce moderate and often reversible changes. Antibiotic associated dysbiosis has been linked to altered cytokine signaling and immune-mediated regulation of osteoclast activity and alveolar bone resorption, processes essential for normal tooth eruption. Early antibiotic exposure has also been associated with developmental enamel defects, supporting downstream dental effects.

Conclusions

Prenatal and early-life exposure to β -lactam and macrolide antibiotics may disrupt oral microbial development and immune signaling during sensitive developmental windows. While microbiome disruption is often transient, immune and bone remodeling alterations may persist and contribute to delayed tooth eruption or altered dental development. This framework highlights antibiotic class specific risks and supports further investigation into the long-term dental effects of early antibiotic exposure.

115. Abstract Withdrawn

116. When Nutrition Fails: Modeling Protein Malnutrition-Driven Vulnerability in Hepatic Drug Metabolism and Inflammatory Stress

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Purpose

Protein malnutrition remains a major global health problem and frequently co-occurs with alcohol use, opioid exposure, and infectious disease, particularly in low- and middle-income settings. The liver is central to both metabolism and inflammatory regulation, yet the effects of a malnutrition-like nutrient environment on hepatic responses to combined metabolic and inflammatory insults are not well defined. Cytochrome P450 3A4 (CYP3A4), a key enzyme involved in opioid metabolism, is highly sensitive to inflammatory signaling and may be especially vulnerable under conditions of nutritional deficiency. This project aims to 1) develop an in vitro model of nutritionally competent versus amino acid-restricted primary human hepatocytes (PHHs) and 2) examine how nutritional status modulates hepatic responses to ethanol, opioids, and bacterial inflammatory stimuli. A secondary objective is to evaluate the ability of pharmacologic interventions (naloxone, naltrexone, and antibiotic therapy) to restore hepatic function following injury.

Methods

PHHs will be cultured under control or partial essential amino acid-restricted conditions to model protein malnutrition. Optional co-culture with human macrophages will be used to incorporate inflammatory crosstalk. Hepatocytes will be exposed to continuous ethanol and morphine, followed by bacterial inflammatory stimulation using *Escherichia coli*. Opioid antagonists will be administered after injury to model rescue. The primary endpoint will be recovery of CYP3A4 activity at 48- and 72-hours post-intervention. Secondary outcomes will include cytotoxicity, hepatocyte synthetic and metabolic function, and inflammatory cytokine production.

Results

This study is expected to define how protein malnutrition alters hepatic susceptibility to metabolic and inflammatory stress and modulates recovery of drug-metabolizing capacity. The findings will provide insight into the clinical importance of nutritional status in drug metabolism and inflammatory response, with implications for substance use and infection management in malnourished populations.

Conclusions

Protein malnutrition enhances hepatic vulnerability to metabolic and inflammatory stress and impairs recovery of drug-metabolizing capacity. By modeling nutrient-inflammatory interactions that influence CYP3A4 function, this work highlights broader principles of hepatic stress adaptation and recovery that extend beyond malnourished populations, with implications for medication safety, substance use, and infection-associated inflammation across diverse clinical settings.

117. Optimization of a KCC2 Small Molecule Agonist and the Development of an In-Silico Model of Intermolecular Dynamics for the Rational Design of Therapeutics Against Opioid Use Disorder

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Purpose

Opioid use disorder (OUD) is characterized by clinical manifestations of addiction, tolerance, and withdrawal brought on by chronic opioid use. Physiologically, the process of opioids binding to the mu opioid receptor initiates a signaling cascade that results in hyperpolarization of the postsynaptic cleft. This accumulation of positive charge inhibits interneuron inhibitory GABA signaling. KCC2 (a potassium-chloride cotransporter) is essential for mitigating this buildup of positive charge. While experimental agonists for KCC2 have been reported, the binding site for these compounds has not been identified or characterized. Recent studies by our lab utilized a machine learning platform to identify nine potential binding sites on KCC2. Using this information, the best-scoring binding site was used in conjunction with the best-scoring agonist candidate to implement iterative R-group substitution and generate KCC2 agonist derivatives of increasing molecular weight (MW) with improved affinity. A virtual model of the KCC2 system was then generated to characterize the intermolecular dynamics associated with these derivatives and the KCC2 binding site.

Methods

A three-dimensional model of human KCC2 was generated using cryo-EM structural data obtained from RCSB PDB. Additionally, a library of KCC2 small-molecule agonists was compiled from the existing literature. The Schrodinger Small Molecule Discovery Suite was used to generate agonist derivatives using iterative R-group substitution. In short: the KCC2 binding pocket was characterized by geometric and physiochemical parameters, multiple agonist derivatives were docked into the binding site, and their resulting ligand-receptor interactions were evaluated using a composite Docking Score (DS) derived primarily from Coulomb and Van der Waals interaction energies.

Results

VU500458, a 31-atom molecule with MW of 430.40 g/mol and an average DS of -2.7560 across 199 unique conformations, served as the initial scaffold. Across ten optimization cycles, 161 derivative ligands were generated. By the tenth iteration, optimization yielded seven derivatives with an average MW of 736.34 g/mol and an average improved DS of -6.324, indicating enhanced ligand affinity to its respective binding site on KCC2.

Conclusions

While in vitro experimental validation is required, our findings provide insights for the rational design of novel KCC2-targeted therapeutics aimed at restoring GABA signaling that is lost in OUD.

118. Cranial OCMM Validation Study

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Purpose

Osteopathic Cranial Manipulative Medicine (OCMM) remains controversial due to inconsistent evidence regarding diagnostic reliability and clinical efficacy. Prior systematic reviews have reported weak or inconclusive findings. However, most studies inadequately account for physician training, experience, and diagnostic standardization. Establishing reliable and reproducible diagnostic measures, particularly cranial rhythmic impulse (CRI) frequency, amplitude, and strain pattern classification, is a prerequisite for valid efficacy research. This prospective study aims to rigorously evaluate inter- and intra-rater reliability of OCMM diagnostic assessments under controlled conditions with physician stratification, thereby defining whether OCMM diagnostics can support subsequent investigations of clinical necessity and therapeutic effect.

Methods

This prospective, single-blind, randomized repeated-measures diagnostic reliability study will enroll adult participants. Participants include both OCMM-trained osteopathic physicians and study volunteers for OCMM diagnoses. The treating physicians will be stratified by 1) self-reported confidence 2) Verified training and experience, and 3) frequency of cranial OMT use (low, medium, high) determined by study criteria.

Each physician, blindfolded to minimize visual and contextual bias, will assess five standardized participants twice in randomized order. Diagnoses will include: 1) CRI frequency 2) CRI amplitude, rated nominally (low/normal/high); 3) Cranial strain pattern, classified into one of twelve standardized categories.

Inter-rater reliability will be calculated within physician groupings. Intra-rater reliability will be assessed using paired analyses across repeated assessments. Confounding factors (hair type,

head positioning, palpation time, memory effects) will be mitigated through standardized head coverings, minimal palpation windows, randomized positioning, and assessor blinding.

Results

We anticipate moderate to substantial inter- and intra-rater reliability for categorical strain pattern identification among physicians with higher confidence and frequency of OCMM use, with lower agreement in less experienced groups. CRI frequency is expected to demonstrate low to moderate reliability, reflecting known challenges in temporal palpatory assessments, while CRI amplitude ratings may show low agreement due to nominal categorization.

Conclusions

If reliability is demonstrated under controlled, stratified conditions, these findings would support the methodological plausibility of OCMM diagnostics and justify subsequent, properly powered efficacy trials limited to patients with validated, treatable strain patterns. Conversely, failure to demonstrate meaningful reliability would argue against OCMM diagnostic reproducibility and undermine claims of clinical necessity. Regardless of outcome, this study will clarify whether limitations in prior OCMM research stem from inadequate diagnostic standardization rather than intrinsic invalidity, thereby providing a critical evidentiary foundation for future investigations into cranial OMT mechanisms and outcomes.

119. Off-Label Use of Tirzepatide to Reduce Alcohol and Nicotine Consumption: A Randomized Control Trial

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Purpose

Tirzepatide, a dual GLP-1/GIP receptor agonist has potential use as a therapeutic agent in supporting cessation of alcohol and nicotine use. Although existing treatments are effective for some individuals, current options to aid those seeking to decrease alcohol and nicotine consumption remain inadequate. Previous studies of traditional GLP-1 receptor agonists such as exenatide and semaglutide have demonstrated associations with reduced alcohol intake, but there is insufficient data on the use of tirzepatide, which exhibits both GLP-1 and GIP receptor agonist activity. This study aims to characterize any correlations between tirzepatide use and changes in substance intake and relevant behaviors. We hypothesize that there will be a significant reduction in alcohol and/or cigarette consumption in individuals treated with tirzepatide.

Methods

This study is a double-blind, placebo-controlled randomized controlled trial. Upon meeting inclusion criteria, participants with heavy alcohol and/or cigarette consumption are categorized into one of three populations, including those who: only drink alcohol, only consume cigarettes, or consume both substances. From there they are randomized to receive weekly placebo or tirzepatide injections. Participants receive eight weeks of treatment. Alcohol and cigarette consumption are monitored by self-report with daily and weekly surveys. Additionally, cigarette consumption is objectively monitored weekly using a Smokerlyzer device to measure exhaled carbon monoxide levels as an indirect measure of smoking frequency. Participants in the smoking groups receive nicotine supplementation patches to enhance their ability to achieve abstinence.

Results

Work in progress

Conclusions

Work in progress

120. Enhancing Medical Student Imaging Literacy Through Rx Bricks on Common Abdominal and Ultrasound Pathologies

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Purpose

Diagnostic imaging is a revolutionary aspect of patient care, and not only a crucial tool for radiologists, but all clinicians. However, the existing educational resources on the ScholarRx platform have limited exposure to clinically and board-relevant imaging findings. To address this gap, we propose two educational articles as part of a larger educational series focused on radiology: Radiology of Common Abdominal Pathologies and Common Pathologies Identified on Ultrasound. These articles aim to enhance the confidence of medical students in interpreting images by emphasizing the most frequently encountered pathologies and encouraging the integration of anatomical knowledge with clinical decision-making.

Methods

Through the ScholarRx platform, students will create individual educational articles (“Bricks”) organized by topic and imaging modality. Development of content will be guided by existing literature to identify common pathologies in clinical practice and board exams. Each Brick will include clinical case connections, annotated radiologic images from multiple imaging modalities, a concise summary of key imaging features, and multiple-choice questions to reinforce the learning objectives. They will emphasize linking systems-level knowledge with pathology and imaging.

Results

This is a prospective educational project, and the proposed Bricks are currently in development.

Conclusions

These proposed Bricks present a novel, structured approach to radiology education by focusing on high-yield pathologies and emphasizing visual learning. We believe this resource will improve medical education by bridging foundational anatomic knowledge with practical image

interpretation skills. These educational Bricks will benefit not only students at a single institution but may also be used nationally and internationally as supplemental medical education resources.

121. Women in the pharmacy workplace – gendered experiences

- Presenting Author: Zoe Campbell (Roseman University)

Additional Author:

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- Erin Johanson (Roseman University)

Purpose

The purpose of this literature review was to synthesize current evidence on workplace experiences affecting women in pharmacy. Using recent peer-reviewed literature, this review examined gender-related factors influencing professional satisfaction, wellbeing, and equity in pharmacy settings. Including both U.S.-based and international studies, the review aimed to identify common themes and contextual differences in workplace challenges faced by women in the pharmacy profession. Findings are intended to inform future research, workplace policy development, and strategies to promote gender equity in pharmacy.

Methods

A structured literature review was conducted on December 1, 2025, using PubMed. The search strategy combined the keywords pharmacy, workplace, and gender and was limited to English, full-text articles involving human subjects published within the preceding 10 years. The initial search yielded 73 records. Titles and abstracts were screened for relevance to gender equity, workplace experiences, job satisfaction, wellbeing, and related outcomes in pharmacy. Three investigators independently reviewed eligible articles, with discrepancies resolved by consensus. Included studies were categorized as U.S.-based or international to facilitate comparative analysis across healthcare and sociocultural contexts.

Results

Thirteen articles met inclusion criteria, including survey studies, cross-sectional analyses, qualitative reviews, and commentaries. Seven were conducted in the United States, and six were in Europe, South Asia, East Asia, the Middle East, and multi-country settings. U.S. studies consistently reported lower job satisfaction, poorer work–life balance, higher stress, and greater exposure to discrimination, bias, and harassment among women compared with men. International studies demonstrated similar patterns, documenting gender inequities, burnout, and psychological distress. Several studies highlighted emotional labor, childcare disruptions, lack of representation in leadership, and gender-specific health issues—including menstruation and menopause—as underrecognized contributors to workplace inequity. Intersectional analyses

showed that women of color experienced the highest dissatisfaction with institutional responses to discrimination and harassment.

Conclusions

This review demonstrates that gender-related workplace inequities in pharmacy are widespread and multifaceted across global contexts. Future studies identifying opportunities to address these disparities requiring systemic, gender-responsive workplace reforms that prioritize wellbeing, equity, leadership access, and inclusive organizational cultures within pharmacy would benefit the profession.



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