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Preface

Abstract Book of ICPHMS2026 & ICPBS2026 is composed of the abstracts of the 2026 11th International Conference on Public Health and Medical Sciences (ICPHMS2026) and 2026 9th International Conference on Psychology and Behavioural Sciences (ICPBS2026). According to the similarity among the topics of ICPHMS2026 and ICPBS2026, ICPHMS2026 is held online in conjunction with ICPBS2026 on August 16-18, 2026.

ICPHMS2026 and ICPBS2026 serve as an optimal platform for specialists, scholars and researchers in the field related to public health, medical sciences, psychology and behavioural sciences to facilitate academic communications and exchange ideas. These abstracts demonstrate the richness of interdisciplinary approaches, theories, models and applied research presented.

Major themes of the conferences include:

Public Health: Infectious Diseases Control, Public Health Practice and Impact, Applied Epidemiology, Health Service Effectiveness, Health Protection, Control of Communicable Diseases, Health Promotion and Disease Prevention, Hygiene, Epidemiology, Health Education, Environmental Health, etc.

Medical Sciences: Anatomy, Medical Ethics, Biology and Genetics, Microbiology, Biophysics and Physics, Neurology, Dentistry, Oncology, Dermatovenereology, Ophthalmology, Otolaryngology, etc.

Psychology: Behavioral Psychology, Social Psychology, Personality, Community Psychology, Sports Psychology, School Psychology, Abnormal Psychology, Forensic Psychology, Clinical Psychology, Cognitive Psychology, Auditory Cognitive Neuroscience, etc.

Behavioural Sciences: Experimental and Clinical Neurosciences, Behavior Genetics, Neurocognitive Sciences, Sociology and Social Networks, Applied Anthropology, Operations Research, Organizational Behavior, Social and Cultural Anthropology, Psychology, Behavioral Aspects of Biology, Psychiatry, etc.

We thank all authors for their scientific contribution to ICPHMS2026 and ICPBS2026 and look forward to having the opportunity to showcase and disseminate your research.

Sincerely,

ICPHMS2026 and ICPBS2026 Organizing Committees

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Global Burden of Lung Cancer in Women Attributable to Environmental Particulate Matter Pollution: Analysis of Status and Trends from 1990 to 2021

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Abstract

Background: Lung cancer poses a significant threat to human health, and environmental fine particulate matter (PM_{2.5}) pollution has become the second most important risk factor for lung cancer, following smoking. **Objective** To analyze the status and trends of the global burden of lung cancer in women attributable to particulate matter (PM_{2.5}) pollution from 1990 to 2021. **Methods:** Using the Global Burden of Disease Study 2021 (GBD 2021) database, indicators such as the number of deaths, Disability-Adjusted Life Years (DALYs), and Expected Annual Percentage Change (EAPC) were employed to assess the burden and trends of PM_{2.5}-attributable lung cancer in women globally and across different Socio-Demographic Index (SDI) regions from 1990 to 2021. An Age-period-cohort (APC) model was also constructed to analyze the risks of death and DALYs. The trends in lung cancer were predicted using an auto regressive integrated moving average (ARIMA) model. **Results:** In 2021, PM_{2.5} contributed to approximately 120,000 global female lung cancer deaths and 2.84 million DALYs. The ASMR and ASDR were 2.63 and 62.00 per 100,000 respectively. Compared with 1990, the ASMR and ASDR of female lung cancer attributable to PM_{2.5} decreased globally in 2021, with the EAPCs being -0.67% [95% CI (-0.75%, -0.65%)] and -0.97% [95% CI (-1.03%, -0.95%)], respectively. The middle SDI region accounted for the highest number of deaths and DALYs, representing about 40% of the global burden, while the middle-high SDI region had the highest ASMR 3.68% [95% CI (2.28%, 5.27%)] and ASDR 86.58% [95% CI (53.25%, 124.31%)]. Between 1990 and 2021, ASMR and ASDR increased in low SDI regions but decreased in middle, middle-high, and high SDI regions, with the most pronounced declines observed in high SDI regions. At the national level, the burden of lung cancer among Chinese women attributable to PM_{2.5} pollution is substantial. APC analysis revealed that the impact of PM_{2.5} on the ASMR and ASDR of female lung cancer increased with age globally, peaking at 80–84 years for ASMR and 70–74 years for ASDR. Projections to 2040 indicate the burden attributable to ambient particulate exposure (APE) is expected to continue rising globally, while household particulate exposure (HPE)-related burden shows a consistent declining trend across all SDI regions. **Conclusion:** From 1990 to 2021, the global burden of PM_{2.5}-attributable female lung cancer showed a downward trend, with differences across SDI regions, and elderly women are the key population for disease prevention and control.

Keywords

Lung Cancer, GBD, Mortality Rate, Disability-adjusted Life Year, Disease Burden

Clinical and Epidemiological Characteristics of Severe Influenza Cases in a Province of China

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Abstract

Objective To analyze the clinical and epidemiological characteristics of severe influenza cases in a province of China, so as to provide scientific evidence for the prevention and control, early identification, and optimized diagnosis and treatment of severe influenza. **Methods** A retrospective collection of data on 326 severe influenza cases reported by the provincial Center for Disease Control and Prevention (CDC) and medical institutions from January 2021 to December 2024 was conducted. Statistical analyses were performed on their epidemiological distribution, clinical symptoms, laboratory indicators, complications, and prognosis. **Results** Among the 326 severe cases, 189 (58.0%) were male and 137 (42.0%) were female. People aged ≥ 60 years accounted for 43.6% and children aged ≤ 5 years accounted for 23.9%, making them the high-incidence groups. The peak incidence was concentrated from December to February of the following year (66.6%), and the main pathogens were influenza A (H1N1) (46.9%) and influenza A (H3N2) (36.2%). The main clinical symptoms were persistent high fever, cough, and dyspnea. Common complications included pneumonia and acute respiratory distress syndrome. The case fatality rate was 8.9%, and most deaths were complicated with underlying diseases and severe complications. **Conclusion** Severe influenza cases in this province show significant seasonal and population-specific characteristics. The elderly, children, and patients with underlying diseases are high-risk groups. Early identification and timely antiviral treatment are the key to reducing the case fatality rate.

Keywords

Influenza, Severe Cases, Clinical Characteristics, Epidemiological Characteristics, A Certain Province

Effect of Sintering Mode, Ceramic Type, and Occlusal Thickness of Endocrowns on Stress Distribution: A Finite Element Analysis

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Abstract

Endocrowns have emerged as a highly predictable, minimally invasive alternative to traditional post-and-core restorations for endodontically treated posterior teeth. These restorations rely on adhesive cementation and the internal anatomy of the pulp chamber for macro- and micro-retention. However, the long-term biomechanical behavior and survivability of the tooth-restoration complex are fundamentally governed by the interplay between the elastic properties of the chosen CAD/CAM ceramics, the geometric occlusal thickness of the preparation, and the complex multiaxial loading conditions inherent to the human masticatory system. The objective of this study was to conduct a comparative evaluation of the stress-strain state and biomechanical behavior of endocrowns fabricated from multilayer zirconia, traditional lithium disilicate, and an advanced virgilite-containing lithium silicate glass-ceramic using three-dimensional finite element analysis (FEA). A highly detailed, three-dimensional finite element model of an endodontically treated mandibular first molar was constructed. Endocrown restorations featuring varying occlusal thicknesses (1 mm, 2 mm, and 3 mm) were geometrically modeled. The investigation simulated the biomechanical response of multilayer high-translucency zirconia (a material class introduced in 2013), standard lithium disilicate (IPS e.max CAD), and a novel advanced lithium silicate (CEREC Tessera) under both standard and speed sintering protocols. Numerical modeling was performed utilizing the Ansys LS-DYNA software package, assuming linear elastic, isotropic, and homogeneous material properties. The models were subjected to both vertical (axial) and 45° oblique occlusal loads of 800 N. Maximum von Mises equivalent stresses within the restorative materials and the residual dental tissues were computed and analyzed. High-modulus ceramic materials, specifically zirconia (Young's modulus >210 GPa), exhibited a pronounced "stress-shielding" effect. At an optimal preparation thickness of 2 mm, zirconia restorations concentrated the applied occlusal forces within their own robust bulk, thereby significantly minimizing stress transfer to the underlying dentin compared to silicate materials. Silicate ceramics (Young's modulus ~105 GPa) transferred proportionally higher stresses to the structural tooth tissues due to their inherently greater flexibility and deformation under load. Under oblique loading, stresses within all evaluated systems increased exponentially. At a 1 mm thickness, oblique loading forced silicate endocrowns into critical internal stress ranges, approaching catastrophic failure thresholds, whereas zirconia maintained a significant structural safety

margin. Importantly, the stress distribution and overall biomechanical performance of the restorations were not significantly affected by the sintering mode (standard versus speed sintering). The advanced lithium silicate (CEREC Tessera) demonstrated a macroscopic stress distribution profile that was nearly identical to that of traditional lithium disilicate under all simulated conditions.

Keywords

Three-dimensional Model, Endocrown, Finite Element Stress Analysis, Multilayer Zirconia, Lithium Disilicate, Speed Sintering, CAD/CAM, Advanced Lithium Disilicate, Chairside

Maternal Normobaric Oxygen Partially Ameliorates Offspring Behavioral and Neuronal Dysfunction Following Lactational Cigarette Smoke Exposure

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Abstract

Maternal smoking and secondhand smoke exposure during lactation remain important public health concerns and are increasingly recognized as risk factors for adverse neurodevelopmental outcomes in offspring. However, the underlying neuronal mechanisms and effective intervention strategies remain incompletely understood. The present study investigated the effects of lactational cigarette smoke exposure (LCE) on offspring behavioral phenotypes and neuronal activation and evaluated the protective effects of normobaric oxygen (NBO) intervention. A mouse model of LCE was established using C57BL/6J dams exposed to cigarette smoke (10–15 mg/m³ total particulate matter, 3 cigarettes/day, 30 min/day) throughout the 3-week lactation period. A subset of smoke-exposed dams simultaneously received NBO treatment (39 ± 1% O₂, approximately 100 kPa, 2 h/day). Offspring survival and body weight were monitored during development, while behavioral phenotypes were assessed during adolescence using the Open Field Test, Elevated Plus Maze, Tail Suspension Test, and Forced Swimming Test. Neuronal activation was evaluated in adulthood by c-Fos immunofluorescence and co-labeling analyses with NeuN, GAD67, and VGLUT2. Compared with control offspring, LCE offspring exhibited transient growth restriction during early postnatal development and developed hyperactivity-like and anxiety-like behavioral abnormalities during adolescence. NBO intervention significantly ameliorated these behavioral deficits. Immunofluorescence analyses revealed reduced c-Fos expression in multiple brain regions, particularly in the paraventricular nucleus of the hypothalamus (PVA) and basal ganglia (BG), indicating impaired neuronal activation. Further analyses demonstrated decreased c-Fos expression in NeuN-positive neurons. Moreover, LCE significantly reduced activation of GAD67-positive inhibitory neurons while increasing activation of VGLUT2-positive excitatory neurons, suggesting disruption of excitatory–inhibitory neuronal homeostasis. Notably, NBO treatment restored the activity of both inhibitory and excitatory neuronal populations toward control levels and partially normalized overall neuronal activation. These findings demonstrate that maternal cigarette smoke exposure during lactation induces persistent behavioral abnormalities and neuronal dysfunction in offspring through disruption of excitatory–inhibitory neuronal balance, whereas normobaric oxygen intervention partially restores neuronal homeostasis and ameliorates adverse behavioral outcomes, providing experimental evidence for a potential strategy to mitigate neurodevelopmental impairments associated with early-life tobacco smoke exposure.

Keywords

Lactational Cigarette Smoke Exposure, Normobaric Oxygen, Excitatory–Inhibitory Neuronal Homeostasis, Neurodevelopment, Behavioral Abnormalities

Determinants and Strategies for Implementing Environmentally Sustainable Practices in Clinical Nursing Settings: A Scoping Review

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Abstract

Aim To systematically map the determinants of implementation, reported implementation strategies, and potential priority settings for environmentally sustainable practices in clinical nursing settings, in order to inform nursing management and low-carbon transitions in hospitals. **Methods** This review followed the JBI methodology for scoping reviews and was reported in accordance with the PRISMA-ScR statement. The review question was defined using the PCC framework: the population comprised clinical nurses, nurse managers, or multidisciplinary clinical teams directly involved in nursing workflows; the concept included barriers, facilitators, implementation strategies, and implementation outcomes related to environmentally sustainable, low-carbon, or net-zero practices; and the context included hospitals, outpatient care, community care, intensive care, operating rooms, and other clinical nursing settings. PubMed, Web of Science, Embase, CINAHL, and Scopus were searched from database inception to 28 March 2026. Included evidence was classified a priori into Type A direct implementation studies and Type B environmental hotspot/measurement studies. Implementation determinants in Type A studies were mapped to the Consolidated Framework for Implementation Research (CFIR), implementation strategies were coded using the Expert Recommendations for Implementing Change (ERIC) taxonomy, implementation outcomes were remapped using Proctor's framework, and applicable studies were methodologically described using the Mixed Methods Appraisal Tool (MMAT, 2018 version). **Results** Twenty-six articles were included in the formal synthesis, comprising 20 Type A studies and 6 Type B studies. CFIR analysis showed that major barriers were poor workflow compatibility, limited time and resources, underdeveloped procurement and recycling/reprocessing chains, unclear knowledge and role boundaries, and lack of continuous feedback and institutional support. Major facilitators included visible environmental and financial co-benefits, contextualised training, supportive leadership, unit-level champions, cross-departmental collaboration, audit and feedback, and embedding environmental goals into existing workflows and quality improvement mechanisms. Based on the ERIC taxonomy, the most commonly reported strategies were conducting educational meetings, identifying and preparing champions, auditing and providing feedback, changing physical structure and equipment, creating new clinical teams, tailoring strategies to context, and using reminders and implementation tools. Synthesising Type A and Type B evidence with the background literature suggested that perioperative/operating room settings, intensive care units, dialysis services, telehealth, and high-consumable or low-value

care processes should be prioritised. *Conclusion* Current evidence suggests that advancing environmentally sustainable practice in clinical nursing should move beyond general value-based advocacy towards the deliberate design of workflow integration, organisational support, and continuous feedback systems. Future research should prioritise nurse-engaged implementation pilots in high-impact units and jointly report environmental, clinical, economic, and implementation outcomes.

Keywords

Environmental Sustainability, Low-carbon Nursing, Clinical Nursing, Implementation Science, CFIR, ERIC, Proctor Framework

Avocado Powder Ameliorates Cognition by Modulating Gut Microbiota and Neuroinflammation

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Abstract

Accumulating evidence highlights that gut microbiota dysbiosis and subsequent peripheral and central neuroinflammation along the gut-brain axis are critical contributors to the initiation and progression of cognitive impairment. Most existing avocado-related neuroprotective studies focus on avocado oil rich in unsaturated fatty acids, whereas few investigations explore the efficacy of whole-fruit avocado freeze-dried powder retaining water soluble bioactive substances such as polyphenols and dietary fiber. The present study aimed to clarify whether avocado freeze-dried powder could alleviate scopolamine-triggered cognitive dysfunction and further reveal its underlying gut-brain axis-related mechanism. In this study, scopolamine was administrated to establish a mouse cognitive impairment model, followed by intragastric intervention with low-and high-dose avocado freeze-dried powder. Behavioral tests were performed to evaluate learning and memory capacity, and related mechanistic studies were conducted. Avocado freeze-dried powder intervention significantly ameliorated scopolamine-induced cognitive impairment, while reshaping the dysbiotic gut microbiota (increasing the abundance of beneficial bacterial genera and suppressing the expansion of pro-inflammatory taxa), restoring intestinal barrier integrity, reducing serum IL-1 β and LPS levels, and thereby inhibiting microglial overactivation and neuroinflammation. The low-dose intervention was more effective in enriching beneficial bacteria and enhancing microbial diversity, whereas the high-dose intervention exhibited greater advantages in restoring intestinal barrier integrity and suppressing the expansion of pro-inflammatory taxa. Collectively, avocado freeze-dried powder ameliorates scopolamine-induced cognitive impairment via modulating gut microbiota, repairing intestinal barrier and blocking gut-derived inflammation transmission to suppress central neuroinflammation. This work provides experimental support for developing whole-avocado-derived dietary supplements against cognitive disorders and makes up for the research deficiency dominated by avocado oil in previous reports.

Keywords

Avocado Freeze-dried Powder, Cognitive Impairment, Gut-brain Axis, Intestinal Barrier, Neuroinflammation

Clinical Outcomes of Haploidentical Hematopoietic Cell Transplantation Using Non-first-degree vs First-degree Related Donors for Hematological Diseases

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Abstract

Objective To compare the clinical outcomes of Non-first-degree versus First-degree Related Donor Haploidentical Hematopoietic Cell Transplantation in Patients with Hematological Diseases. **Methods** Clinical data of 756 patients who underwent allogeneic HSCT at the First Medical Center of Chinese PLA General Hospital from November 1, 2017 to November 1, 2021 were retrospectively reviewed, including 32 recipients with NFD donors and 724 recipients with FD donors. Patients in the FD group were matched at a 3:1 ratio to the NFD group according to disease category, pre-transplant disease remission status and gender, with age difference ≤ 15 years and transplantation interval ≤ 6 years between matched pairs. Finally, 29 patients in the NFD group and 87 patients in the FD were enrolled. **Results** The median age of both groups was 31 (14–60) years. Except for seven patients who died early before hematopoietic reconstitution, all remaining patients achieved successful neutrophil and platelet engraftment. No significant differences were observed in median neutrophil engraftment time (FD:13.0 days vs NFD:11.0, $P=0.11$) and platelet engraftment time (FD:14.0 days vs NFD:13.5, $P=0.71$). The 3-year overall survival (OS:74.1% vs 82.8%, $P=0.34$), disease-free survival (DFS:74.3% vs 75.9%, $P=0.71$), cumulative relapse rate (11.7% vs 6.9%, $P=0.26$) and non-relapse mortality (NRM:14.0% vs 17.2%, $P=0.60$) were comparable between the two cohorts. Similarly, no statistical differences were found in the 3-year cumulative incidence of chronic graft-versus-host disease (cGVHD:32.7% vs 34.5%, $P=0.80$), extensive cGVHD (12.9% vs 13.8%, $P=0.88$), day-100 grade II–IV acute GVHD (aGVHD:42.5% vs 41.4%, $P=0.97$) and grade III–IV aGVHD (8.0% vs 10.3%, $P=0.70$). Multivariate Cox regression analysis demonstrated that disease risk index (DRI) was an independent prognostic factor for OS (HR=2.84, 95%CI:1.05–7.66, $P=0.04$) and DFS (HR=2.65, 95%CI:1.06–6.65, $P=0.03$). **Conclusion** For patients lacking appropriate first-degree related haploidentical donors, non-first-degree relatives can serve as an alternative donor source for haplo-HSCT in hematological Diseases.

Keywords

Allogeneic Hematopoietic Stem Cell Transplantation, Non-first-degree Related Donor, Graft-versus-host Disease

The Association Between Marital Status and Suicide Mortality Among Patients with Breast Cancer

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Abstract

We examined the association between marital status and suicide mortality after breast cancer diagnosis and whether it varied by county-level income or rural–urban residence. This SEER cohort included adults diagnosed with first primary breast cancer during 2000–2022. Stabilized inverse probability of treatment weighting and multivariable Fine–Gray regression were used, treating non-suicide deaths as competing events. Cox, landmark, treatment-adjusted sensitivity, and exploratory interaction analyses were performed. Among 825,047 patients, 40.7% were unmarried/non-partnered. All baseline standardized mean differences were below 0.01 after weighting. During 6,816,981 person-years, 506 suicide deaths occurred (7.42 per 100,000 person-years). Unmarried/non-partnered patients had a higher suicide subdistribution hazard than married/partnered patients (sHR 1.34, 95% CI 1.12–1.60). Cox analysis yielded a consistent association (HR 1.45, 95% CI 1.21–1.73); landmark sHRs at 1, 3, and 5 years were 1.39, 1.46, and 1.34. The treatment-adjusted sensitivity estimate was 1.26 (95% CI 0.99–1.60; $P = 0.064$). The association varied by income category (joint interaction $P = 0.042$): conditional sHRs were 2.74 (95% CI 1.43–5.26) in the lowest and 1.06 (95% CI 0.80–1.39) in the highest category. The highest-versus-lowest income interaction ratio was 0.39 (95% CI 0.19–0.78; $P = 0.008$). Rural–urban interaction was not statistically significant ($P = 0.488$). Unmarried/non-partnered status was associated with higher suicide mortality, although the absolute rate was low. Exploratory findings suggest a weaker association in higher-income settings, with no clear evidence of variation by residence. Observational limitations and sensitivity-analysis uncertainty warrant cautious interpretation and independent validation.

Keywords

Breast Cancer, Marital Status, Suicide Mortality, Social Buffering Framework

AI-driven Nurse Scheduling and Dynamic Task Allocation for ICUs: Optimizing Human Resource Allocation in Public Health Emergencies

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Abstract

Background: During public health emergencies, nursing demands in intensive care units (ICUs) surge dramatically. Traditional static scheduling fails to dynamically match tasks with personnel, resulting in declined care quality and elevated risks of nurse burnout. **Objective:** To develop a reinforcement-learning-based AI-powered scheduling and task allocation system to dynamically optimize ICU nurse staffing and improve the resilience of nursing systems amid large-scale public health emergencies. **Methods:** Retrospective data analysis and simulation modeling were adopted. Nursing scheduling records, patient data and workload assessment scales from the ICU of a tertiary hospital (2020–2025) were collected to construct a training dataset covering over 8,000 shifts. Patient severity levels, nurse qualification grades, consecutive working hours and prior workloads were set as system inputs. High-pressure public health emergency scenarios with bed occupancy rates $\geq 85\%$ were simulated. Indicators including nursing care quality scores, workload imbalance coefficients, critical patient response time, and burnout risk early-warning accuracy were used for comparison against conventional scheduling strategies. **Results:** The AI system raised care quality scores by 18% ($p < 0.05$), reduced the workload imbalance coefficient by 32%, and shortened critical patient response time by approximately 35 minutes. Its burnout risk prediction module achieved a 78% early-warning accuracy for high-risk shifts. **Conclusion:** This system substantially improves human resource allocation efficiency in ICUs, with sound clinical feasibility and promotion value. It serves as an effective AI decision-support tool for critical-care management under public health emergencies.

Keywords

Intensive Care Unit (ICU), Nursing Human Resource Management, Artificial Intelligence, Reinforcement Learning, Public Health Emergency

Research Hotspots of Behavioral Intervention for Autism Spectrum Disorder in Recent 25 Years a CiteSpace Visualization Analysis Based on Dual Databases

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Abstract

Objective: To analyze the research hotspots, development trends and differences in behavioral interventions for autism spectrum disorders (ASD) at home and abroad in the past 25 years, and to provide references for improving the intervention effects in the light of the current situation that the prevalence rate of ASD among children aged 0-6 years old in China has reached 1.8%. **Methods:** We searched the CNKI and Web of Science core ensemble databases for literature related to behavioral intervention methods for ASD from 2000 to 2024, used CiteSpace to cluster keywords, drew a knowledge map, and analyzed research hotspots and cutting-edge trends in the research disciplines based on the search results, and conducted comprehensive interpretation. **Results:** The number of Chinese and foreign publications has increased, and the growth rate of foreign publications is faster after 2018. The cooperation of domestic authors is scattered (3 core articles), while international core authors have published 32 articles with close cooperation. Domestic focuses on traditional techniques such as ABA, while foreign focuses on early intervention/social communication, emphasizing multidisciplinary integration. The proportion of cutting-edge technologies in foreign countries is 28% (5% in China), and the innovation is more significant. **Conclusion:** The diversity of domestic intervention methods is better than that of foreign countries (12 techniques vs. 8 techniques), but the depth of research (e.g., the effect of intervention on brain development) and technological innovation are lagging behind. In the future, we need to learn from the international “medicine-education-engineering” collaboration model to strengthen interdisciplinary cooperation and early intervention during the golden period of 0-6 years old.

Keywords

Autism Spectrum Disorder, ASD, Behavioral Interventions, CiteSpace, Visual Analytics

TEAD Upregulation Promotes Osimertinib Resistance in NSCLC

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Abstract

Osimertinib, a third-generation tyrosine kinase inhibitor (TKI), is the first-line standard therapy for EGFR-mutated non-small cell lung cancer (NSCLC). However, acquired resistance is inevitable, with underlying mechanisms incompletely elucidated, leading to limited subsequent treatments and posing major clinical challenges. This study established osimertinib-resistant NSCLC models in vitro and in vivo, revealing a novel resistance mechanism mediated by TEAD upregulation but independent of the classical Hippo pathway. Osimertinib treatment enhances TEAD protein stability by inhibiting its ubiquitination-mediated degradation. Upregulated TEAD promotes YAP nuclear translocation, strengthens YAP/TEAD intranuclear co-localization and liquid-liquid phase separation (LLPS) capacity. The elevated YAP/TEAD condensates collectively upregulate downstream target gene expression and compromise the anti-proliferative activity of osimertinib. Based on this mechanism, we developed ET825, a novel YAP/TEAD interaction inhibitor to overcome osimertinib resistance. ET825 effectively disrupts the TEAD/YAP interaction in cells, significantly suppresses YAP transcriptional activity, and inhibits NSCLC tumor proliferation. Additionally, since SHP2 is a critical signaling node in the EGFR pathway, the combination of SHP2 inhibitor ET0038 and ET825 exhibited significant synergistic anti-tumor effects in osimertinib-resistant NSCLC models in vitro and in vivo. This study elucidates a previously uncharacterized osimertinib-induced resistance mechanism mediated by TEAD upregulation and YAP-TEAD activation, and provides a translationally promising therapeutic strategy to overcome osimertinib resistance.

Keywords

Non-small Cell Lung Cancer (NscLC), Osimertinib, Tead, Yap, Liquid-liquid Phase Separation (Llps)

Knockdown of TROP2 Suppresses Malignant Phenotype and Promotes Platinum Sensitivity in Ovarian Cancer with Involvement of the Lipid Metabolism-Ferroptosis Axis

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Abstract

Cisplatin resistance is a major cause of treatment failure in advanced ovarian cancer. TROP2 is a transmembrane glycoprotein highly expressed in ovarian cancer and has been implicated in malignant progression and platinum resistance; however, the downstream molecular mechanisms remain incompletely understood. In this study, we established ovarian cancer cell lines with stable TROP2 knockdown and assessed malignant phenotypes and tumorigenic capacity using CCK-8, Transwell, flow cytometry, and a nude mouse xenograft model. Combined with transcriptome sequencing and KEGG enrichment analysis, we identified differentially regulated pathways and validated the expression of key genes. Our results showed that TROP2 knockdown significantly inhibited proliferation, migration, invasion, and in vivo tumour growth, while promoting apoptosis. Notably, cisplatin induced TROP2 expression in a concentration-dependent manner, and this upregulation correlated with reduced drug sensitivity, as TROP2 depletion markedly enhanced cisplatin cytotoxicity in ovarian cancer cells. Transcriptomic analysis and validation revealed that upon TROP2 knockdown, the PI3K-Akt signalling pathway and multiple lipid metabolism pathways were significantly enriched. Specifically, the expression of the elongation of very long chain fatty acids protein 7 (ELOVL7) was markedly downregulated, while the ferroptosis-related genes GPX4 and SLC7A11 were also significantly downregulated, and ACSL4 was significantly upregulated. Collectively, these findings suggest that, TROP2 knockdown suppresses malignant progression and enhances cisplatin sensitivity in ovarian cancer, accompanied by inhibition of the PI3K-Akt pathway, downregulation of ELOVL7-mediated lipid metabolism, and activation of ferroptosis-related gene expression. These findings suggest that TROP2 may regulate a lipid metabolism-ferroptosis axis, providing a novel potential target for reversing platinum resistance and improving therapeutic intervention in ovarian cancer.

Keywords

TROP2, Ovarian Cancer, Cisplatin Resistance, Lipid Metabolism, Ferroptosis

Dose-response Association Between Magnesium Sulfate Administration and 28-Day Mortality in ICU Patients With Delirium: A Target-trial Emulation

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Abstract

Background: Delirium is a frequent and clinically consequential manifestation of acute brain dysfunction in critically ill patients, yet no pharmacological strategy has consistently improved survival. Magnesium sulfate is biologically plausible as a neuroprotective adjunct through N-methyl-D-aspartate receptor modulation, calcium influx inhibition, and anti-inflammatory effects, but its clinical relevance in ICU delirium remains uncertain. **Objective:** To evaluate the association between intravenous magnesium sulfate administration and 28-day mortality among ICU patients with delirium, and to explore dose-response patterns, baseline magnesium status, and hemodynamic safety. **Methods:** We performed a target-trial emulation using the Medical Information Mart for Intensive Care IV database. Adult patients with ICU delirium were classified according to magnesium sulfate exposure during the index ICU stay. Propensity scores were estimated using generalized boosted models, followed by 1:1 matching to construct a balanced cohort. Doubly robust estimation was used for the primary analysis. Restricted cubic splines assessed the association between cumulative magnesium sulfate dose and 28-day mortality, truncated at the 99th percentile to reduce the influence of sparse extreme values. Prespecified subgroup and safety analyses examined baseline magnesium status and new-onset hypotension requiring vasoactive therapy. **Results:** Among 40,287 eligible patients, 20,256 were included after matching, with 10,128 patients in each group. Magnesium sulfate administration was associated with lower 28-day mortality in the doubly robust model (adjusted odds ratio, 0.72; 95% confidence interval, 0.65–0.79; $p < 0.001$). Dose-response analysis suggested an approximately linear inverse association across the cumulative dose range of 0–30 g, without significant evidence of non-linearity. The association persisted among patients with baseline normomagnesemia, suggesting that the observed signal may not be explained solely by correction of hypomagnesemia. Magnesium sulfate was not significantly associated with new-onset hypotension requiring vasoactive therapy. **Conclusion:** In this large real-world ICU delirium cohort, magnesium sulfate administration was associated with lower 28-day mortality, with supportive dose-response and safety signals. These findings identify magnesium sulfate as a promising, low-cost candidate intervention for prospective trials in ICU delirium.

Keywords

Delirium, Magnesium Sulfate, Intensive Care Unit, Mortality, Target-trial Emulation, Dose-response Association

Electroacupuncture Alleviates Migraine Through CXCL13/CXCR5-mediated Communication

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Abstract

Rationale: Chronic migraine is characterized by persistent trigeminal sensitization and neuroinflammation. however, the molecular mechanisms underlying its maintenance and mediate the therapeutic effects of acupuncture remain incompletely understood. **Method:** A chronic migraine-like state was induced in mice by repeated dural inflammatory soup (IS), followed by electroacupuncture (EA). Behavioral hypersensitivity was assessed, and molecular changes in the spinal trigeminal nucleus caudalis (Sp5C) were analyzed using transcriptomic, biochemical, and functional approaches. **Result:** Repeated inflammatory stimulation markedly increased CXCL13 and CXCR5 expression and ERK phosphorylation in the Sp5C, accompanied by mechanical allodynia, thermal hyperalgesia, glial activation, and elevated IL-6 and CCL2 levels. EA significantly attenuated pain hypersensitivity and reduced CXCL13/CXCR5 expression, ERK activation, glial reactivity, and inflammatory mediator release. EA also decreased migraine-related neuropeptides and synaptic plasticity markers, including substance P, PACAP, and NR2B. Functional manipulation experiments demonstrated bidirectional regulation of pain behaviors by CXCR5, establishing its causal role in chronic migraine-like sensitization. MicroRNA profiling identified a dysregulated miRNA signature converging on the transcription factor FOXO3, which indirectly regulated CXCR5 transcription, defining a miRNA-FOXO3-CXCR5 regulatory pathway. **Conclusion:** Our study reveals the CXCL13/CXCR5/ERK axis as a previously unrecognized pathway in migraine neuroinflammation and demonstrates electroacupuncture's multimodal therapeutic mechanisms. These findings provide: (1) novel mechanistic insights into migraine pathophysiology through CXCR5-mediated signaling, and (2) translational implications for chronic migraine treatment by targeting the CXCL13/CXCR5/ERK axis. This work establishes a foundation for future development of targeted therapies and validates electroacupuncture as a viable intervention for migraine management.

Keywords

Migraine, Neuroinflammation, CXCR5, Neuron, Cross-talk, FOXO3

Risk Identification and Control Strategy for Blood Specimen Transportation Quality Under the Centralized Testing Model

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Abstract

Objective: To systematically identify quality risks across the entire process of blood specimen transportation under the centralized testing model in Chongqing, develop a risk evaluation index system, and propose targeted control strategies to reduce the rejection rate of transported specimens, improve the overall quality of centralized testing, and ensure the safety of clinical blood transfusion. **Methods:** The study followed a closed-loop design of "status survey—risk identification—quantitative evaluation—strategy formulation—application validation". First, a comprehensive investigation of current specimen transportation practices was conducted at Chongqing Blood Center and 10 district/county blood collection and supply facilities using questionnaires, on-site observations, and in-depth interviews, and a risk database was established. Laboratory simulation experiments were performed using a vibration table and temperature-controlled chambers, combined with on-site correlation analysis, to quantify the damaging effects of vibration and temperature on specimen quality and to construct a "temperature–vibration coupling" risk assessment model. Graded control strategies were then formulated for high-risk items and pilot-tested in selected districts/counties. The effectiveness of the strategies was evaluated by comparing outcomes before and after implementation. **Results:** Based on centralized testing records from 2023 to 2025, which included over 900,000 valid transport batch records, the average hemolysis rate was 6.55‰, the average temperature excursion rate was 8.0‰, and the average transport time exceeding 6 hours was 22.64‰. On long-distance suburban routes (>150 km), the hemolysis rate reached 10.8‰, more than doubling that on short suburban routes (3.4‰); the temperature excursion rate reached 15‰, three times that on short suburban routes (5.2‰); and the temperature excursion rate climbed to 18.0% during summer. Rejection cause analysis revealed that hemolysis accounted for 22% and temperature excursions for 28% of rejections, together representing 50%. Laboratory experiments showed that after 30 min of vibration, the hemolysis rate increased from 0.03% to 0.17% (a 5.7-fold increase); after 240 min of vibration, the hemolysis rate reached 0.96% (a 32-fold increase), with free hemoglobin rising exponentially. Temperatures above 30°C significantly accelerated hemolysis. Non-targeted metabolomics analysis demonstrated that storage at room temperature (25°C) for 4 hours significantly upregulated the erythrocyte lactate metabolism pathway ($P < 0.01$). The risk assessment identified summer cold-chain failure, mountainous bumpiness, and prolonged post-centrifugation standing as extremely high-risk items. Pilot tests showed that after implementing the graded control strategy, the hemolysis rate on the test routes decreased by 39.7%, the temperature excursion rate decreased by 60.0%, and vibration damping efficiency exceeded 75%, confirming a synergistic "temperature–vibration coupling" effect. **Conclusion:** This study established a four-dimensional "human–machine–environment–management" risk analysis framework and a "temperature–vibration coupling" risk assessment model. The resulting quantifiable risk evaluation tool and standardized operating procedures provide a transferable "Chongqing Model" for improving the quality management

of blood specimen transportation in mountain city blood stations, which is of great significance for ensuring the quality of centralized testing and enhancing blood safety.

Keywords

Centralized Blood Testing, Specimen Transportation, Risk Identification, Quality Control, Failure Mode and Effect Analysis (FMEA), Mountain City

The Role and Mechanism of KLF4-mediated Regulation of PARK2-dependent Endothelial Mitophagy in Atherosclerosis

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Abstract

Objective: To investigate the regulatory role of KLF4 in endothelial mitophagy under atherosclerotic conditions, to elucidate its functional association with PARK2, and to evaluate the potential therapeutic value of PARK2-targeted intervention. **Methods:** Human umbilical vein endothelial cells were treated with oxidized low-density lipoprotein(ox-LDL) to establish an in vitro endothelial injury model. The expression levels of KLF4, PARK2, and mitophagy-related molecules were examined using quantitative PCR, Western blotting, and immunofluorescence staining. A KLF4-deficient model was constructed, and mitochondrial membrane potential, mitochondrial reactive oxygen species production, and mitophagic activity were assessed by JC-1 staining, MitoSOX detection, and mitochondrial colocalization analysis. Chromatin immunoprecipitation (ChIP) assays were performed to verify the transcriptional regulatory effect of KLF4 on the PARK2 promoter region. Furthermore, an endothelial-specific KLF4-deficient mouse model was established, followed by intervention with the PARK2 activator MTK458, to evaluate changes in carotid atherosclerotic lesions and related pathological indicators. **Results:** Following ox-LDL stimulation, the expression of KLF4 and PARK2 was markedly decreased in endothelial cells. Mitophagy-associated markers, including PINK1 and the LC3-II/I ratio, were reduced, whereas p62 accumulated abnormally. These changes were accompanied by mitochondrial membrane potential disruption and increased mitochondrial reactive oxygen species production. KLF4 deficiency further aggravated ox-LDL-induced mitochondrial dysfunction and mitophagy impairment, thereby promoting endothelial injury. Mechanistic analyses demonstrated that KLF4 could bind to the PARK2 promoter region and positively regulate its transcription. In vivo experiments showed that endothelial-specific KLF4 deletion exacerbated carotid atherosclerotic plaque formation. Activation of PARK2 by MTK458 partially restored mitophagic activity, ameliorated mitochondrial dysfunction, and attenuated the atherosclerotic phenotype induced by KLF4 deficiency. **Conclusion:** KLF4 serves as an important protective factor in maintaining endothelial mitochondrial homeostasis. It promotes mitophagy by transcriptionally activating PARK2, thereby reducing oxidative stress and endothelial injury and ultimately delaying the progression of atherosclerosis. The KLF4/PARK2 signaling axis may represent a promising potential target for the prevention and treatment of atherosclerosis.

Keywords

KLF4, PARK2, Mitophagy, Endothelial Cells, Atherosclerosis

Development of the Algerian PCAT Version and Assessment of Primary Care Quality from Patients' Perspective Among the Five Geographical Regions in Algeria

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Abstract

Despite the central role of primary care in Algeria's healthcare system, few studies have assessed services quality, and validated assessment tools remain scarce. This study aimed to develop and validate an Algerian version of the Johns Hopkins Primary Care Assessment Tool, adapted to local healthcare system characteristics, and to evaluate primary care quality across different geographical and socioeconomic regions of Algeria. Methods: PCAT was translated into Arabic using forward-backward translation procedure to obtain a stable and reliable Algerian version (Dz-PCAT). Following pre-testing and experts' consultations, the questionnaire items were adapted to the Algerian health system. A cross-sectional stratified, multi-stage sampling approach was used to sample 715 adult consumers (≥ 18 years) from 20 primary care facilities across five regions in Algeria, and face-to-face interviews were conducted using Dz-PCAT. Reliability and validity of the adapted Dz-PCAT were assessed using Cronbach's coefficient and internal consistency analysis. The main dimensions of Dz-PCAT were scored using Likert scale, and PC quality was tested using the mean scores of each domain. A total of five main dimensions have been analysed: First Contact, Continuity, Coordination of care, Comprehensiveness, and Community orientation. Univariate analysis between dimensions was performed using ANOVA and chi-square analysis. Multiple linear regression was performed to assess the association between health care settings (EPSPs) and the quality of primary care while controlling sociodemographic characteristics. Results: A total of 702 effective samples were included for data analysis. Dz-PCAT is a valid and reliable tool to assess the PC quality in Algeria from patient's perspective. Respondents reported the highest score for First contact accessibility and comprehensiveness services available, while comprehensiveness services provided, ongoing care, and longitudinality showed poor scores. Community orientation was the weakest link in Algeria's primary health care. Conclusion: Currently, Dz-PCAT is the first adapted and validated measurement tool in Algeria based on universal and internationally accepted indicators. Our results

showed that PC services in Algeria are close to residents and accessible at any time of need, and culturally well-adapted. Respondents reported a high evaluation of the accessibility of care and the comprehensiveness of services available. However, continuity of care, comprehensiveness of services provided, and family-centredness showed comparatively lower performance, indicating the need to be emphasized. Dz-PCAT total scores among the five regions were significantly different, and further measures are needed to deal with regional disparities. The gap in community orientation is an important finding of our research that calls for rethinking and improvement.

Keywords

Primary Health Care, PCAT, Dz-PCAT, Questionnaires, Quality measurement, Assessment, Evaluation, Algeria

Lens-induced Myopia: Heightened STAT3 Activation in Ocular Posterior Compartments and Altered Scleral MMP-2/TIMP-2 Secretory Balance

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Abstract

Purpose: To investigate changes in signal transducer and activator of transcription 3 (STAT3) activation in posterior segment ocular tissues, scleral matrix metalloproteinase-2/tissue inhibitor of metalloproteinases-2 (MMP-2/TIMP-2) balance, and their potential mechanisms during lens-induced myopia (LIM) development. **Methods:** Sixty 2-week-old pigmented guinea pigs were divided into four groups: normal control (NC, no intervention), lens-induced myopia (LIM, right eye fitted with a -6.00D lens), LIM+AG490 (following LIM induction, intravitreal injection of 5μL AG490 solution every 2days), and LIM+injection control (LIM+InjCon, following LIM induction, intravitreal injection of 5μL physiological saline every 2days). At 2 and 4weeks, refraction, axial length, retinal/choroidal thickness, posterior segment microstructure, and levels of STAT3/phosphorylated (p)-STAT3 (retina, choroid, sclera) and scleral MMP-2/TIMP-2 were measured. **Results:** Compared with the NC group, the LIM group showed a significant myopic refractive shift, axial elongation, enhanced STAT3 activation in the retina, choroid, and sclera, upregulated scleral MMP-2, downregulated scleral TIMP-2, along with thinning and loosening of posterior pole tissues (including the sclera) at 2 and 4weeks. In contrast to the LIM group, the LIM+AG490 group exhibited attenuated myopia progression, reduced STAT3 activation, downregulated scleral MMP-2, upregulated scleral TIMP-2, and alleviated thinning of posterior pole tissues. The results of the LIM+InjCon group were similar to those of the LIM group. **Conclusions:** During LIM development, STAT3 activation is enhanced in the retina, choroid, and sclera, with disrupted scleral MMP-2/TIMP-2 balance. These changes may correlate with myopia-related phenotypes (e.g. axial elongation, scleral remodeling), though their specific mechanism(s) remain to be elucidated.

Keywords

Guinea Pigs, Lens-induced Myopia, STAT3, MMP-2, TIMP-2

Research on the Legal Liability of Medical Robots

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Abstract

With the deep application of artificial intelligence technology in the medical field, the legal liability issues of medical robots show significant differences in the stages of weak and strong artificial intelligence. In the stage of weak artificial intelligence, medical robots, as technical tools, operate based on pre-set programs and their legal liability follows the principle of "human-centered" attribution: developers bear product liability for algorithm defects and data deviations; medical institutions bear medical malpractice liability for operational errors or professional review oversights; third-party data providers or maintainers share responsibility based on fault or contract. However, the black box of algorithms, the complexity of the liability chain, and the lag of laws make it difficult to determine the cause-and-effect relationship, which requires solutions such as enhancing algorithm transparency, reversing the burden of proof, and implementing dynamic regulatory systems. In the stage of strong artificial intelligence, medical robots may possess autonomous decision-making and learning capabilities, posing a disruptive challenge to the traditional liability framework. Medical robots can act independently beyond the programming designed by humans and have the ability for deep learning. However, this has not been fully achieved yet, thus requiring forward-looking research. This paper, centered on the development stages of artificial intelligence, combines technical characteristics and legal logic to systematically explore the legal liability distribution challenges and solutions for medical robots in the stages of weak artificial intelligence (Narrow AI) and strong artificial intelligence (General AI).

Keywords

Medical Robots, Strong Artificial Intelligence, Weak Artificial Intelligence, Legal Liability

Willingness and Influencing Factors of Rural Residents Enrolling in Inclusive Commercial Medical Insurance: A Village Case Study in Shaanxi

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Abstract

Inclusive commercial medical insurance plays a crucial role in preventing health-induced poverty and improving the multi-tiered medical security system. This study investigates the current willingness of rural residents to enroll in such supplementary medical insurance and explores the primary influencing factors, providing empirical evidence to optimize future promotion strategies. A comprehensive theoretical framework was established utilizing the Unified Theory of Acceptance and Use of Technology (UTAUT) alongside perceived risk theory. A cross-sectional questionnaire survey was conducted using a simple random sampling method among residents in a Shaanxi Province village, yielding 150 valid responses. Quantitative data underwent descriptive statistics, univariate analysis including independent t-tests and ANOVA, and multiple linear regression modeling to systematically identify significant predictors of enrollment willingness. Results indicated that overall insurance product awareness and health risk perception among the surveyed respondents were relatively low. Univariate analyses demonstrated that gender, marital status, age, educational attainment, monthly income, self-rated health status, and prior policy understanding significantly affected enrollment willingness ($P < 0.05$). Furthermore, multiple linear regression analysis revealed that, after controlling for baseline demographic variables, subjective norms, product attitude, and perceived usefulness exerted a significant positive impact on the willingness to enroll. Notably, subjective norms demonstrated the most substantial predictive influence among these cognitive factors. In conclusion, the willingness of rural residents to participate in inclusive commercial medical insurance is jointly driven by underlying sociodemographic characteristics and multidimensional psychological cognitive factors. To enhance coverage rates and public satisfaction, stakeholders should strengthen targeted multi-channel public education, actively elevate rural health risk awareness, and optimize product design, such as appropriately reducing deductible thresholds to accommodate local economic realities.

Keywords

Inclusive Commercial Medical Insurance, Willingness to Enroll, Influencing Factors, Rural Residents

Dietary Patterns and Food Processing Degree on Components of Metabolic Syndrome in Chinese Adults: A Cohort Study Based on the CHNS Database

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Abstract

Objective: To extend the research perspective from single nutrients or food groups to overall dietary patterns and the degree of industrial food processing, and to systematically evaluate their long-term associations with the incidence of metabolic syndrome (MetS) and its components (central obesity, dyslipidemia, hypertension, and hyperglycemia) in Chinese adults, thereby providing precise evidence for the formulation of more actionable, food system-based chronic disease prevention strategies. **Methods:** This study was based on three waves of follow-up data from the China Health and Nutrition Survey (CHNS) between 2011 and 2018, enrolling 6539 adults aged 18–65 years who were free of metabolic syndrome at baseline. Dietary intake was assessed using consecutive 3-day 24-hour dietary recalls combined with household food weighing. Two core exposure variables were constructed: (1) the “China Healthy Diet Index,” which quantified an individual’s adherence to the “Jiangnan Dietary Pattern” characterized by a high intake of cereals, tubers, mixed legumes, vegetables, fruits, aquatic products, dairy products, and legumes; and (2) the percentage of total energy intake contributed by ultra-processed foods, calculated according to the NOVA food classification system. The outcome events were incident metabolic syndrome and its individual components. Multivariable-adjusted Cox proportional hazards regression models were applied, and restricted cubic splines were fitted to explore potential non-linear dose-response relationships. **Results:** During a median follow-up of 7.4 years, 2016 incident cases of metabolic syndrome were documented. For each standard deviation increase in the Jiangnan Dietary Pattern adherence score, the risk of developing metabolic syndrome was reduced by 11% (HR = 0.89, 95% CI: 0.83–0.95), with particularly significant inverse associations observed for waist circumference, triglycerides, and blood glucose (all *P* for trend < 0.05). In contrast, the energy share from ultra-processed foods in the cohort rose rapidly from 6.8% at baseline to 11.2%. Compared with participants in the lowest quartile of ultra-processed food consumption, those in the highest quartile had a 33% increased risk of metabolic syndrome (HR = 1.33, 95% CI: 1.18–1.50), demonstrating a clear dose-response relationship (*P* for trend < 0.001). Notably, the harmful effect of ultra-processed food intake remained robust even after adjusting for the Jiangnan Dietary Pattern score. **Conclusion:** Not only “what to eat” is critical, but “how to eat” and “what kind of foods to eat” also profoundly influence metabolic health. High adherence to the Jiangnan Dietary Pattern, which is rich in plant-based foods and emphasizes light cooking, serves as a significant protective factor against metabolic syndrome, whereas the increasing consumption of ultra-processed foods, independent of traditional nutrients, has emerged as a novel risk factor driving metabolic syndrome. Public health policies should adopt a two-pronged approach: advocating healthy dietary patterns while simultaneously putting forward explicit, restrictive recommendations against the excessive consumption of

ultra-processed foods.

Keywords

Dietary Pattern, Metabolic Syndrome, Cohort Study

Effect of Acute Inhalation Exposure to Propisochlor on Rats

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Abstract

Propisochlor is a widely used herbicidal active ingredient for protecting crops against weeds. During its production and application, however, this compound is present in the air of the working zone and the ambient atmosphere and exerts adverse effects on the health of workers and the general population. Given the limited data on toxic effects following chronic inhalation exposure and the use of this active ingredient in technological processes at production sites within the Russian Federation, a more thorough investigation of the hazard of propisochlor upon repeated inhalation exposure is necessary to minimize the health risk on human. The aim of the present study was to conduct experimental work to establish the threshold of acute action of propisochlor upon inhalation exposure, with a view to subsequently selecting concentration levels for a chronic experiment. The experiments were carried out on 58 outbred male laboratory rats ($n = 29/\text{group}$) weighing 160–180 g. Inhalation exposure was modelled using a head-nose inhalation system (TSE Systems, Germany). The animals were exposed to a respirable aerosol fraction of propisochlor at a concentration of $4569 \pm 392 \text{ mg/m}^3$ for 4 hours. Changes after exposure were assessed with a battery of hematological, biochemical, ethological, and functional tests in comparison with the day before exposure and with control-group rats. To evaluate ethological parameters in the open-field test and the hole-poke test, a neural network model based on Deeplabcut was used. An increase in respiratory rate was detected in the experimental group on day 1 after exposure compared with control animals ($p = 0.043$). Serum biochemical parameters were most markedly altered at 2 hours after exposure. The following changes were observed: a decrease in creatinine ($p < 0.001$), urea ($p = 0.001$), and α -amylase ($p = 0.004$); an increase in uric acid ($p < 0.001$), total bilirubin ($p < 0.001$), and AST ($p = 0.034$). By day 1 after exposure, the creatinine level had returned to the control group level, and a decrease in ALT was also found ($p = 0.023$). On day 3 after exposure, the ALT level was increased ($p = 0.023$) relative to the control group and relative to the ALT level on day 1 after exposure ($p = 0.0026$). By day 14 after exposure, all biochemical parameters in the experimental group had returned to control levels. It was established that propisochlor at a concentration of $4569 \pm 392 \text{ mg/m}^3$ exerts toxic effects on the excretory and digestive systems as well as on the respiratory organs. All changes were transient in nature; therefore, the above-mentioned concentration is taken as the threshold concentration.

Keywords

Propisochlor, Inhalation Toxicity, Herbicides, Pesticides, Threshold of Acute Action

Advances in Multimodal Data Fusion for Intelligent Assessment and Digital Early Warning of Delayed Healing in Postoperative Perianal Wounds Following Anal Fistula Surgery: A Review

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Abstract

Postoperative wounds after anal fistula surgery are typically managed by secondary intention with open wound care, relying on granulation tissue formation and epithelialization. Due to the unique anatomical location, perianal wounds are susceptible to fecal contamination, high humidity, mechanical friction, sphincter movement, and frequent dressing changes. Consequently, some patients experience prolonged healing times, poor infection control, or stalled wound repair. Traditional wound assessment primarily depends on the TIME/TIMERS wound bed preparation frameworks and clinicians' subjective visual inspection. While these frameworks provide structured evaluation of tissue type, infection/inflammation, moisture balance, and wound edge status, they suffer from considerable subjectivity, limited quantification, poor continuity in home-based follow-up, and insufficient capability for early risk identification. Recent advances in medical image processing, deep learning, mobile health, and multimodal machine learning have opened new avenues for the digital assessment of open wounds. Existing studies have predominantly focused on diabetic foot ulcers, chronic leg ulcers, pressure injuries, burns, and general surgical wounds, where convolutional neural networks (CNNs), U-Net-based segmentation models, and Transformer architectures have been successfully applied for wound boundary detection, area measurement, tissue classification, and longitudinal monitoring. However, high-quality datasets, externally validated models, and prospective clinical studies specifically targeting open perianal wounds after anal fistula surgery remain scarce. Multimodal data fusion, which integrates wound images, symptom scores, defecation records, laboratory parameters, nutritional status, dressing compliance, and patient-reported outcomes, shows promise in constructing a more comprehensive postoperative risk assessment framework. Nevertheless, its predictive performance, clinical safety, and translational value in nursing practice require rigorous validation. This narrative review summarizes current evidence regarding risk factors for delayed healing of perianal wounds after anal fistula surgery, limitations of conventional assessment methods, advances in intelligent image recognition, multimodal data fusion strategies, digital early warning systems integrated with closed-loop continuity of care, and future challenges. Future research should prioritize the establishment of standardized anorectal wound databases, unified protocols for image acquisition and annotation, multicenter prospective validation studies, and enhanced model explainability, privacy protection, and clear definition of clinical responsibility. These efforts will provide a solid foundation for precision wound management and improved

continuity of care in patients undergoing anal fistula surgery.

Keywords

Anal Fistula, Delayed Wound Healing, Perianal Wound, Multimodal Data Fusion, Artificial Intelligence, Digital Early Warning, Continuity of Care

***Ophioglonol* Suppresses Psoriatic Progression via FOXO1 Nuclear Translocation and Modulation of the PI3K/AKT and NF- κ B Pathways**

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Abstract

Psoriasis is an immune-mediated skin disease characterized by aberrant keratinocyte proliferation and chronic inflammation. This study evaluated the anti-psoriatic activity of *Ophioglossum* extract, identified its key active constituent, and elucidated the underlying molecular mechanism. An imiquimod-induced psoriasis-like mouse model was used to assess the effect of *Ophioglossum* ointment, and the core active constituent was tracked by combining a HaCaT hyperproliferation model with chromatographic separation and drug-likeness evaluation. Keratinocyte inflammation models induced by IL-17A or a TNF- α /IFN- γ cocktail were evaluated using CCK-8 and qPCR. Network pharmacology (PharmMapper, SwissTargetPrediction, and DisGeNET) combined with GO/KEGG enrichment analyses were employed to predict the core pathway. Further validation was performed by using Western blot and nuclear-cytoplasmic fractionation. *Ophioglossum* ointment significantly alleviated erythema, scaling, and epidermal thickening in psoriatic mice, reduced spleen weight, and modulated the proportions of B cells and macrophages in the spleen and lymph nodes, effectively suppressing psoriasis progression. Activity-guided tracking identified two active monomers, ophioglonol and ophioglonin, of which ophioglonol exhibited superior drug-likeness. Ophioglonol (1–5 μ g/mL) markedly inhibited aberrant keratinocyte proliferation, downregulated the pro-inflammatory cytokines IL-1 β , IL-6, and IL-8, and upregulated the anti-inflammatory cytokine IL-10. Target enrichment analysis identified FOXO1 as the core regulatory pathway. Mechanistic validation demonstrated that ophioglonol significantly inhibited IL-17A-induced PI3K/AKT phosphorylation, promoted FOXO1 nuclear translocation, upregulated the downstream cell-cycle inhibitor p21, and suppressed NF- κ B pathway activation, thereby blocking keratinocyte hyperproliferation and the inflammatory cascade. These findings establish ophioglonol as the core active substance underlying the anti-psoriatic effect of *Ophioglossum*, providing a novel candidate compound and theoretical support for the development of natural targeted therapies for psoriasis.

Keywords

Ophioglossum, Ophioglonol, Psoriasis, Foxo1, Pi3k/Akt, Nf-Kb, Keratinocyte

Clinical Study on Probiotics Combined with Quadruple Therapy for Drug-Resistant *Helicobacter pylori* Infection

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Abstract

Helicobacter pylori (H. pylori) is one of the most prevalent chronic bacterial infections worldwide, affecting approximately 4.4 billion people (nearly 50% of the global population), and has been classified as a Group I carcinogen for gastric cancer by the World Health Organization; however, the rising antibiotic resistance of this pathogen has seriously compromised the efficacy of conventional eradication regimens, with clarithromycin and levofloxacin resistance rates in China reaching 50.83% and 47.17%, respectively, and the eradication rate of traditional therapy declining from over 80% to below 60%. This review aims to systematically evaluate the efficacy of probiotics combined with bismuth-containing quadruple therapy for drug-resistant H. pylori infection and to clarify the underlying regulatory mechanisms and optimal clinical strategies. Evidence was synthesized from published multicenter randomized controlled trials and epidemiological surveillance data, covering more than 20 studies with over 5,000 cases, together with mechanistic analyses of probiotic actions including competitive colonization, secretion of antimicrobial metabolites, interference with quorum sensing, and modulation of host immunity and intestinal microecology. The results showed that the eradication rate of the probiotic-combined group reached 94%–97.62%, markedly higher than the 72%–80.95% observed with quadruple therapy alone, while the incidence of adverse reactions decreased from 19.05% to 4.76%, with particular benefits in children, elderly patients, and those who failed initial treatment. Probiotics improved eradication rates by approximately 10%–20%, and multi-strain composite preparations administered at 10^9 – 10^{10} CFU daily for 10–14 days, separated from antibiotics by at least 2 hours, were associated with the best outcomes. In conclusion, probiotic-supplemented quadruple therapy significantly improves eradication, reduces adverse effects, and enhances treatment adherence and quality of life in drug-resistant H. pylori infection, representing a promising optimization of current eradication strategies, although standardized strains, dosages, and treatment courses together with long-term safety data from high-quality trials remain urgently needed.

Keywords

Helicobacter Pylori, Probiotics, Eradication Therapy

Analysis and Validation of Diagnostic Biomarkers and Immune Cell Infiltration Characteristics in Osteoarthritis by Integrating Bioinformatics and Machine Learning

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Abstract

Osteoarthritis (OA) is one of the most common musculoskeletal diseases, characterized by degeneration of articular cartilage accompanied by subchondral bone remodeling, synovial inflammation, and osteophyte formation. Current diagnostic methods rely heavily on clinical functional assessment and imaging techniques, which do not allow for early diagnosis of OA and may lead to diagnostic discrepancies due to subjective judgments. Exosomes, small extracellular vesicles of 30 – 150 nanometers in diameter secreted by various cell types, facilitate intercellular communication by transferring proteins, lipids, and RNA between cells and have been implicated in inflammation, chondrocyte activity, and cartilage degradation in OA; however, the specific mechanisms of exosome action in OA remain unclear. The aim of this study was to identify potential exosome-related biomarkers in OA and to explore the role and mechanism of exosome-related genes in articular cartilage. Gene expression profile microarrays of normal and OA cartilage samples were obtained from the Gene Expression Omnibus database, and exosome-related genes were retrieved from the GeneCards database. Differential gene expression analysis was performed using the limma package, and exosome-related differential genes (ERDEGs) were identified by intersecting differentially expressed genes with exosome-related genes. Multiple enrichment analyses were conducted to reveal potential mechanisms, and machine learning algorithms—including LASSO logistic regression, support vector machine-recursive feature elimination, and Random Forest—were employed to screen hub ERDEGs. A nomogram was constructed to assess diagnostic ability, and single-sample gene set enrichment analysis (ssGSEA) was used to evaluate immune cell infiltration characteristics. The results identified 105 ERDEGs, from which seven hub genes were screened: TOLLIP, ALB, HP, RHOBTB3, GSTM2, S100A8, and AKR1B1. Among these, AKR1B1, S100A8, and HP were significantly upregulated and RHOBTB3 was significantly downregulated in OA cartilage samples, as validated by qRT-PCR. The nomogram demonstrated high predictive ability for OA diagnosis, and ROC curve analysis confirmed that all seven hub genes exhibited high diagnostic value (AUC > 0.75). ssGSEA analysis revealed that eight types of immune cell infiltration and five types of immune cell activation were significantly increased in OA samples, and these hub genes were significantly correlated with multiple immune cell types and immune functions. In conclusion, this study identified seven exosome-related hub genes with excellent diagnostic potential for OA, which may serve as novel biomarkers and therapeutic targets; however, further experimental validation through large-scale cohorts and in vivo models is needed to support these findings.

Keywords

Osteoarthritis, Exosome, Machine Learning, Immune Infiltration, Biomarkers

Engineered Chitosan Hemostats: Synthesis Optimization and Functional Validation for Critical Arterial Bleeding Management

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Abstract

Leveraging its inherent biocompatibility and demonstrated hemostatic capabilities, chitosan has emerged as a cornerstone biomaterial in advanced wound management systems, particularly for exuding and traumatic injuries. However, the poor mechanical strength of the formed clots can lead to a high risk of secondary bleeding. Here, this study has successfully developed chitosan hemostatic particles (M-CS) capable of arresting arterial hemorrhage by particle size distribution and combining this with lauric acid modification. By integrating physical obstruction, electrostatic forces, and hydrophobic effects, M-CS creates a dense clot matrix that withstands arterial blood flow independently of systemic coagulation pathways. In vitro coagulation tests showed that M-CS reduced whole blood clotting time by 23% compared to unmodified CS. Based on rheological characterization, the M-CS-formed clot matrix demonstrated a 48% higher storage modulus than the commercially available CELOXTM and a five-fold increase over the control group. Moreover, in a Bama minipig femoral artery injury model, M-CS achieved successful hemostasis within 300 s, and reduced blood loss by 12%. The findings lay a robust technological groundwork not only for enhanced hemostatic stability in arterial bleeding management but also for expedited translational advancement in pre-hospital emergency care, particularly for compressible truncal hemorrhage.

Keywords

Hemostatic Material, Chitosan, Arterial Hemorrhage, Emergency Medical Response

Synergistic Effect of Xinyi Zhenggu Manipulation and Precision Nursing Intervention on Neck and Low Back Pain: Clinical Efficacy and Rehabilitation Mechanisms

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Abstract

Objective: To investigate the clinical efficacy and rehabilitation mechanism of New Medical Bone-Setting Manipulation combined with precision nursing intervention for neck and low back pain. **Methods:** A randomized controlled trial was conducted. Two hundred forty patients with neck and low back pain were enrolled and randomly assigned to three groups: the control group (conventional rehabilitation nursing), the manipulation group (New Medical Bone-Setting Manipulation plus conventional nursing), and the synergy group (New Medical Bone-Setting Manipulation plus precision nursing). Precision nursing was based on symptom network analysis, targeting three core nodes—nocturnal pain awakening, pain catastrophizing, and activity avoidance—through four modules: central sensitization management, sleep-pain vicious cycle interruption, exercise self-efficacy reconstruction, and emotional cognitive reappraisal. The intervention lasted 4 weeks. Pain intensity (VAS), functional disability (ODI), sleep quality (PSQI), self-efficacy (PSEQ), and anxiety/depression (GAD-7/PHQ-9) were assessed. Surface electromyography was simultaneously used to analyze core muscle activation patterns. **Results:** The synergy group showed a 2.8-point reduction in VAS and a 15.2-point reduction in ODI compared with the control group (both $P < 0.01$), significantly outperforming the manipulation group ($P < 0.05$). Surface EMG revealed a 37.6% increase in the co-activation index of the multifidus and transversus abdominis, indicating improved neuromuscular control of core muscles. At 6-month follow-up, the recurrence rate in the synergy group (8.3%) was significantly lower than that in the control group (31.2%) and the manipulation group (18.7%). **Conclusion:** New Medical Bone-Setting Manipulation combined with precision nursing can effectively alleviate neck and low back pain, improve function, and reduce recurrence. The mechanism involves the reconstruction of neuromuscular control of core muscles. This model provides a novel integrative rehabilitation strategy combining Chinese and Western medicine.

Keywords

Xinyi Zhenggu, Precision Nursing, Neck and Low Back Pain, Rehabilitation Mechanisms, Neuromuscular Control, Integration of Chinese and Western Medicine

Genetic Architecture and Causal Effects of Serum Amyloid A on Cardiovascular Events

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Abstract

Background: Epidemiological evidence suggests an adverse effect of serum amyloid A (SAA) on cardiovascular health; however, its causal relevance remains uncertain. We aimed to investigate the genetic architecture and causal effects of circulating SAA levels on cardiovascular events through integrative genomic and Mendelian randomization (MR) analyses. **Methods:** Genome-wide association studies (GWASs) were first conducted to identify genetic determinants of SAA levels in Chinese Han and cross-ancestry meta-analysis cohorts separately. Phenotypic association, GRS, and one-sample MR analyses were then performed to assess the effects of SAA levels on a broad spectrum of cardiovascular events and related traits. The shapes of these associations were further characterized using restricted cubic splines and nonlinear MR analyses. Further two-sample MR analyses were implemented to validate the one-sample MR findings and to extend the investigation to additional cardiovascular outcomes. **Results:** The cross-ancestry GWAS meta-analysis ($n = 17,810$) identified five genome-wide significant loci associated with SAA levels, most of which were implicated in inflammatory signaling. We newly identified loci at *IL6R* (1q21.3) and *ZC3H12C* (11q22.3) loci and confirmed their protein upregulations in SAA-1-stimulated endothelial cells. We also replicated known signals at *SAA1* (11p15.1), *LEPR* (1p31.3), and *BCHE* (3q26.1). SAA-associated variants were enriched in biological pathways related to cysteine and methionine metabolism, glycolysis/gluconeogenesis, and glucagon signaling. Observational, GRS, and one-sample MR analyses showed that elevated SAA levels were associated with a higher risk of hypertension, as well as with increased systolic

blood pressure (SBP), pulse pressure (PP), mean arterial pressure (MAP), and total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) levels. In addition, SAA showed J-shaped or nonlinear causal relationships with J-shaped or nonlinear causal relationships with coronary artery disease (CAD), obesity, and hypercholesterolemia. Independent two-sample MR analyses supported causal effects of SAA on CAD, SBP, MAP, TC, and LDL-C, and further revealed causal associations with body mass index, estimated glomerular filtration rate, uric acid, ventricular arrhythmia, and unstable angina pectoris. *Conclusions:* Our study provides new insights into the genetic architecture of circulating SAA levels and its causal relevance to cardiovascular risk, particularly hypertension, atherogenic dyslipidemia, and CAD. The identified pathways, centered on inflammatory signaling and metabolic dysregulation, may provide mechanistic links underlying these associations, although future experimental validation is warranted.

Keywords

Serum Amyloid A, Cardiovascular Events, Genetic Architecture, Causal Effects, Mendelian Randomization

Advances in Research on the Comorbidity of Chronic Obstructive Pulmonary Disease and Lung Cancer

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Abstract

Chronic obstructive pulmonary disease (COPD) and lung cancer are highly prevalent respiratory diseases worldwide, and their comorbidity significantly worsens patient prognosis. Epidemiological evidence indicates that COPD is an independent risk factor for lung cancer beyond shared smoking exposure, with emphysema increasing lung cancer risk by approximately 2.3-fold. High-risk subgroups include elderly males, patients with mild-to-moderate airflow limitation, and never-smokers with COPD. The major driving factors comprise smoking, genetic susceptibility (e.g., 15q25 region, TERT variants), and ambient air pollution (oxidative stress and inflammation). Mechanistically, chronic inflammation with M2 macrophage polarization and CD8⁺ T-cell exhaustion establishes a pro-tumor microenvironment, while aberrant activation of EGFR/NF- κ B/HIF-1 α pathways links airway remodeling to malignant transformation. Overlapping respiratory symptoms often delay diagnosis, necessitating integrated assessment using pulmonary function tests, low-dose CT, and bidirectional screening (lung cancer screening in COPD patients and vice versa). Treatment requires individualized approaches—chemotherapy, immunotherapy, radiotherapy, or surgery—while managing COPD exacerbation risk, chemotherapy resistance driven by hypoxia, and variable responses to immune checkpoint inhibitors. Prognosis is influenced by COPD severity, phenotype, and therapeutic modality. Given the strong association, screening strategies should incorporate spirometry and quantitative CT emphysema metrics to refine risk stratification, enabling earlier detection and tailored intervention. This review synthesizes current evidence on epidemiology, risk factors, pathophysiological crosstalk, diagnostic challenges, and management strategies, aiming to provide a comprehensive framework for improving clinical outcomes in COPD–lung cancer comorbidity.

Keywords

Chronic Obstructive Pulmonary Disease, Lung Cancer, Comorbidity, Inflammatory Microenvironment, Driving Mechanisms, Screening Strategy, Immunotherapy, Prognosis

Early Protection of Compound Amino Acids Against Stress Fracture via Hippo-YAP/TAZ Axis

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Abstract

Objective: Stress fracture is a prevalent form of overuse skeletal injury, arising when repetitive mechanical loading exceeds the intrinsic self-repair capacity of bone tissue. Nutritional interventions based on amino acids have shown beneficial effects on skeletal health; however, a specifically formulated compound amino acids (CAAs) preparation for the prophylactic purpose against stress fractures remains to be established. This study aimed to identify the optimal proportion of CAAs blend (glutamine, branched-chain amino acids, and alanine) and to clarify its protective effects and mechanistic basis in stress fracture pathogenesis. **Method:** The 5-month-old male Sprague-Dawley rats were given intragastric pretreatment with CAAs of different concentration and proportioning for two weeks, followed by two-week axial fatigue loading to construct ulnae stress fracture models. The protein expression levels of osteogenic biomarkers in ulnae were examined by western blotting assays to ascertain the optimal strategies of CAAs administration. Then, the bone metabolism, remodeling activity and biomechanical properties of ulnae with fatigue loading after pretreated with the optimized CAAs were assessed via SPECT/CT imaging, histomorphological analysis, osteocytic functional detection and three-point bending test. Transcriptome sequencing was performed to predict differential genes and key signaling pathways. In vivo rescue assays using Hippo-YAP/TAZ pathway inhibitors were conducted, and the phenotypes of stress fracture injuries pretreated with CAAs were further evaluated after the pathway was inhibited. **Result:** i) The optimal proportion of CAAs for the early protection against stress fracture was glutamine: alanine: branched-chain amino acids at a ratio of 2:2:1. ii) The radiotracer ^{99m}Tc-MDP uptake and osseous micro-damage (including linear microcracks and diffuse microdamage) in ulnae were decreased in CAAs-treated rats followed by fatigue loading. iii) The activity of osteocytes and their regulatory effects on bone formation and resorption were also activated in CAAs-treated rats after fatigue loading. iv) The inhibition of ultimate load and stiffness of ulnae after fatigue loading were significantly reversed

by CAAs pretreatment. v) Mechanically, CAAs can up-regulate RUNX2 expression and stimulate osteogenesis by activating the Hippo-YAP/TAZ pathway collaborating with Homeobox TF family. Inhibiting Hippo-YAP/TAZ or Homeobox obviously reversed CAAs-induced bone protection and osteogenic biomarker changes. Conclusion: Fatigue-induced microdamage accumulation, coupling with bone biomechanical property deterioration can be reversed by early intervention with the prophylactic supplementation of optimized CAAs. The restrain of stress fracture occurrence and progression are regulated by Hippo-YAP/TAZ-mediated osteogenic signaling pathways. In summary, this study offers new theoretical basis and nutritional intervention directions for high-risk populations like athletes and military staff.

Keywords

Stress Fracture, Compound Amino Acids, Bone Remodeling, Hippo-YAP/TAZ Signaling, Osteogenesis, Mechanical Loading, RUNX2

Early Preventive Effects and Mechanism of Xianling Gubao on Stress Fractures

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Abstract

Objective: Stress fractures are highly prevalent among military personnel and endurance athletes under excessive mechanical loading. Existing therapeutic strategies predominantly focus on symptomatic intervention and rehabilitation after the onset of stress fractures, whereas effective early preventive approaches remain insufficient. The traditional Chinese medicine (TCM) theory of “the kidney governs bone” provides a novel theoretical basis for the proactive prevention of stress fractures. Xianling Gubao (XLGB), a classic kidney-tonifying proprietary Chinese medicine, is widely applied in clinical practice for the treatment of osteoporosis and the promotion of fracture healing. Nevertheless, the efficacy and underlying mechanism of XLGB in stress fractures prevention have not been fully elucidated. **Method:** Five-month-old male SD rats were pretreated with different XLGB regimens, followed by two weeks of axial fatigue loading to establish ulnae stress fracture models to investigate its early protective effects and preliminary mechanisms. SPECT/CT scanning was used to detect radionuclide uptake, and alkaline rose staining was performed to assess linear microcracks, diffuse bone microdamage, and canalicular connectivity for identifying the optimal intervention protocol. H&E staining, toluidine blue staining, TRAP staining and three-point bending tests were applied to evaluate the activities and functions of osteocytes, osteoblasts and osteoclasts, as well as biomechanical properties of bone tissues. Additionally, Caspase-3/RANKL immunofluorescence double staining was used to detect the apoptosis of bystander osteocyte and osteoclasts recruitment. Runx2 immunohistochemistry was conducted to quantify osteoblasts recruitment and evaluate bone remodeling capacity. **Result:** i) Early XLGB intervention significantly decreased ^{99m}Tc-MDP uptake and alleviated bone microdamage (including linear microcracks and diffuse microdamage) in the rat ulnae, while notably improving canalicular connectivity. ii) Under cyclic fatigue loading, XLGB treatment increased trabecular bone mass, suppressed

excessive osteoclast activation, and elevated osteoblastic activities, thereby maintaining the bidirectional homeostasis of bone metabolism. Additionally, XLGB significantly reversed the fatigue-induced reduction of ultimate load and stiffness in rats' ulnae. iii) Mechanistically, early XLGB intervention attenuated apoptosis of bystander osteocytes, facilitated the recruitment of osteoclasts and osteoblasts, and augmented targeted bone remodeling. Such bidirectionally modulation of bone remodeling homeostasis effectively enhanced the microdamage repair capacity of ulnar bone tissue. Conclusion: Early prophylactic intervention with XLGB effectively ameliorates fatigue-induced bone microdamage and biomechanical deterioration by balancing bone metabolism, mitigating bystander osteocyte apoptosis and coordinating osteoclasts and osteoblasts recruitment to regulate targeted bone remodeling homeostasis. Accordingly, XLGB exerts prominent preventive effects against stress fractures. The present findings provide a viable TCM strategy for the early protection of stress fractures.

Keywords

Stress Fracture, Xianling Gubao, Bone Microdamage, Bone Remodeling, Osteocyte, Bone Metabolism

Predictive Models for Oral Frailty in Older Adults —An AI-driven Systematic Review

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Abstract

Background: Population aging has become a core challenge in global public health, with increasing attention paid to oral frailty (OF) among older adults. However, current studies on OF in the elderly exhibit high methodological heterogeneity and insufficient model validation, necessitating a systematic review. **Objective:** To systematically retrieve and evaluate literature on predictive models for oral frailty in older adults using artificial intelligence (AI), and to synthesize model performance metrics (AUROC, sensitivity, specificity, calibration) and predictors. **Methods:** The PRISMA statement and CHARMS checklist were followed. Systematic searches were performed in PubMed, Web of Science, Cochrane Library, CNKI, Wanfang, VIP, and Sinomed databases up to June 2026. AI-generated search keywords included "elder/old", "oral frailty", and "model." Inclusion criteria were: (1) participants aged ≥ 60 years; (2) development of a predictive model for oral frailty; (3) model performance validated internally or externally; (4) full text available. Data (first author, publication year, study type, sample size, age, geographic region, predictors, model development and validation methods, performance metrics, presentation format) were extracted using AI. Bias was assessed using the PROBAST tool. Given anticipated high heterogeneity (differences in populations, oral indicators, frailty definitions, and algorithms), a narrative synthesis was conducted. **Results:** A total of 629 articles (424 in English, 205 in Chinese) were retrieved, with 29 finally included. Most studies were cross-sectional, with two retrospective studies. A high risk of bias was common across current models, with OFI-8 ≥ 4 being the predominant criterion for oral frailty. Most studies used logistic regression to develop the model, while two studies also employed some other machine learning methods (e.g., Random Forest, Decision Tree, Support Vector Classifier, K-Nearest Neighbors) for model development. Limitations included lack of external validation, sufficient sample size and model interpretability. **Conclusion:** AI can efficiently facilitate systematic reviews of predictive models for oral frailty in older adults. Current models are transitioning from questionnaire-based tools to those incorporating orally collected biomarkers. Future research should prioritize longitudinal cohort designs, include dynamic changes in oral indicators, adopt acceptable model performance thresholds (AUROC ≥ 0.80) for screening eligibility, implement rigorous external validation, and leverage AI to extend oral frailty screening from specialized hospital settings to community-based proactive early warning.

Keywords

Artificial Intelligence, Elder, Oral Frailty, Predictive Models, Systematic Review

An Interpretable Risk Stratification Model Integrating Vitamin D and Hashimoto Thyroiditis in Papillary Thyroid Carcinoma

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Abstract

Artificial intelligence-assisted precision medicine requires interpretable and clinically accessible indicators for individualized cancer risk assessment. Serum 25-hydroxyvitamin D [25(OH)D] deficiency and Hashimoto thyroiditis (HT) have both been associated with papillary thyroid carcinoma (PTC), but their integrated value for risk stratification remains unclear. This retrospective study aimed to develop an interpretable risk stratification model integrating serum 25(OH)D level and HT status to evaluate aggressive clinicopathological features in PTC. A total of 113 patients with pathologically confirmed PTC were included. Patients were classified according to preoperative HT status and serum 25(OH)D deficiency. Clinicopathological variables, including tumor size, multifocality, lymph node metastasis, capsular involvement, extrathyroidal extension, neural invasion and vascular tumor emboli, were compared between groups. Serum 25(OH)D levels were generally low in the overall cohort, and vitamin D deficiency was common. Patients with PTC and HT tended to have lower serum 25(OH)D levels than those without HT. Vitamin D deficiency was not consistently associated with lymph node metastasis, tumor size or multifocality, but was associated with a higher frequency of local invasive features, particularly capsular involvement and extrathyroidal extension. HT status also contributed to risk heterogeneity in local tumor invasion. An interpretable model combining serum 25(OH)D deficiency and HT status showed better risk separation for capsular involvement and composite aggressive features than either indicator alone. These findings suggest that the integration of serum 25(OH)D level and HT status may provide a simple, explainable and clinically feasible strategy for AI-assisted risk stratification of local invasiveness in PTC. Further multicenter studies and external validation are warranted to confirm its predictive utility.

Keywords

Papillary Thyroid Carcinoma, Hashimoto Thyroiditis, Vitamin D, Interpretable Model, Risk Stratification, Precision Medicine, Artificial Intelligence

Synergistic Effect of the Triglyceride-glucose Index and RAR for Mortality in Patients with Type 2 Diabetes Mellitus

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Abstract

Background: The triglyceride–glucose (TyG) index is closely linked to chronic low-grade inflammation, and the red cell distribution width to albumin ratio (RAR) has emerged as a novel marker of inflammatory and nutritional status. This study examined whether TyG and RAR jointly influence mortality in patients with type 2 diabetes mellitus (T2DM), and further evaluated whether a newly developed composite index, TyG-RAR, provides superior prognostic value compared with conventional TyG-derived obesity indices. **Methods:** The data we analyzed were obtained from 3,799 T2DM patients enrolled in the National Health and Nutrition Examination Survey (NHANES) from 2001–2018. Cox proportional hazards models and restricted cubic spline analyses were applied to assess the associations of TyG and RAR with mortality. Predictive performance was compared via receiver operating characteristic (ROC) curve analyses. Mediation analysis was used to explore the potential mediator. **Results:** During a median follow-up of 85 months, 950 all-cause deaths and 323 cardiovascular deaths occurred. Both TyG and RAR were independently associated with mortality. TyG and RAR exhibit a synergistic effect, patients with concomitantly high TyG and high RAR values presented the greatest risk (all-cause mortality: HR: 2.42, 95%CI: 1.80–3.25; cardiovascular mortality: HR: 3.65, 95%CI: 2.28–5.84). The newly indicator TyG-RAR is significantly associated with the risk of all-cause mortality and cardiovascular mortality. Specifically, compared to the lowest quartile group, the risk of all-cause mortality increased by 157% in the highest quartile group, and cardiovascular mortality by 181%. Compared to other TyG-related indices, TyG-RAR demonstrated superior predictive performance for all-cause mortality (AUC=0.819, NRI=0.183, IDI=0.025) and cardiovascular mortality (AUC=0.850, NRI=0.210, IDI=0.023). C-reactive protein partially mediated the effect of TyG-RAR on all-cause mortality and cardiovascular mortality. **Conclusions:** The TyG index and RAR have synergistic effects on mortality in patients with type 2 diabetes mellitus (T2DM). The composite TyG-RAR index is not only significantly associated with mortality but also outperforms established TyG-derived measures. These findings support the use of the TyG-RAR as a more effective tool for mortality risk stratification in T2DM patients.

Keywords

Triglyceride–glucose Index, Red Cell Distribution Width to Albumin Ratio, All-cause Mortality, Cardiovascular Mortality, Type 2 Diabetes Mellitus

Influence Pathways of Inpatient Satisfaction in a Private Hospital in Tibet: A SERVQUAL and Evaluation Aggregation Degree Approach

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Abstract

Objective From the dual perspectives of service quality level and patient evaluation consistency, this paper analyzes the current situation of inpatient satisfaction and its influencing path in a private hospital in Tibet, and identifies the problem of service experience differentiation that is difficult to be revealed by traditional satisfaction mean analysis, so as to provide reference for the improvement of service quality in private hospitals in ethnic areas. **Methods** The patients who completed hospitalization and were about to be discharged from a private hospital in Tibet from August 25 to September 7, 2025 were selected as the research objects, and the data were collected by on-site questionnaire survey. On the basis of referring to the existing inpatient satisfaction survey and research, combined with the hospital inpatient service process, the questionnaire divides the service content into four categories: admission management, treatment management, logistics management and discharge management. At the same time, combined with the SERVQUAL model, the quality of medical services is evaluated from the five dimensions of tangibility, reliability, responsiveness, assurance and empathy. The evaluation aggregation index was introduced to reflect the consistency of patient evaluation, and the satisfaction-aggregation four-quadrant analysis was used to identify the service advantages and disadvantages. Multivariate linear regression, Pearson correlation analysis and PROCESS Model 4 mediating effect model were further used to test the relationship between the total average score of service quality, evaluation aggregation and total hospitalization satisfaction after controlling for gender, age, education level, marital status and ethnicity. **Results** A total of 518 valid samples were obtained, and 420 complete samples were included in the mediating effect analysis. Among the four types of inpatient services, the satisfaction of discharge management was the highest (79.60%), followed by treatment management, admission management and logistics management. Treatment management and discharge management are in the quadrant of high satisfaction and high aggregation, while logistics management is in the quadrant of low satisfaction and low aggregation, which is the main service weakness. Multiple linear regression showed that inpatient department, gender and ethnicity were important influencing factors of total inpatient satisfaction. Correlation analysis showed that the five dimensions of SERVQUAL and the total average score of service quality were significant.

Keywords

SERVQUAL Model, Hospitalization Satisfaction, Evaluation of Aggregation, Mediation Effect, Private Hospitals, Tibe

Development and Analysis of a Risk Prediction Model for Rheumatoid Arthritis in Tibetan Older Adults in Tibet Based on National Health Service Survey Data

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Abstract

Background: Rheumatoid arthritis (RA) is a common chronic inflammatory joint disease that significantly affects the quality of life in older populations. However, risk prediction models specifically tailored for Tibetan older adults remain scarce. **Objective:** This study aimed to develop and validate a RA risk prediction model for Tibetan individuals aged ≥ 60 years using data from the National Health Service Survey in Tibet, thereby providing a reference for community-based early screening and health management. **Methods:** A cross-sectional design was employed, enrolling 2,144 Tibetan older adults (≥ 60 years) in Tibet. Least Absolute Shrinkage and Selection Operator (LASSO) regression was first applied for feature selection, retaining 16 variables with non-zero coefficients. These variables were then entered into multivariate logistic regression to identify independent predictors at $P < 0.05$. Five machine learning models—LASSO regression, random forest, extreme gradient boosting (XGBoost), light gradient boosting machine (LightGBM), and naive Bayes—were constructed and compared using area under the receiver operating characteristic curve (AUC), accuracy, sensitivity, and specificity. A nomogram was developed for model visualization. **Results:** Multivariate logistic regression identified six independent predictors: prefecture-level city, gender, employment status, insomnia symptoms, daily toothbrushing frequency, and hypertension. In the test set, LightGBM achieved the highest AUC (0.708) and the highest sensitivity (0.556), outperforming XGBoost (AUC 0.683, sensitivity 0.513) and LASSO (AUC 0.694, sensitivity 0.085). Considering the priority of maximizing true positive detection in a screening setting, LightGBM was selected as the optimal model due to its superior balanced performance (F1 score 0.371, Kappa 0.170) and acceptable trade-off in specificity. The nomogram based on logistic regression results visually illustrated the contribution of each factor to RA risk. **Conclusion:** The proposed RA risk prediction model incorporating six readily available factors demonstrates moderate predictive performance in Tibetan older adults. When the screening goal is to minimize missed diagnoses, the LightGBM-based model offers a practical risk-assessment tool for primary healthcare facilities, though its clinical utility warrants further validation through prospective studies.

Keywords

Rheumatoid Arthritis, Machine Learning, Tibetan, Older Adults

Polystyrene Microplastics Impair Bone Homeostasis via Oxidative Stress, Inflammatory Microenvironment, and Osteocyte Senescence

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Abstract

The pervasive distribution of polystyrene microplastics (PS-MPs) in ecosystems has raised substantial concerns regarding their potential impacts on human health, yet their specific effects on skeletal system integrity remain inadequately characterized. This review consolidates current evidence from epidemiological investigations, in vivo animal models, and in vitro cellular systems to delineate the pathogenic pathways through which PS-MPs compromise bone homeostasis. Following systemic entry via gastrointestinal absorption, pulmonary deposition, or transdermal routes, PS-MPs navigate biological barriers and preferentially localize within bone marrow and mineralized matrix, facilitated by the skeletal system's high vascular permeability and the adsorptive properties of hydroxyapatite. At the subcellular level, PS-MPs initiate a cascade of deleterious events beginning with excessive reactive oxygen species production, which subsequently drives mitochondrial depolarization, calcium overload, and energy deficit. This oxidative insult engages multiple stress-responsive signaling cascades, including NF- κ B, MAPK, and NLRP3 inflammasome assemblies, culminating in amplified secretion of inflammatory mediators that disrupt the delicate equilibrium between bone-resorbing osteoclasts and bone-forming osteoblasts. Concurrently, PS-MPs skew macrophage polarization toward the pro-inflammatory M1 phenotype via TLR4-dependent pathways, perpetuating a self-sustaining inflammatory milieu. Notably, internalization of PS-MPs by osteocytes provokes G1-phase cell cycle arrest, DNA double-strand break accumulation, and premature senescence through COX2-prostaglandin E2 axis hyperactivation, thereby compromising the osteocyte network's essential regulatory functions in mechanotransduction and remodeling coordination. Additional systemic contributions arise from gut barrier compromise and microbiome dysbiosis, which potentiate endotoxin translocation and fuel low-grade systemic inflammation that secondarily impacts skeletal integrity. Toxicological evidence from vertebrate models demonstrates that PS-MP exposure diminishes bone mass, disrupts cancellous bone architecture, and retards longitudinal skeletal development, with phenotypic consequences extending to unexposed offspring in multigenerational studies. Notwithstanding these mechanistic insights, critical knowledge gaps persist, particularly regarding environmentally realistic exposure scenarios, chronic low-dose accumulation kinetics, and the absence of longitudinal human cohort data. This synthesis positions PS-MPs as plausible osteotoxic agents and underscores the imperative for enhanced biomonitoring, standardized analytical methodologies, and mechanism-guided preventive strategies to mitigate potential

skeletal health burdens.

Keywords

Microplastics, Polystyrene, Bone Metabolism, Oxidative Stress, Osteocyte Senescence, Macrophage Polarization, Osteoporosis

Machine Learning-Based Prediction of Two-Week Disease Risk in Children Aged 0–6 Years in Xizang

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Abstract

Background: Tibet is located at high altitude and sparsely populated, and the accessibility of children's health services is poor. Harsh natural conditions and limited medical resources further exacerbate the health challenges faced by children in this region. **Objectives:** This study aims to develop and compare logistic regression, random forest, and XGBoost models for predicting two-week illness risk among children aged 0–6 years in Tibet, and to identify key influencing factors using SHAP analysis, thereby providing AI tools for precision public health interventions. **Methods:** Data were collected from the fifth (2013), sixth (2018) and seventh (2023) National Health Service surveys of Tibet Autonomous Region, and children aged 0–6 years were selected as the research subjects. A total of 4433 children were included in the three surveys, including 1889, 1547 and 997 valid samples. The included predictors covered five dimensions: demographic characteristics (age, gender), family socioeconomic status (number of registered residents, subsistence allowance households, and per capita household income), access to medical care (distance to the nearest medical institution, travel time), household sanitation (type of toilet, drinking water source), and survey year. Three prediction models, including logistic regression, random forest and XGBoost, were constructed and optimized by five-fold cross validation. The performance was evaluated by AUC and accuracy, and the explanatory analysis of the best model was performed by SHAP value. **Results:** The two-week prevalence of children was 7.69% (2013:5.61%, 2018:9.57%, 2023:8.73%). The AUC of logistic regression, random forest and XGBoost in the validation set was 0.666, 0.524 and 0.612, respectively, and the accuracy was 0.923, 0.923 and 0.707, respectively. SHAP importance analysis showed that the top five predictors were: 2018 survey year, number of registered population, distance to the nearest medical and health institution, age, and gender. **Conclusion:** Logistic regression yielded the highest AUC and was therefore used for SHAP-based interpretation. Both logistic regression and random forest achieved accuracies above 0.92, whereas XGBoost had an accuracy of 0.707. The discrepancy between the low AUC values and the high accuracies likely results from the low prevalence of the outcome. SHAP analysis indicated that survey year, family size, healthcare accessibility, and demographic characteristics were the main influencing factors, with household sanitation also contributing. This study can serve as a reference for precision health management of children and the allocation of health resources on the Tibetan Plateau.

Keywords

Machine Learning, XGBoost, Child Health, Two-week Illness, Tibet, Health Service Survey

HPV-related Recurrent Respiratory Papillomatosis: Preventive and Therapeutic Interventions from a Public Health Perspective

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Abstract

Objective: Recurrent respiratory papillomatosis (RRP) is a chronic HPV-related respiratory disease that causes persistent morbidity, vocal dysfunction, heavy economic costs, and psychological burdens across all age groups. This review aimed to summarize updated RRP prevention and management strategies, and evaluate the public health value of modern multimodal interventions to support population-level disease control and burden reduction. **Study Design:** A comprehensive overview. **Data Sources:** PubMed, Scopus, and Web of Science. **Methods:** Literature published between 1995 and 2026 was systematically searched focusing on RRP epidemiology, disease burden, interventions, and HPV vaccination. Eligible original studies, reviews, and guidelines were included, while non-clinical and non-English studies were excluded. Given evident literature heterogeneity, narrative synthesis was adopted, and evidence quality was assessed via the GRADE system. **Results:** Overall, 95 full-text articles were included from 128 screened abstracts. Universal HPV vaccination has substantially reduced the incidence of juvenile-onset RRP, serving as a key population preventive measure. Optimized physical interventions minimize iatrogenic injury and improve patients' quality of life. Novel adjuvant approaches, including bevacizumab, immune checkpoint inhibitors, and DNA immunotherapy, effectively prolong surgical intervals and control recurrent lesions. As a vital public health strategy, HPV vaccination significantly reduces long-term surgical frequency and medical consumption. RRP still imposes a massive global healthcare burden, with annual U.S. costs exceeding \$100 million. **Conclusion:** RRP management has evolved into a public health-oriented multimodal model integrating prevention and individualized treatment. HPV vaccination is the most cost-effective population-level intervention. Combined therapies effectively reduce disease recurrence and socioeconomic burdens. Future research should focus on therapeutic vaccines and biomarkers to advance standardized global RRP prevention and control systems.

Keywords

Recurrent Respiratory Papillomatosis, HPV Vaccination, Multimodal Intervention, Disease Burden, Public Health Prevention

Study on Health-related Life and Influencing Factors of Smokers in Tibet Based on EQ-5D-5L Scale

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Abstract

Background: Smoking is an important public health problem, and tobacco exposure seriously endangers the health of residents. EuroQoL Five Dimensions Questionnaire (EQ-5D) is a multi-dimensional health-related quality of life assessment scale with good reliability and validity. Objective: To understand the health status and influencing factors of smokers in Tibet, and to provide reference for improving the quality of life of smokers. Methods: A multi-stage stratified cluster random sampling method was used to select smokers aged 10 years and above in Tibet as the research object. The European five-dimensional health scale (EQ-5D) was used to evaluate the health-related quality of life, including five dimensions of mobility, self-care, daily activities, pain or discomfort, anxiety and depression, and overall health self-assessment (EQ-VAS). Chi-square test and rank sum test were used to compare the health differences of smokers with different characteristics. Binary logistic regression was used to analyze the related factors of health problems in each dimension, and multiple linear regression was used to explore the main influencing factors of EQ-VAS score. Results: A total of 1132 cases were included. Among the five dimensions of EQ-5D, the highest proportion of smokers' self-reported problems was pain or discomfort (16.8%), followed by mobility (13.4%), daily activities (10.6%), anxiety and depression (8.2%), and the lowest proportion of self-care problems (5.1%). EQ-VAS M (P25, P75) was 80 (70,90). Binary logistic regression analysis showed that age, education level, illness and insomnia had significant effects on the five dimensions of health problems (all $P < 0.05$). The results of multiple linear regression showed that advanced age, low education level, non-employment, two-week illness and insomnia were independent influencing factors for the decrease of EQ-VAS score (all $P < 0.05$). Conclusion: The overall health-related quality of life of smokers in Tibet is above the middle level. Old age, low education level, non-employment, recent illness and poor sleep quality are the main risk factors affecting the quality of life of smokers in Tibet. It is suggested that the public health department should focus on the above high-risk groups, and improve the overall health level of smokers through comprehensive strategies such as health education and behavior intervention, chronic disease management, sleep health promotion and employment support.

Keywords

Smoker, Health-related Quality of Life, Eq-5d Scale

Cofactors Regulate Early Thymic Progenitor Development by Silencing Non-T Lineage Programs and Sustaining T-cell Identity

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Abstract

The thymus sustains the lifelong output of new T cells; however, it cannot self-renew and thus requires continuous replenishment by progenitors derived from the bone marrow. Upon thymic entry, these multipotent hematopoietic progenitors gradually differentiate and acquire T-cell identity. A network of sequence-specific transcription factors (TFs) and transcriptional coregulators regulates this process. Transcriptional coregulators interact with a wide range of TFs without directly binding to DNA; however, our understanding of their precise roles during T-cell development remains limited. Among these coregulators, the Tle family consists of several members. They were reported to promote the establishment of CD8⁺ cell lineage identity, while also inhibiting the development of CD8⁺ central memory cells and suppressing the malignant transformation of myeloid lineage cells. In this study, we found that knockout of Tle coregulators at an early stage of thymic development not only impairs the formation and differentiation of early thymic progenitors, but also leads to excessive accumulation of B cells, dendritic cells, and myeloid cells within the early thymocyte compartment. Integrated multi-omics analyses indicate that Tle coregulators repress the expression of non-T lineage transcription factors such as *Pax5*, *Irf8*, and *C/EBPα*, while simultaneously upregulating key components of the T-cell transcriptional program, including *Notch1*, *Gata3*, and *Erg*. Thus, Tle coregulators exert a dual function: they ensure the progression of T-cell specification and commitment while actively preventing cells from diverging into alternative lineages.

Keywords

Thymus, T Cells, Transcription Coregulators, Multiomics Analyse

The Integration of Virtual Reality and OSCE: Design and Preliminary Feasibility Study of a Lightweight Digital Platform in Surgical Nursing

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Abstract

Objective: To design and preliminarily implement a digital, objective structured clinical examination (OSCE) teaching platform based on lightweight virtual reality (VR) technology, evaluate its feasibility and application efficacy in surgical nursing education, and explore effective approaches for digital teaching under resource-constrained conditions. **Method:** A convenience sampling method was employed to recruit 89 nursing undergraduates. A lightweight VR-OSCE teaching platform was developed using an open-source platform (e.g., Second Life), adopting a technical approach combining open-source software, standalone VR headsets, and cloud-based deployment. The platform incorporated virtual teaching scenarios for laparoscopic cholecystectomy, subtotal thyroidectomy, and appendectomy, along with standardized OSCE-based paperless assessment and learning record management functions. Post-intervention, comprehensive evaluation was conducted through platform usability assessments, teaching satisfaction surveys, self-assessments of learning outcomes, and clinical competency evaluations. **Results:** ① Surgical nursing course performance: The theoretical assessment score (84.52 ± 7.63) and OSCE clinical competency score (86.74 ± 7.21) in the experimental group were significantly higher than those in the control group (76.18 ± 8.92 and 78.35 ± 8.46), respectively, with statistically significant differences ($P < 0.001$). ② Clinical reasoning ability: As evaluated using the Nursing Clinical Reasoning Ability Scale, the experimental group scored significantly higher than the control group ($P < 0.05$). ③ Satisfaction with the teaching platform: The overall satisfaction score in the experimental group was 9.08 ± 0.85 , significantly higher than that of the control group (7.62 ± 1.03 ; $P < 0.001$), with a greater proportion of students reporting that the platform made surgical procedures more intuitive (41.57% vs. 13.48%) and learning more convenient (37.08% vs. 8.99%). ④ System usability: All dimensions of platform usability scores exceeded 8.4, including system stability (8.76 ± 0.93), operational ease (8.94 ± 0.88), image clarity (8.42 ± 0.97), interaction fluency (8.63 ± 0.91), and richness of learning resources (8.85 ± 0.86). ⑤ Self-assessment of learning outcomes: The proportions of participants in the experimental group who reported significant improvements in aseptic technique skills, surgical collaboration ability, and postoperative observation skills were 88.76%, 86.52%, and 77.53%, respectively, all significantly higher than those in the control group ($P < 0.05$). Additionally, digital assessment scores on the platform showed a significant positive correlation with traditional OSCE scores ($r = 0.754$, $P < 0.01$). **Conclusion:** This lightweight VR-OSCE digital teaching platform effectively delivers the core instructional functions of VR-OSCE, demonstrating excellent feasibility, usability, and teaching efficacy in surgical nursing education,

thereby providing a practical foundation for the widespread adoption of digital teaching methodologies.

Keywords

Lightweight Virtual Reality-objectively Structured Clinical Examination (VR-OSCE) Platform, Digital Teaching, Surgical Nursing

Comparative Characteristics of Fatal and Nonfatal Pulmonary Embolism Based on Autopsy Materials

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Abstract

Pulmonary embolism (PE) remains a leading cause of in-hospital mortality despite modern prophylactic strategies, warranting detailed postmortem analysis to identify risk patterns. This study aimed to compare clinical and morphological features of fatal versus non-fatal PE using autopsy data. A retrospective review was conducted of 1,090 autopsy-confirmed PE cases from in-hospital deaths at the I.I. Dzhanelidze Research Institute in Saint Petersburg between 2020 and 2024, with statistical significance set at $p < 0.05$. Among the deceased, PE was the immediate cause of death in 721 patients (66.1%; fatal cohort) and a contributing complication in 369 (33.9%; non-fatal cohort). Patients with fatal PE were significantly older (73.6 ± 1.5 vs. 70.6 ± 1.8 years) and more frequently female (66.4% vs. 55.6%). Hospital stay was notably shorter in the fatal group (7.8 ± 1.4 days), with 34.8% of deaths occurring within the first 24 hours compared to 18.7% in the non-fatal group (11.3 ± 0.8 days). Occlusion of main pulmonary artery branches was markedly more frequent in fatal cases (28.3% vs. 5.1%), as was recurrent PE (10% vs. 5.4%). Thrombi originating from the inferior vena cava system predominated in fatal PE (72.5% vs. 29.5%), whereas the embolic source remained unspecified more often in non-fatal cases (64.8% vs. 21.2%). Notably, antemortem clinical diagnosis of PE was absent or uncertain in approximately 40% of cases across both cohorts. These findings indicate that fatal PE is strongly associated with advanced age, female sex, early in-hospital occurrence, central artery involvement, and recurrence. The persistently low rate of timely clinical diagnosis in both groups underscores the need for heightened clinical vigilance and improved diagnostic protocols for PE among hospitalized patients.

Keywords

Pulmonary Embolism, Fatal Outcome, Autopsy, Risk Factors, Clinical Diagnosis, Venous Thromboembolism, Hospital Mortality

Artificial Intelligence Transformer Models for Optimize the Prognosis in Patients with Myocardial Infarction and Lung Cancer

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Abstract

Objective: To create a scale to predict cardiovascular death in patients with myocardial infarction and malignancy. **Materials and methods:** 106 patients with myocardial infarction and cancer were included in the study, 64 men (60.4%) and 42 women (39.6%), mean age 63.8 ± 13.4 years. For the second model The sample size of patients who smoked traditional cigarettes was 167 people, who switched to AIDN - 37 patients. Smoking experience in the group of smoking patients was 17.5 ± 10.7 years, in the group after switching to AIDN - 3.4 ± 2.8 years. Of these, 56 patients had a negative prognosis, which corresponded to the minimum threshold level of statistical significance $p < 0.05$. **Results:** This model visualized that the diagnostic levels of the scale values were: total cholesterol (TC) level 6.26 mmol/l, RDW-CV - 16.3%, neutrophils - 53.1%, eosinophils - 6.3%, leukocytes $-9.1 \times 10^9/l$. F-criterion of the full model was -6.3, coefficient of determination $R^2=4.5$; significance level was $p=0.03$ Predictive Value: The sensitivity of the model was 85.7%, specificity was 87.5%. The area under the ROC-curve was 0.798, which was corresponded to a score of "good" on the area under the curve scale. In next model these were chronic obstructive pulmonary disease (COPD; $r=0.480$ $p=0.006$, chronic kidney disease ($r=0.670$ at $p=0.001$), level of coefficient of variation of erythrocytes (RDW-CV; $r=0.448$ $p=0.004$), leukocyte content ($r=0.33$ at $p=0.016$), increased liver density according to ultrasound scanning ($r=0.543$ $p=0.042$). It was found that patients who smoked traditional cigarettes were more likely to die from MI than those who smoked heated tobacco systems. (12,1% versus 5,6%). It is also important to note that the phenotype of patients smoking heated tobacco systems was closer to that of non-smoking patients, which may result in a milder clinical picture. **Conclusion:** The model haematological parameters used in routine practice: RDW-CV, leucocyte count, segmented neutrophils, eosinophils, TC, as well as increased hepatic density according to ultrasound scanning and the presence of chronic obstructive lung disease. All parameters are maximally reproducible in clinical practice not only for inpatients, but also for outpatients. The second study showed that

smoking is an important factor affecting the clinical course of myocardial infarction. Patients smoking traditional cigarettes have a higher risk of death from myocardial infarction, whereas smoking heated tobacco systems is associated with a less severe clinical course of myocardial infarction, and the phenotype of these patients is closer to that of nonsmoking patients.

Keywords

Myocardial Infarction, Lung Cancer, AI Model

Development of a Radiograph Database and Pretrained Deep Learning Model for Primary Bone Tumor Classification

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Abstract

Primary bone tumors are relatively rare, but delayed or inaccurate diagnosis of malignant lesions can substantially affect patient prognosis. Artificial intelligence has shown potential for assisting radiographic diagnosis; however, the development of robust diagnostic models is limited by the lack of dedicated, well-annotated bone tumor datasets and the relatively small number of malignant cases. This study aimed to construct a primary bone tumor radiograph database and develop a pretrained deep learning model for classifying normal bone images, benign bone tumors, and malignant bone tumors. We established the Bone Tumor X-ray Radiograph Dataset (BTXRD), an open-access dataset comprising 3,745 radiographs, including 1,879 normal images, 1,524 benign tumor images, and 342 malignant tumor images. All tumor radiographs were annotated with pathological categories, tumor subtypes, anatomical sites, bounding boxes, and segmentation masks. To improve classification performance under limited-data conditions, a ResNet-based musculoskeletal foundation model was first pretrained on approximately 40,000 radiographs from the MURA dataset and subsequently fine-tuned on BTXRD to develop the ResNet-FM classification model. A directly trained ResNet model without musculoskeletal pretraining was used as the comparator. Model performance was evaluated using five-fold cross-validation and an independent validation set. ResNet-FM consistently outperformed the directly trained model and achieved areas under the receiver operating characteristic curve of 0.845, 0.969, and 0.904 for benign tumors, malignant tumors, and normal bone images, respectively. Compared with the directly trained model, these values increased by 12.8, 7.2, and 7.7 percentage points, respectively. Explainability analysis further showed that ResNet-FM focused more accurately on tumor-related regions. The construction of BTXRD provides a standardized resource for bone tumor radiograph research, while musculoskeletal radiograph pretraining significantly improves the classification performance and interpretability of deep learning models. This approach may support more accurate and efficient radiographic assessment of primary bone tumors in clinical practice.

Keywords

Primary Bone Tumor, Radiography, Artificial Intelligence, Deep Learning, Transfer Learning, Image Classification

Nonlinear Dose-response Association of Remnant Cholesterol With MACCE After PCI in Acute Myocardial Infarction

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Abstract

Background: Remnant cholesterol (RC) has emerged as a potential contributor to residual cardiovascular risk, but its nonlinear dose-response association with adverse outcomes after percutaneous coronary intervention (PCI) in patients with acute myocardial infarction (AMI) remains incompletely characterized. **Objective:** This study aimed to evaluate the association between RC and the risk of major adverse cardiovascular and cerebrovascular events (MACCE) after PCI in patients with AMI. **Methods:** This multicenter ambispective cohort study consecutively enrolled 4,440 patients with AMI from 3 provincial tertiary hospitals in Jiangxi Province between January 2018 and December 2020. The primary outcome was post-PCI MACCE. Restricted cubic spline (RCS) models within the Cox proportional hazards regression framework were fitted with 4 knots at the 5th, 35th, 65th, and 95th percentiles of the RC distribution to evaluate the dose-response association between RC and MACCE. **Results:** The median follow-up was 1,389.00 days (IQR: 1,083.75-1,754.00). The median age at baseline was 65.00 years (IQR: 57.00-72.00), 74.55% of patients were men, and the incidence of MACCE was 25.99%. After adjustment for potential confounders, RC was positively and nonlinearly associated with MACCE risk ($P_{\text{Total}} = 0.013$; $P_{\text{Nonlinear}} = 0.037$). The fitted curve showed a J-shaped pattern with a threshold-like change around $RC = 0.49$ mmol/L and a progressive increase in risk at higher RC levels. In subgroup analyses, RC was not significantly associated with MACCE among patients aged <55 years ($P_{\text{Total}} = 0.264$; $P_{\text{Nonlinear}} = 0.161$), whereas a significant nonlinear association was observed among patients aged ≥ 55 years ($P_{\text{Total}} = 0.011$; $P_{\text{Nonlinear}} = 0.027$). Among men, RC was significantly and linearly associated with MACCE risk ($P_{\text{Total}} = 0.037$; $P_{\text{Nonlinear}} = 0.232$). Among women, the overall association did not reach statistical significance ($P_{\text{Total}} = 0.052$), although evidence of nonlinearity was observed ($P_{\text{Nonlinear}} = 0.022$). Sensitivity analyses showed that the positive nonlinear association between RC and MACCE remained robust in patients with hypertension and in those with non-ST-segment elevation myocardial infarction. **Conclusions:** RC levels were significantly and nonlinearly associated with the risk of MACCE after PCI in patients with AMI, with evidence of heterogeneity across age and sex subgroups. Routine monitoring of RC may help identify residual cardiovascular risk and refine secondary prevention strategies in this population.

Keywords

Remnant Cholesterol, Acute Myocardial Infarction, Major Adverse Cardiovascular and Cerebrovascular Events, Restricted Cubic Spline

Multi-perspective Qualitative Study: Practices and Dilemmas of Gamified Respiratory Training for Pediatric Pneumonia

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Abstract

Objective: To explore the participation experience, behavioral evolution, multidisciplinary collaboration, and practical dilemmas of gamified respiratory training for children with pneumonia from multiple perspectives (children, parents, rehabilitation therapists, nurses, and physicians). **Methods:** A phenomenological approach was adopted. Semi-structured interviews were conducted with 39 participants (15 children, 15 parents, 3 rehabilitation therapists, 3 nurses, and 3 physicians). Data were analyzed using Colaizzi's seven-step method. **Results:** Three themes and eight sub-themes were identified. Theme 1: Experience reshaping from "passive treatment" to "active player" (behavioral trajectory, age gradient of motivation, parental attitude change). Theme 2: Professional foundation and interdisciplinary collaboration model (three-tier strategy, three-party closed-loop collaboration). Theme 3: Multi-perspective barriers and sustainability dilemmas (high workload, collaboration vulnerability, home continuation gap). **Conclusion:** Gamified respiratory training has significant value in pediatric pneumonia rehabilitation. The three-party collaboration (therapist-nurse-physician) is key to ensuring quality but faces challenges including lack of standardization, insufficient human resources, and difficulties in home continuation.

Keywords

Children with Pneumonia, Gamified Nursing, Respiratory Training, Multidisciplinary Collaboration, Qualitative Research

Assessment of Causal Relationship Between Type 2 Diabetes Mellitus and Hypothyroidism: A Bidirectional Two-sample Mendelian Randomization Study

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Abstract

Background: Type 2 Diabetes Mellitus (T2DM) and hypothyroidism are two common endocrine disorders that frequently co-occur in clinical practice. Observational studies have suggested a potential association between T2DM and hypothyroidism, but the magnitude of the causal relationship remains unclear. **Objective:** The current investigation was to assess the possible causal relationship between T2DM and hypothyroidism through the application of a bidirectional two-sample Mendelian Randomization (2SMR) analysis. **Methods:** We performed bidirectional 2SMR analysis to investigate the causal relationship between T2DM and hypothyroidism in European population by the publicly accessible genome-wide association studies (GWASs) summary datasets. The total sample size were extracted from the IEU Open GWAS Project database. Causal estimate was based on inverse-variance weighted (IVW) method, and additional sensitivity tests to evaluate the validity of the causal direction. IVW and MR-Egger were used for heterogeneity testing, and MR-Egger was also used for pleiotropy testing. Leave-one-SNP-out analysis was used to identify potential impact of single nucleotide polymorphisms (SNPs). IVW (random effects) were performed to further validate the reliability of results. **Results:** Our results showed that there have significant association between genetically predicted T2DM and hypothyroidism risk: (OR=1.060, 95% confidence interval (CI): 1.018-1.104, P=0.005); or between genetically predicted hypothyroidism and T2DM risk: OR= 1.060, 95% CI: 1.018-1.104, P=0.005). **Conclusions:** These findings suggested that T2DM and hypothyroidism have a complex bidirectional causal inference using the 2SMR analysis of GWAS datasets. The findings are only relevant for genetic predisposition; thus, further research are needed to determine the impact of non-genetic predispositions.

Keywords

Type 2 Diabetes Mellitus, Hypothyroidism, Mendelian Randomization, Causal Relationship, GWAS

Type 1 Diabetes Mellitus and the Risk of Male Infertility: A Mendelian Randomization Study

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Abstract

Multiple studies have indicated that type 1 diabetes mellitus (T1DM) disrupts male reproductive function and contributes to infertility. In contrast, type 2 diabetes mellitus (T2DM) has been demonstrated to exert a direct causal influence on male infertility, as validated by Mendelian randomization (MR) analysis. The magnitude and direction of the causal association between T1DM and male infertility, however, remain uncertain. To clarify this potential relationship, a two-sample MR (2SMR) analysis was conducted. Data related to male infertility and T1DM in European populations were retrieved from the publicly available Integrated Epidemiology Unit (IEU) Open genome-wide association studies (GWAS) database. The outcome dataset included 680 male infertility cases and 72,799 controls. Five MR approaches—MR-Egger, weighted median estimation (WME), simple mode, weighted mode (WM), and inverse-variance weighted (IVW)—were applied to assess the causal association between T1DM and male infertility. Among these, the IVW method served as the primary analytical strategy. To assess the potential causal association between T1DM and male infertility, a multivariable MR analysis was conducted. The 2SMR results indicated that T1DM was linked to an increased genetic predisposition to male infertility among Europeans (IVW, odds ratio (OR): 0.914, 95% confidence interval (CI): 0.849–0.985, $P = 0.019$; MR-Egger, OR: 0.870, 95% CI: 0.778–0.972, $P = 0.018$; WME, OR: 0.908, 95% CI: 0.818–1.008, $P = 0.071$; WM, OR: 0.918, 95% CI: 0.838–1.005, $P = 0.072$; simple mode, OR: 1.004, 95% CI: 0.803–1.254, $P = 0.974$). Heterogeneity tests yielded P -values of 0.866 and 0.851, indicating the absence of significant heterogeneity. The Egger-intercept ($P = 0.240$) revealed no evidence of horizontal pleiotropy. A leave-one-out analysis further confirmed the stability of the results. These findings provide statistical support for a causal link between T1DM and male infertility based on data from 680 European cases. However, given that the ORs approximate unity, the directionality of the association remains unclear. Considering existing literature and known diabetic pathophysiological impacts on the reproductive system, the results suggest that T1DM contributes to an elevated risk of male infertility among Europeans. Further research is warranted to clarify the underlying biological mechanisms connecting T1DM and male infertility, which may inform preventive strategies for affected male populations.

Keywords

Mendelian Randomization, Type 1 Diabetes Mellitus, Male Infertility, GWAS

Epidemiological Characteristics and Influencing Factors of Autism Spectrum Disorder in China

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Abstract

Background: The prevalence of autism spectrum disorder (ASD) is rising globally. Its insidious onset often delays early intervention, while families face heavy caregiving burdens and limited rehabilitation access. Multi-regional epidemiological evidence remains scarce in China. A nationwide survey across diverse geographic areas is warranted to delineate epidemiological characteristics and associated factors, informing early screening and precision prevention. **Objective:** To analyze the epidemiological characteristics and associated factors of ASD among children in China, providing empirical evidence for early screening, intervention, and policy improvement. **Methods:** Using geographical location as the stratification basis, a multi-stage stratified sampling was conducted from February to October 2025 across 8 provinces in eastern, western, southern, northern, and central China, recruiting 1,747 families with children diagnosed with ASD. Electronic questionnaires were administered via rehabilitation centers, special education schools, community health centers, and parent communities to collect data on demographics, clinical features, perinatal exposures, family care environments, and rehabilitation histories. Complex sampling weighted descriptive analyses and multivariate logistic regression were used to examine distribution patterns, clinical phenotypes, and associated factors. **Results:** Among 1,747 respondents, 1,415 (81.00%) were male and 332 (19.00%) female (ratio 4.26:1). Peak diagnostic/suspected age was 2–3 years (41.3%). Language impairment was the most common initial symptom (86.4%), followed by unresponsiveness, social deficits, and stereotyped behaviors. Over 95% received rehabilitation; all families reported unmet rehabilitation needs. Parental psychiatric history, adverse perinatal exposures, maternal age ≥ 35 years, paternal age ≥ 40 years, neonatal asphyxia, and premature rupture of membranes were risk factors ($P < 0.05$); breastfeeding, frequent outdoor activities, and democratic parenting were protective ($P < 0.05$). Birth season, sex, ethnicity, preterm birth, threatened abortion, cesarean section, maternal personality, and menarcheal age showed no significant associations ($P > 0.05$). **Conclusions:** The epidemiological profile of ASD in China is characterized by male predominance and a diagnostic peak at 2–3 years. Parental psychiatric history, adverse perinatal exposures, advanced parental age, neonatal asphyxia, and premature rupture of membranes are independent risk factors, while breastfeeding, frequent outdoor activities, and democratic parenting serve as protective factors. Despite high rehabilitation coverage, all families continue to experience unmet needs, underscoring the importance of enhanced early screening for high-risk populations and strengthened family support policies to alleviate caregiver burden.

Keywords

Autism Spectrum Disorder, Epidemiological Characteristics, Influencing Factors

Research on the Current Status and Influencing Factors of Nursing Humanistic Care Ability Among Undergraduate Nursing Interns

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Abstract

This study aimed to investigate the current status of humanistic care ability among undergraduate nursing interns and explore its influencing factors. A convenience sampling method was used to recruit 235 fourth-year undergraduate nursing interns who were completing their clinical internships at a tertiary general hospital in Binzhou City, China, from June to July 2025. Data were collected using a general information questionnaire, the Humanistic Care Ability Scale for Nursing Undergraduates, the Emotional Intelligence Scale, and the Clinical Communication Competence Scale for Nursing Students. Univariate analysis and multiple linear stepwise regression analysis were performed to identify factors influencing humanistic care ability. A total of 226 valid questionnaires were returned, yielding an effective response rate of 96.17%. The mean scores for the Humanistic Care Ability Scale for Nursing Undergraduates, the Emotional Intelligence Scale, and the Clinical Communication Competence Scale for Nursing Students were (73.72 ± 20.48) , (115.74 ± 24.53) , and (49.49 ± 12.47) , respectively. Multiple linear regression analysis showed that family health status, degree of family care, degree of friend care, degree of humanistic care cognition, humanistic care training during internship, emotional intelligence, and clinical communication competence were the main influencing factors of humanistic care ability among undergraduate nursing interns (all $P < 0.05$). The humanistic care ability of undergraduate nursing interns was at a moderate level and affected by multiple factors. Emphasis should be placed on cultivating this ability by enhancing emotional intelligence and clinical communication competence, reinforcing humanistic care training, and implementing targeted interventions.

Keywords

Humanistic Care, Undergraduate Nursing Interns, Influencing Factors, Nursing Care, Clinical Practice

Advances in the Application of Machine Learning for Tacrolimus Dosage Prediction

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Abstract

Objective Tacrolimus is an essential immunosuppressive agent widely applied for organ transplantation and autoimmune disease treatment. Nonetheless, its narrow therapeutic window and prominent interindividual variability in pharmacokinetics bring substantial difficulties to clinical individualized precision dosing. This review summarizes recent advances in machine learning (ML)-assisted tacrolimus individualized dose prediction, so as to provide evidence for clinical medication practice. **Methods** Systematic literature retrieval was conducted in four authoritative English databases including PubMed, Web of Science, Scopus and Embase, as well as three mainstream Chinese databases: China National Knowledge Infrastructure (CNKI), Wanfang Database and VIP Database. Original researches developing machine learning-based tacrolimus dose prediction models were enrolled. Relevant data were extracted, including endpoint parameters, follow-up duration, sample size, variable selection approaches, predictor variables and model evaluation metrics. **Results** Ten eligible articles were finally included after screening against predefined inclusion and exclusion criteria, covering liver transplantation, kidney transplantation, autoimmune diseases, heart and lung transplantation. Most included studies were single-center retrospective analyses. Popular machine learning algorithms adopted for initial or maintenance dose prediction consisted of Random Forest (RF), Extreme Gradient Boosting (XGBoost) and Long Short-Term Memory (LSTM). In pediatric liver transplant cohorts, Extremely Randomized Trees (ET) achieved the lowest median Absolute Percentage Error (APE) of 2.04 ng for initial dose prediction. For adult liver transplant recipients, LSTM yielded the minimal median Mean Percentage Error (MPE) of 8.8% in maintenance dose forecasting, which was statistically superior to Linear Regression (LR) and Population Pharmacokinetics (PPK) models. In kidney transplantation, RF obtained a coefficient of determination (R^2) of 0.95 for initial dose prediction, and Extra-Trees Regressor (ETR) attained an overall dose target achievement rate of 97.73% among perioperative renal transplant patients. Among autoimmune disease populations, XGBoost presented optimal performance: the R^2 for adult maintenance dose prediction was 0.54, with a predictive accuracy of 74.4% within the $\pm 30\%$ deviation range of actual doses. After integrating PPK-derived covariates, the hybrid XGBoost model improved the R^2 up to 0.74 for initial dose prediction in children with systemic lupus erythematosus. For combined liver, renal and cardiac transplant patients, XGBoost reached an R^2 of 0.941 in initial dose estimation, outperforming conventional Maximum. **Conclusion** Machine learning algorithms exert significantly better predictive performance than conventional approaches for tacrolimus dose optimization. However, current models are hampered by multiple drawbacks, such as inherent bias from retrospective design, insufficient evidence

for special populations, inadequate calibration assessment, limited model interpretability and poor reproducibility.

Keywords

Tacrolimus, Machine Learning, Individualized Medication

RUNX3 Influences Edema After Intracerebral Hemorrhage via TIMP1-mediated Regulation of the PI3K/AKT Pathway

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Abstract

Intracerebral hemorrhage (ICH) accounts for 20%–30% of acute cerebrovascular diseases in China, and perihematomal brain edema (PHE) secondary to ICH is a critical factor contributing to high mortality and disability rates during the acute phase. Although immune-inflammatory responses play an important role in the development of PHE, the underlying molecular mechanisms remain poorly understood. This study aimed to explore the role of RUNX3 in brain edema formation after ICH and its association with TIMP1 and the PI3K/AKT signaling pathway. Transcriptome sequencing was performed on perihematomal brain tissues from clinical ICH patients and normal brain tissues. Weighted gene co-expression network analysis (WGCNA), combined with three machine learning algorithms—Lasso regression, support vector machine (SVM), and random forest (RF)—was applied to screen key immune-related gene biomarkers. Receiver operating characteristic (ROC) curves were used to evaluate diagnostic performance, while Gene Set Enrichment Analysis (GSEA) was employed to identify associated signaling pathways. Immune infiltration analysis was conducted to assess the correlation between gene expression and immune cell infiltration, and the GEO external dataset (GSE24265) was utilized to validate downstream target genes. A total of 163 co-expressed differentially expressed genes were identified, and RUNX3 was determined as the key immune-related gene biomarker through cross-validation across the three machine learning algorithms. ROC analysis demonstrated that RUNX3 distinguished ICH patients from normal controls with an AUC > 0.90 (95% CI: 0.89–0.95), indicating its potential diagnostic value. GSEA revealed that gene sets associated with the PI3K/AKT signaling pathway were significantly enriched in samples with high RUNX3 expression. Immune infiltration analysis further showed that RUNX3 expression was significantly correlated with the infiltration abundance of multiple immune cell types, including microglia and macrophages. Through TRRUST database prediction and cross-validation with the GEO dataset (GSE24265), TIMP1 was identified as a potential downstream target gene of RUNX3. In conclusion, RUNX3 serves as a key immune-related gene biomarker associated with brain edema following ICH, potentially participating in neuroinflammation and brain edema progression through the regulation of TIMP1 and involvement in PI3K/AKT signaling-associated processes. This study provides a theoretical basis for understanding the mechanisms of secondary brain injury after ICH and suggests potential molecular targets for future functional validation.

Keywords

Intracerebral Hemorrhage, Perihematomal Edema, RUNX3, TIMP1, PI3K/AKT Signaling Pathway

Study on the Effect and Mechanism of Emodin in Anti-nasopharyngeal Carcinoma

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Abstract

Objective: Due to the poor prognosis of nasopharyngeal carcinoma (NPC), there is an urgent need for novel therapeutic agents. This study aimed to screen effective anti-NPC candidates from Traditional Chinese Medicine (TCM) monomers and explore their underlying mechanisms. **Methods:** Thirty TCM monomers were initially screened using CCK-8 and trypan blue staining assays with human NPC 6-10B cells. The antitumor efficacy of Emodin was evaluated in vitro and in a nude mouse xenograft model. RNA-Seq was performed to identify differentially expressed genes, and the PI3K/Akt/FOXO3A pathway was validated via qRT-PCR, Western Blot, and immunohistochemistry. **Results:** Five active monomers (Magnolol, Artesunate, Platycodin D, Emodin, and Shikonin) were identified, with Emodin exhibiting the most significant inhibitory effect. Emodin suppressed 6-10B cell proliferation in a dose- and time-dependent manner and induced apoptosis in vitro. RNA-Seq analysis revealed 3,513 differentially expressed genes, which were enriched in the FOXO signaling pathway. Mechanistically, Emodin downregulated PI3K, CyclinB, p-AKT, and p-FOXO3A, while upregulating FOXO3A, Bim, and P19. In vivo, Emodin significantly inhibited tumor growth and promoted apoptosis, consistent with its in vitro regulatory effects on the PI3K/Akt/FOXO3A pathway. **Conclusion** Emodin inhibits nasopharyngeal carcinoma (NPC) cell proliferation and induces apoptosis by modulating the PI3K/Akt/FOXO3A signaling pathway, suggesting its potential as a novel therapeutic agent for NPC.

Keywords

Nasopharyngeal Carcinoma, Traditional Chinese Medicine Monomers, Emodin, 6-10B Cells, RNA-Seq, PI3K/Akt/FOXO3A Signaling Pathway

The Mediating Role of Age in the association between Estimated Pulse Wave Velocity and Cognitive Function

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Abstract

Background: Previous studies have independently examined the relationships between estimated pulse wave velocity (ePWV), age, and cognitive function; however, it remains unclear whether age plays a mediating role between ePWV and cognitive function. Therefore, this study aims to investigate the mediating effect of age in the relationship between ePWV and cognitive function. **Methods:** We analyzed data from 8,806 participants aged 45 and older in the China Health and Retirement Longitudinal Study (CHARLS) in 2015. Multivariate logistic regression models were used to examine the associations between ePWV, age, and cognitive function separately. Bootstrap mediation analysis was employed to assess the mediating role of age between ePWV and cognitive function. For nonlinear relationships, restricted cubic spline (RCS) regression analysis was applied. Additionally, threshold and subgroup analyses were conducted. **Results:** In fully adjusted models, both ePWV and age showed negative associations with cognitive function. RCS analysis confirmed that ePWV is nonlinearly associated with cognitive function, and age also shows a nonlinear relationship with cognitive function. Mediation analysis revealed that age partially mediated the association between ePWV and cognitive function, accounting for 57.97% of the effect. Subgroup analysis indicated that, in the association between ePWV and cognitive function, only marital status showed an interaction effect, whereas in the association between age and cognitive function, both residence and marital status showed interaction effects. **Conclusion:** This study found that both ePWV and age were negatively correlated with cognitive function, and that age played a mediating role in the relationship between ePWV and cognitive function.

Keywords

Estimated Pulse Wave Velocity, Age, Cognitive Function, CHARLS

The Mediating Role Handgrip Strength Between Estimated Pulse Wave Velocity and Dementia: A Cross-sectional Study Based on the CHARLS

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Abstract

Background: Several studies have shown that there is an association between estimated pulse wave velocity (ePWV), handgrip strength (HGS) and dementia. However, the extent to which HGS mediates the relationship between pulse wave velocity and dementia remains unclear. This study aims to explore the extent to which handgrip strength mediates the relationship between pulse wave velocity and dementia, and is based on a large-scale population-based sample of middle-aged and elderly individuals in China. **Methods:** This study conducted a cross-sectional analysis utilizing 2015 data from the China Health and Retirement Longitudinal Study (CHARLS), including 7,403 participants aged ≥ 45 years. Employed multivariate logistic regression analyses to evaluate the associations of ePWV and HGS with dementia, adjusting for demographic characteristics, behavioral factors, and biomedical covariates. The mediating effect of HGS in the relationship between ePWV and dementia was evaluated using the bootstrap method with 1,000 bootstrap samples. Stratified analyses were conducted to assess the robustness of findings across sex, age categories, educational attainment levels, and other pertinent demographic factors. **Results:** After adjusting for confounding factors, ePWV was significantly positively related to dementia (OR: 1.12, 95% CI: 1.05-1.19; $P < 0.001$). Conversely, HGS was significantly inversely associated with dementia, (OR: 0.95, 95% CI: 0.93-0.96; $P < 0.001$). ePWV demonstrated a significant negative correlation with HGS (β : -0.61, 95% CI: -0.73 to -0.49; $P < 0.001$). Mediation analysis revealed that HGS partially mediated the relationship between ePWV and dementia, accounting for 15.38% of the total effect. subgroup analysis confirmed the consistency of these associations across sex, age groups, educational levels, and other pertinent demographic factors (all interaction P-values > 0.05). **Conclusion:** ePWV is positively correlated with dementia, and HGS plays a mediating role in this relationship. Comprehensive assessment of vascular function and muscle health may enhance the prediction and prevention of dementia.

Keywords

Dementia, Handgrip Strength, Estimated Pulse Wave Velocity, Middle-aged and Elderly

Funding

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Clinical and Health Service Value of Liposomal Bupivacaine in Enhanced Recovery After Anal Fistula Surgery

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Abstract

Postoperative pain after anal fistula surgery may interfere with early ambulation and defecation, increase rescue analgesic requirements, prolong hospitalization, and contribute to greater healthcare resource utilization. However, the clinical effectiveness and healthcare resource implications of long-acting local infiltration analgesia within enhanced recovery after surgery (ERAS) pathways for anal fistula surgery remain insufficiently characterized. This single-center prospective cohort study included 160 patients undergoing anal fistula surgery who were classified according to the local infiltration analgesic received in routine clinical practice: liposomal bupivacaine or 0.5% ropivacaine, with 80 patients in each group. The primary outcome was cumulative pain burden over the first 48 postoperative hours. Additional outcomes included pain scores at prespecified time points, pain during first defecation, rescue analgesic use, length of hospital stay, hospitalization costs, 30-day unplanned healthcare utilization, and adverse events. Compared with ropivacaine, liposomal bupivacaine was associated with a significantly lower cumulative pain burden during the first 48 postoperative hours ($P = 0.036$). Between-group differences in pain scores at 6, 24, and 48 h exceeded the prespecified minimal clinically important difference. Liposomal bupivacaine was also associated with a 1.72-point reduction in pain during first defecation, an 8.0-h longer time to first rescue analgesia, a lower rescue analgesia rate (42% vs 63%), and a 1.4-day shorter hospital stay. These clinical improvements were not accompanied by increases in total hospitalization costs, 30-day unplanned healthcare utilization, or adverse events. Within an ERAS pathway for anal fistula surgery, liposomal bupivacaine was associated with reduced postoperative pain burden, lower rescue analgesic requirements, and shorter hospitalization without increasing overall healthcare costs or short-term safety risks. These findings provide clinically relevant evidence to support optimization of perioperative analgesic strategies and healthcare resource allocation in this surgical population.

Keywords

Anal Fistula, Liposomal Bupivacaine, Ropivacaine, Local Infiltration Analgesia, Enhanced Recovery After Surgery, Health Services

Climate Change and Stroke: An Analysis of Epidemiological Data with Special Reference to Croatia, the European Union, and the United States

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Abstract

Stroke is the second leading cause of global mortality and the third leading cause of disability, with 11.9 million new cases and 7.3 million deaths reported worldwide in 2021, a 44% rise compared with 1990. Climate change is accelerating the frequency, intensity and duration of heatwaves, and Croatia occupies a particularly vulnerable position at the intersection of a Mediterranean/sub-Mediterranean climate, an ageing population and cerebrovascular mortality already above the European Union average. This narrative review, conducted according to SANRA criteria, aimed to synthesize epidemiological evidence linking heatwaves to stroke incidence and mortality, with special reference to Croatia, the European Union and the United States. PubMed, Scopus, Web of Science and institutional reports from WHO Europe, the CDC, ECDC, IPCC, Eurostat, DHMZ and HZJZ were searched for the period 2014–2025; peer-reviewed original studies, systematic reviews, meta-analyses and reference-body reports in English or Croatian were included, while non-peer-reviewed conference abstracts and studies lacking a defined temperature exposure or cerebrovascular outcome were excluded. Each 1°C rise in mean daily temperature was associated with a 1–2% increase in ischemic stroke incidence, with heatwaves showing a lag effect of one to four days and tropical nights acting as an independent risk factor. Between 2022 and 2024, more than 181,000 heat-related deaths were recorded across 32 European countries, with the highest mortality rates in Greece, Bulgaria and Italy, while the United States recorded record-breaking heat-related emergency department visits in summer 2023. Croatia's standardized cardiovascular mortality (572.8 per 100,000) significantly exceeds the EU average, with heat-related excess cerebrovascular mortality observed both along the southern Adriatic coast and in the continental lowlands. By 2050, days above 35°C in the Mediterranean are projected to increase two- to four-fold, with European heat-related deaths potentially reaching approximately 120,000 annually and a projected global

stroke burden of 21.43 million new events. Heatwaves represent a modifiable, climate-driven risk factor for stroke, and Croatia is disproportionately exposed. A national heat-stroke surveillance registry integrating meteorological and stroke incidence data is urgently needed, and cerebrovascular medicine must incorporate climate factors into prevention and emergency care strategies.

Keywords

Climate Change, Heatwaves, Stroke, Cerebrovascular Disease, Heat-related Mortality, Epidemiology, Croatia, Cardiovascular Mortality

The Role of Visual Evoked Potentials in the Early Diagnosis and Monitoring of Partial Optic Nerve Atrophy in Infants

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Abstract

Background. Partial optic nerve atrophy in infants remains a significant challenge in pediatric ophthalmology. Early diagnosis is complicated by the limited ability to subjectively assess visual function in young children. Therefore, objective diagnostic methods capable of evaluating the functional status of the visual pathway are of particular importance. Visual evoked potentials (VEPs) represent one of the most informative electrophysiological techniques for assessing impulse conduction along the visual pathway to the visual cortex. Among VEP parameters, the latency of the P100 component is considered the most sensitive indicator of functional impairment of the optic nerve. **Objective.** To evaluate the diagnostic value of visual evoked potentials in the early detection and longitudinal monitoring of infants with partial optic nerve atrophy. **Materials and Methods.** The study included 44 children aged 6 months to 2 years with ophthalmoscopically confirmed partial optic nerve atrophy. The diagnosis was established based on clinical examination and the presence of temporal pallor of the optic disc. All patients underwent flash visual evoked potential testing with assessment of P100 latency and response amplitude. Following the initial examination, all patients received a course of neurotropic therapy. The follow-up period ranged from 6 months to 3 years. **Results.** The mean P100 latency before treatment was 97.1 ms. Follow-up examinations demonstrated a tendency toward normalization of P100 latency in a proportion of patients. In contrast, VEP amplitude remained relatively stable throughout the observation period. Ophthalmoscopy consistently revealed varying degrees of temporal optic disc pallor in all patients. Statistical analysis was performed using descriptive statistical methods. Quantitative variables were expressed as mean (M) $\pm$ standard deviation (SD). The mean P100 latency was 97.12 ± 1.21 ms before treatment and 97.80 ± 1.67 ms after neurotropic therapy, corresponding to a mean change of 0.68 ms. These findings support the utility of VEPs as an objective tool for monitoring optic nerve function in young children with partial optic nerve atrophy. **Conclusion.** Visual evoked potential testing is an informative and objective method for assessing the functional integrity of the visual pathway in infants. The latency of the P100 component may serve as a sensitive biomarker for early functional changes associated with partial optic nerve atrophy and may be useful for monitoring the effectiveness of neurotropic therapy.

Keywords

Partial Optic Nerve Atrophy, Infants, Visual Evoked Potentials, P100 Latency, Pediatric Ophthalmology, Neurotropic Therapy

Combined Antioxidant Therapy for Chronic Pelvic Pain Associated with Pelvic Varicose Veins in Women

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Abstract

Chronic pelvic pain (CPP) is one of the clinical manifestations of pelvic varicose veins (PVV) in women, and drug therapy remains relevant for patients who are not surgical treatment or prefer a non-invasive approach. Oxidative stress is pathophysiologically substantiated in chronic venous disease and has been demonstrated in PVV, but evidence for conservative treatment is limited, and its effect on complete CPP relief remains insufficiently studied. The aim was to evaluate the effect of combined conservative therapy on CPP relief, pelvic venous haemodynamics and pro-/antioxidant indices. This prospective study included 120 women aged 25–49 years with ultrasound-confirmed pelvic varicose veins, persistent dysmenorrhoea and CPP, all examined by different doctors to confirm the varicose origin of the pain. Patients were sequentially allocated to two parallel groups: group 1 (n = 60) received conventional venotropic monotherapy with a micronised purified flavonoid fraction 1000 mg once daily orally for three months; group 2 (n = 60) received the same therapy plus targeted antioxidants: superoxide dismutase 250 mg, acetyl-glutathione 100 mg and dihydroquercetin 100 mg, each three times daily with meals for 90 days. Pelvic venous haemodynamics were assessed by transvaginal ultrasound before and after treatment; lipid peroxidation products and antioxidant defence enzymes were measured in venous blood by spectrophotometry and enzyme immunoassay. Results. Complete relief of CPP occurred in 51/60 (85.0%) in group 2 and 19/60 (31.7%) in group 1 ($p < 0.001$), absence of dysmenorrhoea in 53 (88.3%) and 29 (48.3%) ($p < 0.001$), and resolution of dyspareunia in 49 (81.7%) and 17 (28.3%) ($p < 0.001$), respectively, whereas changes in menstrual cycle parameters did not differ between the groups (86.7% vs. 85.0%; $p > 0.05$). Both groups showed decreased vein diameter, increased peak antegrade flow velocity and shortened reflux in the ovarian veins ($p < 0.05$), with more pronounced improvement in group 2, including higher flow velocities in the iliac ($p = 0.030$), ovarian ($p = 0.032$) and arcuate ($p = 0.040$) veins. Group 2 also had lower lipid hydroperoxides, diene conjugates and malondialdehyde and higher activity of catalase, superoxide dismutase, glutathione peroxidase, glutathione reductase and glutathione-S-transferase ($p < 0.001$). Conclusion. Combined venotropic and targeted antioxidant therapy is associated with more frequent relief of CPP, dysmenorrhoea and dyspareunia, more pronounced improvement of pelvic venous haemodynamics and a favourable shift in the prooxidant-antioxidant balance. These results substantiate further study of antioxidant therapy within combined conservative treatment of PVV.

Keywords

Chronic Pelvic Pain, Pelvic Varicose Veins, Antioxidant Therapy, Venotropic Therapy, Venous Haemodynamics, Lipid Peroxidation

Successful Multilevel Replantation Preserves Hand Viability After Transcarpal Crush Avulsion Amputation

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Abstract

Simultaneous transcarpal amputation with loss of multiple digits is an exceptionally rare injury and remains one of the most challenging situations in reconstructive microsurgery, especially when caused by a high-energy crush-avulsion mechanism. We present the case of a 62-year-old right-hand-dominant factory worker who sustained a devastating industrial machine injury to his right hand, resulting in transcarpal amputation, partial palmar avulsion, and traumatic amputation of the thumb, index, middle, and little fingers. The patient reached our center approximately three hours after injury and underwent emergency replantation surgery. Reconstruction was carried out in a stepwise proximal-to-distal fashion, beginning with skeletal stabilization followed by tendon repair, arterial and venous anastomosis, and nerve coaptation at each level of injury. Revascularization of the wrist, palm, thumb, and amputated digits was successfully achieved during a single operation lasting approximately 14.5 hours. All replanted structures showed satisfactory perfusion immediately after surgery. At three weeks of follow-up, limited areas of skin necrosis were noted over the proximal interphalangeal joint of the middle finger and the distal phalanx of the ring finger; however, all major replanted segments remained viable and no principal structure was lost. The patient was discharged on postoperative day 15 with a viable hand and preserved digits. This case highlights that even severe crush-avulsion injuries involving transcarpal amputation and multiple digit loss should not automatically be considered unsuitable for replantation. With timely referral, meticulous microsurgical technique, and an aggressive salvage approach, successful limb preservation and the potential for meaningful functional recovery can still be achieved.

Keywords

Multilevel Replantation, Transcarpal Amputation, Crush-avulsion Injury, Microsurgery, Industrial Trauma, Hand Reconstruction

Optimization of the Formulation of Vitaminized Water-based Beverages Enriched with Oxygen

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Abstract

In recent years, there has been a significant increase in consumer interest in a healthy lifestyle and balanced nutrition. In this context, vitaminized water-based beverages enriched with oxygen attract particular attention due to their unique properties and potential health benefits. Vitaminized water-based beverages enriched with oxygen represent a special category of products. Investigating the influence of various factors—such as formulation components, saturation and storage conditions, as well as storage duration—on the physicochemical and rheological characteristics of these beverages is a relevant task. To optimize the formulation, we applied the Scheffé method based on simplex lattice design. This method enables the study of the effect of the proportion of each component on the final product characteristics, which is essential for developing a high-quality vitaminized beverage. The use of the Scheffé simplex lattice design in the development of production technologies for vitaminized water-based beverages enriched with oxygen made it possible to experimentally evaluate how different proportions of vitamins and other ingredients affect the physicochemical and organoleptic properties of the beverages. Analysis of the obtained results showed that a certain amount of vitamin C enhances the brightness of taste, but this effect depends on the specific concentration of flavoring agents. It was also found that increasing the oxygen concentration in the beverage positively influences taste perception; however, it reduces the stability of some vitamins. The results of the conducted analysis demonstrate that optimization using the Scheffé simplex lattice design in the development of production technologies for vitaminized beverages allows establishing patterns of component interactions and their influence on consumer characteristics of the beverages.

Keywords

Beverages, Oxygen, Vitamins, Health

Funding

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Effects of a Periodized Combined Training Program on Lipid Profile and Cardiovascular Risk in Sedentary Women Aged 50 to 60 Years in Colombia

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Abstract

Cardiovascular disorders are one of the primary causes of mortality in public health. Sedentary life style and dyslipidemia are some of the key variables that can promote these disorders. This situation worsens in women between 50 and 60 years old, who, due to the hormonal transition typical of climacteric and early postmenopause, are more vulnerable to developing metabolic and cardiovascular disorders. Despite the considerable impact of this issue in Latin America, there are few studies evaluating the effects of community-based supervised exercise programs in this demographic group. The aim of this study is to evaluate the effects of a periodized combined training program on the lipid profile and cardiovascular risk in sedentary women aged 50 to 60 in Colombia. A quantitative methodology was utilized, with a quasi-experimental pretest-posttest design involving a population of 15 sedentary women, without a prior diagnosis of cardiovascular or metabolic diseases, selected through non-probabilistic intentional sampling (mean age: 55.4 ± 3.2 years). All women participating in the study voluntarily signed the informed consent form. The intervention consisted of a supervised

20-week program that integrated aerobic endurance and strength training, implemented three days a week, complemented by two days of unsupervised walking. The implemented program was divided into three stages: adaptation, development, and optimization. The results of these variables allowed for feedback to be used to refine the combined training program during the intervention. Waist circumference and lipid profile consisting of total cholesterol, LDL cholesterol, HDL cholesterol and triglycerides were measured before and after the periodized training. The study data collected were analyzed using descriptive statistics and the Wilcoxon test. The results of the study showed that the total cholesterol level decreased 8.2% after application of the supervised training program, the LDL cholesterol level decreased 11.6%, and the waist circumference decreased 3.8%. HDL cholesterol increased 4.1% and triglycerides were unchanged. The internal load analysis showed that a positive physiological adaptation to the applied loads was present in the intervention process, avoiding adverse cardiovascular consequences. The results of the study suggest that the supervised training program, based on the combination of aerobic endurance and strength in the community setting, is a preventive health strategy; it is low cost and easy to replicate in the Latin American context. This kind of intervention improves metabolic profile and reduces cardiovascular risk in previously sedentary middle-aged women.

Keywords

Combined Training, Lipid Profile, Cardiovascular Risk, Sedentary Women, Preventive Health, Physical Activity, Colombia, Community Intervention

Salvia Miltiorrhiza Alleviates High Salt Diet-induced Hypertension by Regulating the Th17/Treg Axis Balance and Altering the Gut Microbiota

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Abstract

High salt Diet (HSD) can participate in the mechanism of hypertension by inducing differentiation of T helper cell 17(Th17) and adjusting intestinal microecological structure. Salvia miltiorrhiza (SM) is a traditional Chinese medicine utilized for treating hypertension for thousands of years. Our investigation seeks to evaluate the effect of SM on HSD induced hypertension by the Th immune response and gut microecology approaches. The levels of blood pressure, serum inflammatory factors, intestinal inflammatory factors, Th17 cells, Regulatory cells (Treg) and gut microbiota were determined, respectively, to achieve this aim. Our results showed that SM restored blood pressure level of hypertension rat to those observed in healthy controls. Meanwhile, this medicine obviously improved the Th17/Treg axis balance, with the levels of IL-6, IL-17 and IL-1 β decreased and the levels of IL-10 increased. Regarding the gut microbiota, SM treatment improved their abundance and diversity, as well as decreased the ratio of Firmicutes to Bacteroidetes (F/B). Especially, this medicine apparently increased the level of the beneficial bacteria of *Prevotella*. Further correlation analysis showed that there was a significant positive correlation between *Prevotella* and the improvement of Th17/Treg axis. In conclusion, our results demonstrated that SM can effectively reduce the blood pressure level caused by HSD, which may be related to the functions of adjusting gut microbiota and improving Th17/Treg axis balance. This study is of great significance for the effective use of SM in the treatment of HSD induced hypertension.

Keywords

High Salt Diet, Hypertension, Salvia Miltiorrhiza, Gut Microbiota, Th17/Treg Axis

MicroRNAs as an Early Diagnostic Predictor of Heart Failure Complicated Acute Myocardial Infarction

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Abstract

MicroRNA detection is considered to be a promising way for the development of early noninvasive diagnostics in patients with myocardial infarction (MI). MicroRNA is stable in biological substance which can be successfully isolated from various tissues. MicroRNA expression levels do not differ by gender and age, quantitative analysis of microRNA expression can be carried out using standard laboratory techniques. Objective: to evaluate the expression level of microRNA 208a-5p and microRNA 499, as well as associated clinical signs and symptoms in patients with MI and acute heart failure (AHF) class II-IV to Killip. Materials and methods: 250 patients treated in ICU with MI were examined. Males were 67.2%, females – 32.8%. The average age was 65.2 ± 2.7 years. Patients were divided into (I) 126 persons with MI and AHF, (II) 124 with MI without AHF. MicroRNA expression in plasma was detected by real-time polymerase chain reaction. Results: In group I patients, the normalized expression level (NUE) of microRNA 208a-5p - 24(16;34). It was statistically higher than in II - 14(9;20) NUE, $p < 0.05$. Serum microRNA 499 of patients in group I was 9 (7;12) NUE, in group II- 5 (4;7) NUE, respectively, $p < 0.05$. Conclusions: patients with MI and AHF had statistically higher expression level of microRNAs 499 and 208a-5p-24 that also correlated with severity of AHF. It seems as perspective prognostic marker of HF development after MI.

Keywords

MicroRNA, Myocardial Infarction, Acute Heart Failure

Culturally Syntonic Crisis Intervention in China: A Retrospective Analysis of Psychological Hotline Data During the COVID-19 Pandemic

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Abstract

Background: Crisis hotlines provide vital support during public health emergencies, yet most intervention frameworks rely on Western assumptions, limiting their resonance in contexts shaped by Confucian, Daoist, and aesthetic traditions. This study examines mental health symptom trajectories across three COVID-19 pandemic phases and evaluates the immediate de-escalation effectiveness of a novel Cultural-Value-Psychology (CVP) framework mobilizing traditional Chinese cultural resources. **Methods:** We conducted a retrospective analysis of 2,899 call records from the Shenzhen Hope Hotline (2020–2022). Applying strict criteria, 2,795 valid calls were analyzed across the Initial (January–June 2020; $n=922$), Adaptation (December 2020–June 2021; $n=1,020$), and Recovery (December 2021–June 2022; $n=853$) phases. **Results:** Anxiety remained pervasively high across all phases ($57.5\% \rightarrow 50.0\% \rightarrow 53.9\%$; $p < 0.01$). Depressive symptoms exhibited significant phase-dependent variation, peaking sharply during the Adaptation phase ($9.2\% \rightarrow 19.6\% \rightarrow 12.3\%$; $p < 0.001$). Males ($OR=3.54$, 95% CI: 2.45–5.10) and adolescents aged 10–18 ($OR=2.46$, 95% CI: 1.53–3.95) demonstrated significantly elevated risk for suicidal ideation. Crucially, CVP-grounded modalities achieved exceptional immediate crisis de-escalation rates: Chinese Cultural Psychology (93.2%), Strategic Culture drawing on Daoist dialectics (95.7%), and Clarifying and Analyzing Action Techniques (CAT) anchoring Confucian family interconnectedness (100%, $n=16$ pilot). **Conclusion:** Mental health symptoms display distinct temporal trajectories during prolonged collective crises. Integrating culturally syntonic resources—such as Confucian family interconnectedness, Daoist naturalistic acceptance, and strategic coping derived from Chinese military philosophy—yields high immediate de-escalation effectiveness. These findings challenge the reliance on unadapted Western paradigms, advocating instead for the systematic incorporation of indigenous cultural logic into global public mental health protocols.

Keywords

COVID-19, Crisis Hotline, Cultural Psychiatry, Chinese Cultural Psychology, Suicidal Ideation, CVP Framework, CAT Technique, Art of War

Skin Temperature Biofeedback as an Adjunct Intervention in Psychotherapy

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Abstract

Anxiety disorders are globally prevalent and disabling mental illnesses characterized by persistent autonomic nervous system dysregulation. This dysfunction contributes to not only core emotional anxiety symptoms but also measurable physiological changes, including peripheral vasomotor anomalies and impaired autonomic modulation. Such physiological aberrations sustain anxious states and drive behavioral avoidance, serving as a key physiological foundation for persistent anxiety symptoms. Systematic desensitization, a mainstream exposure-based technique in cognitive behavioral therapy, operates based on reciprocal inhibition theory, with its efficacy largely dependent on patients' stable relaxation states. However, most anxious patients present a dissociation between subjective relaxation experience and objective autonomic responses. This discrepancy hinders accurate baseline relaxation assessment, undermining the precision and reproducibility of traditional systematic desensitization interventions. Skin temperature biofeedback can convert real-time peripheral temperature fluctuations into perceivable, quantifiable signals, enabling objective evaluation of autonomic tone and relaxation levels. This study systematically reviews the physiological mechanisms and empirical evidence of thermoregulatory abnormalities in anxiety disorders, demonstrating the validity of skin temperature as a reliable anxiety-related physiological biomarker. It also summarizes the technical principles, operational procedures and clinical progress of skin temperature biofeedback. Targeting the limitations of subjective assessment in conventional desensitization, this paper constructs an integrated intervention model combining skin temperature biofeedback pre-training with graded systematic desensitization, and clarifies its implementation procedures and underlying mechanisms. Based on interoception theories, it further explains how biofeedback narrows the gap between subjective bodily awareness and objective physiological states. This study proposes that skin temperature biofeedback acts as a preparatory strategy rather than a replacement for desensitization, enhancing patients' interoceptive ability, relaxation level and autonomic regulation to optimize subsequent exposure therapy outcomes. This integrated framework provides a novel theoretical reference for physiological-oriented anxiety interventions and offers testable hypotheses for future clinical trials.

Keywords

Anxiety Disorders, Biofeedback, Skin Temperature, Cognitive Behavioral Therapy, Psychotherapy

Psychosocial and Health Factors Associated with Stress among Police Personnel in the Southern Border Provinces of Thailand

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Abstract

Background: Police officers deployed in the conflict areas of Thailand's Southern Border Provinces endure heavy workload and considerable psychological distress. Although systemic social and economic determinants exert a pervasive influence, their impact on the mental and physical wellbeing of these officers has received relatively little attention. **Aim:** The objective of this study was to assess the prevalence rate and association between psychosocial factors, health-related factors and stress among police personnel in Southern Border Provinces of Thailand. **Materials and Methods:** A cross-sectional study was conducted using data were obtained from 11,860 police officers who participated in the 2024 annual mental health screening program. Stress levels were evaluated using the Srithanya Stress Test (ST-5), developed by the Department of Mental Health, Ministry of Public Health, Thailand. Associations between stress and psychosocial and health risk factors were examined using multiple binary logistic regression analysis while adjusting for demographic covariates. **Results:** The overall prevalence of elevated stress among the participants was 2.7 percent. Sleep disturbance was the most widely reported symptom and affected 47.8 percent of the personnel. Multiple logistic regression analysis revealed that significant psychosocial and health factors predicting elevated stress included family and relationship problems (aOR = 6.53, 95% CI 3.40 to 11.90), a history of psychiatric illness (aOR = 6.03, 95% CI 4.24 to 8.48), self-perceived stress (aOR = 5.07, 95% CI 3.56 to 7.44), occupational problems (aOR = 3.93, 95% CI 2.63 to 5.75), financial difficulties (aOR = 3.04, 95% CI 2.19 to 4.17), and a willingness to seek counseling (aOR = 2.49, 95% CI 1.60 to 3.77). **Conclusion:** After controlling for demographic variables, this study found that psychosocial and health factors were associated with increased stress among police officers. These factors included relationship and family problems, a history of mental illness, and financial difficulties. Police organizations need to invest in targeted interventions such as family therapy, financial management, and sleep promotion, as sleep problems remain the most common symptom.

Keywords

Mental Health, Police Officers, Southern Border Provinces, Occupational Stress, Psychosocial Factors, Health Factors

Research Hotspots and Evolution of Mental Health in Emergency Responders and Military Personnel: A Comparative BERTopic Analysis

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Abstract

Emergency responders and military personnel are routinely exposed to traumatic events, prolonged occupational stress, and high-risk working environments, making mental health a major concern in occupational health research. Despite the rapid growth of publications in this field, the thematic structure and developmental trajectories of mental health research across these two high-risk occupational groups remain insufficiently understood. This study aimed to identify and compare research hotspots and their temporal evolution using BERTopic-based topic modeling. A total of 1,231 publications published between 2005 and 2025 were retrieved from the Web of Science, Scopus, and PubMed databases. Titles, abstracts, and keywords were integrated into a text corpus, and BERTopic was employed to identify latent semantic topics, which were further analyzed through temporal trend analysis to explore their evolution over time. The identified topics were synthesized into three conceptual domains: occupational stress and contextual factors, help-seeking and service utilization, and psychological problems and outcomes. Although both occupational groups shared a similar thematic framework, substantial differences were observed in their research priorities. Studies involving emergency responders primarily emphasized occupational exposure, organizational context, cumulative stress, and work-related psychological adaptation, whereas research on military personnel focused more heavily on post-traumatic outcomes, mental health stigma, suicide risk, and mental health service utilization. Temporal analysis further demonstrated that research in both fields has gradually shifted from early problem identification toward prevention, intervention, and service-oriented strategies, while exhibiting distinct occupational trajectories. These findings provide a comprehensive understanding of the thematic landscape and evolution of mental health research in two major high-risk occupational populations and offer evidence to support occupation-specific mental health policies, intervention development, and future research priorities.

Keywords

Emergency Responders, Military Personnel, Occupational Mental Health, BERTopic, Topic Modeling, Help-seeking, Psychological Resilience

Cultivating Social and Emotional Competencies Through a Digital Platform: An Integrated Intervention Combining Mindfulness, Gratitude, and Emotion-focused Writing

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Abstract

University students face multiple sources of stress arising from academic demands, interpersonal relationships, and career development. Accordingly, providing accessible psychological support that can be readily integrated into students' daily lives has become an important concern in higher education. Grounded in the self-awareness and self-management domains of social and emotional learning and informed by the broaden-and-build theory of positive emotions, this study developed a digital mental health support platform for university students to use independently outside class. The study examined changes in mental health and positive affect following four consecutive weeks of platform use. By combining reflective, contemplative, and strength-based activities, the platform was intended to provide a low-threshold form of preventive support that students could access flexibly and repeatedly in daily life. A one-group pretest–posttest design was employed, and 70 university students participated in the intervention. The platform incorporated several functions, including daily mood tracking, personal journaling, recording three things for which one felt grateful each day, self-affirming statements, and mindfulness meditation. Participants were instructed to log in and complete the assigned activities daily. Daily mood tracking and emotion-focused writing were designed to strengthen emotional identification and self-reflection. Mindfulness meditation emphasized present-moment awareness, stress coping, and emotion regulation. Gratitude and self-affirmation activities were intended to help participants recognize positive experiences and personal resources in everyday life. The findings indicated that, after completing the one-month intervention, participants reported better mental health and higher levels of positive affect than before the intervention. These results suggest that integrating brief, repeated, and self-directed social-emotional activities into a digital platform may contribute to the enhancement of university students' psychological well-being. Such a platform may also serve as a supplementary resource for campus mental health education and counseling services by extending support beyond formal classroom or counseling settings and encouraging regular self-care practices. Nevertheless, the findings should be interpreted with caution. Because the study used a one-group design, involved a relatively short intervention period, and relied on self-report measures, causal conclusions cannot be drawn. Future research should include a control group, follow-up assessments, objective indicators of platform engagement, and direct measures of social and emotional competencies. These additions would allow for a more rigorous examination of the durability of the intervention effects, the relationship between actual platform use and outcomes, and the mechanisms through which digital social-emotional activities may influence students' mental health and emotional functioning.

Keywords

Social and Emotional Learning, Digital Intervention, Mindfulness, Gratitude, Reflective Journaling

Fear of Progression in Patients with Benign Breast Tumors During the Perioperative Period: A Mixed Methods Review

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Abstract

Fear of progression (FoP) refers to an individual's apprehension regarding the symptoms of their disease itself, as well as anxiety about potential deterioration, loss of control, or life-threatening progression of the condition. This psychological symptom is most commonly observed among patients with chronic diseases. However, existing research has predominantly focused on malignant tumors such as breast cancer, while studies on FoP in patients with benign tumors remain relatively scarce, with a particular lack of in-depth exploration into their subjective experiences. The perioperative period represents a critical transitional phase from diagnosis to postoperative recovery, during which patients not only face physiological stressors—including surgical trauma, pain, and body image changes—but also bear the complex psychological burden associated with concerns about disease nature, surgical outcomes, and future health. Despite the benign pathological nature of their condition, patients continue to experience significant psychological distress throughout the perioperative period. Mixed methods research (MMR), which integrates quantitative and qualitative data, provides a more comprehensive and nuanced understanding of the current status, subjective experiences, and causal attributions of FoP, thereby overcoming the limitations inherent in single-method approaches. This review adopts a mixed methods research perspective to systematically synthesize the epidemiological prevalence, subjective experiential characteristics, attributional patterns, and influencing factors of FoP among patients with benign breast tumors during the perioperative period, with the goal of establishing a theoretical foundation for the development of precision-oriented psychological intervention strategies.

Keywords

Benign Breast Tumors, Fear of Progression, Perioperative Period, Mixed Methods Research, Measurement Tools

Behavioral and ERP Characteristics Under Facial Emotion Working Memory Task in Relation to Social Psychophysiology in Healthy University Students

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Abstract

Previous studies have suggested that the processing of facial expression plays a critical role in shaping one's social psychological traits. This study aimed to explore the relationship of behavioral and event-related potential (ERP) characteristics during a facial emotion working memory task with social psychological traits. Fifty-eight healthy university students were recruited. Their social psychological traits were assessed using the Social Anxiety Scale and the Simplified Coping Style Questionnaire. All participants completed a delayed matching task for facial emotions, during which 64-channel electroencephalographic signals were recorded. The task consisted of 40 trials. At the beginning of each trial, 2–5 memory faces were sequentially presented, interleaved with 0–2 distractor faces. The presentation time (1050, 600, 400, 250 ms) was randomized across trials but fixed within each trial. At the end of each trial, three sequential free-response matching faces were presented for retrieval. Retrieval reaction time (RT) and accuracy (ACC) were recorded; ERP characteristics (latency and amplitude of P1 onset, P1, N170, and N170 offset) were extracted from ERPs over averaged bilateral posterior-lateral electrodes (O1, O2, PO7, PO8, P7, P8). Correlation and regression analyses were conducted to examine the relationships among these behavioral and ERP measures and social psychological traits. Greater social anxiety was associated with longer RT and shorter N170 offset latency under distractor conditions, across all temporal constraints. Linear regression showed that shorter N170 offset latency under distractor conditions predicted social anxiety ($\beta = -0.403$, $p = 0.002$). Binary logistic regression further indicated that this measure distinguished high versus low anxiety individuals (based on normative criteria), with 77.6% accuracy ($p = 0.012$). Less positive coping score was associated with reduced N170 offset amplitude under distractor conditions across all temporal constraints. Linear regression showed that greater N170 offset amplitude under distractor conditions predicted positive coping scores ($\beta = 0.416$, $p = 0.002$). Binary logistic regression further demonstrated that this measure distinguished individuals with higher versus lower positive coping scores (based on normative criteria) ($p = 0.041$). These results indicate that maladaptive traits (e.g., high social anxiety or low positive coping) are associated with prolonged reaction times and altered distractor processing (earlier N170 offset and reduced amplitude), suggesting difficulties in decision-making during retrieval and altered neural resource allocation to emotional distractors.

Keywords

Social Anxiety, Positive Coping, Facial Emotion, Working Memory, ERP

Funding

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Childhood Trauma and Non-suicidal Self-Injury: A Network Analysis of Rumination and Psychological Inflexibility

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Abstract

Background: Non-suicidal self-injury (NSSI) has become a serious mental health issue among adolescents, childhood trauma is a significant risk factor for NSSI, the mechanisms of rumination and psychological inflexibility remain underexplored, as well as group-specific variations, hindering the development of tailored and stratified interventions. **Objective:** To explore the network of relationships among childhood trauma (Emotion Abuse, Physical Abuse, Sexual Abuse, Emotion Neglect, Physical Neglect), rumination (Brooding, Reflect), psychological inflexibility (Experiential Avoidance, Cognitive Fusion) and NSSI through analyses of undirected and Bayesian directed networks. This study focuses on identifying core risk factors, bridge nodes, and differences in causal pathways between groups, with the aim of guidance on intervention targets for precision interventions targeting suicidal behavior in adolescents. **Method:** Undirected Gaussian graphical models were estimated using EBICglasso ($\gamma = 0.5$) to explore partial correlations among the 10 nodes (EA, PA, SA, EN, PN, Br, Re, Av, Fu, NSSI). Nodal centrality and bridge nodes were assessed via expected influence (EI) and bridge expected influence (BEI), with predictability computed using the mgm package. A Network Comparison Test (1000 iterations) was applied to compare network structure, global strength, and centrality between the NSSI and non-NSSI groups. The Bayesian directed acyclic graph (DAG) were subsequently constructed using the Hill-Climbing algorithm to infer directed causal pathways, with edge stability evaluated via 1000 bootstrap resamples. Network accuracy and stability were confirmed by bootstrap confidence intervals and CS coefficients exceeding 0.5. **Result:** In the undirected network, a full-sample analysis revealed that the connection between emotional abuse and NSSI was the strongest, and EA had the highest EI, while NSSI was the node with the highest BEI. A comparison of the networks between the self-injury and non-self-injury groups revealed significant differences in the overall structure and global strength of the two networks, with the self-injury group's network being more tightly connected; a comparison of centrality measures showed significant differences in the EI of EA, PA, SA, EN, and NSSI between the groups. DAG indicates that, in the group with self-injury, PA is the most upstream predictor, leading directly or indirectly to NSSI through pathways such as SA or EA; whereas in the group without self-injury, Br serves as the upstream node, influencing PN and NSSI through pathways such as Av or Fu. **Conclusion:** This study reveals the mechanisms underlying between-group differences in how childhood trauma drives NSSI through the mediating pathways of rumination and psychological inflexibility, providing a causal pathway and evidence for targeted interventions.

Keywords

Childhood Trauma, Non-suicidal Self-injury, Rumination, Psychological Inflexibility, Network Analysis

Funding

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Differential Risk Factors for Suicide Attempts in Depressed Adolescents with and Without Childhood Sexual Abuse: A Machine Learning and Moderated Modeling Approach

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Abstract

Background: Childhood sexual abuse (CSA) is a major risk factor for suicide attempts (SA) in depressive disorders. However, few studies have thoroughly investigated the differences in risk factors and psychopathological mechanisms in SA between depressed adolescents with and without CSA. The goal of this work was to combine traditional regression models and machine learning (ML) methods to uncover distinct predictors of SA in these two subgroups, and to investigate the moderating effect of rumination on the relationship between CSA and SA. **Methods:** A total of 796 adolescents with depressive disorders were stratified into two subgroups based on CSA history. Logistic regression was used to identify predictive factors for SA in each subgroup. The SHapley Additive exPlanations (SHAP) method was employed to quantify feature importance and enhance model interpretability. Additionally, a moderation analysis was performed within the CSA subgroup to investigate the moderating effect of rumination on the relationship between CSA and SA. **Results:** SHAP feature importance analysis identified rumination, age, and CSA as the top predictors in the CSA subgroup. Whereas depressive symptoms and age were the primary predictors in the non-CSA subgroup. Notably, a subsequent moderation analysis demonstrated that rumination exerted a significant moderating effect on the association between CSA and SA within the CSA subgroup. **Conclusions:** Individualized suicide prevention strategies, such as rumination-focused interventions for the CSA subtype and evidence-based depression treatment for non-CSA subtype, may be beneficial for depressed adolescents.

Keywords

Depressive Disorders, Suicide Attempts, Childhood Sexual Abuse, Rumination, SHAP

Funding

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Childhood Trauma Predicts Suicide Attempts in Depressed Adolescents: The Serial Mediating Role of Alexithymia and Psychological Inflexibility

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Abstract

Objective: This study aims to explore the relationships of childhood trauma and suicide attempts in adolescents with depressive disorders, and the serial mediating role of alexithymia and psychological inflexibility between them. **Methods:** A total of 1,426 adolescents with depressive disorders were included in this study. We used Childhood Trauma Questionnaire (CTQ), Mini International Neuropsychiatric Interview (MINI), Toronto Alexithymia Scale (TAS-20), Action Questionnaire-2nd edition (AAQ-II), and Cognitive Fusion Questionnaire (CFQ) to evaluate childhood trauma, suicide attempts, alexithymia, and psychological inflexibility, respectively. **Results:** The incidence of suicide attempts in adolescents with depressive disorders was 51.68%, with females (74.90%) having a rate 2.98 times higher than that of males (25.10%). In addition, compared with the non-suicide attempts group, the suicide attempts group had significantly higher scores in childhood trauma [48 (39, 57) vs. 54 (43, 65), $Z = -6.87$, $p < 0.001$], alexithymia [63 (55, 68) vs. 63 (58, 71), $Z = -5.22$, $p < 0.001$], and psychological inflexibility [72 (48, 85) vs. 74 (62, 93), $Z = -6.07$, $p < 0.001$]. Furthermore, childhood trauma, alexithymia and psychological inflexibility were all positively correlated with suicide attempts ($r = 0.18$, 0.14 , 0.16 , all $p < 0.001$). The results of the mediation analysis indicate that childhood trauma has a significant direct effect on suicide attempts ($\beta = 0.019$, $p < 0.001$, 95% CI: 0.011, 0.026), psychological inflexibility significantly simple mediates the relationship between childhood trauma and suicide attempts ($\beta = 0.002$, $p < 0.001$, 95% CI: 0.001, 0.004). Importantly, the serial mediation effect of alexithymia and psychological inflexibility on the relationship between childhood trauma and suicide attempts is also significant ($\beta = 0.002$, $p < 0.001$, 95% CI: 0.001, 0.003). **Conclusion:** Childhood trauma not only directly predicts suicide attempts among adolescents with depressive disorders, but also indirectly increases the risk of suicide attempts through the independent mediating effect of psychological inflexibility and the serial mediating effect of alexithymia and psychological inflexibility.

Keywords

Childhood Trauma, Suicide Attempts, Alexithymia, Psychological Inflexibility, Depressive Disorders

Funding

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