

THE 72ND

SIMC

INTERNATIONAL MEDICAL CONGRESS OF SILESIA

May 13<sup>th</sup> - 15<sup>th</sup> 2026

## BOOK OF ABSTRACTS



Students'  
Scientific  
Association  
SUM



**PTSS**

Polskie Towarzystwo  
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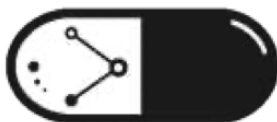
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Dear Students,

I have a great pleasure to invite you to the International Medical Congress of Silesia 2026 - "SIMC 2026" organized by the Medical University of Silesia. This annual event has become our long-standing tradition and a continuation of the International and Interfaculty Conference of Students of Medical Universities, organized by the Student Scientific Society of our University since 2006. The aim of the Conference is to initiate and to promote the scientific development of students as well as to facilitate exchange of experience and create a forum for scientific discussion. It is also an unique opportunity for young scientists to present their achievements in front of international audience. I am proud that our Silesian region can host this splendid event. The popularity and prestige of the conference is evidenced by the fact that this edition received as many as 341 abstracts; 24 sessions and workshops will be held. I would like to express my appreciation to the Organizing Committee. It is thanks to your hard work and creativity that this event is held at highest standards, when it comes not only to presented papers and discussions but also the professional organization. I am convinced that the scientific program and the accompanying events will meet the expectations of attendees. I am very happy that so many of you have found time and energy to take part in our event. Finally, I wish all participants many scientific achievements and persistence in pursuit of chosen life and professional goals. I hope this could be a prelude of your scientific careers during exciting period of medical studies. I wish you all a fruitful and productive time during the SIMC 2026 Conference!

Rector

of the Medical University of Silesia  
Tomasz Szczepański, MD, PhD, Professor of Medicine

Dear Colleagues,

It is a great honor and pleasure to invite you to participate in a very special event which is an INTERNATIONAL MEDICAL CONGRESS of SILESIA (SIMC), organized by Student's Scientific Society of Medical University of Silesia. Last year we had a great time together, so this year I do hope to see you all again in May. We will have the opportunity to continue the good traditions of student scientific meetings. I strongly encourage you to support this conference actively. Medicine and science are, and always should be a passion. The SIMC conference is a great opportunity to exchange your scientific experience and compete in the scientific field. It does not really matter if you win as the success consists of going from failure to failure without loss of enthusiasm. I do believe that you will find the meeting enjoyable and fruitful as the organizers did spare no effort to make it so.

Sincerely,

The Head of Students' Scientific Association  
of the Medical University of Silesia in Katowice  
Michał Holecki, MD, PhD, Professor of Medicine

Dear Participants,

It is with great pleasure that we welcome you to the International Medical Congress of Silesia 2026— an event with roots reaching back over 70 years, when the very first student scientific conference was held in Zabrze.

From those humble beginnings, our Conference has evolved into one of the leading student medical congresses in Central Europe. Held annually at the University Campus in Katowice-Ligota, SIMC continues to grow in both scale and reach — and this year is no exception. We are proud to announce that nearly 350 papers have been submitted and distributed across more than 20 scientific sessions, including a record number dedicated to doctoral students.

We'd like to thank everyone who helped make this event possible, as well as all administrative staff for their invaluable support in bringing this Congress to life. Our sincere gratitude goes to the Members of the Scientific Committees of each session — for their dedication, time, and insightful feedback. To the Doctoral Students' Self-Government and all volunteers – thank you for your energy, commitment, and teamwork. And most importantly — thank you, dear participants! Your creativity, scientific rigor, and ambition breathe life into this Congress. We wish you fruitful discussions, inspiring lectures, and the best of luck during your presentations.

Let SIMC 2026 be a stepping stone to your future in science and medicine!

The Board of Students' Scientific Association  
of the Medical University of Silesia

# Misinterpreting Malnutrition: How Extracorporeal and Pharmacological Interventions Alter Biomarker Profiles

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**Background:** Malnutrition in the ICU is linked to poor clinical outcomes. Traditional markers like albumin act as negative acute-phase reactants during inflammation. Furthermore, routine ICU interventions actively interfere with these biochemical parameters, causing misinterpretation of true nutritional status

**The aim:** To investigate baseline correlations between biochemical nutritional markers in ICU patients and establish how specific treatments (CRRT, statins, propofol, albumin, and iron supplementation) alter or decouple these links

**Materials and methods:** A single-center, retrospective study analyzed 100 ICU patients at the Silesian Centre for Heart Diseases between January and December 2024. The study evaluated correlations among traditional and composite biochemical nutritional markers. Patients were stratified based on concurrent therapies (CRRT, statins, propofol, albumin, and iron) to assess how these specific interventions altered marker relationships. Only clinically relevant correlations ( $|r| > 0.3$ ) were analyzed, deliberately excluding known mathematical and physiological redundancies.

**Results:** Generally, procalcitonin (PCT) negatively correlated with albumin and prealbumin. However, interventions caused "iatrogenic decoupling". CRRT entirely abolished native negative correlations between albumin and renal markers. With statins, cholesterol negatively correlated with PCT, and the CRP-to-Albumin Ratio (CAR) emerged as a massive disease severity correlate. Propofol lipid vehicles severed physiological links between triglycerides and prealbumin. Exogenous albumin decoupled serum albumin from PCT and renal function. Lastly, intravenous iron bypassed inflammatory blocks, creating a near-perfect correlation between serum iron and transferrin saturation

**Conclusions:** ICU therapies heavily distort standard nutritional biomarkers via "iatrogenic decoupling". Interpreting raw biochemical values without their therapeutic context risks clinical errors. Clinicians must adopt a highly context-aware approach to nutritional assessment

**Keywords:** ICU, nutrition, ICU interventions

# Learn Fast, Scan Faster: Effectiveness of 4-Hour Peer-Assisted eFAST Training in Students

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**Work's tutor: dr hab. n. med. Zbigniew Nawrat**

**Background:** Point-of-Care Ultrasound, particularly the eFAST protocol, is a cornerstone of modern trauma care, enabling rapid triage and improved outcomes. Despite its relevance, undergraduate medical education faces implementation challenges like curriculum overload and instructor shortages. Peer-Assisted Learning has emerged as a strategy to address these barriers by optimizing logistics and hands-on training time.

**The aim:** This study aimed to evaluate the immediate impact of a concise, 4-hour PAL-based intervention on both theoretical knowledge and practical skills related to the eFAST protocol among a multidisciplinary cohort of healthcare students.

**Materials and methods:** A prospective, single-arm pre-post study was conducted among 100 students (medicine, paramedicine, and nursing). The intervention included 1 hour of theoretical instruction followed by 3 hours of interleaved practical sessions led by trained student instructors. Knowledge acquisition was assessed using a pre- and post-intervention single-choice questionnaire. Practical skills were evaluated using a 21-point Objective Structured Clinical Examination based on hybrid simulation (ultrasound scanning of healthy volunteers combined with clinical image interpretation).

**Results:** Before the course, 87% of participants had no prior ultrasound experience. A statistically significant improvement in theoretical knowledge was observed ( $p < 0.001$ ), with a large effect size ( $r = 0.615$ ); mean scores increased from 52.8% to 89.8%. The mean OSCE score was high (19.38/21 points), indicating successful acquisition of the scanning protocol irrespective of the level of training.

**Conclusions:** A brief Peer-Assisted Learning based eFAST course is a feasible and effective method for introducing Point-Of-Care Ultrasound skills to undergraduate students, promoting skill standardization regardless of prior experience. While these short-term results are promising, further randomized trials with long-term follow-up are necessary to evaluate knowledge retention and clinical skill transfer.

**Keywords:** POCUS, eFAST protocol, Peer-Assisted Learning, Undergraduate medical education, Trauma care

## Who is an anesthesiologist? - public knowledge about the role and competences of an anesthesiologist

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Łukasz Krzych

**Background:** A specialist in Anesthesiology is responsible for the administration of anesthesia, provision of intensive care, pain management, and resuscitation. Despite their well-established role within the healthcare system, public awareness of the competencies of anesthesiologists remains limited and is often reduced to the stereotypical perception of them as a “surgeon’s assistant” or merely an “anesthesia doctor.”

**The aim:** To assess the level of knowledge regarding the role of the anesthesiologist and to identify key factors influencing this knowledge.

**Materials and methods:** A cross-sectional study based on an anonymous survey was conducted among 200 participants, including 163 individuals not affiliated with the medical profession. The questionnaire, in addition to demographic data, included items assessing knowledge of anesthesiologists’ competencies and respondents’ prior medical experiences. Statistical analysis was performed using Microsoft Excel.

**Results:** Only 81% of respondents correctly identified an anesthesiologist as a medical specialist, while 90% recognized their role in the administration of general anesthesia. However, merely 21% of participants were aware that anesthesiologists are also responsible for postoperative pain management. Medical education significantly increased the level of knowledge (43.3% vs. 16.6%;  $p < 0.001$ ), as did prior medical experience (84.5% vs. 66.7%;  $p = 0.04$ ). A total of 98.5% of respondents perceived the work of an anesthesiologist as stressful, and 64% considered it to be insufficiently appreciated.

**Conclusions:** General knowledge regarding the role of the anesthesiologist is limited, particularly among individuals not affiliated with the healthcare system and those without prior hospitalization experience.

**Keywords:** Anesthesiology, Public awareness, Analgesia, Intensive Care

# Physicians' Perspectives on Futile Therapy Outside Anesthesiology and Intensive Care Settings

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**Background:** Futile therapy refers to the application of treatment that, in light of current medical knowledge, will not result in the recovery of a terminally ill patient. Withholding or withdrawing futile therapy aims to ensure a dignified death and alleviate suffering.

**The aim:** This study aimed to evaluate the opinions of non-anesthesiologist physicians regarding the concept of medical futility.

**Materials and methods:** An anonymous electronic survey was conducted between February and March 2026, during which 69 opinions were collected. Fifty-two responses were qualified for final analysis (mean age 41 years, 69% female). These responses were from physicians of specialties whose scientific societies have adopted the position of the Working Group of the Polish Society of Internal Medicine on Medical Futility in Internal Medicine Wards.

**Results:** The majority of respondents (69%, N = 36) acknowledged the necessity of structured psychological support for healthcare staff involved in decisions to withhold or withdraw futile therapy. In nearly half of the participants' workplaces, formal medical protocols were not drafted (43.8%, N=21). Simultaneously, the vast majority (91.7%) of respondents indicated that the "Time Limited Trial" (TLT) procedure is utilized in their workplace and considered its application appropriate. The most significant non-medical factors that could influence the decision to refrain from such actions were: fear of legal consequences (85.4%), the patient's determination to sustain life (83.3%), and the physician's personal moral and ethical dilemmas (45.8%).

**Conclusions:** The development and implementation of uniform, formal therapy protocols should follow a top-down and systemic approach, integrated with legal and psychological support for physicians, among whom this topic remains controversial.

**Keywords:** futile therapy, time-limited trial, medical ethics

## Futile Therapy- what do medical students know about it?

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Work's tutor: dr n. med. Marek Grochla

**Background:** Medical futility refers to medical interventions used to sustain vital functions in terminally ill patients. It helps preserve patient dignity at the end of life, reduces unnecessary therapeutic persistence, and supports ethical decision-making in intensive care.

**The aim:** The aim of this study was to compare knowledge of futile therapy procedures between third- and sixth-year medical students.

**Materials and methods:** Data was collected using an anonymous questionnaire. The first part included demographic and educational data and assessed familiarity with medical futility. Respondents who answered positively completed a second section with detailed clinical questions. A total of 80 students participated: 40 third-year and 40 sixth-year.

**Results:** Knowledge of the definition of futile therapy was reported by 21 (40%) third-year students and 35 (80%) sixth-year students ( $p = 0.00152$ ). All sixth-year students (100%) and only 7.5% of third-year students correctly indicated that futile therapy may be applied in any hospital ward, not only in care units ( $p = 0,001$ ). Additionally, 31 sixth-year and 20 third-year students did not consider pharmacological coma to be an element of futile therapy ( $p = 0.02003$ ). Palliative care was considered mandatory by 31 sixth-year students and 15 third-year students ( $p = 0,001$ ). Furthermore, 87.5% of sixth-year students and 37.5% of third-year students correctly identified that decisions regarding the termination of futile therapy are made by a medical board ( $p = 0.0001$ ).

**Conclusions:** There is a great difference in the level of knowledge between third- and sixth-year medical students, with graduating students presenting a significantly greater knowledge of procedures and bioethical issues. However, the study revealed that the topic of chronic coma in the context of futile therapy remains ambiguous for both groups and requires further analysis.

**Keywords:** futile therapy, medical students, questionnaire

# The use of andexanet-alfa in the treatment of intracranial hemorrhage in patients taking factor Xa inhibitors:

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Work's tutor: Michal Pluta, MD, PhD

**Background:** In 2018, the U.S. Food and Drug Administration approved andexanet alfa (AA) for the antagonism of factor Xa inhibitors. In recent years, there have been reports of an increased risk of thromboembolic complications following treatment with AA.

**The aim:** The aim of this study was to investigate the general characteristics of patients who received emergency treatment with AA to reverse the effects of a factor Xa inhibitor due to intracranial hemorrhage (ICH). In addition, the incidence of serious thromboembolic events was assessed.

**Materials and methods:** A retrospective analysis was conducted of patients who were hospitalized at the Clinical Hospital of the Medical University of Silesia in Katowice between January 2025 and January 2026 due to intracranial hemorrhage while being treated with factor Xa inhibitors and who received emergency AA. Basic demographic and clinical data were collected, including: age, sex, results of brain computer tomography or magnetic resonance, time from initiation of factor Xa inhibitor therapy to administration of AA, and the dose of AA. Occurrence of thromboembolic complications were assessed.

**Results:** The case series included 5 patients, 4 men and 1 woman, aged 47-98 years. In 2 out of 5 patients (40%), the ICH was idiopathic, and in 3 patients (60%), it was the result of traumatic brain injury. The time from administration of the anti-Xa inhibitor was known in 3/5 patients (60%) and averaged 13 hours (787 minutes). Only low doses of AA (5 ampoules) were used for treatment of all the included patients. 5 out of 5 patients survived to hospital discharge, of whom 3 were in good neurological condition, rated as 0-2 on the modified Rankin Scale. No thromboembolic complications were observed in any of the patients.

**Conclusions:** None of the patients receiving andexanet alfa experienced thromboembolic complications. The safety profile of andexanet alfa requires further evaluation in large prospective studies.

**Keywords:** andexanet-alfa, TBI, stroke, rivaroxaban, apixaban

# The Application of Machine Learning Pose Estimation for Noninvasive Monitoring of ICU Patients

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**Background:** Artificial Intelligence (AI) is increasingly integrated into medical devices and systems to support daily healthcare operations. Patients in Intensive Care Units (ICU) are frequently intubated or require various vascular accesses. Such procedures put patients at risk of self-extubation or the accidental dislodgement of intravascular catheters. Utilizing Machine Learning (ML) computer vision techniques may reduce the risk of such events and assist medical professionals by providing real-time alerts regarding patient movements. AI systems can detect hazardous movements more rapidly than manual observation, allowing healthcare workers to intervene promptly.

**The aim:** To assess the feasibility of using ML-based pose estimation for the identification of upper limb movements that may lead to accidental extubation or vascular catheter dislodgement.

**Materials and methods:** An ICU environment was simulated using a hospital bed monitored by an overhead digital camera. A series of mock movement sequences, representing potentially hazardous clinical scenarios, were performed. The acquired video data were processed using Python-based open-source libraries for computer vision and pose estimation.

**Results:** The preliminary results are promising. The ML model correctly identified anatomical keypoints, effectively filtering movements potentially leading to self-extubation or the dislodgement of a neck-situated central venous catheter (CVC).

**Conclusions:** Preliminary analyses have demonstrated the potential of AI-driven computer vision methods for the non-invasive monitoring of patient movements.

**Keywords:** AI, monitoring, machine learning

# Analysis of mechanical ventilation parameters in the treatment of patients with Acute Respiratory Failure

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Łukasz Krzych**

**Background:** Acute Respiratory Failure (ARF) requires optimization of mechanical ventilation to minimize ventilator-induced lung injury while ensuring adequate gas exchange, and low tidal volumes (TV), adequate PEEP and low driving pressure (DP) play key roles among other settings.

**The aim:** We sought to verify whether patients with ARF treated in the intensive care unit (ICU) were ventilated in adherence to current recommendations.

**Materials and methods:** We retrospectively analyzed data from randomly selected 18 adult patients (11 M, 59±16 yo) with ARF, who were ventilated using the BiLevel mode after ICU admission. We assessed baseline values, as well as ventilatory parameters during 3 days after ARF onset.

**Results:** Baseline OI was 255±106 mmHg, PEEP was 7±2 cmH<sub>2</sub>O and lactate was 2.43±0.16 mmol/L. Two subjects died and 6 were weaned from ventilation during the study period. There were significant variations in ventilatory settings across patients. TV was unadjusted to ideal body weight in 7/18 patients on D1, 6/14 on D2 and 6/11 on D3. PEEP was unadjusted to FiO<sub>2</sub> in 11/18 subjects on D1, 10/14 on D2 and 9/11 on D3. DP was inappropriately high in 6/18 patients on D1, 7/14 on D2 and 5/11 on D3.

**Conclusions:** Improper ventilation may promote lung injury in ventilated patients; therefore, further research is needed to explain the reasons for inconsistencies in lung-protective ventilation strategies.

**Keywords:** Acute respiratory failure, mechanical ventilation, lung protective ventilation

# Awareness and Risk of Analgesic Dependence (OTC and Prescription) among Residents of the Silesian Voivodeship

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**Background:** The widespread availability of over-the-counter (OTC) and prescription (Rx) analgesics poses a public health concern. Their misuse may lead to serious complications, highlighting the need to monitor usage patterns and patient awareness.

**The aim:** The aim of this study was to evaluate the level of awareness regarding the risks of analgesic use and to assess the prevalence of behaviors indicating a risk of dependence on both over-the-counter (OTC) and prescription pain medication among residents of the Silesian Voivodeship.

**Materials and methods:** A survey was conducted among 206 (100%) residents of the Silesian Voivodeship (154 women – 74.8%, 50 men – 24.3%, 2 non-binary individuals – 1.0%). A self-designed questionnaire assessed frequency and reasons for analgesic use, drug preferences, awareness of side effects, and perception of dependence.

**Results:** NSAIDs, especially ibuprofen (71.4%), were most commonly used, mainly for headaches and migraines. Some respondents reported prophylactic use. Regular use was declared by 5.8%, while 10.8% reported symptoms suggestive of dependence (e.g., dose escalation, anxiety without access), indicating a potentially unrecognized problem.

**Conclusions:** Analgesics are sometimes used without clear indications. Although dependence-related symptoms were reported by a minority, they remain relevant from a public health perspective. The findings suggest insufficient awareness of risks. Educational interventions and greater involvement of healthcare professionals and pharmacists are needed to prevent misuse.

**Keywords:** analgesics, awareness, pain management, OTC, prescription drugs, public health

# Generation of Reporter Plasmid with NF- $\kappa$ B Responsive Element for Screening Anti-Inflammatory Plants

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**Work's tutor: Asst.Prof.Dr. Chutamas Thepmalee**

**Background:** Inflammation is a vital response to harmful stimuli, but when it becomes chronic, it contributes significantly to various diseases. A key mechanism behind this response is the NF- $\kappa$ B signaling pathway. Once stimulated, NF- $\kappa$ B moves into the nucleus and triggers the expression of inflammation-related genes. Additionally, we will develop stable reporter cell lines using a lentiviral delivery system. This will establish a robust and reproducible platform for high-throughput screening of various compounds, including plant extracts, pharmaceutical agents, and cytokines, to evaluate their ability to modulate NF- $\kappa$ B activity. This new reporter system offers a powerful tool for research.

**The aim:** create a more efficient and specific reporter system for real-time monitoring of NF- $\kappa$ B activity.

**Materials and methods:** First, the preparation of pCDH mCherry plasmid backbone; second, the preparation of NF- $\kappa$ B responsive element gene by PCR; third, DNA cloning by the ligation method; after we get the recombinant plasmid, the positive clones were checked by colony PCR; finally, DNA sequencing was performed by Sanger sequencing. Then transfection of NF- $\kappa$ B responsive element plasmid in HEK293T cells.

**Results:** cells without TNF- $\alpha$  stimulation exhibited low red fluorescent, indicating low basal NF- $\kappa$ B activity. In contrast, TNF- $\alpha$  treated cells exhibited strong red fluorescent report gene, indicating robust NF- $\kappa$ B activation and subsequent expression of the mCherry reporter.

**Conclusions:** we developed an NF- $\kappa$ B fluorescent reporter by inserting tandem NF- $\kappa$ B response elements F1, F2, and F3 into the pCDH-mCherry plasmid to drive mCherry gene expression. DNA sequencing confirmed correct insertion and orientation. After verification, the plasmids were tested for functional activity. Further, we will also create stable reporter cell lines using lentiviral transduction for long-term monitoring of NF- $\kappa$ B signaling. These stable cell lines will serve as a useful platform for screening plant extracts, drugs, and cytokines that affect NF- $\kappa$ B activity.

**Keywords:** NF- $\kappa$ B, Reporter system, Anti-inflammatory screening, Lentiviral delivery

# Artificial Intelligence in Medicine: A Review of Applications and an Analysis of Public Opinion in Poland Base

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**Background:** Artificial intelligence (AI) is increasingly used in medical diagnostics and decision support systems. Its rapid development, especially in large language models (LLMs) and deep learning architectures, raises both expectations and concerns. Understanding public attitudes toward these technologies and comparing them with current scientific findings is essential for their safe and effective implementation in clinical practice.

**The aim:** This study aimed to investigate public opinion regarding the use of AI in medicine and to compare these views with the current state of research on clinical applications, particularly large language models and deep learning systems.

**Materials and methods:** An anonymous online survey was conducted using a Google Forms questionnaire. A total of 764 respondents participated, aged between 18 and over 71 years, mostly women, urban residents, and individuals with secondary or higher education. The survey results were analyzed by 2 authors, and conclusions were drawn.

**Results:** Most respondents (89.0%) declared familiarity with the concept of artificial intelligence, and 81.7% expressed a positive or rather positive attitude toward its use in medicine, while only 12.6% had personal experience with medical AI systems. Participants primarily expected improvements in care quality (56.4% believed in reducing diagnostic errors), shorter waiting times for appointments (79.2%), and shorter treatment durations (67.9%), while 90.8% emphasized mandatory verification of AI results by physicians.

**Conclusions:** Both scientific research and societal perspectives highlight the potential of AI in medicine, especially in specialized deep learning and LLM-based systems. However, AI remains limited in its ability to interpret complex clinical contexts and diagnostic nuances. The analysis indicates that AI is highly beneficial and should serve as a clinical decision-support tool that cannot be deployed without professional oversight due to technical and psychological constraints.

**Keywords:** artificial intelligence, large language models, AI, LLM, people's opinion,

# Wound temperature dynamics and inflammatory markers after abdominal surgery

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**Background:** Early detection of healing complications following abdominal surgery remains a clinical challenge. While wireless monitoring enables non-invasive assessment of local tissue response, the association between wound thermal dynamics and systemic inflammation is not clearly defined.

**The aim:** To evaluate the temporal dynamics of postoperative wound temperature after abdominal surgery and determine its association with inflammatory markers: C-reactive protein (CRP), procalcitonin (PCT), and white blood cell (WBC) count.

**Materials and methods:** This prospective preliminary study included 24 patients undergoing abdominal surgery via a subcostal incision. Local wound and control site temperatures were monitored continuously using the NFC-based SteadyTemp system for 72 hours postoperatively (measurements every 6 hours). Analyzed variables included wound temperature, temperature difference ( $\Delta T$ ), and inflammatory markers (CRP on days 0 and 3; PCT and WBC on days 0–3). Non-parametric statistical tests were applied.

**Results:** Wound temperature changed significantly over time ( $p=0.0028$ ), gradually increasing and peaking on the 2nd or 3rd postoperative day. Temperature on day 3 was significantly higher than on day 1 ( $p=0.0244$ ). Neither wound temperature nor  $\Delta T$  exhibited significant correlations with PCT, CRP, or WBC levels. However, a moderate, statistically significant positive correlation was found between general body temperature on the day of surgery and maximum wound temperature ( $\rho=0.47$ ;  $p=0.02$ ).

**Conclusions:** Postoperative wound temperature exhibits specific temporal dynamics following abdominal surgery. Its changes are not associated with systemic inflammatory markers (CRP, PCT, WBC). There is a significant positive correlation between the patient's baseline general body temperature and the maximum postoperative wound temperature.

**Keywords:** Surgical Wound, Body Temperature, Biomarkers, Postoperative Period

## Evaluation of posterior vitreous detachment using wide-field optical coherence tomography.

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Sirek**

**Background:** Posterior vitreous detachment (PVD) is an age-related process leading to the gradual separation of the vitreous cortex from the retina. The introduction of wide-field optical coherence tomography (OCT) imaging enables a more precise and quantitative assessment of this process, including measurement of the distance between the vitreous cortex separation site and the macula (PLM-VD). Previous studies suggest that PVD is progressive and may begin earlier than previously thought.

**The aim:** The aim of this study is to evaluate the stages of PVD using wide-field OCT and to analyze the correlation of this process with patient age and its symmetry between both eyes.

**Materials and methods:** The study included 43 patients (81 eyes) from a university hospital outpatient ophthalmology clinic, with a mean age of 70 years and a median of 75. All patients underwent wide-field OCT examination with assessment of the PLM-VD parameter and classification of PVD stages on a 5-point scale (0-4). The relationship between PVD stage and patient age was analyzed, and results were compared between the patient's eyes. Spearman's correlation test was used for statistical analysis, with a significance level of  $p < 0.05$ .

**Results:** The mean PLM-VD value was  $1000 \mu\text{m} \pm 941 \mu\text{m}$ . The percentage distribution of patients across individual PVD stages was as follows: 0 (30.1%); 1 (6.0%); 2 (3.6%); 3 (10.9%); 4 (49.4%). Analysis showed a moderate but statistically significant positive correlation between patient age and PVD stage in the right eye ( $p = 0.0054$ ) and the left eye ( $p = 0.0022$ ). PVD height shows a strong and statistically significant positive correlation between the right and left eyes ( $p < 0.0001$ ).

**Conclusions:** These results confirm that the progression of PVD is closely related to age, reaching the highest stages primarily in patients over 70 years of age. Furthermore, the results confirmed a high symmetry of the PVD process in the studied patients, suggesting that this process progresses nearly simultaneously in both eyeballs.

**Keywords:** posterior vitreous detachment, optical coherence tomography

# Phenotypic Characterization of Granulocytic Differentiation in K562 Cells Inducibly expressing CEBP $\alpha$

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**Background:** Recent research has reshaped our view of neutrophils, revealing them as adaptable and functionally diverse cells - not just simple innate effectors. Yet, in vitro studies remain challenging due to short lifespan, terminal differentiation, spontaneous activation, and resistance to genetic modifications.

To address this, we developed a K562-based cellular model, with inducible overexpression of the CEBP $\alpha$ , a key granulopoietic transcription factor. The CEBPA gene was introduced via the doxycycline-inducible Tet-ON lentiviral system, allowing K562 cells to differentiate into granulocyte-like cells upon doxycycline treatment.

**The aim:** Our aim was to assess the expression changes of myeloid surface markers during the differentiation of K562-CEBP $\alpha$  cells.

**Materials and methods:** Differentiated and undifferentiated cells were stained with fluorochrome-conjugated antibodies specific to the following surface markers: CD10, CD11b, CD14, CD15, CD16, CD33, CD45, CD62L, CD71, CD80, CD83, CD86, CD117, CD235a, HLA-DR and analyzed by flow cytometry.

**Results:** Our findings indicate that differentiated K562-CEBP $\alpha$  cells acquire expression of the CD11b and CD16 markers. The highest percentage of CD11b+ cells (50%) was observed after 96 hours of incubation with doxycycline, while the highest percentage of CD16+ cells (45%) was already present on the second day of differentiation. During differentiation, both the CD11b+ and CD16+ populations acquired expression of the other marker, emerging as a double-positive CD11b+CD16+ population, which accounted for 28% of all cells at 96 hours of differentiation. None of the examined cells expressed CD10 or CD14.

**Conclusions:** The results show that differentiated K562-CEBP $\alpha$  cells acquire certain granulocytic markers (CD11b, CD16). Among the differentiated cells, three populations can be distinguished: CD11b+CD16-; CD11b-CD16+; and CD11b+CD16+, each of which require functional testing to confirm their granulocyte-like nature. The absence of CD14 expression denies the monocyte-like phenotype of our model.

**Keywords:** K562, CEBP $\alpha$ , Neutrophil-like Cells, Granulocytic Differentiation

# Non-Covalent Interactions Governing Substrate Binding in GH27 $\alpha$ -Galactosidase-Catalyzed Transglycosylation

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**Background:**  $\alpha$ -Galactosidase, a member of the glycoside hydrolase family 27 (GH27), catalyzes the hydrolysis of  $\alpha$ -1,6-glycosidic bonds in carbohydrate molecules and plays a key role in glycan metabolism.

**The aim:** In this study, we investigated the non-covalent interactions (NCIs) responsible for the stability of enzyme–substrate complexes required for  $\alpha$ -galactosidase-catalyzed transglycosylation. Three disaccharides (melibiose, lactose, and sucrose) were considered as acceptor molecules of the transglycosylation and both wild-type (WT) enzyme and two variants (W188A and F235A) were examined.

**Materials and methods:** NCI analysis was performed by analyzing published simulation data, visualizing structures in VMD, and generating interaction plots using NCIweb. This information provides molecular-level insights into the roles of key residues and important NCIs in shaping substrate binding and catalytic outcomes.

**Results:** The results reveal that hydrogen bonds, van der Waals forces, and steric effects contribute to substrate binding at the enzyme active site with different NCI patterns observed between the WT and the mutants. It was found that WT forms stronger and more favorable interactions that support efficient catalysis, whereas alanine mutants weaken key interactions leading to reduced binding stability.

**Conclusions:** These findings highlight the importance of NCIs in substrate recognition, binding stability, and hence enzyme reactivity, offering useful insights for future enzyme engineering and drug development.

**Keywords:**  $\alpha$ -galactosidase, GH27, NCIs, transglycosylation, intermolecular interaction, mutant

# Uncovering common molecular signatures between psoriasis and vitiligo via integrated bioinformatics analysis

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**Background:** Psoriasis (Ps) and Vitiligo (Vit) are chronic autoimmune skin disorders. Despite their distinct clinical phenotypes, emerging evidence suggests a shared genetic architecture and immune dysregulation.

**The aim:** This study aims to identify common hub genes and biological pathways linking Ps and Vit to understand their shared pathogenesis.

**Materials and methods:** Gene expression datasets of Ps and Vit (GSE121212 and GSE75819) were retrieved from the Gene Expression Omnibus (GEO). Differentially expressed genes (DEGs) were identified using GEO2R (adj.p-value < 0.05). Overlapping DEGs were identified via Venny 2.1.0. A protein-protein interaction (PPI) network was constructed using STRING (confidence 0.700) and visualized in Cytoscape. Top 10 hub genes were extracted using the cytoHubba plugin. Furthermore, Gene Ontology (GO) terms and KEGG pathways were performed using Enrichr online program.

**Results:** A total of 103 shared DEGs were identified. The PPI network analysis pinpointed 10 key hub genes: CXCL10, CXCL8, CDK1, TOP2A, UBE2T, BUB1, DLGAP5, CENPN, CKS2, and MAD2L. These genes are predominantly involved in inflammatory responses, chemokine signaling, and cell cycle regulation.

**Conclusions:** The identified hub genes, particularly chemokines (CXCL10, CXCL8) and cell cycle regulators (CDK1, TOP2A), highlight a significant molecular overlap between Ps and Vit. These findings suggest that both diseases share core pathways related to immune-mediated inflammation. In conclusion, these hub genes represent potential shared biomarkers and therapeutic targets for autoimmune skin conditions.

**Keywords:** Psoriasis, Vitiligo, Autoimmune, Hub genes, Bioinformatics

# Artemisinin-Induced Ferroptosis: A Promising Mechanism for Targeted Cancer Therapy

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**Background:** Cancer remains a leading cause of death worldwide, and conventional therapies such as chemotherapy often lack selectivity, causing severe side effects and reducing patients' quality of life. Natural compounds with anticancer properties, including artemisinin (ART) from *Artemisia annua*, offer a promising alternative due to their potentially higher safety profiles and unique mechanisms of action, such as inducing ferroptosis.

**The aim:** This study aimed to evaluate the potential anticancer properties of artemisinin in comparison to the conventional chemotherapeutic agent 5-fluorouracil (5-FU) using *in vitro* and *in vivo* models, and to investigate whether artemisinin's mechanism involves ferroptosis.

**Materials and methods:** The study used three cancer cell lines (HCT116 – colon, CAL51 – breast, HepG2 – liver) and one healthy cell line (CHO-K1). Cell viability was assessed using the MTT assay after 24, 48, and 72 hours of treatment with ART and 5-FU. Iron levels in cells and culture medium were measured as a marker of ferroptosis. Additionally, zebrafish (*Danio rerio*) embryos were used for toxicity tests (FET) and xenograft models to assess antitumor efficacy *in vivo*.

**Results:** ART reduced viability in all cancer cell lines in a time- and dose-dependent manner, with the highest sensitivity in HepG2 cells (IC<sub>50</sub> 27.75 µM at 72h). ART showed significantly lower toxicity to healthy CHO-K1 cells compared to 5-FU. ART induced intracellular iron accumulation in HepG2 cells, consistent with ferroptosis, while 5-FU did not. In zebrafish, ART demonstrated antitumor activity in both HCT116 and HepG2 xenografts but showed higher embryotoxicity (LD<sub>50</sub> 19.96 µg/mL) than 5-FU.

**Conclusions:** Artemisinin exhibits selective anticancer activity and induces ferroptosis, making it a promising natural compound for safer cancer therapy. Further research is needed to improve its bioavailability and assess long-term safety.

**Keywords:** Artemisinin, Anticancer, Ferroptosis, Zebrafish, *In vitro*

## Usage of additive technologies in production of personalized orthoses

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**Background:** There are many, widely available orthosis models, which can be used in various situations. However, in specific conditions of disfunction, those versions do not fulfil need of the patient.

**The aim:** The aim of this project was to develop and manufacture personalized orthosis of difunctional upper limb.

**Materials and methods:** The orthosis's model consisted of three main parts: a hand shell, a forearm shell, and a humeral shell. Each part was designed to fit the specific anatomical dimensions of the injured person. Due to the potential disability, the orthosis was equipped with original connection system, which allowed for the adjustment of immobilization angles according to the user's preferences. The pieces were manufactured using FDM and SLS methods of additive technology. Additionally, the hand section was equipped with a special splint, allowing for the use of molded inserts for various purposes.

**Results:** As a result of this project, two prototypes of inter-scale connection system were developed, differing in their nature of operation and possible applications depending on individual preferences. The additively manufactured parts were then lined with a special orthotic foam to protect against upper limb injuries, but also to enhance comfort and fit. Equipping the orthosis with interchangeable end-effectors allowed for increased usability of the disabled limb, aiding in professional and personal life.

**Conclusions:** Project demonstrates the potential of additive technologies in personalized orthotic care, offering a cost-effective, modular solution suited to the patient's needs and requirements. The project opens the door to further expansion of the proposed design with elements enabling greater functionality and rehabilitation.

**Keywords:** orthosis, additive technology, FDM, SLS, connection system, upper limb

# Design of a Wheelchair with Verticalization Function Connected with Variable Wheelbase

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**Background:** Trail Orienteering is a sport created especially for disabled people, who are unable to participate in Foot Orienteering due to their musculoskeletal disorders. Despite this, there are no wheelchairs designed specifically for this discipline.

**The aim:** The aim of the project was to design a wheelchair dedicated for Trail Orienteering competitions.

**Materials and methods:** The project's concept was based on a survey conducted among members of the Polish National Trail Orienteering Team. Strength calculations, kinematic and dynamic analyses were performed as a fundamental for development of vehicle's load bearing and kinematic structure, as well as its wheel amortization system. The center of mass of the wheelchair and its user was determined in both extreme positions. 3D models of all vehicle components were created. Finite element calculations were performed for an exemplary wheelchair component. Technical documentation was developed in the form of an assembly drawing and working drawings of selected mobility aid's parts.

**Results:** The result of the project is the lightweight wheelchair equipped with a verticalization function combined with a variable wheelbase. Moreover, the vehicle was enriched with many other features extremely useful during Trail Orienteering competitions.

**Conclusions:** The wheelchair's design is a compromise between the needs of most athletes. In the verticalized position connected with the short wheelbase, it provides a more favorable perspective on the flags and greater maneuverability valued on narrow, crowded paths or at decision points. In the configuration with the extended wheelbase, it ensures stability and safety on uneven, demanding forest terrain traveled at higher speeds. However, each athlete has different preferences and needs caused by their disability, so the wheelchair's design allows for a high level of personalization.

**Keywords:** wheelchair, Trail Orienteering, verticalization, variable wheelbase, CAD modeling

# Eleutherine palmifolia Extract: Antioxidant and Anti-Inflammatory Effects in PM10-Exposed Trophoblast Cells

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**Background:** Eleutherine palmifolia (L.) Merr. (Wan Hom Deang) is a local medicinal plant that has been pharmacologically studied and found to have antioxidant, antibacterial, and immunomodulatory effects. Currently, Thailand is facing the problem of particulate matter with a diameter of  $\leq 10$  micrometers (PM10), which can induce inflammatory responses, particularly among pregnant women who are considered a risk group. Prolonged exposure to PM10 may impair trophoblast cell function, which is essential for embryonic implantation and placental development.

**The aim:** This study evaluated the antioxidant activity of E. palmifolia extract and investigated its anti-inflammatory activity in PM10-stimulated trophoblast cells.

**Materials and methods:** E. palmifolia extract was prepared by hot water extraction at 90 °C for 5 and 10 minutes. The antioxidant activity was assessed using DPPH and ABTS radical scavenging assays. For anti-inflammatory activity, trophoblast cells were pre-treated with the extract followed by PM10 stimulation. The mRNA expression of IL-1, IL-6, and TNF- $\alpha$  was then quantified by qRT-PCR.

**Results:** The results demonstrated that the antioxidant activity, as assessed by ABTS and DPPH scavenging assays, showed that 5 and 10 minutes E. palmifolia hot water extracts had significantly greater antioxidant activity. Pre-treatment of trophoblast cells with either 5 or 10 minutes E. palmifolia hot water extracts followed by PM10 exposure potentially inhibited the expression of genes related to inflammation (IL-1, IL-6, and TNF- $\alpha$  in PM10-induced trophoblast cells.

**Conclusions:** These findings suggest that E. palmifolia extract possesses antioxidant and anti-inflammatory properties against PM10-induced responses in trophoblast cells. Further investigation is required to understand the molecular mechanism of E. palmifolia extract for its potential role in protecting trophoblast cell function under air pollution conditions.

**Keywords:** Eleutherine palmifolia (L.) Merr., Trophoblast cell, PM10, Antioxidant, Anti-inflammatory

# From Textbook to Algorithm: A New Era of Learning for Medical Sciences Students

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**Background:** Artificial intelligence (AI) is increasingly used in medical education, offering new tools to support learning. Anatomy remains a challenging subject due to its complexity and volume, requiring both memorization and spatial understanding. AI-based language models may enhance learning, but their accuracy and reliability remain a concern.

**The aim:** To evaluate the effectiveness of selected AI language models in solving anatomy test questions and to assess their use and perceived reliability among medical sciences students.

**Materials and methods:** Three AI models (ChatGPT-4, ChatGPT-5, and Microsoft Copilot) were tested using 207 multiple-choice anatomy questions (5 options each; max. 1035 points), grouped into 12 anatomical categories. Models were instructed to select correct answers only. Scoring was based on agreement with the answer key and verified by academic anatomists. Results were expressed as percentages. Additionally, a survey was conducted among 145 medical sciences students to assess AI usage, purposes, and trust. Descriptive statistics were applied.

**Results:** High accuracy was observed: ChatGPT-5 – 94.40%, ChatGPT-4 – 93.75%, Copilot – 91.88%. Best performance was noted in upper limb and head and neck anatomy, while the lowest was in abdominal topics. Over 95% of students reported using AI, mainly for explanations and revision. Most showed moderate trust and verified information using other sources.

**Conclusions:** Language models demonstrate high effectiveness in solving anatomy test questions and can serve as valuable support in the learning process. However, they should not replace traditional sources of knowledge or expert instruction. A critical approach to AI-generated content and its verification remains essential. The integration of AI in medical education holds significant potential but requires further research and appropriate academic supervision.

**Keywords:** artificial intelligence, medical education, anatomy learning, language models, ChatGPT, Copilot,

# Novel Congo Red-based Drug Delivery Systems: Practical Applications in Oncology

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**Background:** Congo red (CR) forms supramolecular complexes that improve drug stability and cellular uptake. This may enhance the efficacy of tyrosine kinase inhibitors such as dovitinib in pancreatic cancer.

**The aim:** This study aimed to evaluate the biological effects of CR-dovitinib complexes in pancreatic cancer cell lines (PANC-1, BxPC3) and to assess their selectivity towards normal pancreatic cells (HPDE6c7).

**Materials and methods:** Complex formation and stability were analyzed using dynamic light scattering (DLS). Cytotoxicity was evaluated by the MTT assay to determine IC<sub>50</sub> values, while membrane integrity in normal cells was evaluated by the LDH assay. Cell death mechanisms were analyzed by flow cytometry (FACS). Antimigratory effects were evaluated using scratch assays, and long-term proliferative capacity was assessed by a clonogenic assay. The impact on intracellular signaling pathways was examined using capillary-based immunoassay (Jess).

**Results:** The CR-dovitinib complex induced a significant dose-dependent reduction in cancer cell viability, with improved efficacy compared to monotherapy. Limited cytotoxicity toward HPDE6c7 cells was observed. FACS analysis confirmed an increase in induction of cell death. The complex significantly reduced migratory capacity and clonogenic potential, indicating strong antimetastatic and long-term antiproliferative effects. Molecular analysis revealed modulation of AKT and ERK1/2 phosphorylation, suggesting disruption of key survival pathways.

**Conclusions:** Supramolecular complexation with Congo red enhances the therapeutic profile of dovitinib by improving its efficacy while maintaining selectivity towards normal cells. These findings highlight CR-based systems as a promising and versatile platform for targeted pancreatic cancer therapy with potential translational relevance. The research was funded by the Polish Ministry of Science and Higher Education and the European Union as part of the program Support for students in increasing their competences and skills (MNIŚW/2025/DPI/649).

**Keywords:** Congo red, Drug delivery systems, Pancreatic cancer, Dovitinib, Supramolecular complexes

# Impact of Simulated Artifacts on Classification of Apical TTE Views Using CNNs

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**Background:** Artificial intelligence (AI), particularly deep convolutional neural networks (CNNs), is increasingly used for automated echocardiographic analysis. This study evaluated the impact of image artifacts—motion blur, acoustic shadowing, and speckle noise—on the classification of standard transthoracic echocardiographic (TTE) views using ResNet models.

**The aim:** The aim of this study was to quantitatively evaluate and compare the robustness of ResNet-18 and ResNet-34 architectures in the automated classification of standard apical TTE views (A2C, A3C, A4C, and A5C). The study assessed the impact of varying intensities of three common echocardiographic artifacts (motion blur, acoustic shadowing, and speckle noise) on classification performance.

**Materials and methods:** The analysis included 217 TTE video clips (2,170 frames) covering apical views: two-, three-, four-, and five-chamber (A2C, A3C, A4C, A5C). Two convolutional neural networks—ResNet-18 and ResNet-34—were applied, initialized with pretrained ImageNet weights. Classification performance was evaluated at the frame level under controlled image degradation. Three artifact types were simulated: motion blur, acoustic shadowing, and speckle noise.

**Results:** All artifacts reduced classification performance. Speckle noise had the strongest effect, decreasing accuracy from ~85% to below 30%. Motion blur caused a gradual decline (~80% to ~50% from mild to severe). Acoustic shadowing reduced accuracy to ~72–74% even at low intensity, stabilizing around ~65% at higher levels. ResNet-34 consistently outperformed ResNet-18 by 5–7 percentage points, but did not compensate for severe degradation.

**Conclusions:** Image degradation significantly impairs CNN-based TTE view classification. Speckle noise is the most detrimental artifact, while acoustic shadowing has a moderate impact. These findings highlight the need for artifact-aware training strategies, including data augmentation, to improve robustness in clinical conditions.

**Keywords:** AI, transthoracic echocardiography, CNN, motion blur, acoustic shadowing, speckle noise

## Project of an innovative biomaterial scaffold preventing glioblastoma recurrence.

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**Background:** Glioblastoma IDH wildtype WHO Grade 4 (GBM) is the most aggressive brain tumor in adults characterized by resistance to the treatment. Moreover, GBM is associated with an almost 100% risk of recurrence, which nearly always occurs in the immediate vicinity of the primary lesion. The current standard of treatment (surgical resection combined with radiochemotherapy using temozolomide (TMZ))—remains palliative, as a complete tumor removal is not yet achievable. As a result, the median survival of patients with GBM does not exceed 15 months from diagnosis. This necessitates the search for new therapeutic strategies. Recent studies have highlighted the role of cannabidiol (CBD) in alleviating certain features of tumor malignancy. However, in the context of GBM recurrence, the effects of CBD are not yet fully understood.

**The aim:** In response to this challenge, the aim of our project is to develop a non-immunogenic, layered composite (biomaterial) that will enable the controlled release of TMZ and CBD into the postoperative cavity in order to inhibit local GBM recurrence.

**Materials and methods:** Parallel studies (conducted at Silesian Medical University and Silesian University of Technology) are focused on obtaining a composite with defined physicochemical and biological properties. In vitro studies were carried out under hypoxic conditions and in a modern flow bioreactor using 3D scaffolds. Imaging of cellular and mitochondrial changes was performed using a Nanolive holotomographic microscope.

**Results:** The doses of TMZ and CBD that produced the strongest cytotoxic effect were experimentally determined following direct administration to cultures of three GBM cell lines. The results obtained so far have also shown that CBD induces changes at the mitochondrial level in glioma cells.

**Conclusions:** CBD, released in a controlled manner from the developed composite, appears to be a promising component of adjuvant therapy due to its multifaceted anticancer activity against GBM.

**Keywords:** Glioblastoma, Biotechnology, Chemotherapy, Cannabidiol

# Malassezia pachydermatis as a zoonotic pathogen - occurrence and clinical implication in humans

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**Background:** *Malassezia pachydermatis* is a non-lipophilic yeast that is predominantly associated with the skin and external ear canal of domestic animals. Unlike other *Malassezia* species, it is not a commensal of the human microbiota and is traditionally regarded as non-pathogenic. However, accumulating evidence highlights its potential for interspecies transmission and its capability to cause skin infections in humans.

**The aim:** The aim was to investigate the frequency of *M. pachydermatis* isolation from feline and canine ear canals as a potential source of skin colonization for their owners.

**Materials and methods:** A retrospective analysis was conducted on laboratory results for ear swab samples collected from dogs and cats over a one-year period.

**Results:** Over a 12-month period, 496 animals were examined via ear canal swabs (71 cats, 425 dogs). Mycological testing (culture on Sabouraud medium) was performed on 416 animals. As many as 32.5% (161 cultures) were positive for *M. pachydermatis*.

**Conclusions:** The prevalence of *M. pachydermatis* in the ear canals of animals remains high, potentially due to favourable growth conditions (moist environment, long ear flaps in certain dog breeds). Therefore, there is a risk of high contamination among pet owners. Those who are potential carriers and come into contact with immunocompromised individuals, particularly premature infants, should be especially cautious. *M. pachydermatis* can cause serious secondary infections.

**Keywords:** zoonosis, mycology, skin infection, yeast

# Analysis of the Necroptosis Pathway Gene Expression Profile in Colorectal Cancer

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**Background:** Colorectal cancer (CRC) is characterized by high mortality and increasing resistance to treatment [1]. A key element of its pathogenesis is the evasion of programmed cell death, including necroptosis—regulated necrosis dependent on the necrosome complex (RIPK1, RIPK3, MLKL). This process serves as an alternative to apoptosis and plays a dual role: it can either inhibit tumor growth or promote an inflammatory environment conducive to tumor progression [2,3].

**The aim:** To evaluate the expression profile of necroptosis-related genes in CRC tissue relative to surgical margins and to analyze the dynamics of these changes according to the clinical TNM stage (1-4).

**Materials and methods:** Tumor sections and surgical margins from patients at various stages were examined. The analysis was conducted in two stages. The preliminary stage involved microarray screening, which identified RIPK1 as a key gene differentiating the studied groups. The current stage focused on verification via RT-qPCR for the RIPK1, RIPK3, and MLKL genes. The application of qPCR allowed for a precise assessment of necrosome components, addressing the lack of specific probes on the previous platform and validating archival transcriptomic results.

**Results:** Biological process analysis confirmed that the necroptotic pathway most significantly differentiates the studied groups [4]. RT-qPCR measurements revealed statistically significant dysregulation of the necrosome in tumor tissue. Consistent with the literature, a decrease in the mRNA expression of RIPK3 and MLKL correlates with TNM stage progression, increased tumor invasiveness, and poorer patient prognosis [5].

**Conclusions:** RT-qPCR, as a method for validating archival microarray data, allowed for a more comprehensive characterization of the necroptosis pathway in CRC. The demonstrated dysregulation of RIPK1/RIPK3/MLKL genes confirms the significance of necroptosis impairment in oncogenesis and highlights these components as potential molecular markers useful in diagnostics and targeted therapy strategies.

**Keywords:** Colorectal cancer, Necroptosis, Gene expression profiling, Molecular biomarkers, TNM staging

# Protein Corona Modulates Cellular Uptake and Transfection Efficiency of DMAEMA Star Polymers

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**Background:** Polycationic DMAEMA star polymers are promising candidates for gene delivery; however, their interactions with serum proteins critically affect cellular uptake. We previously observed that FBS markedly reduces polymer association with cells, indicating rapid protein corona formation.

**The aim:** This study aimed to determine how complexation with various proteins and designed ligand-containing peptides modulates polymer uptake, receptor interactions, and transfection efficiency.

**Materials and methods:** DMAEMA stars were complexed with BSA, fibrinogen, vitronectin, transferrin, or a synthetic peptide. The peptide was engineered with an acidic domain for polymer binding, a neutral linker, and a VEGFR-1 ligand. Complex formation was evaluated using UV-Vis, DLS, and cryo-TEM. Biological interactions were assessed in HT-1080 cells, and VEGFR-1 overexpressing clones using flow cytometry. Receptor involvement was evaluated using vitronectin and competitive ligand blocking. Transfection efficiency was assessed using luciferase reporter assays.

**Results:** Protein complexation led to the formation of larger structures compared to native stars, with size and properties depending on protein type. Complexation with BSA resulted in large aggregates, whereas the synthesized peptide formed significantly smaller, electron-dense structures. Vitronectin-containing complexes exhibited receptor interaction in competitive assays; however, neither vitronectin nor the targeted peptide improved selective uptake or reduced nonspecific binding in HT-1080 cells. However, peptide-coated polyplexes demonstrated a marked increase in pDNA transfection efficiency in both cell lines.

**Conclusions:** The results suggest that the synthetic peptide corona enhances transfection not through receptor-mediated targeting, but by shielding the polycationic core from unfavorable serum protein interactions. This likely promotes the formation of smaller, more stable, and efficient polyplexes, offering a promising strategy for optimizing non-viral gene delivery vectors.

**Keywords:** protein corona, cationic polymer, gene delivery, transfection, cellular uptake, serum proteins

# Design of a Lightweight Pressure Vessel for Portable Medical Oxygen Storage

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**Background:** Development of medical technologies creates a constant demand for ergonomic and lightweight equipment. Traditional high-pressure oxygen cylinders, typically made of aluminum alloys or steel, are often heavy, which results in a significant burden for medical staff and individual patients with respiratory diseases. Composite type 4 pressure vessels offer a superior strength-to-weight ratio, allowing for a great reduction in weight while allowing for high operating pressures.

**The aim:** The primary objective was to design and manufacture a lightweight, portable pressure vessel for medical oxygen storage. The work aimed to develop a functional prototype with high weight efficiency and ergonomic dimensions suitable for manual transport. The research focused on selecting appropriate materials, including a polymer liner and fibre reinforcement, and optimizing the winding strategy based on an analysis of structural parameters found in available composite solutions.

**Materials and methods:** The research involved reverse engineering of type 4 vessels to identify structural patterns. Methods included calcination of composite samples to determine fibre angles and the volumetric ratio of polymer to fibre, as well as an analysis of cross-sections to measure number of layers. For the prototype, a custom liner was made using a PET bottle, which was then reinforced with glass fibre using wet filament winding method.

**Results:** The prototype weighed 1235 grams, which is around 27% less in comparison to available aluminum vessels of similar capacities. The structure withstood a pressure of 550 bar during a burst test, which means the safe working pressure of the cylinder is around 180-220 bar, allowing for storage of roughly 240-290 liters of oxygen.

**Conclusions:** The produced vessel represents a viable, lightweight solution for medical applications. Achieved burst pressure ensures safe operation at desired working conditions. Future changes to fibre orientation and usage of a lighter, carbon reinforcement could further improve current results.

**Keywords:** medical oxygen, high pressure composite vessel, fibre winding, fibre architecture winding

# Comparative Evaluation of Large Language Models in the Polish National Specialty Examination in Angiology

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**Background:** Large Language Models (LLMs) are increasingly evaluated in medical education, yet evidence regarding their performance in specialized postgraduate examinations remains limited. This study compared four LLMs on the Polish National Specialty Examination (PES) in angiology and identified factors associated with correct responses.

**The aim:** The purpose of this study was to compare the accuracy of four LLMs on the Polish National Specialty Examination (PES) in angiology and identify key predictors of their success.

**Materials and methods:** 360 questions from three PES sessions (2016–2017) were used to evaluate ChatGPT-3.5, ChatGPT-4o, DeepSeek Chat, and Gemini Turbo. Each question was submitted five times in separate stateless sessions. Questions were classified by Bloom's taxonomy, clinical relevance, and thematic subtype. Statistical analyses included chi-square, Cochran's Q with McNemar post-hoc, Friedman, Wilcoxon, Spearman correlation, logistic regression, Fleiss' kappa, and Mann-Whitney U tests.

**Results:** Gemini Turbo achieved the highest overall accuracy (81.67%), followed by ChatGPT-4o (71.94%), DeepSeek Chat (66.67%), and ChatGPT-3.5 (37.22%). Differences were highly significant (Cochran's Q= 231.24;  $p < 0.001$ ). Memory-based questions were answered more accurately than those requiring comprehension and critical thinking (OR= 1.41; 95% CI: 1.09-1.81;  $p= 0.0081$ ). Human-derived difficulty was the strongest predictor of model success (OR= 12.76; 95% CI: 8.50-19.16;  $p < 0.001$ ). Agreement between models was low (Fleiss' kappa= 0.254). Despite higher performance in newer models, all exhibited limited confidence calibration and generated high-confidence incorrect answers.

**Conclusions:** Three LLMs passed the PES threshold, though performance was model-dependent. Limited calibration and high-confidence errors suggest that success in multiple-choice settings should not be equated with reliable specialist-level clinical reasoning. LLMs may support medical education, but remain unsuitable for autonomous clinical decision-making.

**Keywords:** large language models; artificial intelligence; angiology; clinical reasoning

# Surgeons of Tomorrow: Impact of a Vascular Surgery Summer School

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**Background:** With limited opportunities to gain early exposure to specialised surgical fields. Immersive surgical experiences possess potential to provide practical insights, shape career aspirations and inspire the next generation of surgeons.

**The aim:** The aim was to assess the impact of a one-week intensive vascular surgery summer school (VSSS) on knowledge, practical skills and career decisions of medical students.

**Materials and methods:** Students in 4th/5th year from European Universities partook in the programme, led by vascular surgeons. The programme consisted of workshops (Suturing, Endovascular Procedures, Vascular Imaging), Outpatient exposure, simulation centre scenarios, case discussions and assistance in the operating room (OR). One-on-one mentorship from vascular surgeons was provided to offer personalised guidance and career advice.

**Results:** All reported significant improvements in technical skills and clinical confidence. Hands-on workshops and OR experience were cited as most valuable. Students emphasised “support” and “approachability” of the vascular team as key drivers in fostering “an open and collaborative environment”. Mentorship was highlighted as particularly influential in shaping career aspirations with all reporting that the programme influenced their decision to pursue vascular surgery. Attendance was perceived as “extremely beneficial” to enhance career networking. Feedback on improvement yielded a desire to extend the programme, with more advanced surgical workshops and OR exposure.

**Conclusions:** Feedback indicated personalised teaching, proactive workshops and consistent mentorship significantly enhanced competency in combining theoretical knowledge with practical applications. VSSS successfully demonstrated the value of specialty-focused education in medical training, with unanimous reports of it “exceeding expectations” and highly recommended by all. Early exposure to surgical subspecialties within immersive and mentorship-driven programmes has the potential to inspire and shape the surgeons of tomorrow.

**Keywords:** Surgery, Vascular Surgery, Surgical Education

# Predictors of Excess Weight Loss Twelve Months After Sleeve Gastrectomy

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Wałędzia

**Background:** Laparoscopic sleeve gastrectomy is one of the most commonly performed bariatric procedures worldwide. Despite its overall effectiveness, substantial interindividual variability in postoperative weight loss remains. Identification of clinical factors present at the time of qualification for surgery may improve patient counseling and outcome prediction.

**The aim:** To assess demographic and clinical predictors of percentage excess weight loss (%EWL) twelve months after laparoscopic sleeve gastrectomy, with particular emphasis on body mass index at qualification for surgery.

**Materials and methods:** A retrospective cohort study including 100 patients undergoing laparoscopic sleeve gastrectomy was performed. The primary outcome was %EWL at 12 months postoperatively. Univariate analyses using independent-samples t-tests evaluated associations between %EWL and selected comorbidities, including hypertension and type 2 diabetes mellitus. A multivariable linear regression model was constructed incorporating body mass index at qualification for surgery, age at surgery, sex, hypertension, and type 2 diabetes mellitus. Model assumptions and collinearity were assessed.

**Results:** Univariate analyses demonstrated that patients with hypertension and type 2 diabetes mellitus achieved significantly lower %EWL at 12 months compared to patients without these conditions. In the multivariable model, however, body mass index at qualification for surgery and age at surgery emerged as the only independent predictors of %EWL. Higher BMI at qualification and older age were associated with reduced postoperative weight loss, while hypertension, type 2 diabetes mellitus, and sex lost statistical significance after adjustment.

**Conclusions:** Although hypertension and type 2 diabetes mellitus are associated with lower %EWL in univariate analyses, body mass index at qualification for surgery and age at surgery are the principal independent predictors of weight loss twelve months after laparoscopic sleeve gastrectomy.

**Keywords:** Laparoscopic sleeve gastrectomy, Bariatric surgery, Excess weight loss (%EWL), Predictive factors

# Is the da Vinci System Truly Intuitive? Insights from the EBLUS Novice Study

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**Background:** The rapid expansion of robot assisted surgery has transformed modern surgical practice, particularly in urology. Beyond improved visualization, ergonomics, and patient benefits, an important question remains: how intuitive are robotic systems for individuals without prior surgical experience? Objective data on usability in complete novices is still limited.

**The aim:** This study aimed to assess whether robot-assisted surgery (RAS) may function as an intuitive interface facilitating early acquisition of basic minimally invasive skills.

**Materials and methods:** The European Basic Laparoscopic Urological Skills (EBLUS) Novice study included primarily medical students from various centers and junior healthcare professionals without prior laparoscopic or robotic experience. In this prospective multicenter study, participants performed two EBLUS tasks (Peg Transfer, Needle Guidance) after standardized instruction, using 2D laparoscopy (2Dlap), 3D laparoscopy (3Dlap), or RAS. Tasks had no strict time limit. Performance was assessed by completion time and errors. Workload was evaluated using NASA Task Load Index (NASA-TLX), and discomfort on a 0–10 scale.

**Results:** Preliminary analysis showed that robotic participants achieved performance approaching EBLUS criteria despite no prior experience. Workload and discomfort were lower in RAS and 3Dlap compared to 2Dlap. These findings suggest that robotic assistance and 3D laparoscopy may reduce technical difficulty and cognitive and physical burden during initial task performance.

**Conclusions:** Robotic systems may offer a more intuitive interface for novices. By reducing cognitive load and facilitating early task execution, both RAS and 3D laparoscopy may lower the technical barrier to minimally invasive surgery, with implications for future training pathways.

**Keywords:** Robotic surgery. Surgical education. Laparoscopy. Training pathways. Novices

# ANALYSIS OF THE RELATIONSHIP BETWEEN THE SIZE AND NATURE OF SURGICALLY REMOVED ADRENAL TUMORS

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**Background:** Adrenal tumors constitute a heterogeneous group of lesions with diverse morphological structure and potential hormonal activity. Indications for removal are based on clinical presentation, diagnostic imaging and biochemical tests. Large tumor size may indicate malignant nature and constitute a rationale for surgery.

**The aim:** The aim of the study was to analyze the relationship between the size and nature of surgically removed adrenal tumors.

**Materials and methods:** A retrospective study included 317 patients treated between 2018 and 2025 at the Department of General, Vascular and Transplant Surgery, Medical University of Silesia, Katowice (SUM). Adrenalectomy was performed using open or laparoscopic method. Pathological examination was performed at the Departments of Pathomorphology of SUM and the Provincial Specialist Clinics in Katowice. Lesions were classified as benign or malignant. The largest dimension was assumed as tumor size.

**Results:** Mean age was  $57 \pm 13$  years (13–84). Primary tumors constituted 85.5% of lesions. The most common diagnoses were: adrenocortical adenoma (36.3%), pheochromocytoma (21.8%), lipoma/myelolipoma (8.8%), and nodular hyperplasia (6.3%). Less frequent: adrenocortical carcinoma (5.7%), cyst (3.5%), ganglioneuroma (1.6%), and hemangioma (1.6%). Metastases accounted for 8.8%: renal cell carcinoma (6.0%) and others (2.8%). Other rare lesions comprised 3.8%. Malignant tumors accounted for 15.5%.

The mean size of benign tumors was  $4.74 \pm 2.65$  cm (0.8–14): pheochromocytoma -  $5.33 \pm 2.41$  cm; adenoma -  $3.75 \pm 2.24$  cm; lipoma/myelolipoma -  $6.80 \pm 2.75$  cm; ganglioneuroma -  $7.5 \pm 3.46$  cm; hemangioma -  $6.67 \pm 3.79$  cm. The mean size of malignant tumors was  $6.75 \pm 3.69$  cm (0.5–15): adrenocortical carcinoma -  $8.11 \pm 4.38$  cm; metastasis -  $5.68 \pm 2.69$  cm.

## **Conclusions:**

Malignant tumors, particularly adrenocortical carcinoma, were significantly larger than benign lesions. No difference was found between metastatic and benign tumor size.

## **Conclusions:**

**Keywords:** adrenal tumor, adrenalectomy, adrenocortical carcinoma, pheochromocytoma, tumor size, malignancy

# Comparative Analysis of Sclerotherapy Foam Quality: Manual Method vs Varixio Device

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Tomasz Urbanek

**Background:** The minimal invasive varicose vein treatment is a valid alternative to the classical surgical approach. One of the important methods used in this field is foam sclerotherapy; however, due to the lack of an optimal method of sclerosing foam production, there is a significant problem with treatment standardization. New technical developments open possibilities to improve foam sclerotherapy efficacy, safety, and standardization.

**The aim:** The aim of this study is to analyze the quality of foam used in sclerotherapy, obtained using a manual method (PCF – physician compounded foam) and foam generated with the automatic device (Varixio).

**Materials and methods:** Sclerosing foam was prepared using two techniques: the manual Tessari method and the Varixio device. Polidocanol was tested at four concentrations: 0.25%, 0.5%, 1% and 2%. In the Tessari method foam was produced using a 1:4 liquid to air ratio. Foam stability was assessed by measuring foam half-life time (FHT) as well as by the analysis of the foam structure (morphology) changes up to 3 minutes after foam production. Measurements were conducted immediately after foam preparation.

**Results:** The mean half-life dilution time for the foam concentrations of 0.25%, 0.5%, 1% and 2% were 105, 117, 130 and 162 seconds respectively. The number of the macrobubbles visible in the morphological analysis correlated with the foam concentration, however was significantly lower in the automatic device (Varixio) produced foam). The use of the automatic device created foam increased the stability of the foam in the patient with 0.25% and 0.5 % as well as increased the foam half-life dilution time by 1.3 to 2.6 times.

**Conclusions:** Foam stability is influenced by both sclerosant concentration and preparation technique. Foam generation using automatic device provides more stable foam compared to the manual Tessari method. These findings suggest that device-assisted foam preparation may potentially improve clinical efficacy and safety of foam sclerotherapy.

**Keywords:** foam sclerotherapy, polidocanol, foam half-life, Tessari method, Varixio, foam stability

# Is lower limb bandaging simple and easy procedure? – critical appraisal

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**Background:** Compression therapy is used in the chronic venous and lymphatic diseases. Its effectiveness depends on the compression level provided by the bandage, which should reach at least 40mmHg at rest and increase during walking. The application of the medical compression by the health care providers (HCPs) can significantly differ between the treatment centers and bandage applying persons influencing the treatment efficacy.

**The aim:** The aim of this study was to assess the quality of the short stretch compression bandage (Rosidal® K) application among the HCPs as well as to evaluate whether simple instruction can improve the medical students' skills.

**Materials and methods:** 40 participants were included: 20 medical students with no prior experience in compression bandaging and 20 HCPs. Students applied compression bandaging as they believed was correct, without any additional guidance. The sub-bandage pressure was measured at rest, standing and walking using a Kikuhime pressure monitor (TT MediTrade) and sensors placed on the calf (at points B1 and C). After demonstration of the correct technique, students were tested again. HCPs were evaluated once using the same measurement approach.

**Results:** 90% of students failed to achieve effective bandaging reaching on average 29.4mmHg and at B1 point 28.9mmHg  $\pm$  16.7. After an explanation, 35% of students achieved the maximum pressure of 40-49mmHg, 25% achieved 50-59mmHg and 40% achieved  $\geq$ 60mmHg in lying position. All of them were able achieve the correct pressure gradient, and an increase in pressure during movement - the respective values were 15%, 20% and 65%. In the health care provider study part the rate of the properly applied compression ranged from 40 to 60% depending on the group of the HCPs.

**Conclusions:** Medical students generally cannot apply compression bandages, however, a simple explanation and demonstration improves their skills. A notable proportion of HCPs did not reach the recommended pressure levels, indicating how important is strengthening of professional competencies.

**Keywords:** compression therapy, bandaging, Kikuhime pressure monitor

# Serum PTH and ionised calcium in women with PHPT and vitamin D3 deficiency

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**Background:** Primary hyperparathyroidism (PHPT) is the most common cause of hypercalcemia, and its clinical course may be modulated by vitamin D<sub>3</sub> levels. Vitamin D<sub>3</sub> deficiency may exacerbate disturbances in calcium–phosphate metabolism and parathyroid hormone (PTH) secretion.

**The aim:** To assess the impact of vitamin D<sub>3</sub> deficiency on serum PTH and ionized calcium (Ca<sup>2+</sup>) levels in women with PHPT.

**Materials and methods:** The study included 47 female patients hospitalized at the Department of General and Endocrine Surgery, Medical University of Silesia in Katowice, between November 2022 and May 2023. Patients were divided into two groups according to vitamin D<sub>3</sub> levels: <30 ng/ml (n=25) and >30 ng/ml (n=22). Serum PTH, Ca<sup>2+</sup>, and vitamin D<sub>3</sub> levels were measured 24 hours prior to planned surgical treatment. Statistical analysis was performed using appropriate tests, with p<0.05 considered statistically significant.

**Results:** PTH levels were significantly higher in patients with vitamin D<sub>3</sub> deficiency (266.2 vs 148.8 pg/ml; p=0.013). Similarly, Ca<sup>2+</sup> levels were higher in this group (1.5 vs 1.4 mmol/l; p=0.037). No significant differences were observed in age or BMI.

**Conclusions:** Vitamin D<sub>3</sub> deficiency in patients with PHPT is associated with higher PTH and Ca<sup>2+</sup> levels.

**Keywords:** Primary hyperparathyroidism, vitamin D deficiency, parathyroid hormone, ionized calcium, hypercalcemia

# Jejunioleal gastrointestinal stromal tumors: clinicopathological characteristics and surgical outcomes

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**Background:** Gastrointestinal stromal tumors (GISTs) located in the jejunum and ileum in the majority of patients become symptomatic at the time of diagnosis, or the tumor is palpable on physical examination. The most common clinical manifestations include gastrointestinal or intra-abdominal hemorrhage, associated with either acute or gradually developing anemia and abdominal pain. The standard treatment is complete surgical resection, however, it may be insufficient, and additional adjuvant therapy may be required.

**The aim:** The aim of this single-center study was to assess the clinicopathological characteristics, diagnostic methods and treatment strategies in patients diagnosed with jejunioleal GIST.

**Materials and methods:** This retrospective study included 8 patients (5 males, 3 females) with a mean age  $61.4 \pm 12.6$  years and BMI  $26.9 \pm 3.1$  kg/m<sup>2</sup> who underwent open or laparoscopic tumor resection between 2017 and 2024. The choice of surgical approach depended on tumor size, degree of local invasion, and the patient's individual operative risk.

**Results:** Clinical symptoms were present in 6 (75%) patients, and abdominal pain was the most common symptom reported in 5 (62.5%) cases. The most frequent tumor location was jejunum, found in 5 (62.5%) patients. Open surgery was more commonly performed (n = 6, 75%) compared to the laparoscopic surgery (n = 2, 25%). Most tumors showed high expression of CD117 and DOG1 (both in 7 patients, 87.5%), as well as CD34 (n = 5, 62.5%) and SMA (6, 75%), while S-100 expression was absent. According to the NIH classification, most tumors were classified as very low or low risk (n = 5, 62.5%) and had a low mitotic index (mitotic figures  $<5/50$  HPF\*) rather than intermediate or high risk tumors (n = 3, 37.5%)  $p < 0.05$ .

**Conclusions:** Lower NIH risk categories are associated with smaller tumor size and a lower mitotic index, indicating a more favorable tumor biology and potentially improved clinical prognosis.

**Keywords:** GIST, jejunum, ileum, open surgery, laparoscopic surgery

# Clinical outcomes in patients with peripheral arterial disease and femoral amputations

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**Background:** Femoral amputation is one of the most common consequences of the acute as well as critical lower limb ischemia. The most commonly reported causes may be: arterial thrombosis, embolism or trauma and in many cases the significant prevalence as well as the severity of the concomitant diseases can be found.

**The aim:** Evaluation of complications of femoral amputations in terms of patient survival and their further prognosis.

**Materials and methods:** The analyzed group consisted of 59 women (36,2%) and 104 men (63,8%), who underwent femoral amputation in the Department of General and Vascular Surgery, Angiology and Phlebology between January 2022 and December 2024. The average age of the women was 69 and the men 73. We collected data about risk factors, cause and length of hospitalization, and treatment complications. According to the available follow up data the mortality as well as the chance for the patient mobilisation were also analysed.

**Results:** The most common procedure was primary femoral amputation (58,9%) and the main cause of hospitalization was critical ischemia with constant pain and necrosis (58,3%). In the majority of patients, the cause of ischemia was arterial thrombosis. Postoperative complications occurred in 37,4% patient with femoral amputations. 36 patients died perioperatively – the early mortality was - 22,1% (11,7% women and 10,4% men). The analysis concerning the follow up mortality rate is pending.

**Conclusions:** Femoral amputation remains a surgical procedure that can be implemented to save patients' lives. However, the high in hospital mortality rate correspond with the significant advancement of cardiovascular disease (especially heart ischemic disease), positioning this patient population among the patients with high risk of major cardiovascular events.

**Keywords:** peripheral vascular disease, ischemia of lower limb, femoral amputations

# Glass of Water or Medical Compression – Which One Is More Effective?

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**Background:** Medical compression (MC) is widely used in the treatment of venous and lymphatic system disorders. However, despite its common use, several limitations should be noted, including patient compliance and tolerance to compression.

To increase the efficiency of compression, various methods can be applied, including elastic or inelastic compression, compression wraps, or compression stockings. Despite these options, in some cases the tolerance of compression therapy remains insufficient. One of the newer approaches is the use of hydrostatic pressure and aquatic compression.

**The aim:** The aim was to quantify the hydrostatic pressure acting on the lower limbs during exercises in an aquatic environment and then, based on the obtained data, to design and initially evaluate a proprietary therapeutic method using Pascal's Law.

**Materials and methods:** In the first part of the study, the certified Kikuhime underclothing pressure measurement system was used to monitor the hydrostatic pressure exerted on the distal lower limbs of individuals performing a standardized pool-based exercise protocol. Subsequently, measurements of compression pressure in out-of-pool conditions were performed based on Pascal's law, and a model of aquatic compression was proposed.

**Results:** Measurements using the Kikuhime device enabled monitoring of pressure changes around the ankle and lower leg during water-based kinesiotherapy. Underwater pressure depended on the depth of measurement and, in pool conditions, ranged from 65 to 74 mmHg at a depth of 100 cm, and from 95 to 107 mmHg at a depth of 150 cm. In the part of the experiment focusing on the hydrostatic compression model, a non-stretch compression model containing a water bag was proposed, achieving pressure at the ankle level above 60 mmHg, with a low level of reported local discomfort.

**Conclusions:** The new method allows maintenance of the unique advantages of hydrostatic pressure while eliminating the main disadvantages of hydrotherapy, and ensures independence from swimming pool infrastructure.

**Keywords:** Medical compression, compression therapy, hydrostatic pressure, hydrotherapy, aquatic compression

# Iliac vein compression in patients suffering from abdominal aortic aneurysm

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**Background:** The left iliac vein compression by the right iliac artery (May Thurner syndrome) remains one of the anatomy-related important DVT risk factors. The presence of the large abdominal aortic aneurysm in the distal aortic segment can potentially compromise the venous outflow from the lower limbs due to caval and ilio-caval obstruction, however, there are still very few reports documenting an increased rate of DVT occurrence due to iliac vein compression by the enlarged aortic aneurysm sac.

**The aim:** In the study the prevalence of the caval and iliac vein stenosis related to the isolated abdominal aortic aneurysm presence was evaluated.

**Materials and methods:** The study was performed on a group of 100 AAA patients with an isolated abdominal aortic aneurysm. On the basis of the angio-CT analysis the prevalence of the aortic as well as iliac vein stenosis was evaluated. The diameters of the aortic aneurysm, inferior vena cava as well as left and right common iliac veins were measured and compared with the iliac vein and caval vein diameters in the control group without abdominal aortic aneurysm of the same age.

**Results:** In the preliminary analysis of 50 AAA patients with AAA diameter >5.5 cm as well as 30 control group cases, the prevalence of the iliac vein stenosis was significantly higher in the non-AAA group. The prevalence of the left iliac vein stenosis > 50% concerned 48% of the control group and in 22% the stenosis over 70% was noticed. In the AAA patients the presence of the significant iliac vein stenosis (>50%) was observed in 32% with the prevalence of the stenosis exceeding 70% in 15% of cases. In none of the patients the thrombotic or postthrombotic changes within ilio-caval vein segment were noticed.

**Conclusions:** The presence of the isolated abdominal aortic aneurysm reduces the rate of the anatomical obstruction of the iliac veins. Except for the anatomical factors related to the AAA size (diameter), the potential dilatation but also elongation of the iliac arteries should be taken into consideration.

**Keywords:** may thurner syndrome, abdominal aorta aneurysm, iliac vein stenosis, anatomical compression

# Analysis of etiology, factors affecting mortality and treatment outcomes in patients with AMI

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**Background:** Acute mesenteric ischemia (AMI) is a vascular emergency caused by a sudden reduction of mesenteric blood flow. Although AMI accounts for only approximately 0.1% of hospital admissions, it remains a life-threatening condition with a high mortality rate.

**The aim:** To assess the primary etiology, clinical presentation, applied treatment strategies and factors associated with in-hospital mortality in patients admitted de novo with acute mesenteric vascular disease.

**Materials and methods:** A retrospective analysis was performed of patients admitted on an emergency basis with acute vascular disease of the intestine to the hospital between 2022 and 2026. Demographic data, etiology, presenting symptoms, comorbidities, laboratory and imaging findings, surgical procedures, complications and outcomes were collected. Continuous variables are presented using the Mann–Whitney U test; categorical variables were compared with Fisher's exact test.

**Results:** A total of 26 patients were included — 13 men (50.0%) and 13 women (50.0%) with a median age of 78 years (IQR 73–83, range 62–97). Embolism of the superior and/or inferior mesenteric artery was the predominant etiology, identified in 15 patients (57.7%) and constituting the principal subgroup of clinical interest. The most frequent comorbidities were arterial hypertension (73.1%), ischemic heart disease (53.8%). Surgical embolectomy of the mesenteric artery was performed in 21 patients (80.8%), intestinal resection in 13 (50.0%). The most common postoperative complications included cardiac arrest (46.2%) and respiratory failure (42.3%). In-hospital mortality was 62.5% (15/24 patients with a known outcome).

**Conclusions:** The results confirm the poor prognosis of AMI in elderly patients with a high burden of cardiovascular comorbidities, and underline the dominant clinical and epidemiological role of SMA embolism in this population. Prospective multicenter studies are needed to identify reliable predictors of mortality and to optimize the timing of surgical and endovascular interventions.

**Keywords:** acute mesenteric ischemia, exploratory laparotomy, mortality, retrospective study, SMA embolism

# From Zero to Ultrasound: Can Students Learn DVT Diagnosis in One Session?

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**Background:** Deep vein thrombosis (DVT) requires rapid and accurate diagnosis. Compression ultrasonography is a first-line method with pooled sensitivity of ~90% and specificity up to 98,5% for proximal DVT. After short training, non-radiologist physicians achieve high diagnostic accuracy; studies in general practitioners report sensitivity of 90% and specificity of 97,1%, with good agreement with expert sonographers, which has been associated with a reduction in unnecessary referrals to emergency departments for suspected DVT. Despite these benefits, this technique is not routinely included in undergraduate medical education.

**The aim:** The aim of this study was to assess whether a brief, single-session training enables medical students with no prior ultrasound experience to correctly perform and interpret compression ultrasonography.

**Materials and methods:** The study included a group of medical students with no prior ultrasound experience. Training consisted of a brief theoretical introduction and demonstration of three-point compression ultrasonography. The probe was applied at three sites: groin (femoral vein), mid-thigh (femoral vein), and popliteal fossa (popliteal vein). Students practiced for a few minutes on a healthy volunteer, then underwent assessment requiring identification of vein and artery and three effective compressions at each site with complete vein collapse and proper image centering under supervision. Total time to independent task completion was recorded.

**Results:** All students completed training. Correct identification at all sites was achieved by 85%, adequate compression by 90% in the popliteal region, 76% in mid-thigh and 86% in the groin, and full protocol completion by 71%. Mean total time was  $9,3 \pm 4$  minutes plus 5 minutes of briefing.

**Conclusions:** Compression ultrasonography is an easily teachable skill, with most students achieving competency after short training. Early implementation in medical education may improve diagnostic efficiency and reduce unnecessary healthcare utilization.

**Keywords:** Deep Vein Thrombosis, Ultrasonography, Compression Test

# Changes in Attitudes Toward Living and Deceased Organ Transplantation in Silesia: 2002 Study Uptade

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**Background:** Organ transplantation is an effective treatment modality for patients with end-stage organ failure; however, its development depends on social acceptance. In Poland, a significant increase in transplant activity has been observed - in 2024, 2,338 organs were transplanted, and the number of deceased donors reached 667 (17.8 pmp), the highest result in history. For comparison, in 2002, 1,220 transplantations were performed, with a deceased donor rate of 12.68 pmp. Despite this growth, the share of living donor transplants (kidney and partial liver transplants) remains low, increasing from 3.1% in 2002 to approximately 4.5% in 2024.

**The aim:** The aim of the study was to analyze changes in the opinions of the residents of the Silesian Province regarding organ transplantation from living and deceased donors, compared to 2002.

**Materials and methods:** The study was conducted using an online survey from December 2025 onwards, based on a questionnaire developed from the tool used in 2002. The sample was selected using a quota method, ensuring comparability with the study group from 2002. The results were analyzed comparatively.

**Results:** The results indicate a significant increase in full approval of transplantation - 25% more positive responses compared to 2002 (52.3%). A clear rise was also observed in consent for post-mortem donation, with a 15% increase in positive responses. Full approval increased from 41.1% to approximately 70-75% for living donors and from 53.1% to around 80-85% for deceased donors. Willingness to donate remains highest for close relatives. The main barrier is concern about donor health, while religious and moral factors are of minor importance. Respondents indicated a need for greater knowledge of procedural safety and medical aspects.

**Conclusions:** Awareness and acceptance have improved compared to 2002. Barriers have shifted from ideological to medical. Despite high acceptance, willingness for living donation remains limited. Targeted education on risks and procedures may help increase transplantation rates.

**Keywords:** organ transplantation, living donor, deceased donor, public attitudes, social awareness, Silesia

# Too Young for Dementia? Plasma Tau Says Otherwise

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**Background:** Mild cognitive impairment (MCI) is an intermediate clinical condition associated with an increased risk of dementia [1]. Although its prevalence increases with age, MCI is also observed in middle-aged adults and frequently coexists with chronic somatic and affective conditions [2].

**The aim:** To evaluate plasma p-tau217 and p-tau181 concentrations in adults aged 50–60 years with MCI compared with cognitively healthy age-matched controls, and to examine associations between plasma biomarkers, cognitive performance, and comorbidity burden.

**Materials and methods:** This retrospective observational study included 236 patients aged 50–60 years with suspected or diagnosed MCI and 210 cognitively healthy controls. Cognitive status was assessed using MMSE and MoCA. Plasma p-tau217 and p-tau181 were measured using high-sensitivity immunoassays.

**Results:** Participants with MCI had lower MMSE and MoCA scores, higher plasma p-tau217 and p-tau181 concentrations, and a higher burden of chronic diseases.

**Conclusions:** MCI in middle-aged adults is characterized by cognitive impairment, elevated plasma phosphorylated tau markers, and increased multimorbidity.

**Keywords:** Mild cognitive impairment, middle age, dementia, plasma tau

# Pulmonary hypertension and OP-pattern ILD as primary manifestations of seropositive RA

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Work's tutor: Aleksandra Hus, Piotr Szczęsny, Maria Maślińska

**Background:** Pulmonary involvement is a frequent and prognostically significant extra-articular manifestation of rheumatoid arthritis (RA). Rheumatoid arthritis-associated interstitial lung disease (RA-ILD) is the most common respiratory presentation and a major contributor to morbidity and mortality. Growing evidence suggests the lungs may be a site for initiating autoimmune processes preceding clinically overt RA.

**The aim:** To address diagnostic challenges of pulmonary involvement in RA, the lung's role in disease initiation, and the need for early RA-ILD recognition.

## Materials and methods:

**Results:** A 54-year-old female with a 14-year history of idiopathic pulmonary arterial hypertension (iPAH) presented with acute onset of polyarthritis following an emotional stress accompanied by infection. She exhibited high disease activity (DAS-28 6.74), significant systemic inflammation (ESR 96 mm/h, CRP 105 mg/L), and high titers of autoantibodies (RF 58.44 IU/mL, ACPA >500 U/mL). High-resolution computed tomography (HRCT) and lung cryobiopsy confirmed an organizing pneumonia (OP) pattern. Pulmonary function tests (PFTs) showed FVC 88% and reduced DLCO 58%. Based on clinical, serological, and radiological findings, a diagnosis of RA-ILD was established. Treatment was initiated with intravenous methylprednisolone, followed by a regimen of methotrexate, hydroxychloroquine and tapering dose of oral methylprednisolone.

**Conclusions:** This case highlights the diagnostic challenges of RA with pulmonary involvement. The patient's ILD, characterized by an inflammatory OP pattern on HRCT, was preceded by long-standing iPAH. This clinical sequence suggests a possible gradual evolution from a subclinical pulmonary state, such as interstitial pneumonia with autoimmune features to clinically defined RA. Early recognition of RA-ILD, enabling timely immunomodulatory and immunosuppressive treatment, is crucial for influencing the disease course and prognosis, particularly in patients with long-standing unexplained pulmonary disease.

**Keywords:** Rheumatoid arthritis; Rheumatoid arthritis-associated interstitial lung disease; Pulmonary arterial

# Oxidative stress and molecular aging markers in OSA: the modifying role of cardiometabolic diseases

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**Background:** Obstructive sleep apnea (OSA) is characterized by intermittent hypoxia and oxidative stress, which may promote molecular damage and accelerated cellular aging. The relationship between OSA, cardiometabolic comorbidities, and biomarkers such as relative leukocyte telomere length (rLTL) and oxidative damage remains complex.

**The aim:** This study aimed to characterize the interplay between OSA, hypertension (HA), type 2 diabetes (DM2), and biomarkers of aging (rLTL), lipid peroxidation (oxoLDL), and oxidative nucleic acid damage.

**Materials and methods:** The study included 286 participants (72 healthy controls; 214 OSA patients) diagnosed via polysomnography (PSG). Participants were stratified by HA and DM2 status. rLTL was assessed using qPCR. Serum oxoLDL and markers of oxidative nucleic acid damage (8-hydroxyguanosine variants) were measured in morning blood samples.

**Results:** No significant differences in rLTL were found between OSA patients and controls. However, OSA patients showed significantly higher oxidative DNA/RNA damage ( $p=0.007$ ) and lower oxoLDL levels ( $p=0.025$ ) compared to controls. In the OSA group, the presence of HA ( $p=0.044$ ) or DM2 ( $p=0.033$ ) was linked to increased oxidative damage. In OSA patients without HA, rLTL correlated negatively with oxidative damage ( $R=-0.689$ ,  $p=0.002$ ) and positively with severity metrics, including AHI ( $R=0.278$ ,  $p=0.008$ ) and desaturation index ( $R=0.216$ ,  $p=0.043$ ). These correlations were abolished in the presence of comorbidities.

**Conclusions:** OSA is associated with increased oxidative nucleic acid damage and altered oxoLDL levels, independent of rLTL. Cardiometabolic comorbidities modulate these biomarkers and attenuate the associations between telomere length, oxidative stress, and OSA severity. Funding: National Science Centre (Poland), project no. 2023/49/N/NZ5/04039.

**Keywords:** obstructive sleep apnea, cardiometabolic risk, oxidative stress, molecular aging

# „Don't stop at one - HCM Risk score and its relation with heart failure and comorbidities in HCM patients.”

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**Background:** Hypertrophic cardiomyopathy (HCM) is a genetic cardiac disorder associated with heart failure, arrhythmias and an increased risk of sudden cardiac death (SCD). Disease progression is reflected by functional status (NYHA) and influenced by comorbidities, while SCD risk is estimated using the HCM Risk-SCD score. Together, these factors guide therapeutic decisions in HCM.

**The aim:** The aim of the study was to assess the relationship between patients' functional status, comorbidities and the HCM Risk-SCD score in patients with HCM.

**Materials and methods:** The study included 56 patients with HCM (mean age  $54.9 \pm 13.6$  years; 21 women, 37.5%). Data collected included demographics, family history, echocardiography, Holter monitoring, clinical and laboratory findings. The HCM Risk-SCD score was calculated according to the 2023 ESC guidelines. Patients were stratified by heart failure symptoms into asymptomatic (NYHA I,  $n=14/25\%$ ) and symptomatic (NYHA II–III,  $n = 42/75\%$ ) groups and by comorbidity burden into low (0-1 comorbidity;  $n=24/42.9\%$ ) and high ( $\geq 2$  comorbidities;  $n=32/57.1\%$ ). Comorbidities assessed in the study included systemic hypertension, hyperlipidemia, coronary artery disease, chronic kidney disease, COPD and DM2.

**Results:** The HCM Risk-SCD score was 3.05% (SD 1.5) for the asymptomatic and 2.07% (SD 1.2) for the symptomatic group ( $p=0.008$ ). The analysis of HCM Risk-SCD score in regards to comorbidities was 2.29% (SD 1.3) for low burdened and 2.34% (SD 1.4) for high burdened groups ( $p=0.94$ ). There was no correlation between HCM Risk-SCD score and the number of patient's comorbidities ( $r=-0.05$ ,  $p=0.71$ ).

**Conclusions:** The risk of SCD in HCM is higher for patients with no significant symptoms of congestive heart failure. HCM Risk-SCD score seems to be independent of the comorbidity burden in HCM patients. This shows that HCM individuals with better clinical and functional status may be at higher risk of SCD.

**Keywords:** HCM, Risk-SCD score, NYHA, heart failure, multimorbidity

# Association Between QRS Complex Morphology and NYHA Functional Class in Chronic Heart Failure

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**Background:** Chronic heart failure is characterized by structural and electrical cardiac remodeling. The QRS complex reflects ventricular depolarization and may be prolonged in more advanced disease. The New York Heart Association (NYHA) functional classification is widely used to assess symptom severity and functional limitation. The relationship between electrocardiographic parameters and clinical status remains important for understanding disease severity and improving patient risk stratification.

**The aim:** This study aimed to assess the association between QRS complex characteristics and NYHA functional class in patients with chronic heart failure

**Materials and methods:** This retrospective quantitative study included 139 patients with chronic heart failure and reduced left ventricular ejection fraction. Patients with available electrocardiogram data were analyzed. The relationship between QRS complex characteristics and the NYHA functional class was evaluated. Clinical, electrocardiographic, laboratory, and echocardiographic data were collected. Statistical analysis was performed using descriptive methods and the Spearman correlation test.

**Results:** A significant positive correlation was found between QRS duration and NYHA functional class ( $\rho = 0.424$ ,  $p < 0.001$ ). Higher NYHA classes were associated with prolonged QRS duration and more frequent electrocardiographic abnormalities. QRS duration also showed significant correlations with NT-proBNP and left ventricular ejection fraction.

**Conclusions:** QRS duration and morphology correlate with NYHA functional class in chronic heart failure. These parameters may help assess disease severity and support clinical risk stratification.

**Keywords:** Chronic heart failure, QRS complex, NYHA functional class, electrocardiography

# Assessing Functional Vulnerability among Geriatric Patients with Multimorbidity Using VES 13

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MD, PhD

**Background:** Multimorbidity is a major challenge in geriatric medicine. Although clinically important, the link between functional status and disease burden remains unclear. Functional vulnerability can be assessed using the Vulnerable Elders Survey 13 (VES 13), a brief tool for identifying at risk older adults. Understanding how functional vulnerability relates to multimorbidity may help improve geriatric assessment.

**The aim:** To assess the association between multimorbidity and functional vulnerability using VES 13.

**Materials and methods:** A cross sectional study was conducted in 591 geriatric patients. The number of chronic conditions was used as a multimorbidity measure and dichotomized at the median ( $\geq 9$  conditions) for analysis. Functional vulnerability was assessed using VES 13. Group differences were analyzed with the Mann–Whitney U test. Associations were evaluated using logistic regression and general linear models, adjusted for age and sex.

**Results:** Patients in the high multimorbidity group were older and had higher VES 13 scores (both  $p < 0.001$ ). Higher VES-13 scores were independently associated with the higher multimorbidity group in both logistic and the linear models adjusted for age and sex.

**Conclusions:** A significant association was observed between multimorbidity and functional vulnerability. Higher VES 13 scores were associated with belonging to the higher multimorbidity group. However, due to the cross sectional design, causality cannot be inferred.

**Keywords:** Multimorbidity, Functional Vulnerability, VES-13

# Association between albuminuria and peripheral neuropathy severity in people with diabetes

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**Background:** Diabetic microvascular complications often coexist and share mechanisms such as endothelial dysfunction, inflammation, and ischemia. Albuminuria reflects renal and systemic microvascular damage and may be linked to peripheral nerve injury, though this relationship is not fully established.

**The aim:** To assess the association between urinary albumin excretion and the presence and severity of peripheral neuropathy in people with diabetes mellitus (DM).

**Materials and methods:** Cross-sectional study of 812 adults with DM undergoing routine complication assessment. Neuropathy was evaluated using the Michigan Neuropathy Screening Instrument (MNSI) and defined as  $\geq 4$  points (questionnaire) and  $\geq 2$  points (examination). Kidney involvement was assessed by urinary albumin-to-creatinine ratio (UACR), with categories defined as normoalbuminuria ( $< 30$  mg/g), microalbuminuria (30–300 mg/g), or macroalbuminuria ( $> 300$  mg/g). Associations were analyzed using correlation and multivariable logistic regression adjusted for age, sex, DM duration, BMI, and hypertension.

**Results:** The mean age of participants was  $61.8 \pm 10.7$  years and median DM duration was 11 years. Peripheral neuropathy was present in 26.4% of people. Neuropathy prevalence increased progressively with worsening albuminuria, from 20.3% in individuals with normoalbuminuria to 34.0% in those with microalbuminuria and 46.3% in those with macroalbuminuria ( $p < 0.001$ ). Neuropathy severity assessed by MNSI score also increased across albuminuria categories. UACR demonstrated a significant positive correlation with neuropathy severity (Spearman  $r = 0.24$ ,  $p < 0.001$ ). In multivariable analysis, both microalbuminuria (OR 1.68, 95% CI 1.19–2.38) and macroalbuminuria (OR 2.54, 95% CI 1.47–4.37) were independently associated with peripheral neuropathy.

**Conclusions:** Albuminuria is independently associated with both the presence and severity of diabetic peripheral neuropathy and may reflect generalized microvascular injury affecting renal and neural tissues.

**Keywords:** Diabetes, Albuminuria, Neuropathy, Microvascular, UACR, Endothelium

# The Silent Link: Cardiovascular Autonomic Neuropathy Signals and Chronic Kidney Disease in Diabetes

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**Background:** Cardiovascular autonomic neuropathy (CAN) is a common but underdiagnosed complication of diabetes mellitus (DM), sharing mechanisms with chronic kidney disease (CKD), including endothelial dysfunction and microvascular damage.

**The aim:** To evaluate the association between CAN and CKD in adults with DM.

**Materials and methods:** This observational study included 728 adults with DM from the Silesia Diabetes Heart Study. CAN was assessed using standardized cardiovascular autonomic reflex tests according to Toronto Consensus criteria and classified as no CAN, early CAN, or definite CAN. CKD was defined as eGFR <60 mL/min/1.73 m<sup>2</sup> or urine albumin-to-creatinine ratio ≥30 mg/g. Logistic regression models were used to analyze the association between CAN and CKD.

**Results:** CAN was identified in 48.2% of participants (early CAN 32.4%, definite CAN 15.8%). The prevalence of CKD increased with CAN severity, from 11% in individuals without CAN to 35% in those with definite CAN (p for trend <0.001). In unadjusted analysis, CAN was associated with over 2.5-fold higher odds of CKD (OR 2.57, 95% CI 1.71–3.91; p<0.001). After adjustment for age and sex, the association remained significant (OR 1.67, 95% CI 1.08–2.59; p=0.021). Further adjustment for diabetes duration, HbA1c, BMI, hypertension, statin use, and SGLT2 inhibitor therapy attenuated the association but it remained borderline significant (OR 1.57, 95% CI 1.00–2.47; p=0.050).

**Conclusions:** CAN is significantly associated with CKD in individuals with DM and may reflect systemic microvascular injury. It is of utmost importance for patients to be aware of this condition since both increase the risk of cardiovascular events and death.

**Keywords:** Diabetes, CAN, CKD, Neuropathy, eGFR, Microvascular

# The impact of renal dysfunction and comorbidities affecting renal function on the outcome after acute myocarditis

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**Background:** Renal dysfunction (RD) is an important predictor of adverse outcomes in patients with acute myocardial infarction (AMI). The prognostic impact of RD may differ depending on coexisting diabetes mellitus (DM) and arterial hypertension (HA).

**The aim:** The aim of the study was to assess the influence of RD and its different clinical backgrounds on baseline characteristics, in hospital renal outcome and prognosis in patients treated invasively due to AMI.

**Materials and methods:** Among 4556 consecutive AMI survivors treated with percutaneous coronary intervention (PCI) in acute phase of AMI, four RD subgroups were identified according to comorbidities: RD with exclusively DM (RD+DM; n=61), RD with exclusively HA (RD+HA; n=367), RD with both DM and HA (RD+DM+HA; n=256), and RD without DM nor HA (RD-DM-HA; n=169). Patients without RD, nor DM and HA served as controls (n=1448). Comparative and survival analyses were performed. Cumulative survival was compared using a long-rank test.

**Results:** Patients with RD were older, had more advanced coronary artery disease, worse renal function on admission and discharge, more frequent contrast-induced acute kidney injury, and lower left ventricular ejection fraction than controls. In-hospital mortality was significantly higher in all RD subgroups (3.0–18.0% vs. 0.6%;  $p < 0.001$ ), with the highest rate in RD+DM. One-year mortality was also markedly increased (13.4–42.6% vs. 3.2%;  $p < 0.001$ ), showing a clear risk gradient depending on the aetiology of RD. Total mortality was significantly higher in all RD subgroups (24.8–54.1% vs. 7.0%;  $p < 0.001$ ), with the highest rate observed in the RD+DM group.

**Conclusions:** RD significantly worsens clinical profile, in-hospital renal outcome, short- and long-term prognosis in AMI patients treated with PCI. Considering different comorbidities influencing renal function DM is associated with the worst outcome in this study population treated invasively.

**Keywords:** renal dysfunction, myocardial infarction, diabetes mellitus, arterial hypertension, prognosis

# Targeted Therapeutics in Pancreatic Cancer: A Multidisciplinary Translational Approach

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**Background:** Targeted therapies, particularly tyrosine kinase inhibitors (TKIs), represent a promising strategy in the treatment of pancreatic cancer. However, its clinical efficacy remains limited due to resistance mechanisms and insufficient intracellular delivery. Combining TKIs with nanotechnology-based carriers may enhance therapeutic outcomes.

**The aim:** This study aimed to evaluate the biological effects of gold nanoparticle (AuNP)-based complexes with TKI-258 on pancreatic cancer cell lines (PANC-1, BxPC3).

**Materials and methods:** The physicochemical stability of AuNP complexes was assessed using dynamic light scattering. Cytotoxicity was evaluated by MTT assay, allowing determination of IC50 values. Cell survival and death mechanisms were analyzed by flow cytometry. The antimigratory potential was assessed using scratch assays. The impact on intracellular signaling pathways was examined using capillary-based immunoassay (Jess).

**Results:** The complexes demonstrated dose- and time-dependent inhibition of cancer cell growth. Apoptosis was identified as the predominant mechanism of cell death. A significant reduction in migratory capacity indicated antimetastatic potential. Molecular analysis showed modulation of AKT phosphorylation, suggesting interference with key survival pathways.

**Conclusions:** The combination of TKI-258 with AuNP-based delivery systems improves anticancer efficacy by improving intracellular targeting and modulating critical signaling pathways. These findings highlight the translational potential of nanotechnology-supported targeted therapies in overcoming current limitations in pancreatic cancer. The research was funded by the Polish Ministry of Science and Higher Education and the European Union as part of the program Support for students in increasing their competences and skills (MNiSW/2025/DPI/649).

**Keywords:** pancreatic cancer, targeted therapies, nanomedicine, TKI-258

# Real-world biochemical and inflammatory profiles of patients with operable triple-negative breast cancer.

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**Background:** Treatment of triple-negative breast cancer (TNBC) has undergone significant changes in recent years. The introduction of immunotherapy has significantly improved patient outcomes; however, its use is currently limited to the neoadjuvant setting. The mechanism of immunotherapy is complex and depends on the proper functioning of the immune system. Therefore, careful patient selection is crucial to identify individuals who are most likely to benefit from this treatment.

**The aim:** The aim of this study was to characterize the real-world population of patients with non-metastatic TNBC and to identify factors influencing the decision to use neoadjuvant treatment.

**Materials and methods:** Data from all patients who initiated treatment for TNBC at an academic center over a six-month period were retrospectively analyzed.

**Results:** Patients receiving neoadjuvant chemotherapy including immunotherapy (NACTH) did not differ from those receiving adjuvant chemotherapy (ACTH) in white blood cell count (7.14 vs 7.08,  $p=0.93$ ), neutrophil count (4.27 vs 4.28,  $p=0.99$ ), or lymphocyte count (1.80 vs 1.95,  $p=0.60$ ). Albumin concentration and albumin-to-alkaline phosphatase ratio were significantly higher in the NACTH group (44.5 vs 33.1,  $p=0.01$ ; 0.77 vs 0.48,  $p=0.01$ , respectively). A trend toward higher CA 15-3 levels (28.6 vs 13.1,  $p=0.12$ ) was observed in the NACTH group, consistent with more advanced disease.

**Conclusions:** Baseline complete blood counts were comparable between groups; however, higher albumin and albumin-to-alkaline phosphatase ratio in the neoadjuvant group suggest that surgery may be associated with impaired nutritional status and may reflect increased non-specific inflammatory activation, negatively impacting outcomes. This finding is particularly relevant for patients with suboptimal performance status and baseline nutritional deficiencies, suggesting that preoperative treatment may be safer and more effective than equally intensive postoperative treatment by avoiding surgery-related metabolic and inflammatory burden.

**Keywords:** Triple negative breast cancer, real-world data, nutritional status, inflammatory status, neoadjuvant

# YY1AP1 as a Potential Prognostic Biomarker in Colorectal Cancer

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**Background:** Colorectal cancer (CRC) remains a major cause of cancer-related mortality worldwide. Despite advances in diagnostics and treatment, reliable molecular markers predicting disease progression are still needed. YY1-associated protein 1 (YY1AP1) a transcriptional co-regulator has been implicated in oncogenic processes, however, its clinical significance in CRC remains unclear.

**The aim:** To investigate YY1AP1 expression in colorectal cancer tissues and evaluate its association with clinicopathological parameters and overall survival.

**Materials and methods:** A total of 118 patients with histologically confirmed CRC were included in the study. Adjacent histologically normal tissues were available for 42 cases and served as controls. YY1AP1 expression was assessed by immunohistochemistry and quantified using the semi-quantitative H-score method. Associations between YY1AP1 expression, clinicopathological characteristics, and overall survival were analyzed.

**Results:** YY1AP1 expression was observed in both the nuclear and cytoplasmic compartments of tumor cells. Significantly higher expression levels were detected in CRC tissues compared to adjacent normal mucosa. Elevated YY1AP1 expression correlated with advanced tumor stage and was associated with reduced overall survival.

**Conclusions:** Our findings demonstrate that YY1AP1 is overexpressed in colorectal cancer and correlates with disease progression and adverse clinical outcomes. These results suggest that YY1AP1 may serve as a novel prognostic biomarker in CRC and warrant further functional studies to clarify its role in tumor biology.

**Keywords:** Colorectal cancer; YY1AP1; Tumor progression; Prognostic biomarker; Clinical outcome; Immunohistoche

# More Than a Snapshot: Electrolyte volatility outperforms static minimums in predicting extreme length of stay

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**Background:** Clinical focus centers on static electrolyte snapshots, overlooking the dynamic fluctuations common in multimorbid patients. Driven by both disease and treatment, this ionic instability remains poorly defined and underappreciated.

**The aim:** This study evaluates whether in-hospital sodium and potassium fluctuations ( $\Delta\text{Na}$ ,  $\Delta\text{K}$ ) act as independent predictors of length of hospital stay (LOS) when compared directly to static minimum concentrations.

**Materials and methods:** Analyzing 274 internal medicine patients (LOS >3 days), we used multivariable GLM, HC3-OLS, and logistic models to compare electrolyte variability (max-min difference) versus minimum concentrations, adjusting for age, sex, comorbidities, and eGFR.

**Results:** Integrated multivariable GLM gamma analysis revealed that eGFR ( $p = 0.320$ ),  $\text{Na}_{\text{min}}$  ( $p = 0.393$ ) and  $\text{K}_{\text{min}}$  ( $p = 0.948$ ) were all statistically insignificant as predictors, while the  $\Delta\text{Na}$  (MR = 1.023, 95% CI: 1.010 - 1.036,  $p < 0.001$ ) and  $\Delta\text{K}$  (MR = 1.154, 95%CI: 1.058 - 1.258,  $p = 0.001$ ) emerged as independent predictors. Furthermore, Logistic regression analyzing two endpoints (>7 days and >9 days risk of LOS) showed that  $\Delta\text{Na}$  was the main risk factor in prolonged stays (>7 days; OR=1.091 per 1 mmol/L,  $p=0.026$ ) but  $\Delta\text{K}$  was an even better indicator for extreme stays (>9 days; OR=2.122 per 1 mmol/L,  $p=0.008$ ). Absolute minimums ( $\text{Na}_{\text{min}}$ ,  $\text{K}_{\text{min}}$ ) failed as predictors ( $p>0.500$ ), while the fluctuations remained significant throughout.

**Conclusions:** In-hospital electrolyte variability predicts length of stay better than static admission or minimum levels. Such instability - frequently iatrogenic, like aggressive diuresis in heart failure patients - causes an "observational lag" that delays discharge. Ultimately, electrolyte variability - not absolute minimums - drives the recovery timeline. Therefore, focusing on stabilizing ionic trajectories rather than merely correcting baseline deficits could optimize resource use and shorten hospitalizations.

**Keywords:** Water-Electrolyte Imbalance, Length of Stay, Internal Medicine, Prognosis, Multimorbidity

# Assessment of knowledge regarding phosphates in beverages among young adults

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**Background:** In recent years, there has been an increasing consumption of highly processed foods and carbonated beverages. These products are characterized by a high content of inorganic phosphates used as food additives. These compounds extend the shelf life of products, enhance their flavor, and provide appropriate color and texture. Chronic exposure to inorganic phosphates is associated with serious health consequences.

**The aim:** The aim of the study was to assess the knowledge of individuals aged 20-30 regarding phosphates present in beverages.

**Materials and methods:** Respondents meeting the age criteria were recruited via a survey link shared on social media platforms. Participants received 1 point for each correct answer. The maximum possible score was 8 points. Knowledge levels were assigned based on the score: low, moderate, high.

**Results:** A total of 192 individuals participated in the survey, aged 20–30. When asked about the labeling symbol for phosphoric acid, 44.78% of respondents aged 20–24 and 43.20% aged 25–30 correctly indicated E338. Knowledge of phosphate functions was lower, with 37.31% of younger participants and 20.00% of older respondents identifying their role in preservation and sour taste. Similarly, 41.79% of the 20–24 group and 24.00% of the 25–30 group correctly recognized energy drinks as a source of phosphates. However, only 20.90% of younger and 8.80% of older respondents achieved a high knowledge score. A statistically significant but weak negative relationship between age and knowledge was found ( $p = 0.001$ ; Gamma = -0.28). No significant association was observed between age and cola consumption frequency ( $p = 0.329$ ).

**Conclusions:** The findings indicate an overall low and fragmented level of knowledge about phosphates, with younger respondents demonstrating slightly better understanding, although the relationship between age and knowledge is weak. Moreover, knowledge does not appear to influence behavior, as no significant association was found between age and cola consumption frequency.

**Keywords:** inorganic phosphates, food additives, beverages, level of knowledge

# Assessment of technical high school students' knowledge about food additives

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**Background:** Food additives are substances used in the food industry to give food an appropriate appearance and specific properties. These include colorants, preservatives, antioxidants, flavor enhancers, and antibiotics. Their excessive use may contribute to the development of significant health complications.

**The aim:** The aim of this study was to assess the knowledge of technical high school students with a gastronomy profile regarding food additives.

**Materials and methods:** The study was conducted using the CAWI (Computer-Assisted Web Interview) method, based on an original questionnaire that was distributed among respondents via a survey link. Each correct answer was awarded 1 point. The maximum possible score was 16 points.

**Results:** A total of 280 individuals participated in the analysis, including 155 men (55%) and 125 women (45%). The average age of respondents was  $16 \pm 1.51$  years. When asked about the risks associated with excessive consumption of food additives, only 58 (20.71%) respondents indicated that it may be linked to health problems. 55 (19.64%) participants correctly answered that emulsifiers are used by food manufacturers to mix ingredients that do not naturally combine. 54 (19.29%) respondents indicated that the additive labeled E120 raises ethical concerns because it is derived from insects. 77 (27.50%) respondents identified aspartame as a sweetener. Meanwhile, only 59 (21.07%) respondents correctly identified the role of beta-carotene in margarine production.

**Conclusions:** A significant majority of participants answered the questions incorrectly. These individuals demonstrated a low level of knowledge on the subject. It is necessary to increase the availability of information about food additives in the public sphere.

**Keywords:** food additives, preservatives, emulsifiers, survey study

# CALORIC PERCEPTION OF MEALS IN ACTIVE INDIVIDUALS AND PREFERENCES FOR HEALTHY VS. UNHEALTHY FOODS

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**Background:** Maintaining energy balance is crucial for health and body weight regulation. A key element is the ability to accurately perceive the caloric content of meals. Subjective categorization of products as "healthy" or "unhealthy" can impair the intuitive assessment of energy value. For physically active individuals, the precision of these estimates is fundamental for athletic performance and recovery.

**The aim:** The aim of the study was to evaluate the accuracy of caloric perception of meals in a physically active population and to identify factors determining the precision of these estimates.

**Materials and methods:** The study included 159 physically active participants (92 men and 67 women) with a mean age of  $27.7 \pm 10.25$  years. Data were collected via an online survey utilizing photographs of food portions across various categories. Knowledge of energy requirements and the accuracy of estimating the caloric content of selected food items were analyzed.

**Results:** Most participants (62.9%) had a normal body mass index (BMI). Although over half (52.2%) declared knowledge of their daily energy requirements, only 19.5% reported regular calorie counting. A significant tendency to underestimate the caloric content of products perceived as "healthy" or energy-dense was observed; the greatest errors occurred for cashew nuts (72.2% underestimations) and protein bars (54.0%). Conversely, products traditionally viewed as less healthy, such as light mayonnaise (66.7%) or potato chips (44.3%), were frequently overestimated. Statistically significant differences in energy control approaches were found based on BMI ( $p = .01$ ).

**Conclusions:** Physically active individuals underestimate calories in items associated with a healthy lifestyle, suggesting a "health halo" effect. Further nutritional education regarding visual portion assessment is essential to optimize training outcomes.

**Keywords:** caloric perception, physical activity, food choices, BMI, energy balance

# MASS MEDIA AS A RISK FACTOR FOR EATING DISORDERS AMONG INDIVIDUALS AGED 15–25

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**Background:** Mass media, specifically social media platforms, act as powerful catalysts for societal beauty norms. Mechanisms such as social comparison, internalization of unrealistic beauty ideals, and the pervasive use of digital filters significantly heighten the risk of developing eating disorders (ED) among young populations.

**The aim:** The aim of the study was to analyze the relationship between media exposure and ED risk among individuals aged 15–25, with a particular focus on comparing adolescents (15–20) to young adults (21–25).

**Materials and methods:** The study involved 441 participants (298 women, 143 men) and was conducted between June and December 2024. Standardized research tools included the Eating Attitudes Test (EAT-26) to assess ED risk and the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ-3). An original questionnaire was used to evaluate social media habits.

**Results:** A significantly higher risk of eating disorders was identified in the younger cohort (15–20 years;  $p=0.039$ ), with the highest vulnerability observed among women ( $p=0.001$ ). Prolonged time spent online and the frequent application of beauty filters were positively correlated with increased ED risk ( $p<0.05$ ). Furthermore, younger participants, particularly females, reported significantly higher levels of media-driven pressure and internalization of beauty standards ( $p<0.05$ ).

**Conclusions:** The findings confirm that social media exposure intensifies ED risk through complex psychological and sociocultural mechanisms. The heightened vulnerability of the 15–20 age group underscores the urgent need for targeted media literacy programs and early intervention strategies to mitigate the impact of digital beauty standards.

**Keywords:** eating disorders, social media, body pressure, adolescents, beauty filters

# Comparison of antioxidant properties of various types of cereal flakes

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**Background:** Cereal flakes are food source valued for their nutritional quality. Apart from being a rich source of vitamins and minerals, they contain polyphenols with antioxidant activity, and fiber fractions. All those compounds determine their health-promoting potential, including lifestyle disease prevention and digestive support.

**The aim:** A comparative analysis of bioactive compounds content and antioxidant properties of aqueous extracts from five types of flakes: oat, rice, barley, rye, and wheat.

**Materials and methods:** Aqueous extracts were prepared from commercial flakes. Spectrophotometric analysis included total phenols, phenolic acids, flavonoids, tannins, and procyanidins. Antioxidant activity was evaluated using ABTS and DPPH assays. Additionally, the swelling index was determined according to pharmacopoeial standards to assess water-binding capacity.

**Results:** The highest phenolic content was found in oat and barley flakes extracts. Rye flake extract showed the highest concentration of phenolic acids. The highest flavonoid levels were recorded in barley and rye extracts. Procyanidins were not detected in any sample. Rice flake extract showed a negligible tannin content. ABTS and DPPH tests confirmed the highest antioxidant activity for barley, oat, and rye flakes extracts. The highest swelling index was observed for oat and barley flakes.

**Conclusions:** Oat, barley, and rye flakes are valuable sources of polyphenols, characterized by high antioxidant potential and a high swelling index. Rice flakes showed the lowest content of the analyzed compounds and the weakest antioxidant properties.

**Keywords:** cereal flakes, antioxidants, polyphenols, phytochemical analysis, swelling index.

# The relationship between orthorexic behaviors and sports anxiety among track and field athletes

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**Background:** The pursuit of excellence in sports leads track and field athletes to follow strict training and dietary regimens, which may contribute to unhealthy eating patterns such as orthorexia. Orthorexic behaviors are increasingly observed among athletes and may be associated with psychological factors, including sports anxiety.

**The aim:** The aim of the study was to assess the relationship between components of sports anxiety and the occurrence of nonpathological and pathological orthorexic behaviors among Polish track and field athletes.

**Materials and methods:** The study included 134 track and field athletes aged 18-28 years competing in national-level events and members of the national track and field team. Sports anxiety was assessed using the Sports Anxiety Scale-2 (SAS-2), measuring somatic anxiety, worry, and concentration disturbances. Orthorexic behaviors were assessed using the Teruel Orthorexia Scale (TOS), which distinguishes between nonpathological and pathological orthorexic behaviors.

**Results:** No significant differences were found between groups in somatic characteristics or orthorexic behaviors. However, national-level athletes showed higher levels of worry ( $p = 0.040$ ) and concentration disturbances ( $p = 0.023$ ). Pathological orthorexic behaviors were significantly associated with somatic anxiety, worry, and concentration disturbances ( $p < 0.001$ ). Strong positive correlations were found between components of sports anxiety.

**Conclusions:** Sports performance level does not influence orthorexic behaviors, but lower level is associated with higher cognitive anxiety and difficulties in attention regulation. Pathological orthorexic behaviors are associated with all components of sports anxiety, suggesting that higher anxiety may contribute to their development.

**Keywords:** orthorexia, sports anxiety, track and field athletes

# Associations between the Triglyceride-Glucose (TyG) Index, Inflammation and WCR in Hospitalized Older Adults

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**Background:** Chronic inflammation and adverse body composition patterns are closely associated with morbidity and mortality in older adults. Although the Triglyceride-Glucose (TyG) index is an established surrogate marker of insulin resistance, its specific associations with inflammation and body composition in older adults remain insufficiently characterized.

**The aim:** To assess the associations between the TyG index, C-reactive protein (CRP), and waist-to-calf ratio (WCR) in hospitalized older adults.

**Materials and methods:** This cross-sectional study included 351 older adults (237 women and 114 men) aged  $\geq 60$  years. Inflammation status was assessed by CRP, and TyG index was calculated. Waist-to-calf ratio (WCR), an anthropometric marker related to body composition, was also assessed. Statistical analysis included Spearman correlations and multivariable linear regression, adjusting for age and sex.

**Results:** TyG positively correlated with both CRP ( $r = 0.19$ ,  $p < 0.001$ ) and WCR ( $r = 0.20$ ,  $p < 0.001$ ). Additionally, CRP was associated with WCR ( $r = 0.14$ ,  $p = 0.003$ ). In multivariable linear regression, higher WCR and higher CRP were independently associated with higher TyG index, with WCR showing the strongest association (model:  $F = 11.46$ ,  $p < 0.001$ , adj.  $R^2 = 0.082$ ; WCR: Partial  $\eta^2 = 0.040$ ,  $F = 19.16$ ,  $p < 0.001$ ).

**Conclusions:** The TyG index was independently associated with CRP and with WCR in this cohort of hospitalized older adults. These findings suggest a link between TyG index, systemic inflammation, and body composition-related anthropometric patterns. WCR may reflect central adiposity-related anthropometric characteristics relevant to metabolic risk. Hence, these findings also suggest the possibility of a metabolic-inflammatory pattern in hospitalized older adults. However, further studies are needed to confirm their clinical significance.

**Keywords:** Triglyceride-Glucose (TyG) index, inflammation, waist-to-calf ratio (WCR), adverse body composition

# Clinical Training Shapes Dietetics Students' Professional Readiness and Autonomy

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**Background:** Educational programs vary by type of institution: medical universities emphasize clinical training, whereas non-medical and online programs often offer limited clinical exposure. These disparities may influence students' competencies, professional identity, and readiness for patient care. In Poland, the lack of legal regulation of the dietitian profession further complicates the development of professional autonomy.

**The aim:** This study explored the alignment between dietetics students' expectations and their experiences of clinical education, and examined how clinical training shapes professionalism, perceived autonomy, and readiness for practice.

**Materials and methods:** A qualitative study was conducted using Individual In-Depth Interviews (IDIs) with 12 Bachelor's and Master's dietetics students at the Medical University of Lublin. Data were collected using eight open-ended questions with follow-up probes and analyzed thematically.

**Results:** A clear shift in perception was observed between study levels. Bachelor's students associated dietetics with nutrition planning for healthy individuals and reported limited expectations of clinical practice, whereas Master's students emphasized the clinical role and responsibility for patient care. Clinical training emerged as a turning point, reshaping professional understanding and increasing awareness of responsibility. Despite adequate theoretical knowledge and improved practical skills, students at both levels reported lack of confidence—particularly in decision-making and patient interaction—as a key barrier to professional readiness.

**Conclusions:** Clinical education and hospital placements are crucial for developing competencies, professionalism, and autonomy. These findings highlight the importance of practice-oriented clinical training in dietetics education.

**Keywords:** Dietetics education, clinical training, professional autonomy, students' perception

# BMI vs. Actual Metabolic Demand: The Role of Fat-Free Mass (FFM) in Shaping Metabolic Efficiency A Pilot Study

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**Background:** Basal Metabolic Rate (BMR) is the foundation of total energy expenditure. In clinical practice, BMR is often estimated via BMI, which neglects tissue differentiation. Fat-free mass (FFM), comprising metabolically active tissues like muscles and organs, is the primary determinant of resting metabolism.

**The aim:** To analyze the relationship between BMR and FFM and evaluate BMI's accuracy in predicting energy expenditure in young adults.

**Materials and methods:** The study involved 48 subjects (31 females, 17 males) aged 18–29. Participants were students and medical school candidates. Body composition was measured using Bioelectrical Impedance Analysis (BIA). Parameters analyzed included body mass, BMI, FFM, and BMR.

**Results:** • Females: Average BMI was 22.4 kg/m<sup>2</sup> with a mean BMR of 1530 kcal. High FFM (≈68.9 kg) corresponded to BMR >2000 kcal, while low FFM (≈37 kg) resulted in ≈1200 kcal. • Males: Average BMI was 22.8 kg/m<sup>2</sup>. BMR typically ranged from 1600–2000 kcal, exceeding 2400 kcal in highly muscular individuals. • Correlations: BMR correlated more strongly with FFM than with BMI. In subjects with similar BMI, BMR differed by several hundred calories due to variations in FFM.

**Conclusions:** FFM is the most precise indicator of resting energy expenditure. BMI has significant limitations in individual metabolic assessment, particularly for non-standard body compositions. Body composition, not total mass, should guide nutritional and training interventions

**Keywords:** BMI, FFM, Bioelectrical Impedance Analysis, resting Metabolism

# Eating behaviours and the risk of eating disorders among patients diagnosed with anxiety disorders

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**Background:** Anxiety disorders often coexist with eating disorders and disturbed eating behaviours, yet this problem remains insufficiently explored in clinical populations.

**The aim:** To assess the risk of eating disorders and identify selected factors associated with this risk in adults diagnosed with anxiety disorders.

**Materials and methods:** A cross-sectional study was conducted between May 2025 and March 2026 among patients of the Daily Neurosis Treatment Ward in Zawiercie and members of online support groups. Of 127 recruited participants, 122 adults who met the inclusion criteria were analysed. Standardized instruments were used: FACES III, TFEQ-13, SCOFF, and an author-designed questionnaire. Statistical analysis included descriptive methods, chi-square-based tests, association measures, and odds ratios.

**Results:** Overall, 76% of respondents showed increased eating-disorder risk in at least one analysed domain or in SCOFF. High risk was found in 15% for cognitive restraint of eating, 31% for uncontrolled eating, and 22% for emotional eating; 44% screened positive in SCOFF for probable anorexia nervosa or bulimia nervosa. Increased overall risk was especially frequent among participants with social phobia (89%). Female sex (OR=3.81; 95% CI: 1.50-9.67;  $p=0.003$ ), perfectionism (OR=2.78; 95% CI: 1.19-6.49;  $p=0.016$ ), and work-related appearance pressure (OR=3.31; 95% CI: 1.18-9.23;  $p=0.020$ ) significantly increased the odds of elevated risk.

**Conclusions:** Adults with anxiety disorders present a high burden of disturbed eating behaviours and screening-positive eating-disorder symptoms. Routine screening for eating disorders in anxiety-treatment settings, with particular attention to women, perfectionistic individuals, and people exposed to appearance-related occupational pressure, may support earlier identification and interdisciplinary intervention.

**Keywords:** eating disorders, anxiety disorders, eating behaviours

# Relationship between dietary habits, physical activity, and self-esteem among adolescents in the Silesian Voiv

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**Background:** Dietary habits and physical activity are key factors in adolescent health; however, numerous irregularities are observed, co-occurring with obesity and low self-esteem. These factors may negatively affect quality of life and contribute to the persistence of unhealthy behaviors.

**The aim:** The aim of the study was to examine the relationship between dietary habits, level of physical activity, and overall self-esteem among adolescents, and selected sociodemographic factors such as age, gender, and type of school.

**Materials and methods:** The study was conducted from September 2025 to January 2026 in selected secondary schools in the Silesian Voivodeship, Poland. The research was carried out using an online questionnaire (Microsoft Forms), distributed to students via QR codes during school classes. Participation was anonymous and voluntary.

**Results:** Among 415 women, 74% (N=307) reported being physically inactive, while among men 57.6% (N=148) were inactive. Spearman's correlation coefficient was 0.18 ( $p < 0.05$ ), indicating statistical significance. In the study group, 80.5% of women (N=334) had low self-esteem and 19.3% (N=80) moderate. Among men, the vast majority—98% (N=252)—had low self-esteem, while 2% (N=5) had moderate self-esteem. For these variables, Spearman's rank correlation coefficient was -0.26 ( $p < 0.05$ ), indicating a statistically significant relationship. Low dietary healthiness was reported by 57.9% (N=394), while 42.1% (N=286) reported moderate dietary healthiness. Additionally, as many as 86.9% (N=591) followed a moderately unhealthy diet.

**Conclusions:** Females were more likely than males to report physical inactivity; however, this relationship was weak, although statistically significant. A weak but statistically significant correlation was found between gender and self-esteem, with low self-esteem predominating, especially among males. Most respondents demonstrated unhealthy dietary habits, characterized by low dietary healthiness or moderately unhealthy diets.

**Keywords:** Adolescents, Physical activity, Dietary habits, Self-esteem, Gender differences

# Choices and eating behaviors of Glovo app customers in the city of Racibórz.

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**Background:** The sustained popularity of food delivery apps since the COVID-19 pandemic facilitates excessive caloric intake, exacerbating the obesity crisis (BMI > 30). Driven primarily by a caloric surplus, obesity has surged since 1990, with 43% of adults being overweight and 16% obese in 2022.

**The aim:** The aim of the study was to characterize Glovo app users, assess whether manual workers use delivery services more frequently than white-collar workers, and analyze the relationship between the subjective assessment of diet and BMI.

**Materials and methods:** The data was collected by distributing QR codes providing access to a questionnaire among individuals who placed an order via the Glovo app in the city of Racibórz.

**Results:** The study included 100 participants. Women (N=60), apartment block residents (N=67), and white-collar workers (N=31) predominated. The mean age was 26.7 years. Restaurant meals were ordered significantly more often than groceries and medications, most frequently every 2-3 weeks (N=29) between 15:00 and 23:00 (N=60), mainly due to a lack of time (N=65). Manual workers ordered via the Glovo app more frequently than white-collar workers. An abnormal BMI was observed in 44 respondents, yet as many as 64 assessed their diet as healthy.

**Conclusions:** Women used the Glovo application more frequently than men. Users were primarily young adults (mean age 26), apartment residents, and white-collar workers. Orders were most often placed on weekdays during the afternoon and evening, typically every 2–3 weeks or less frequently. Orders from restaurants or bistros predominated, driven mainly by a lack of time and the desire to eat favorite dishes. The frequency of ordering was higher among manual workers. An abnormal BMI was observed in 44% of the respondents, even though the majority assessed their diet as relatively healthy.

**Keywords:** Glovo, Online Food Delivery, Ultra-processed food,

# Ocular adverse effects reporting with semaglutide vs tirzepatide in EudraVigilance

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**Background:** Glucagon-like peptide-1 receptor agonists and dual incretin therapies, including Semaglutide and Tirzepatide, are widely used in type 2 diabetes and obesity management. Emerging concerns regarding ocular adverse events necessitate systematic pharmacovigilance evaluation using large spontaneous reporting databases such as EudraVigilance.

**The aim:** To compare the reporting frequency of ocular adverse events associated with semaglutide versus tirzepatide using disproportionality analysis.

**Materials and methods:** A retrospective pharmacovigilance study was conducted using EudraVigilance data. Ocular adverse events were identified using Preferred Terms. Disproportionality was assessed using the Reporting Odds Ratio (ROR) with 95% confidence intervals (CI) and p-values. A safety signal was defined as ROR >1 with the lower CI >1 and p<0.05.

**Results:** Semaglutide demonstrated significantly higher reporting of multiple ocular adverse events compared to tirzepatide. Strong signals were observed for optic atrophy (ROR≈10.3, p=0.0029), papilloedema (ROR≈6.27, p<0.001), and optic ischaemic neuropathy (ROR≈4.29, p<0.001). Additional significant signals included retinopathy (ROR≈3.4), diabetic retinopathy (ROR≈2.78), reduced visual acuity (ROR≈2.24), and visual impairment (ROR≈1.63). Some events, including macular oedema and retinal vascular disorders, did not reach statistical significance.

**Conclusions:** This disproportionality analysis revealed a consistent signal of increased reporting of ocular adverse events, particularly optic nerve and retinal disorders, with semaglutide compared to tirzepatide. While causality cannot be established due to inherent limitations of spontaneous reporting systems, these findings highlight the need for further pharmacoepidemiological studies and clinical vigilance regarding potential ocular risks.

**Keywords:** Semaglutide; Tirzepatide; Ocular adverse events; Pharmacovigilance; Disproportionality analysis

# Neurological adverse event reporting after HPV vaccination: VAERS disproportionality analysis

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**Background:** Neurological adverse events are a key concern in post-licensure HPV vaccine safety surveillance, yet many pharmacovigilance studies rely on broad symptom groupings and limited case-level deduplication. We evaluated disproportional reporting of neurological adverse events following HPV vaccination in the Vaccine Adverse Event Reporting System.

**The aim:** To assess disproportional reporting of neurological adverse events associated with HPV vaccines using refined case-level methodology.

**Materials and methods:** A retrospective disproportionality analysis was conducted using pooled domestic and non-domestic VAERS reports. VAERSDATA, VAERSVAX, and VAERSSYMTOMS tables were linked by VAERS\_ID, deduplicated at case level, and the most recent report retained. Exposure included HPV2, HPV4, HPV9, or HPVX. Outcomes comprised a prespecified specific/serious neurological composite and a secondary nonspecific composite. Reporting odds ratios (ROR), 95% confidence intervals (CI), Fisher exact p-values, PT-level and sensitivity analyses were calculated.

**Results:** Among 2,715,822 reports, 81,288 involved HPV vaccines. The primary neurological composite occurred in 7,805 HPV and 169,158 non-HPV reports (ROR 1.55, 95% CI 1.51–1.59,  $p < 0.001$ ). The nonspecific composite showed a stronger signal (ROR 1.88, 95% CI 1.85–1.91), and the broad neurological category yielded ROR 1.74 (95% CI 1.72–1.77). PT-level signals included convulsion (ROR 4.58), seizure (ROR 2.48), encephalitis (ROR 2.23), tremor (ROR 1.56), hypoaesthesia (ROR 1.45), and peripheral neuropathy (ROR 1.32), while Guillain–Barré syndrome was not elevated (ROR 1.08). Sensitivity analyses remained positive, whereas HPV9 alone showed no signal (ROR 0.99).

**Conclusions:** HPV vaccine reports showed disproportionate reporting of neurological adverse events compared to non-HPV vaccines, with heterogeneity across terms and stronger signals for nonspecific symptoms. No signal was observed for HPV9 alone. These findings are hypothesis-generating and do not establish causality.

**Keywords:** HPV vaccine; Neurological adverse events ;Pharmacovigilance; Disproportionality analysis ;VAERS

# Justification of the traditional use of lemon balm leaves extract

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Granica**

**Background:** Lemon balm (*Melissa officinalis* L.) has been used in traditional medicine for centuries in the management of neuropsychological and gastrointestinal symptoms. Despite its recognition as a pharmacopeial herbal substance (*Melissae folium*), its interactions with the gut microbiota remain insufficiently characterized. Especially since the gut microbiota may alter the characteristics of bioactive compounds.

**The aim:** The aim of this study was to investigate the interaction between human gut microbiota and the compounds present in aqueous extract of lemon balm leaves by human gut microbiota, as well as to identify the postbiotic metabolites.

**Materials and methods:** The extract was incubated with faecal slurries obtained from three healthy donors. The analysis of both the native extract content and postbiotic metabolites was performed using HPLC-DAD-MS.

**Results:** Seventeen postbiotic metabolites were detected following the incubation *ex vivo*, of which two compounds were preliminarily identified. Biotransformation of certain compounds present in the original extract was also noted. Observed results varied (the speed and presence of certain biotransformations) depending on the donor.

**Conclusions:** While the compounds found in aqueous extract of lemon balm leaves interact with gut microbiota, the current results remain preliminary. Therefore, a future research should focus on isolating and performing an NMR analysis on postbiotic metabolites. Furthermore, the metabolic diversity observed in donors may suggest that the composition of the intestinal microbiome plays a critical role in these interactions.

**Keywords:** microbiota, *Melissa officinalis*, lemon balm, postbiotics

# The effect of $\alpha$ -tocopherol on HT-29 human adenocarcinoma cells

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**Background:** Tocopherols and tocotrienols are two main classes of fat-soluble compounds known as vitamin E. Tocopherols are divided into four variants:  $\alpha$ ,  $\beta$ ,  $\gamma$ , and  $\delta$ , where the  $\alpha$  variant has the strongest activity. These molecules are essential for human health, primarily due to their potent antioxidant properties. Tocopherols have received much attention for their role in the prevention of cancer. Studies show they can potentially reduce cancer risk. Nevertheless, the results are often inconsistent.

**The aim:** The purpose of this study was to evaluate the cytotoxic influence of  $\alpha$ -tocopherol (a-toc) on human colon adenocarcinoma HT-29 cells. The study also aimed to assess the impact of this vitamin on the transcription levels of genes encoding key regulators of the cell cycle (cyclin D1, p27), apoptotic (BCL2, BAX) and metastasis (MMP2, MMP9) and transcription factors (NF $\kappa$ B, STAT3).

**Materials and methods:** The HT-29 colon cancer cells were cultured using standard techniques and exposed to a range of  $\alpha$ -toc concentrations (0.2-200  $\mu$ M). Cytotoxic activity after 48 h exposure was assessed using the sulforhodamine B (SRB) assay. Gene expression analyses were performed by real-time RT-qPCR. Quantification of transcript levels in cells treated with 2, 20, and 200  $\mu$ M  $\alpha$ -toc was carried out after 12 h and 24 h of incubation.

**Results:** The present study revealed that  $\alpha$ -tocopherol did not exert significant cytotoxicity toward HT-29 cells after 48 h of treatment in the SRB assay. Nevertheless,  $\alpha$ -toc caused concentration- and time-dependent modulation of the expression of genes encoding key cell cycle and apoptosis regulators. The observed alterations in gene expression suggest that  $\alpha$ -toc may influence cell proliferation, apoptosis and metastasis in cancer cells.

**Conclusions:** The findings indicated that  $\alpha$ -toc modulates the expression of genes encoding proteins involved in the processes of proliferation, apoptosis and metastasis in colon cancer cells. Further investigations are required to confirm and extend these observations.

**Keywords:** tocopherol, colon cancer, proliferation, apoptosis, metastasis

# Meloxicam as a pro-apoptotic agent - a promising treatment approach for amelanotic melanoma

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**Background:** The term “melanoma” refers to a malignant neoplasm arising from the transformation of melanocytes. While characteristically defined by the presence of melanin, the lesions can be either pigmented (melanotic) or unpigmented (amelanotic). Therapeutic strategies for the amelanotic variants remain limited and require further research.

**The aim:** The objective of this study was to determine pro-apoptotic properties of meloxicam (MLX) as a potential therapeutic agent for amelanotic melanoma.

**Materials and methods:** The research utilized human amelanotic melanoma cell line C32, maintained under constant conditions (37°C, 5% CO<sub>2</sub>) in DMEM supplemented with 10% FBS. Firstly, a WST-1 assay was performed to evaluate MLX's cytotoxicity and to select drug concentrations for further analysis. Subsequently, several parameters were measured: (1) mitochondrial membrane potential ( $\Delta\Psi_m$ ), (2) the activity of caspase-3/7, -8, and -9, and (3) annexin V affinity for phosphatidylserine (Annexin V assay). All procedures were followed by a cytometrical image analysis.

**Results:** The Annexin V assay confirmed the proapoptotic effect of meloxicam. This hypothesis is further supported by a high incidence of  $\Delta\Psi_m$  depolarization, which suggests that MLX-induced cell death is activated via an intrinsic pathway. Furthermore, the results demonstrated a dose-dependent relationship between meloxicam concentration and the extent of C32 cell death, with the most significant effects observed at 700  $\mu\text{M}$ . However, the increased activity of caspase-8 and caspase-9 indicates that MLX may trigger apoptosis through both mitochondrial and extrinsic pathways.

**Conclusions:** The current findings highlight a notable therapeutic potential of meloxicam for the development of treatment strategies targeting amelanotic melanoma. Nevertheless, expanding the scope of current research is essential to validate MLX's application in clinical practice.

**Keywords:** amelanotic melanoma, meloxicam, apoptosis, therapy

# Assessment of the phototoxic potential of doxycycline in the treatment of pharyngeal squamous cell carcinoma.

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**Background:** Squamous cell carcinoma of the pharynx constitutes a heterogeneous group of cancers located in the head and neck region. It is estimated that approximately 890,000 people worldwide are diagnosed with this type of cancer each year, making it a significant public health issue. For this reason, there is an intensive search for new, alternative therapeutic strategies. Recent scientific reports indicate that certain compounds from the tetracycline group, due to their high phototoxicity, may inhibit the growth of pathological cancer cells.

**The aim:** The aim of this study was to evaluate the effect of doxycycline's phototoxic potential on the viability of squamous cell carcinoma of the pharynx cells.

**Materials and methods:** The experiment was conducted using the FaDu (HTB-43) squamous cell carcinoma of the oropharynx cell line. Following artificial UV-radiation, cell viability was assessed using the WST-1 colorimetric assay with the NucleoCounter® NC-3000™ imaging cytometer.

**Results:** The test drug exhibits cytotoxic activity within the concentration range analyzed, and a strong phototoxic effect was observed when cells were simultaneously exposed to the drug and UV radiation.

**Conclusions:** Based on the results, it was found that the phototoxic potential of doxycycline significantly reduces the viability of pharyngeal squamous cell carcinoma cells.

**Keywords:** Doxycycline, tetracyclines, phototoxicity, photosensitivity

# Effect of Clonazepam on Expression of Kisspeptin and Receptor GPR54 in Hypothalamic-Pituitary-Testicular Axis

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**Background:** Clonazepam, a benzodiazepine, which enhances GABA-A receptor activity, increasing inhibitory tone and suppressing hypothalamic kisspeptin neurons, thereby reducing GnRH and downstream reproductive hormone secretion. Kisspeptin, encoded by the KISS1 gene, acts via its receptor GPR54 (KISS1R) as a key regulator of the reproductive axis, driving pulsatile GnRH release. Disruption of this pathway is linked to hypogonadotropic hypogonadism and other reproductive disorders.

**The aim:** This study aims to investigate the effects of Clonazepam on Kisspeptin and GPR54 (KISS1R) expression within the Hypothalamic-Pituitary-Testicular Axis.

**Materials and methods:** Male Sprague-Dawley rats received intraperitoneal clonazepam treatment for 21 days. After euthanasia, hypothalamic, pituitary and testicular tissues were collected. KISS and GPR54 expression were quantified by real-time PCR and localized via immunohistochemistry

**Results:** The results show increased KISS expression in the hypothalamus and pituitary, with lower levels in the control group and testes, following the trend: hypothalamus > pituitary > control > testes. A similar pattern was observed for GPR54, with highest expression in the hypothalamus, moderate in the pituitary, and lowest in the testes. In the pituitary, KISS and GPR54 levels were comparable, indicating a balanced ligand receptor relationship, while in the control group both remained similar.

**Conclusions:** Clonazepam influences reproductive neuroendocrine activity primarily through its effects on central components of the hypothalamic-pituitary-testicular axis. Increased expression of KISS and GPR54 observed in the hypothalamus and pituitary gland, the absence of notable changes in the testes, suggests that central tissues are more responsive to GABAergic modulation. Kisspeptin expression in the testes was minimal but comparatively higher levels of its receptor were still detected, suggesting increased sensitivity to circulating ligand.

**Keywords:** Clonazepam, Kisspeptin, GPR54, KISS1R, GABA-A, Hypothalamic-Pituitary-Testicular Axis

# The Role of Semaglutide in the Adjuvant Therapy of Glioblastoma Multiforme.

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**Background:** Glioblastoma multiforme (GBM) is among the most aggressive brain tumors. Despite current therapeutic regimens (surgical resection, radiotherapy, and chemotherapy with temozolomide [TMZ]) and significant advancements in neuroimaging techniques, a GBM diagnosis continues to be associated with poor survival outcomes. Therefore, there is a critical need to identify novel therapeutic strategies to counteract GBM recurrence and modulate the metabolism of this tumor. Hyperglycemia, whether occurring in the course of diabetes or as an adverse effect of anti-edema steroid therapy in GBM patients, promotes tumor growth and increases mortality. Previous studies have highlighted the role of antidiabetic drugs (a repurposing strategy) in inhibiting the malignant features of GBM; however, data on the role of semaglutide (SG) in GBM remain scarce.

**The aim:** Our project aimed to investigate the effect of SG (administered alone or in combination with TMZ) on selected malignant characteristics of GBM cells, their sensitivity to TMZ, and the type of changes induced at the mitochondrial level.

**Materials and methods:** Experiments were conducted on primary glioblastoma cell lines (HROG02 and HROG17) cultured under hypoxia characteristic of the tumor microenvironment. GBM cells were incubated with SG, TMZ, or their combination (SG+TMZ) for 72 hours, followed by an analysis of selected malignant features, including viability, proliferation, and migration. Imaging of mitochondrial alterations was performed using an advanced holotomographic microscopy system (Nanolive).

**Results:** Our results demonstrated the inhibitory properties of SG on selected malignant features of GBM and indicated a novel mechanism of action involving the modulation of energy metabolism, as evidenced by the analyzed mitochondrial parameters.

**Conclusions:** SG appears to be a promising candidate for further research in the adjuvant therapy of patients with GBM.

**Keywords:** glioblastoma, semaglutide, drug repurposing, temozolomide, mitochondrial metabolism

# From Hydrophilic to Lipophilic: Antioxidant Activity of Ascorbyl Palmitate as a Vitamin C Derivative

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**Work's tutor: dr n. med. Magdalena Szumska, dr inż. Agnieszka Siewniak; The work constitutes a part of a PBL (Project Based Learning) project carried out at the Silesian University of Technology, 2025. The research involved collaboration between the Silesian University of Technology and the Medical University of Silesia in Katowice.**

**Background:** L-ascorbic acid (AA), or vitamin C, is an antioxidant widely used in cosmetology and dermatology. However, its practical application is limited by chemical instability. Therefore, AA derivatives such as ascorbyl palmitate (AP) are developed. Compared to AA, AP demonstrates higher stability, and its lipophilic structure facilitates penetration through the hydrophobic stratum corneum.

**The aim:** To evaluate the antioxidant activity of ascorbyl palmitate in relation to ascorbic acid.

**Materials and methods:** AP was synthesized via a model reaction using a biocatalyst chemically immobilized on an organic carrier (Silesian University of Technology). The antioxidant activity comparison was performed using commercially available AA. The spectrophotometric methods DPPH (2,2-Diphenyl-1-picrylhydrazyl) and FRAP (Ferric Reducing Antioxidant Power) were employed to assess AP and AA antioxidant activity at defined time intervals. Statistical analysis included descriptive statistics and non-parametric tests.

**Results:** Higher antioxidant activity (using Trolox as standard) was observed for AA compared to AP (DPPH:  $0.65 \pm 0.03$  vs.  $0.24 \pm 0.02$  [mmol/L],  $p < 0.0001$ ; FRAP:  $1.17 \pm 0.21$  vs.  $0.53 \pm 0.04$  [mmol/L],  $p < 0.0001$ ). DPPH results also showed higher radical scavenging percentage for AA (49.34% vs. 20.18%). The stability of the antioxidant activity of AP and AA was evaluated at 24, 72, and 96 h and after 1, 2, and 3 weeks. Both methods showed a decreasing trend in overall antioxidant activity with less negative slope for AP, suggesting higher stability of this derivative.

**Conclusions:** AP exhibits higher stability over time in terms of ability to prevent oxidation reactions compared to AA. AP is a lipophilic AA derivative, less available in aqueous reaction environments, resulting in weaker overall antioxidant effects. However, the higher stability and hydrophobicity of AP enable new applications, e.g., in the cosmetic industry. Thus, the evaluation of antioxidant activity is important. Also, FRAP and DPPH assays proved to be effective in the study.

**Keywords:** vitamin C, ascorbic acid, ascorbyl palmitate, antioxidants, DPPH, FRAP

# Knowledge levels regarding *Clostridioides difficile* infections among medical students in light of current ESCM

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**Background:** *Clostridioides difficile* infection (CDI) remains a major challenge in hospital epidemiology. Despite updated guidelines favoring fidaxomicin and vancomycin, outdated therapies such as metronidazole are still used in Polish clinical practice. Effective CDI management depends on well-prepared healthcare professionals, yet their knowledge is rarely objectively assessed.

**The aim:** To evaluate the knowledge of students at the Medical University of Silesia regarding the epidemiology and modern pharmacotherapy of CDI, with a particular focus on the correlation between subjective self-assessment and factual medical knowledge.

**Materials and methods:** The study was conducted between January and June 2025 among 366 students using an original, validated questionnaire. Statistical analysis with the chi-square test was performed using Statistica 13.3 software, with a significance level set at  $p < 0.05$ .

**Results:** Overall knowledge was moderate. Only 43.2% correctly identified fidaxomicin as first-line therapy, while 31% selected vancomycin. Medical students performed better than other healthcare students (46.5% vs. 34.9%,  $p = 0.04$ ). No significant progression of knowledge across years of study was observed ( $p = 0.17$ ), although correct responses increased from 40% in year one to 73.3% in year six. Importantly, no correlation was found between self-assessed and actual knowledge ( $p = 0.24$ ); among those declaring high competence, 50% answered incorrectly. Additionally, 12.3% of medical students still chose metronidazole as optimal therapy.

**Conclusions:** There is a clear discrepancy between subjective confidence and adherence to Evidence-Based Medicine. Although education improves knowledge, the persistence of incorrect responses highlights the need for earlier implementation of Antimicrobial Stewardship principles. Enhanced training in CDI management, particularly recurrence prevention, is essential to reduce hospitalization time and healthcare costs. Curriculum reforms should prioritize objective competence assessment over self-evaluation.

**Keywords:** *Clostridioides difficile* infection (CDI), antimicrobial stewardship, medical education, pharmacotherapy

# Impact of Thyroid Autoimmunity on Ovarian Reserve in Polycystic Ovary Syndrome

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**Background:** Ovarian function and reserve may be compromised by autoimmune diseases. A high prevalence of thyroid autoimmunity is frequently observed among patients with Polycystic Ovary Syndrome (PCOS). However, it remains unclear whether thyroid autoimmunity may compromise ovarian reserve in this population, warranting further investigation.

**The aim:** To evaluate the impact of thyroid autoantibodies on ovarian reserve in patients with PCOS, as assessed by serum anti-Müllerian hormone (AMH) levels.

**Materials and methods:** A retrospective analysis of clinical and laboratory data was performed in 278 patients diagnosed with PCOS according to the Rotterdam criteria. Patients were grouped based on the presence of thyroid autoimmunity (TAI): TAI-positive and TAI-negative. The analysis included serum AMH along with other hormonal, metabolic, and inflammatory parameters. Comparative and multivariable analyses were performed, adjusting for selected clinical variables.

**Results:** Median AMH levels were lower in antibody-positive patients; however, the differences were not statistically significant. No significant associations were observed for anti-TPO ( $p = 0.217$ ), anti-TG ( $p = 0.546$ ), both antibodies ( $p = 0.162$ ), or overall TAI ( $p = 0.459$ ). In multivariable models, thyroid autoimmunity was not associated with AMH. BMI was independently associated with lower AMH ( $p \approx 0.02$ ), while age was not significant.

**Conclusions:** Thyroid autoimmunity was not associated with ovarian reserve as assessed by AMH in patients with PCOS. This may be explained by the characteristics of the studied population, comprising young patients with PCOS, who typically present with elevated AMH levels.

**Keywords:** Polycystic Ovary Syndrome(PCOS), Thyroid autoantibodies, Anti-Müllerian Hormone (AMH), ovarian reserve

# What Shapes Women's Choice of Gynecologist? Insights into patient preferences and decision-making.

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**Background:** Choosing a gynecologist is an important decision that affects patients' comfort and safety. Available literature focuses primarily on the role of physician gender as a determinant in the choice of a gynecologist, while other factors remain less well characterized. A more detailed understanding of these factors may ultimately support improvements in the quality of care.

**The aim:** The study evaluated factors influencing women's choice of gynecologist.

**Materials and methods:** The retrospective study surveyed 1298 women aged 18-81 about their preferences and expectations regarding the choice of gynecologist. The self-developed questionnaire was distributed from December 2025 to January 2026 via social media. The data was collected in an Excel spreadsheet. Statistical analysis was conducted using Statistica software, with statistical significance set at  $p < 0,05$ .

**Results:** Younger patient age and higher anxiety before the visit correlate with choosing a female gynecologist ( $p < 0.001$ ). In contrast with increasing age, a growing proportion of women reported having no clear preference or difficulty defining one. The highest-rated factors were the gynecologist's knowledge and experience ( $M = 4.869$ ;  $Me = 5$ ), as well as their communication skills and empathy ( $M = 4.793$ ;  $Me = 5$ ), along with waiting time for the appointment and the clinic's location. The professionalism of the entire support staff was also rated highly.

**Conclusions:** The choice of a gynecologist remains a complex, multifactorial process. Contemporary patients make this decision with increasing awareness. Women expect care that is empathetic, accessible, and easy to understand. The importance of the physician-patient relationship and overall patient experience in gynecological care continues to grow.

**Keywords:** obstetrician-gynecologist, patient care, public health, patient experience

# Impact of Perinatal Social Media Content on Anxiety and Attitudes Toward Future Childbirth

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**Background:** Social media is an important source of information that may shape perceptions and emotions related to childbirth and motherhood.

**The aim:** The study examined the connection between exposure to perinatal content on social media and anxiety levels, as well as attitudes toward future childbirth and motherhood in young women.

**Materials and methods:** A cross-sectional survey using an original 44-item questionnaire was conducted among 218 nulliparous women aged 18–35 years (mean age:  $24.6 \pm 3.2$ ), including 40.0% medical students. Spearman's rank correlation coefficient and the Mann-Whitney U test were used. Variables such as frequency of contact with negative and educational content, anxiety levels, and attitudes towards motherhood were used.

**Results:** The analysis showed a statistically significant relationship between the type of content consumed and anxiety levels. Exposure to negatively framed content was positively correlated with anxiety ( $\rho = 0.223$ ;  $p < 0.001$ ), while educational content was negatively correlated with anxiety ( $\rho = -0.207$ ;  $p = 0.002$ ). Time spent on social media was not associated with anxiety ( $\rho = -0.026$ ;  $p = 0.698$ ). Medical students reported a less idealized perception of childbirth and motherhood compared to students of other medical fields. Video content elicited stronger emotional reactions than text-based content ( $p < 0.001$ ); however, no association was found between this perception and anxiety levels.

**Conclusions:** Perinatal content on social media may influence anxiety and attitudes of young women toward potential motherhood. Negatively framed material is associated with higher levels of anxiety, whereas educational content may serve a protective function. These results emphasize the importance of the responsible presentation of perinatal content on social media, as well as the role of medical education in fostering realistic attitudes toward childbirth and motherhood.

**Keywords:** Anxiety, Childbirth, Motherhood, Social Media, Perinatal content, young women

# Beyond the 15% Threshold: Redefining Failure Predictors and Clinical-Biochemical Dissociation in Methotrexate

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**Background:** Medical management of ectopic pregnancy (EP) using Methotrexate (MTX) is typically guided by standardized  $\beta$ -hCG trends and static mass measurements. However, "Clinical Failure" (rupture) frequently occurs despite "Biochemical Success" (declining  $\beta$ -hCG), suggesting that current predictive markers (particularly the 15%  $\beta$ -hCG drop rule) may be insufficient for high-risk subsets.

**The aim:** To identify synergistic predictors of MTX failure by analyzing the interplay between initial hormonal load, anatomical location, and sonographic dynamics in refractory cases.

**Materials and methods:** This study analyzed 6 cases of EP where systemic MTX failed to prevent surgical intervention. Variables evaluated included initial  $\beta$ -hCG levels, presence of fetal cardiac activity, anatomical site (tubal vs. interstitial), and mass characteristics post-treatment.

**Results:** Analysis of these cases reveals that MTX resistance often manifests as clinical-biochemical dissociation, where tubal rupture occurs despite a  $>15\%$  decline in  $\beta$ -hCG or low absolute titers. While initial  $\beta$ -hCG levels  $>2,000$ – $5,000$  mIU/mL are established risk factors, rupture has been documented at levels  $<105$  mIU/mL when accompanied by rapid mass expansion. High vascularity in interstitial or cornual segments and the presence of a yolk sac or cardiac activity serve as critical markers of resistance, often bypassing MTX's inhibitory effects. In such high-risk scenarios, increasing adnexal mass diameter (reaching up to 6 cm post-treatment) is a more reliable predictor of imminent rupture than isolated Day 7  $\beta$ -hCG trends. Furthermore, patients conceiving via In Vitro Fertilization (IVF) demonstrate higher failure rates and a greater need for multi-dose regimens or surgical intervention compared to spontaneous pregnancies.

**Conclusions:** Sole reliance on  $\beta$ -hCG kinetics to determine Methotrexate efficacy is clinically insufficient. We propose a management framework integrating anatomical site, mass expansion velocity, and serial sonography into the decision-making matrix.

**Keywords:** Ectopic Pregnancy, Methotrexate Resistance,  $\beta$ -hCG Dissociation, Mass Expansion Velocity

# Association between Perceived Stress and Menstrual Disorders among Female Medical Students

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**Background:** Stress constitutes a significant factor influencing the functioning of the human organism, including the hormonal regulation in women. Female students of medical disciplines represent a population particularly susceptible to chronic psychological burden due to the intensive nature of their studies, high academic demands, and exposure to clinical environments.

**The aim:** The study evaluated the impact of stress on menstrual disorders among female students of medical fields.

**Materials and methods:** The cross-sectional study surveyed 177 women aged 19-38 regarding their perceived level of stress and the impact of this stress on their menstrual cycle. The questionnaire was distributed from February 2026 to March 2026 via Internet forums. The survey included a questionnaire, namely the PSS-10 scale.

**Results:** The majority of respondents (63.3%) reported that their studies had an impact on the occurrence or exacerbation of menstrual disorders, with 25.4% indicating "definitely yes" and 37.9% "rather yes." In contrast, 17.5% of participants answered "rather no," a smaller proportion selected "definitely no," and 9% reported uncertainty.

**Conclusions:** The results indicate that a high level of stress correlates with an increased risk of menstrual disorders. The implementation of preventive measures, such as stress management techniques, psychological support, and health education, could contribute to improving the quality of life of female students as well as their reproductive health.

**Keywords:** stress, menstrual disorders, menstrual cycle, medical students, perceived stress

# Prevalence of GBS colonization in women delivering at the Specialist Hospital no. 2 in Bytom.

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**Background:** Group B Streptococcus (GBS), a common component of the maternal microbiota, is a major etiological factor in neonatal sepsis, meningitis, and pneumonia. Given the substantial risk of vertical transmission during childbirth, together with the high mortality and significant risk of complications associated with GBS infections in neonates, GBS is of particular importance to the fields of neonatology and obstetrics.

**The aim:** The study seeks to broaden the epidemiological understanding of GBS by assessing the prevalence of maternal colonization among a previously undescribed population of women delivering at the Clinical Department of Gynecology, Obstetrics, and Gynecologic Oncology of Specialist Hospital no. 2 in Bytom.

**Materials and methods:** Medical records of 2482 patients delivering between 01.01.2023 and 18.12.2025 were analyzed to determine the results of routine cultures for GBS. The cultures were obtained from the vaginal introitus and perianal region between the 35th and 37th weeks of gestation as per the recommendations of The Polish Society of Gynecologists and Obstetricians (PTGiP).

**Results:** The screening was performed in 1139 patients (approximately 46% of the studied population). Of these 1139 patients, 270 (approximately 24%) tested positive for GBS colonization. The remaining 869 patients (approximately 76%) tested negative. No statistically significant differences were observed between GBS-positive and GBS-negative patients with respect to maternal age, fetal weight, or gestational age at delivery. No screening results were recorded for 1343 patients (approximately 54% of the studied population). Among women without a recorded result, 189 (14%) delivered before 35 weeks of gestation, i.e., before the planned timing of specimen collection.

**Conclusions:** The findings of the study support the validity of conducting routine GBS screening in accordance with current recommendations.

**Keywords:** Group B Streptococcus, GBS maternal colonization, Streptococcus agalactiae

# Clinical Utility of the Nugent Score and the Kuczyńska Scale in Vaginal Microbiome Analysis- Preliminary Study

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**Background:** Bacterial vaginosis (BV) is the most common vaginal dysbiosis among women in reproductive age. The essence of BV is reduction of H<sub>2</sub>O<sub>2</sub> producing Lactobacillus bacteria and increased number of anaerobic bacteria such as Gardnerella spp., Mobiluncus spp., Bacterioides spp. A characteristic syndrome of BV is vaginal discharge with intense „fishy” odor, however, an asymptomatic form also occurs. An elevated vaginal pH is also typical of BV asymptomatic form also occurs.

The diagnosis is established based on the Amsel criteria or on microscopic evaluation of a vaginal smear stained using the Gram method and assessed according to the Nugent scoring system (NSS). This scale evaluates the presence of Gram-positive Lactobacillus spp. rods, Gram-negative bacteria associated with BV, and clue cells. The results are presented on a 10-point scale, with scores of 7–10 indicating BV

In Poland, direct smears are also assessed using the Kuczyńska grading scale (KGS). In addition to the number of lactic acid bacteria, this scale evaluates the presence of potentially pathogenic microorganisms and leukocytes. The results are presented in five main grades and five intermediate grades.

Due to the common difficulties in diagnosing BV, it is necessary to select the method with the highest sensitivity and specificity in clinical practice.

**The aim:** Comparison of the clinical utility of NSS and KGS for diagnosing BV based on direct smears of vaginal discharge.

**Materials and methods:** Twenty direct vaginal secretion smears stained using the Gram method were examined and evaluated using the NSS and KGS. A result was considered abnormal if the NSS score was above 3 points (4–6 points +clue cells) or if the KGS grade was 0, III, or IV.

**Results:** Abnormal results were found in 8/22 cases, including 8/22 according to NSS and 8/22 according to KGS.

**Conclusions:** Both scales have different practical applications. The Nugent scoring system (NSS) appears to be simpler and more practical.

**Keywords:** bacterial vaginosis, vaginal dysbiosis, Nugent score, microbiom, clue cells

# The correlation between visceral obesity markers and AMH in Polycystic Ovary Syndrome

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**Background:** The association between serum anti-Mullerian hormone (AMH) concentration and metabolic risk has been investigated in previous studies, with inconsistent results.

**The aim:** This study aimed to evaluate the relationship between metabolic indices and serum AMH concentration in women with PCOS.

**Materials and methods:** We conducted a cross-sectional study including 1149 patients with PCOS. Anthropometric measurements included height, weight, and body mass index (BMI). Body composition was assessed using bioelectrical impedance analysis, providing percentage body fat and visceral fat area. Fasting blood samples were collected during the early follicular phase (days 2-5 of the menstrual cycle) to evaluate metabolic parameters, including glucose, insulin, and lipid profile. A 75g oral glucose tolerance test (OGTT) was performed with glucose and insulin measurements. Hormonal assessment included sex hormone-binding globulin (SHBG) and anti-Mullerian hormone (AMH). Insulin resistance and cardiometabolic risk were evaluated using established indices, including HOMA-IR, the Cardiometabolic Index (CMI), and the Lipid Accumulation Product (LAP).

**Results:** Overall, the observed associations between AMH and metabolic parameters were weak. AMH showed weak negative correlations with CMI, LAP, visceral fat area, BMI, waist-to-hip ratio, and skeletal muscle mass, as well as with glucose concentration during OGTT. A weak positive correlation was found between AMH and SHBG levels. In contrast, LAP presented strong positive correlations with triglycerides, fasting insulin, HOMA-IR, body fat parameters, and anthropometric parameters, and strong negative correlations with HDL and SHBG. CMI was also negatively associated with HDL levels.

**Conclusions:** AMH levels had only weak associations with metabolic and body composition parameters in women with PCOS, indicating limited value as a marker of cardiometabolic risk. Consequently, AMH is unlikely to be a reliable indicator of metabolic disturbances in this population.

**Keywords:** polycystic ovary syndrome, AMH, visceral obesity

# Biatrial Structural and Functional Remodeling in Atrial Fibrillation Patients Qualified for Ablation

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**Background:** Atrial fibrillation (AF) leads to structural and functional remodelling of the atria, including enlargement, changes in geometry, and impaired reservoir and contractile function. Modern echocardiographic parameters, including volumetric indices and atrial muscle strain, allow for a more accurate assessment of the degree of remodelling and may be important in qualifying patients for ablation.

**The aim:** This study aims to evaluate advanced structural and functional parameters of the left atrium and right atrium in patients with AF who qualify for ablation and to analyze the changes in these parameters post-procedure.

**Materials and methods:** The investigation involved 52 patients with AF (38% with paroxysmal AF > 6 months, 59% with persistent AF) scheduled for ablation, with a mean age of 67±11 years, 42.3% of whom were male. Each patient underwent echocardiography with the assessment of the following atrial morphology and function parameters: left atrial volume index (LAVI), right atrial volume index (RAVI), left atrial sphericity index (LASI), left atrial contraction index (LACI), right atrial contraction index (RACI), left atrial reservoir strain (LARS), and right atrial reservoir strain (RARS). These assessments were repeated after the ablation.

**Results:** The findings demonstrated significant enlargement of both atria; LAVI measured at 41.37±17 ml/m<sup>2</sup> and RAVI at 32.43± 9 ml/m<sup>2</sup>. The LASI (0.69±0.5) reflected an increase in LA sphericity. Notably, functional measures were abnormal: LACI was at 65± 35%, and RACI at 72±16%. The reservoir function exhibited pronounced deficiencies, with LARS at 17.18± 7% and RARS at 20.76 ±9%. Follow-up results are presently under analysis.

**Conclusions:** Patients with AF undergoing ablation reveal significant enlargement and mechanical dysfunction in both atria, highlighting the importance of advanced echocardiographic evaluation in understanding atrial remodeling and guiding treatment strategies.

**Keywords:** atrial fibrillation, ablation, atrial strain, advanced echocardiography

# Limitations of clinical risk scores in predicting outcomes in pulmonary embolism

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**Background:** Pulmonary embolism (PE) is a clinically heterogeneous condition with a wide spectrum of outcomes, ranging from mild disease to life-threatening complications. Although several clinical risk stratification tools are routinely used, their prognostic performance in real-world populations remains uncertain.

**The aim:** To assess the predictive value of commonly used clinical risk scores (PESI, sPESI, HESTIA, BOVA) for short- and long-term mortality in patients with PE, and to identify additional prognostic factors associated with adverse outcomes.

**Materials and methods:** A retrospective cohort study included 326 patients with objectively confirmed PE from the RIETE registry (2016–2025). Risk scores were calculated at baseline. Discriminatory performance was assessed using ROC analysis. Independent predictors were identified using multivariable logistic regression.

**Results:** PESI demonstrated the highest, though moderate, predictive performance for mortality (AUC 0.618 for 30-day and 0.654 for 12-month mortality;  $p < 0.01$ ), while sPESI, BOVA and HESTIA were not statistically significant. Age (OR 1.033; 95% CI 1.001–1.067), leukocyte count (OR 1.145; 95% CI 1.060–1.237) and D-dimer level (OR 1.92; 95% CI 1.61–2.29) were independently associated with 30-day mortality. For 12-month mortality, significant predictors included age (OR 1.036; 95% CI 1.010–1.063), leukocyte count (OR 1.132; 95% CI 1.053–1.218), D-dimer level (OR 1.020; 95% CI 1.002–1.038), chronic kidney disease (OR 2.97; 95% CI 1.52–5.65) and chronic pulmonary disease (OR 1.88; 95% CI 1.12–3.43). Laboratory markers increased progressively across PESI classes ( $p < 0.05$ ), indicating overlap between clinical scores and systemic disease burden.

**Conclusions:** In this real-world cohort, commonly used risk scores showed limited prognostic accuracy. Mortality was more strongly associated with age, inflammatory markers and comorbidities than with score-based stratification. Combined models incorporating clinical, laboratory and comorbidity data may improve risk prediction in PE.

**Keywords:** pulmonary embolism, risk stratification, PESI, biomarkers, prognosis, comorbidity

# Arterial stiffness and sST2 as a function of the severity of frailty in a population of hospitalized patients

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**Background:** In the general population aged  $\geq 65$  years, an association has been documented between carotid-femoral pulse wave velocity  $>11$  m/s and the prevalence of frailty, disability, and mortality. Arterial stiffness is influenced by various cardiovascular risk factors and comorbidities. sST2 is a potential biomarker of these pathologies and vascular remodeling.

**The aim:** The aim of this study was to determine the relationship between sST2 levels, arterial stiffness and the severity of frailty syndrome in patients with angiographically documented atherosclerotic cardiovascular disease (ASCVD).

**Materials and methods:** This study is a supplementary analysis of the FRAPICA trial. The trial included 690 patients with angiographically documented ASCVD. Frailty was assessed using Linda Fried's phenotypic scale. Carotid-femoral pulse wave velocity was measured using the Complior device. sST2 levels were determined using the Aspect Reader kit. The results were analyzed using analysis of variance and linear regression with categorical variables.

**Results:** Patients were divided into three groups depending on the severity of frailty: robust – 222 patients (46F), prefrail – 370 patients (155F), and frail – 98 patients (57F). The mean age for each group was  $71.8 \pm 5.0$ ,  $73.1 \pm 5.4$ , and  $76.1 \pm 6.2$  years ( $p < 0.001$ ). Pulse wave velocity did not differ between the groups and was  $11.0 \pm 9.3$ ,  $10.2 \pm 2.5$ , and  $10.7 \pm 3.0$  m/s, respectively (NS); sST2 level was also similar at  $23.9 \pm 14.5$ ,  $24.0 \pm 15.9$ , and  $24.8 \pm 14.0$  ng/ml, respectively (NS). No correlation was found between sST2 and arterial stiffness. Regression analysis showed that only age and frailty are independent variables that exert a positive influence on arterial stiffness (coefficient of determination for age 0.46, for frailty 0.35).

**Conclusions:** Although frailty is associated with arterial stiffness, no association with sST2 concentration was found. This may indicate that arterial wall remodeling and changes in mechanical properties in frail patients are driven by mechanisms independent of the sST2 pathway.

**Keywords:** Frailty, Arterial stiffness, sST2

# Atrial Fibrillation Across Heart Failure Phenotypes: Clinical and Echocardiographic differences in HFpEF vs HF

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**Background:** Atrial fibrillation (AF) is a frequent comorbidity in heart failure (HF). HF comprises two major phenotypes, HFrEF and HFpEF, which differ greatly in pathophysiology and prognosis. However, the relationship between AF and HF phenotypes, particularly regarding clinical characteristics and echocardiographic profiles, remains insufficiently defined.

**The aim:** To compare AF prevalence across HF phenotypes and to characterise clinical and echocardiographic differences between HFrEF and HFpEF among patients with AF.

**Materials and methods:** This retrospective study included 168 HF patients. HF phenotypes were defined by LVEF: HFrEF (<40%) and HFpEF (≥50%), with mid-range LVEF (40–49%) excluded. AF prevalence was compared using Fisher's exact test. Continuous and categorical variables were analyzed with the Mann–Whitney U and Fisher's exact tests, respectively. Logistic regression was used to identify factors associated with HF phenotype among AF patients. Statistical significance was set at  $p < 0.05$ .

**Results:** Among 62 patients with AF, AF was strongly associated with HF phenotype: all HFrEF patients had AF, whereas only a minority of HFpEF patients did ( $p < 0.001$ ). Within the AF cohort, HFrEF patients were older ( $p = 0.013$ ) and had higher prevalence of diabetes ( $p = 0.031$ ), prior myocardial infarction ( $p = 0.043$ ), and nicotine dependence ( $p = 0.008$ ). In multivariate analysis, higher age ( $p = 0.021$ ), higher BMI ( $p = 0.008$ ), larger left atrial volume ( $p = 0.014$ ), and hypertension ( $p = 0.045$ ) were associated with lower odds of HFpEF, while higher TAPSE independently predicted HFpEF ( $p = 0.001$ ).

**Conclusions:** AF was strongly associated with HFrEF in this cohort. Among AF patients, clinical and echocardiographic characteristics clearly distinguished HF phenotypes, highlighting HF heterogeneity in the context of AF and the potential utility of phenotype-based stratification. The association between AF and HFrEF may, however, reflect greater underlying disease burden rather than causality. Prospective studies are needed to delineate this relationship.

**Keywords:** Atrial fibrillation, Heart failure, HFpEF, HFrEF, Echocardiography, Phenotypic differences

# MEESSI-AHF Score and fibrin clot properties in patients with decompensated HFrEF in sinus rhythm

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**Background:** Patients hospitalized for decompensated HFrEF are at increased risk of thromboembolic events, which may persist for weeks or months after discharge. The issue is particularly crucial in patients without indications for long-term anticoagulation, e.g., those without AF. Novel biomarkers and refined clinical risk stratification tools are needed to identify individuals at highest thromboembolic risk.

**The aim:** To investigate whether the MEESSI-AHF score is associated with alterations in fibrin clot properties and thrombin generation and assess their modification after pharmacological stabilization in the described cohort.

**Materials and methods:** In this prospective cohort study, 98 patients hospitalized for HFrEF decompensation without indications for anticoagulation were enrolled. Fibrin clot permeability (Ks), clot lysis time (CLT), and thrombin generation were measured during the acute phase and after a median of 3 months. All-cause mortality, rehospitalization, ischemic stroke, and major bleeding were recorded (median follow-up of 24 months).

**Results:** Median MEESSI-AHF score was 1.94 (1.23–3.24). Higher scores were associated with longer hospitalization ( $r=0.552$ ), lower LVEF ( $r=-0.429$ ), larger IVC diameter ( $r=0.367$ ) and higher INR ( $r=0.447$ ). It was also associated with lower Ks at baseline ( $r=-0.250$ ,  $P=0.039$ ), but not with CLT or thrombin generation. At follow-up, Ks increased ( $P<0.001$ ) and CLT shortened ( $P=0.010$ ). Higher baseline MEESSI-AHF predicted greater improvement in Ks ( $r=0.281$ ,  $P=0.013$ ) and CLT ( $r=-0.301$ ,  $P=0.008$ ). After adjustment for fibrinogen, MEESSI-AHF remained independently associated with Ks during hospitalization ( $R^2=0.295$ ,  $P<0.001$ ), Ks improvement ( $R^2=0.220$ ,  $P=0.004$ ), and CLT shortening. No association with long-term clinical outcomes was observed.

**Conclusions:** In this cohort, higher MEESSI-AHF scores are associated with formation of denser fibrin clots. After pharmacological stabilization, higher baseline risk predicts greater improvement in fibrin clot permeability and fibrinolytic potential.

**Keywords:** HFrEF, MEESSI-AHF score, clot permeability, clot lysis time, prothrombotic state

# Does peak troponin T concentration determinate LVEF recovery in ARNI-treated patients after AMI?

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**Background:** Sacubitril/valsartan (S/V) may improve left ventricular remodeling after acute myocardial infarction (AMI), but predictors of left ventricular ejection fraction (LVEF) recovery remain unclear.

**The aim:** To assess whether peak troponin T (cTnT) concentration, as a surrogate marker of MI and infarct size, predicts LVEF recovery in patients treated with S/V after first AMI.

**Materials and methods:** This retrospective single-center study included adults with first AMI, complete revascularization during index hospitalization, baseline LVEF  $\leq 40\%$ , and treatment with S/V. Patients with previous MI or revascularization, prior heart failure, other cardiac disorders, severe hepatic or renal dysfunction, major systemic disease or malignancy, in-hospital death, or incomplete records were excluded. Overall 41 patients (37 men; mean age  $58 \pm 9.5$ ) were analysed. Separate multivariable linear regression models were constructed for 6-week and 4-month follow-up, with follow-up LVEF as the dependent variable and baseline LVEF plus log-transformed peak cTnT as independent variables.

**Results:** Baseline median LVEF was 30% (IQR, 28.75-36.25), while mean LVEF increased to  $36.7 \pm 7.2\%$  at 6 weeks and  $41.0 \pm 8.0\%$  at 4 months. At 6 weeks, the model was significant overall ( $R^2=0.307$ ,  $p=0.0009$ ): baseline LVEF independently predicted 6-week LVEF ( $\beta=0.52$ ,  $p=0.0005$ ), whereas log-transformed peak cTnT did not ( $\beta=1.04$ ,  $p=0.4095$ ). At 4 months, the model was not significant overall ( $R^2=0.099$ ,  $p=0.2846$ ), and neither baseline LVEF ( $\beta=0.416$ ,  $p=0.1336$ ) nor log-transformed peak cTnT ( $\beta=1.278$ ,  $p=0.5507$ ) independently predicted follow-up LVEF.

**Conclusions:** Peak cTnT was not identified as a significant independent predictor of LVEF at either 6 weeks or 4 months. Baseline LVEF was a significant positive predictor of short-term LVEF. S/V therapy was accompanied by improvement in LVEF during follow-up; however, further analyses are needed to clarify factors associated with recovery of LV systolic function in this population.

**Keywords:** ARNI Sacubitril/Valsartan troponin T acute myocardial infarction AMI LVEF

# Comorbidity-specific effects of beta-blocker treatment in heart failure with preserved ejection fraction

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**Background:** The benefits of beta-blocker treatment in heart failure (HF) have been firmly established in individuals with ejection fraction (EF) < 50%, yet the debate persists regarding the potential effects of this therapy among HF patients with preserved ejection fraction (HFpEF).

**The aim:** This study aimed to evaluate the association and comorbidity-specific effects of beta-blockers treatment among individuals diagnosed with HFpEF.

**Materials and methods:** The study included HFpEF patients (N=4,397, 52% female, median [Q1, Q3] age 74 [66, 81] years) from the Academic Repository of Clinical Cases of Medical University of Silesia (2018–2025). The association between therapy and the study's endpoints (all-cause mortality, rehospitalization) was examined using confounder-adjusted Cox proportional hazards models. The median follow-up time was 35 (14, 64) months. Interaction terms with history of myocardial infarction (MI), arterial hypertension (HA) and atrial fibrillation (AF) were included one-by-one to screen for comorbidity-specific effects of the therapy.

**Results:** The effect of beta-blockers on mortality was not significant, with an adjusted hazard ratio (aHR) of 0.96 (95% CI: 0.75–1.23) and deaths percentage was comparable between the groups (8.2% for treated vs. 8.6% for not treated,  $p = 0.74$ ). Analysis of the comorbidity-specific effects revealed that beta-blocker therapy was associated with increased risk of rehospitalization but only when accompanied by a history of MI (main effect aHR of 1.19, 95% CI: 0.91-1.56, significant interaction term with aHR of 1.86, 95% CI: 1.03-3.34,  $p=0.039$ ). Rehospitalization rate did not differ significantly between the treatment arms (10.9% of treated vs. 9.2% of untreated,  $p = 0.07$ ). There were no significant interactions of beta-blockers use with HA and AF in regard to the analyzed endpoints.

**Conclusions:** Beta-blocker therapy does not reduce mortality in the HFpEF cohort. Moreover, it may be associated with an increased risk of rehospitalization in patients with previous MI.

**Keywords:** HFpEF, mortality, rehospitalization,

# Elevated lipoprotein(a) in primary care: prevalence and cardiovascular risk in the “Moje Zdrowie” program

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**Background:** Lipoprotein(a) (Lp(a)) is an independent, genetically determined cardiovascular risk factor. ESC guidelines recommend Lp(a) measurement at least once in every adult's lifetime. Elevated Lipoprotein(a) co-exist with and classical modifiable cardiovascular risk factors.

**The aim:** To determine the prevalence of elevated Lp(a) ( $\geq 50$  mg/dl) in a primary care population and to characterise the cardiovascular risk profile according to Lp(a) level.

**Materials and methods:** Cross-sectional analysis of 285 participants enrolled in the "Moje Zdrowie" preventive program (median age 35 years, 36.8% female). Assessment included anthropometric measurements, fasting lipid panel with Lp(a), fasting glucose, renal and hepatic biomarkers, blood pressure, and structured questionnaires on smoking, physical activity, and family history. Cardiovascular risk was quantified using the SCORE2 algorithm.

**Results:** Elevated Lp(a) ( $\geq 50$  mg/dl) was identified in 47 participants (16.5%). The high Lp(a) group demonstrated significantly higher SCORE2 values ( $p=0.014$ ), greater proportion classified as high cardiovascular risk (12.8% vs. 3.8%;  $p=0.031$ ), higher prevalence of MASLD (23.4% vs. 5.9%;  $p=0.002$ ) and dyslipidemia (80.9% vs. 63.9%;  $p=0.037$ ). Conventional lipid parameters did not differ significantly between groups. Participants with Lp(a)  $\geq 50$  mg/dl carried a significantly higher number of concomitant risk factors (mean 2.30 vs. 1.80;  $p=0.027$ ). A substantial treatment gap was observed - 87.9% of participants with dyslipidemia remained untreated.

**Conclusions:** Elevated Lp(a) affects approximately one in six primary care adults and is associated with a less favourable cardiovascular risk profile, greater MASLD burden, and higher clustering of classical cardiovascular risk factors. These findings support of routine Lp(a) measurement into primary care preventive programs.

**Keywords:** Lipoprotein(a), cardiovascular risk, primary care

# Lp(a) and standard modifiable risk factors in ACS: a missed opportunity for LDL-C optimization

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**Background:** Lipoprotein(a) [Lp(a)] is a causal risk factor for atherosclerotic cardiovascular disease. In the absence of Lp(a)-lowering therapies, the management of high Lp(a) is based on optimization of other risk factors, particularly on reduction of low-density lipoprotein cholesterol (LDL-C).

**The aim:** The aim of this study was to investigate the burden of standard modifiable cardiovascular risk factors (SMuRFs) in relation to Lp(a) in patients with acute coronary syndrome (ACS).

**Materials and methods:** This retrospective, single-center study included 93 patients with Lp(a) levels measured during hospitalization for ACS. High Lp(a) was defined as levels  $\geq 125$  nmol/L. SMuRFs comprised diabetes, hyperlipidemia, hypertension, overweight or obesity, and smoking.

**Results:** The mean age was  $59.8 \pm 12.7$  years, 20.4% were female, and 21.5% displayed high Lp(a). Overall, 2.2% had no SMuRFs, 16.1% had one, 21.5% had two, 35.5% had three, and 24.7% had four or more SMuRFs. The number of SMuRFs, as well as the prevalence of diabetes (20.0% vs. 23.6%), hyperlipidemia (73.7% vs. 80.8%), hypertension (55.0% vs. 65.8%), overweight or obesity (76.5% vs. 75.4%), and smoking (45.0% vs. 35.6%) were comparable between patients with high and low Lp(a). 40.0% and 32.9% of patients with high and low Lp(a), respectively, were on any statin. The mean LDL-C was  $104.0 \pm 42.0$  mg/dL and  $114.0 \pm 50.4$  mg/dL, and the median percentage LDL-C reduction from baseline required to achieve the LDL-C goal was 61.0% [50.0; 68.0] and 58.0% [50.0; 69.0] in the high and low Lp(a) group, respectively. At discharge, 26.3% and 25.3% of patients with high and low Lp(a), respectively, received high-intensity statin with ezetimibe, while the remaining received statin monotherapy.

**Conclusions:** SMuRFs were common in ACS patients regardless of Lp(a) levels. The extent of guideline-recommended LDL-C reduction was comparable between patients with high and low Lp(a). Lipid-lowering therapies were underutilized in both groups.

**Keywords:** lipoprotein(a), acute coronary syndrome

# Prognostic Value of SIRI, NLR, and MLR for In-Hospital Outcomes in AMI: Impact of Prior Myocardial Infarction

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**Background:** Inflammation plays a key role in the pathophysiology and prognosis of acute myocardial infarction (AMI). Morphological inflammatory indices derived from routine blood counts, including the systemic inflammatory response index (SIRI), neutrophil-to-lymphocyte ratio (NLR), and monocyte-to-lymphocyte ratio (MLR), have emerged as inexpensive and readily available prognostic factors for cardiovascular outcomes. Their comparative performance remains uncertain, and inconsistent findings across studies have been reported. It is also unclear whether their prognostic value differs in patients with and without prior myocardial infarction, a subgroup characterized by distinct inflammatory profiles, myocardial remodeling, and higher baseline risk.

**The aim:** To compare SIRI, NLR, and MLR and to assess the effect of prior myocardial infarction on their prognostic performance.

**Materials and methods:** The data of a total of 142 patients hospitalized in a tertiary care hospital with a diagnosis of AMI were retrospectively sampled. Demographic, clinical, laboratory, echocardiographic, and in-hospital outcome data were collected from electronic medical records. The composite event was defined as the occurrence of one of: death, in-hospital recurrent infarction, stroke, cardiogenic shock, life-threatening arrhythmia, and need for mechanical support.

**Results:** 142 patients (25.4% female) with a median age of 70 were included in the study, out of which 41 (28.9%) had a history of prior MI. In logistic regression analysis, SIRI was the index with the best accuracy for predicting the composite outcome, with a good discriminatory ability in a multivariable model (AUC, 0.79; 95%CI, 0.70-0.88). The interaction terms between morphological indices and first/recurrent myocardial infarction did not reach statistical significance.

**Conclusions:** SIRI showed the best predictive performance for the composite outcome. The findings suggest a consistent prognostic value across the subgroups.

**Keywords:** myocardial infarction, blood morphology, predictors

# What form of therapy: pacemaker implantation or catheter ablation is dedicated for patients with T-B syndrome?

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**Background:** Tachycardia-bradycardia syndrome is sinus node dysfunction with alternating bradyarrhythmias and supraventricular tachyarrhythmias, mainly paroxysmal AF. It impairs quality of life and increases the risk of stroke and heart failure. Although pacemakers were the standard therapy, AF ablation has shown benefits in survival and quality of life.

**The aim:** This study aimed to compare clinical characteristics of patients with tachycardia-bradycardia syndrome according to treatment strategy: pacemaker implantation and/or catheter ablation.

**Materials and methods:** A retrospective analysis included 92 patients with confirmed tachy-brady syndrome treated in 2023–2024 at the 1st Cardiology Department in GCM. Demographic data, cardiovascular history, biochemical and cardiological parameters, treatment type, and CHA2DS2-VA score were analysed. Myocardial infarction, stroke, pulmonary embolism, hypertension, coronary artery disease, diabetes, and hyperlipidemia were also considered.

**Results:** In the study population, 78 patients (84.8%) underwent pacemaker implantation and 34 (36.9%) catheter ablation; 58 (63.0%) received a device only, 14 (15.2%) ablation only, and 20 (21.7%) both procedures. Patients undergoing ablation were younger than those receiving device implantation (mean age: 66.6 vs. 82.2 years,  $p < 0.05$ ), while hybrid therapy was used in patients with mean age of 71.6 years. CHA2DS2-VA score was lower ( $p < 0.05$ ) in the ablation-only group (mean: 2.67) than in device-only (mean: 3.65) and hybrid-therapy groups (mean: 3.88). No statistically significant association was found between treatment strategy and metabolic comorbidities: obesity, type 2 diabetes, or hyperlipidemia.

**Conclusions:** Tachycardia-bradycardia syndrome mainly affects elderly patients. Both ablation and/or pacemaker implantation are available treatment options; however, electrotherapy as first-line treatment seems to be preferred in older patients with higher CHA2DS2-VA scores.

**Keywords:** tachy-brady syndrome, ablation, cardiac device

# Zero Stroke and Better Survival After Minimally Invasive Aortic Valve Replacement: A PSM Analysis

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**Background:** Stroke remains one of the most devastating complications after surgical aortic valve replacement (AVR), with contemporary perioperative rates of approximately 2-3% and substantial long-term morbidity.

**The aim:** Whether minimally invasive AVR (miniAVR) via upper hemisternotomy can reduce perioperative stroke risk compared with conventional full sternotomy remains uncertain.

**Materials and methods:** This retrospective cohort study analyzed 1,741 consecutive patients undergoing elective aortic valve surgery from January 2014 to December 2025. After exclusions, 1,432 patients (156 miniAVR, 1,276 conventional AVR) were eligible. Propensity score matching using 1:1 nearest-neighbor matching with 10 baseline covariates created 155 matched pairs with excellent balance (all standardized mean differences <0.1). The primary endpoint was a composite of in-hospital stroke or transient ischemic attack. Secondary outcomes included 30-day and 5-year survival and major postoperative complications. Firth penalized multivariable logistic regression identified independent predictors of stroke.

**Results:** Stroke occurred in 0 of 155 patients (0.0%) after miniAVR versus 7 of 155 (4.5%) after conventional AVR (absolute risk difference -4.5%; Fisher exact  $p=0.015$ ; number needed to treat 22). Thirty-day mortality (0.6% vs 2.6%;  $p=0.371$ ) and other major complications were comparable between groups. Five-year survival was higher after miniAVR (94.6% vs 87.2%; log-rank  $p=0.047$ ). In multivariable analysis, miniAVR independently reduced stroke risk (odds ratio [OR] 0.052, 95% confidence interval [CI] 0.003-0.832;  $p=0.037$ ), whereas longer cardiopulmonary bypass time increased risk (OR 1.014 per minute, 95% CI 1.001-1.028;  $p=0.032$ ).

**Conclusions:** MiniAVR via upper hemisternotomy is associated with a zero observed perioperative stroke rate compared with conventional AVR, with improved 5-year survival.

**Keywords:** aortic valve replacement; minimally invasive surgery; stroke; transient ischemic attack; propensity

# Unmasking Risk in BAV Surgery: The Role of Smoking and Atrial Arrhythmias

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**Work's tutor: prof. UM Kamil Baczewski, MD, PhD, Michał Woś, PhD**

**Background:** Bicuspid aortic valve (BAV) is the most common congenital cardiac anomaly and often requires surgical intervention. Postoperative outcomes in BAV patients can be influenced by modifiable risk factors, such as smoking, as well as by preexisting conditions, including atrial arrhythmias. The precise impact of these factors on perioperative complications and functional status remains incompletely understood, limiting accurate risk stratification and optimal perioperative management.

**The aim:** The aim of this study was a comprehensive evaluation of the impact of selected preoperative factors, including modifiable and clinical variables such as smoking and atrial arrhythmias, on surgical outcomes and functional status as assessed by the NYHA classification in patients with bicuspid aortic valve.

**Materials and methods:** A total of 108 consecutive BAV patients (mean age 64.3 years; 66.7% male) from the University Clinical Hospital No. 4 in Lublin underwent aortic valve replacement between January 2022 and January 2024. Data were analyzed using Python (Pandas, NumPy, SciPy, Statsmodels, Lifelines).

**Results:** Among patients, 68.5% were non-smokers, 22.2% former smokers, and 9.3% current smokers. Postoperative complications occurred in 21.3% and were significantly more frequent in smokers ( $p = 0.008$ ). Preoperative assessment showed a strong association between atrial arrhythmias and advanced functional impairment (NYHA III,  $p < 0.001$ ). Patients in sinus rhythm exhibited heterogeneous status, predominantly NYHA I–II or asymptomatic, whereas all patients with AF/AFL were NYHA III, indicating more severe heart failure.

**Conclusions:** Smoking is associated with increased postoperative risk. Atrial arrhythmias correlate with advanced preoperative functional impairment, highlighting the importance of comprehensive risk assessment in BAV patients.

**Keywords:** BAV, cardiac surgery, smoking, NYHA

# Pulmonary Regurgitation as the Potential Emerging Problem After Balloon Pulmonary Valvuloplasty

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Work's tutor: lek. Anna Danel, dr n. med. Michał Gałeczka, dr hab. n. med. Roland Fiszer

**Background:** Balloon pulmonary valvuloplasty (BPV) is the standard treatment for pulmonary stenosis (PS), providing excellent short and mid-term outcomes. However, progressive pulmonary valve regurgitation (PVR) can develop over time, posing a challenge for long-term management.

**The aim:** This study evaluates the short- and mid-term outcomes of BPV for native PS in both children and adults, with a focus on the long-term emergence of PVR.

**Materials and methods:** We conducted a retrospective, single-center study of 67 consecutive patients (26 females) who underwent BPV between 2011 - 2025 in our centre. The median age at BPV was 14 months (IQR 2–95 months), with a mean body weight of 23.1 kg. The median balloon size used was 12 mm (IQR 8–19 mm), achieving a balloon-to-pulmonary annulus ratio of 1.1 (IQR 1.1–1.2). Follow-up data were available for a median of 5.5 years (IQR 1–8.9 years).

**Results:** BPV produced significant immediate hemodynamic improvement with the reduction of systolic peak-to-peak gradient from 52.9 mmHg to 22.5 mmHg ( $p < 0.001$ ), with post-procedural echocardiography confirming a decrease from 78.5 mmHg to 40 mmHg ( $p < 0.001$ ). In 22 patients (40.7%) the direct gradient reduction was  $<50\%$  acutely; however, many of these demonstrated further decline in gradient on subsequent echocardiographic follow-up. The incidence of at least moderate PVR increased progressively from 6.5% pre-procedure to 14.6% immediately post-procedure, and up to 42% at the longest follow-up. Despite that, no patient in our cohort met the criteria for pulmonary valve replacement during the study period. Early reintervention was required in 7 patients (13.7%). Two early postoperative deaths were reported.

**Conclusions:** BPV for native pulmonary stenosis results in favorable short-term outcomes, including significant and durable reduction of the pressure gradient. However, progressive pulmonary valve regurgitation is common over time, which may predispose patients to eventual pulmonary valve replacement and warrants long-term surveillance.

**Keywords:** pulmonary valve stenosis, balloon valvuloplasty, pulmonary valve regurgitation

# Acute kidney injury among patients undergoing transcatheter edge-to-edge mitral valve repair (TEER-AKI study)

Marta Marks

Work's tutor: lek. Tomasz Gallina

**Background:** Transcatheter Edge-to-Edge Repair (TEER) is a minimally invasive method of treatment of mitral regurgitation (MR). Although iodinated contrast is not typically used in TEER, incidences of acute kidney injury (AKI) are reported in literature, however data on its clinical implications remain limited.

**The aim:** Aim of this study was to assess the prevalence, risk factors for developing AKI and its clinical implications among patients with MR undergoing TEER.

**Materials and methods:** This registry included 92 patients with severe MR who underwent TEER between August 2022 and April 2025. The database contains clinical characteristics, pharmacotherapy, and laboratory data - serum creatine concentration before and 24 and 48 hours after procedure. Diagnosis of AKI was based on KDIGO guidelines (2012).

**Results:** The analysis included 44 women and 48 men with a mean age of 77 years ( $\pm 6.61$ ) who underwent TEER. Preexisting chronic kidney disease (CKD) was present in 56 out of 92 people (61%). The mean creatinine level before TEER was 1.38 mg/dl, maximal value was 4.91 mg/dl, minimal - 0.62 mg/dl, after the procedure it was - 1.35 mg/dl, 4.91 mg/dl, 0.59 mg/dl, respectively. 8 of 92 patients (9%) developed AKI after the procedure was performed. No statistically significant risk factors for developing AKI were found, especially there were no significant correlations with creatine levels or diagnosis of CKD. The mean time of hospitalization among patients with AKI was significantly longer than in non-AKI group ( $3,9 \pm 2,15$  vs  $7,9 \pm 4,6$  days;  $p < 0,001$ ).

**Conclusions:** TEER in patients with severe MR is associated with low risk of AKI, however development of AKI is associated with prolonged hospitalisation.

**Keywords:** TEER, AKI, mitral regurgitation

# CTA-guided fascicle-targeted Left Bundle Branch Area Pacing: A computational model for optimal lead placement

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Work's tutor: dr n.med. Maciej Lis

**Background:** Left bundle branch area pacing (LBBAP) is a growing method for electrical resynchronization with better outcomes than traditional pacing, but its success depends on accurate lead placement near the left bundle branch origin. Current fluoroscopic guidance is limited by imprecise measurements that don't account for patient-specific anatomy or interference from the tricuspid valve's septal leaflet.

**The aim:** To create a CT-guided, clinically practical approach to fascicle-targeted LBBAP that converts individual patient anatomy into a standardized fluoroscopic method for precise lead positioning near the origin of the left bundle.

**Materials and methods:** Twenty-seven coronary CTA scans were analyzed. Virtual lead trajectories to all three left bundle branch fascicles were simulated within the interventricular septum using the His bundle, right ventricular apex, and tricuspid annulus as key landmarks. Co-axial lead positions targeting the LBB system were modeled at 15 mm and 20 mm from the tricuspid annulus. Fascicular pathways along the LV endocardial surface were approximated by shortest routes from the bundle origin to the anterolateral papillary muscle base (superior fascicle), septal apical segment center (septal fascicle), and posteromedial papillary muscle base (inferior fascicle).

**Results:** When measured along the LV endocardial surface, superior fascicle lead tips were closest to the left bundle origin at both reference points from the tricuspid valve ( $9\pm 2.9$  mm at 15 mm and  $14\pm 3$  mm at 20 mm). Inferior fascicle lead tips showed the greatest separation from the origin ( $23.5\pm 8.6$  mm at 15 mm and  $32.7\pm 8.7$  mm at 20 mm;  $p < 0.001$  for both), while septal fascicle targets fell in between ( $12\pm 4.5$  mm and  $18.9\pm 4.5$  mm at 15 mm and 20 mm, respectively).

**Conclusions:** This study presents a novel model of the cardiac conduction system to guide selective left bundle branch fascicle targeting while accounting for valvular spatial constraints.

**Keywords:** segmentation, angiography, computed tomography, area pacing, electrophysiology

# TAVI in patients with aortic stenosis – is 5-year enough to observe widening for TAVI indications?

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**Background:** Aortic stenosis (AS) is the most common acquired valvular disease with increasing prevalence in developed countries. New therapeutic options provide opportunities for treating patients with risk factors, and Transcatheter Aortic Valve Implantation (TAVI) is the optimal option for these patients.

**The aim:** The aim of the study was to compare the real-life clinical characteristics of patients with AS eligible for TAVI in 2019 vs 2025.

**Materials and methods:** The study is a tertiary cardiology single-center retrospective evaluation of patients qualified and treated with TAVI in 2019 and 2025. Based on the electronic AMMS system, a proprietary database was created, which served as the basis for further analysis. The study covered 224 patients (median age of 76; 51% females) with various types of AS, including patients with coexisting aortic regurgitation, consistent with the primary ICD-10 diagnosis of 135.0 and 135.2.

**Results:** In 2019, 31 patients from 104 (29.8%) with AS were qualified for TAVI with a median age of 79 years (67.7% females) mean LVEF: 54.4%. In 2025 ( $p < 0.05$ ), the cohort comprised 73 patients from 120 (60.8%) with a median age of 80 years (45.2% females) mean LVEF: 50.7%. Compared to 2019, patients qualified for TAVI in 2025 less frequently presented with arterial hypertension (83.6% vs 93.5%), CKD with eGFR  $< 60$  mL/min/1.73 m<sup>2</sup> (54.8% vs 58.1%). In contrast, IHD (68.5% vs 51.6%) and fragile syndrome (4.1% vs 3.2%) were more prevalent in patients with TAVI implantation in 2025. Analysis of the hemodynamic profile of AS revealed that high-gradient AS was more frequent (71.2% vs 64.5%) and low-gradient AS less frequent (28.8% vs 35.5%) in patients treated in 2025.

**Conclusions:** TAVI is increasingly utilized in the management of patients with AS. Over the past 5 years, the availability of the method increased that was accompanied by an expansion of indications to include patients with less common comorbidities and high-risk hemodynamic AS profile.

**Keywords:** TAVI, aortic stenosis, valvular disease, 2019 vs 2025

# Bicuspid Aortic Valve Does Not Affect Mortality After Elective Ascending Aortic Aneurysm Surgery

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**Background:** Debate persists regarding whether bicuspid aortic valve (BAV) morphology independently increases surgical risk in ascending aortic aneurysm surgery.

**The aim:** We conducted a propensity score-matched analysis comparing perioperative and long-term outcomes between BAV and tricuspid aortic valve (TAV) patients undergoing elective ascending aortic aneurysm surgery.

**Materials and methods:** This retrospective cohort study analyzed 1,340 consecutive patients (450 BAV, 890 TAV) undergoing elective ascending aortic surgery from January 2014 to December 2025. After exclusions, 816 patients (373 BAV, 443 TAV) were eligible. Propensity score matching using 1:1 nearest-neighbor matching with 15 baseline covariates created 285 matched pairs with excellent balance (all standardized mean differences <0.1). Primary endpoints were 30-day and long-term all-cause mortality.

**Results:** Thirty-day mortality was 0.7% (2/285) in BAV versus 1.05% (3/285) in TAV (odds ratio 0.66, 95% CI 0.11–3.98,  $p=1.00$ ). Ten-year survival was 61.4% (95% CI 55.8–67.1%) in BAV versus 57.9% (95% CI 52.2–63.6%) in TAV (log-rank  $p=0.31$ ). Early postoperative complications showed no significant differences between groups (all  $p>0.05$ ). In multivariable Cox regression, BAV morphology was not an independent predictor of mortality (HR 0.92, 95% CI 0.58–1.45,  $p=0.74$ ).

**Conclusions:** Bicuspid aortic valve morphology does not independently increase perioperative or long-term mortality in elective ascending aortic aneurysm surgery. Based on these findings, our research group recommends that aortic valve morphology should not be a primary risk factor in operative decision-making or timing of surgical repair.

**Keywords:** bicuspid aortic valve; tricuspid aortic valve; ascending aortic aneurysm; propensity score matching;

# Prognosis in heart failure patients undergoing cardiac resynchronization therapy with and without rem

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**Background:** Cardiac resynchronization therapy (CRT) has been proven therapy in patients with heart failure (HF) with reduced left ventricular ejection fraction (LVEF). Remote monitoring plays a critical role in post-implantation follow-up, facilitating continuous assessment of device performance and patient clinical status.

**The aim:** To assess outcome in patients with HF undergoing CRT with and without remote monitoring.

**Materials and methods:** Materials and methods: 1121 consecutive patients with CRT implanted between 2002 and 2020 in a tertiary care university hospital, in a densely inhabited, urban region of Poland was analyzed (1007 subjects [89.8%] with CRT-D; 114 patients with CRT-P [10.2%]). All CRT patients were divided into subjects monitored with and without telemonitoring (n=589; 52.5% and n=532; 47.5%, respectively).

**Results:** The median follow-up was 1773 days (10th and 90th percentile: 329-4019). All-cause mortality in CRT patients with remote monitoring was significantly lower than in subjects without telemonitoring (n=329, 55.9% vs. n=311, 58.4%, P=0.03). On multivariable regression analysis, older age (HR 1.04, 95%CI 1.01-1.07, P<0.001), ischemic cardiomyopathy (HR 1.21, 95%CI 1.15-2.10, P<0.001), lower left ventricular ejection fraction (HR 0.96, 95%CI 0.93-0.99, P<0.001), higher creatinine level (HR 1.01, 95%CI 1.005-1.012, P=0.003), diabetes (HR 1.3, 95%CI 1.05-1.7, P=0.007), and lack of remote monitoring (HR 0.81, 95% CI 0.67-0.91, P=0.01) were identified as independent predictors of higher mortality in patients with HF undergoing CRT implantation.

**Conclusions:** Mortality rates in CRT recipients with remote monitoring is significantly lower compared to those without monitored remotely. Multivariable analysis identified several independent predictors of increased mortality in HF patients treated with CRT, including advanced age, ischemic etiology, reduced left ventricular ejection fraction, elevated creatinine levels, diabetes, and absence of remote monitoring.

**Keywords:** CRT, remote monitoring, heart failure

# Prognosis and mortality predictors in patients with extremely enlarged LVEDD treated with CRT.

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**Background:** Cardiac resynchronization therapy (CRT) has been proven therapy in patients with heart failure (HF) with reduced left ventricular ejection fraction (LVEF). Data on efficacy of cardiac resynchronization therapy (CRT) and prognosis of CRT recipients with extremely enlarged left ventricular prior to device implantation are scarce.

**The aim:** To determine prognosis and mortality predictors in patients with heart failure (HF) and extremely increased left ventricle end-diastolic diameter (LVEDD) treated with cardiac resynchronization therapy.

**Materials and methods:** Study population consisted of 1121 consecutive patients with CRT implanted between 2002 and 2020 in a tertiary care university hospital, in a densely inhabited, urban region of Poland (1007 subjects [89.8%] with CRT-D; 114 patients with CRT-P [10.2%]).

**Results:** The median LVEDD before CRT implantation was 68 mm (56-80). We divided all CRT patients into quartiles as per LVEDD: I <61 mm, II 61-67 mm, III 68-74 mm and IV 374 mm. During the median follow-up of 1773 days (10th and 90th percentile: 329-4019) mortality rates for quartiles I-IV were 41.2, 49.6, 55.9 and 68.1%, respectively (P<0.001). The LVEDD 374 mm (quartile IV) appeared to be an independent risk factor for death (HR 1.29, 95%CI 1.05-1.6, P=0.02). On multivariable analysis, severe mitral regurgitation (MR; HR 1.54, 95%CI 1.1-2.16, P=0.01) and advanced age (HR 1.02, 95%CI 1.01-1.03, P=0.02) were independent risk factors for death in quartile IV. Mortality rates in those with LVEDD 374 mm, aged >65 years and with severe MR was 90% during the observation.

**Conclusions:** Mortality rates in CRT recipients with extremely enlarged LVEDD is significantly higher compared to those with LVEDD <74 mm. CRT offer to HF patients with LVEDD >74 mm (and in particular those with accompanying severe MR and aged >65 years) should be very carefully assessed and other HF therapies (i.e. left ventricular assist devices) should be considered, as more than 90% of those die within 4 years since CRT implantation.

**Keywords:** LVEDD, CRT, Mortality predictors, Mitral regurgitation, HF with reduced EF, LV remodeling

# Native vs Graft PCI After CABG-Procedural Complexity and Clinical Insights

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**Background:** Patients with prior coronary artery bypass grafting (CABG) frequently require repeat revascularization due to recurrent angina or acute coronary syndromes. The choice of strategy is largely determined by anatomical factors, with percutaneous coronary intervention (PCI) often preferred because of its lower periprocedural risk.

**The aim:** To compare procedural characteristics and outcomes of PCI in native coronary arteries and bypass grafts in patients with prior CABG, with a focus on technical complexity and procedural success rates.

**Materials and methods:** We analyzed 159 patients with previous CABG who underwent elective coronary angiography between 2020 and 2025 at the University Hospital in Kraków. Patients were assigned to three groups: native vessel intervention (n=48), graft intervention (n=17), and conservative management (n=94). Patients with acute myocardial infarction, hemodynamic instability, or incomplete data were excluded.

**Results:** Native vessel intervention was performed in 30.2% and graft intervention in 10.7% of patients, at a mean of 12.41 and 16.47 years after surgery. Mean age was 70.7 and 72.4 years, respectively. Cardiovascular risk factors were common, including hypertension (100% vs. 88.2%), diabetes (47.9% vs. 17.6%), and dyslipidemia (81.3% vs. 76.5%). The mean number of stents per patient was 1.4 and 1.3. In native vessel intervention, intravascular ultrasound (n=17), optical coherence tomography (n=4), mechanical circulatory support (n=2), and rotational atherectomy (n=6) were used, while thrombectomy was performed only in graft interventions (n=2).

**Conclusions:** Repeat revascularization after coronary artery bypass grafting is associated with increased procedural complexity and risk. Procedural success was not achieved in 22.9% of native interventions and 35.5% of graft interventions. Native vessel procedures more often required advanced techniques, whereas graft interventions were associated with higher thrombotic risk.

**Keywords:** CABG, PCI, repeat revascularization, bypass grafts, procedural complexity

# Ultrasonographic and biochemical predictors of complications in pediatric Crohn's disease

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**Background:** The clinical course of pediatric Crohn's disease (CD) is frequently complicated by structural bowel damage, including fistulas, abscesses, and obstructions. Early identification of patients at high risk of progressing to B2 (stricturing) and B3 (penetrating) phenotypes remains a diagnostic priority.

**The aim:** This study aims to evaluate the prognostic value of intestinal ultrasound (IUS) parameters and biochemical markers in predicting intestinal complications and assessing the somatic status of pediatric patients.

**Materials and methods:** A retrospective analysis was conducted on 58 pediatric patients. The study focused on correlations between maximum bowel wall thickness (BWT), Power Doppler vascularization, and the occurrence of complications (abscesses, fistulas, obstructions). The relationship between transmural inflammation and markers of malnutrition or anemia (albumin, BMI, hematocrit) was assessed. Statistical significance was determined using comparative analysis ( $p < 0.05$ ).

**Results:** Patients with penetrating complications exhibited significantly higher mean BWT compared to uncomplicated phenotypes ( $6.0 \pm 2.1$  mm vs.  $4.8 \pm 1.8$  mm;  $p < 0.05$ ). A BWT threshold  $> 7.0$  mm was associated with a three-fold increase in the risk of obstruction or stoma requirement. Increased transmural vascularization correlated negatively with serum albumin ( $r = -0.28$ ) and hematocrit ( $36.4\% \pm 4.5\%$ ), underscoring the systemic impact of severe transmural activity. Additionally, the presence of free peritoneal fluid was strongly associated with peak clinical activity (mean PCDAI: 70 points).

**Conclusions:** IUS is a potent prognostic tool in pediatric CD, where BWT exceeding 6–7 mm serves as a critical "red flag" for structural complications. IUS parameters correlate significantly with systemic indicators of malnutrition and anemia. Early identification of severe wall thickening and peri-intestinal fluid is essential for predicting a severe disease course and justifies early escalation of therapy or surgical consultation.

**Keywords:** Pediatric Crohn's Disease, Intestinal Ultrasound (IUS)

# Clinical characteristics of primary Immune regulatory disorders in children

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**Background:** Inborn errors of immunity with predominant immune dysregulation result from impaired immune tolerance/control and present with variable autoimmunity, lymphoproliferation, organ inflammation, and infection susceptibility, often delaying genetic diagnosis and affecting outcomes in children.

**The aim:** To characterize clinical features according to the defective genes/syndromic groups.

**Materials and methods:** We retrospectively reviewed 23 medical records of children (1 month–18 years) admitted to the Republican Scientific and Practical Center for Pediatric Oncology, Hematology and Immunology. Patients (16 boys, 9 girls) with verified variants of defective genes (STAT3GOF, FAS, PI3KCD, CTLA4, FOXP3, XIAP, SH2D1) were grouped by predominant syndrome: ALPS (n=5), APDS (n=11), and other T-regulatory (T-reg) pathway disorders (n=7). Analysis was performed using methods of variational statistics with the software GraphPad Prism10.

**Results:** Age at first clinically significant manifestations was 1.29 [0.74; 2.98] years in ALPS, 1.31 [0.58; 4.23] years in APDS, and 14.07 [2.97; 17.08] years in T-reg disorders, suggesting earlier and more aggressive onset in ALPS/APDS. Organ involvement severity was graded on a 0–4 scale (0 none; 4 life-threatening, refractory to therapy changes). In ALPS, leading features were autoimmune cytopenias (1.8), recurrent infections (1.72), and lymphoproliferation (1.62). In APDS, recurrent infections (1.6) and lymphoproliferation (1.62) predominated. Other T-reg disorders showed overall milder but polymorphic involvement, including endocrinopathies (1.29), cytopenias (1.14), granulomatous changes (0.57), and skin/eye involvement (0.71).

**Conclusions:** Immune dysregulation disorders demonstrated distinct patterns: ALPS—early onset with prominent cytopenias, infections, and lymphoproliferation; APDS—early debut dominated by infections and lymphoproliferation with milder initial presentation; T-reg pathway defects—later recognition with a broader, less specific phenotype.

**Keywords:** Primary immunodeficiency, primary immune regulatory disorders, T-reg, immunology

# Knowledge on supplementation and substance use on fetal development among women of reproductive age

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**Work's tutor: Beata Borek-Dzięcioł MD PhD**

**Background:** Many women lack awareness of proper supplementation of iron, vitamin D, iodine, folic acid, and docosahexaenoic acid (DHA), despite guidelines established by the Polish Society of Gynecologists and Obstetricians. Furthermore, despite public health efforts, up to 30% of pregnant women report drinking alcohol and 26% continue smoking.

**The aim:** The objective of this study was to assess the awareness of reproductive-age women regarding factors influencing fetal development to identify the knowledge gaps that require targeted health-educational strategies.

**Materials and methods:** We evaluated the knowledge of 100 participants: postpartum patients of the Gynaecology and Obstetrics Ward and female medical students. The assessment covered essential supplementation and usage of substances in pregnancy (alcohol, caffeine, tobacco). Both groups were expected to demonstrate advanced knowledge: medical students through their medical curriculum, and postpartum women through professional guidance provided during the pregnancy.

**Results:** Knowledge on proper supplementation varied widely, with 12-90% of correct responses depending on the specific element. While both groups performed similarly across most categories, postpartum women showed significantly greater knowledge regarding iodine supplementation, comparing to medical students. Although both groups showed high awareness of alcohol's toxicity, 36% of respondents incorrectly stated that a single glass of wine in pregnancy is permissible. Smoking a cigarette during pregnancy was considered acceptable by 26% of postpartum women and 16% of medical students.

**Conclusions:** There are multiple gaps in awareness of proper supplementation and impacts of substance usage on fetal development. Educational efforts are required to promote supplementation guidelines and eliminate misconceptions about alcohol and substance use in pregnancy. Despite action taken, there remains a significant gap between general awareness and practical application of guidelines into practice.

**Keywords:** Congenital abnormalities, Supplementation, Alcohol, Tobacco, Pregnancy, Reproductive health

# Prevalence of asthma and allergic diseases in the pediatric population in Gliwice: a cross-sectional study

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Work's tutor: lek. Adam Borek

**Background:** Allergic diseases, including asthma, constitute a significant health problem in childhood.

**The aim:** To assess the prevalence of respiratory and allergic diseases in the pediatric population of Gliwice.

**Materials and methods:** An epidemiological cross-sectional study of children and adolescents in Gliwice was conducted using a questionnaire completed by parents and distributed through schools. Analyses were performed in subgroups of 849 younger children aged 5–11 years and 857 older children aged 12–17 years, with stratification by sex.

**Results:** A total of 1,706 participants aged 5–17 years were included (mean age  $11.5 \pm 2.7$  years), including 865 boys (50.7%) and 841 girls (49.3%). Physician-diagnosed asthma was reported in 7.5% of children (age NS, sex NS); chronic bronchitis in 8.6% (age NS, sex  $p=0.03$ ); allergic rhinitis in 29.5% (age NS, sex  $p=0.04$ ); atopic dermatitis in 18.4% (age  $p=0.004$ , sex NS); allergic conjunctivitis in 10.5% (age NS, sex  $p=0.004$ ); drug allergy in 7.5% (age NS, sex NS); and food allergy in 13.9% (age  $p=0.01$ , sex NS).

**Conclusions:** Allergic diseases are highly prevalent in the pediatric population of Gliwice, with allergic rhinitis and atopic dermatitis being the most common conditions. The observed burden of asthma and other allergic disorders highlights the need for early diagnosis and appropriate management. Differences related to age and sex for selected conditions suggest the importance of targeted preventive strategies. These findings support the need for public health initiatives aimed at improving awareness, early detection, and access to specialized care for children with allergic diseases.

**Keywords:** allergic diseases, asthma, epidemiology, pediatric population

# Invasive Meningococcal Disease: Parenteral Knowledge and Decisions on Vaccination of Children Aged 0-5

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**Background:** Invasive meningococcal disease (IMD) is a life-threatening infection with rapid progression and high mortality. Vaccination is the most effective preventive measure; however, in Poland it is recommended but not mandatory, and parental awareness plays a key role in vaccine uptake.

**The aim:** To assess parental knowledge of IMD and meningococcal vaccination and identify factors influencing vaccination decisions.

**Materials and methods:** A cross-sectional study was conducted among 221 parents of children aged 0–5 years using an anonymous questionnaire distributed in a primary care clinic, kindergartens, and a nursery in Czestochowa, Poland. The survey assessed knowledge of IMD, awareness of meningococcal vaccination, information sources, and determinants of vaccination decisions.

**Results:** Overall, 38.5% of children were vaccinated against meningococci, 50.7% were unvaccinated, and 11.3% of parents were unsure of vaccination status. Physicians were the main source of vaccination information (71.5%). Among parents who received a physician recommendation (n=125), 57.6% vaccinated their children, whereas 42.4% declined vaccination, mainly due to concerns about adverse effects (71.7%). Among parents without a recommendation (n=52), only 11.5% vaccinated their children, while 88.5% did not vaccinate, most often due to lack of medical recommendation. Among parents of infants under 1 year of age, only 36.7% correctly identified their children as the most at risk of invasive meningococcal disease, while 63.3% were unaware of this.

**Conclusions:** Parental knowledge of IMD remains insufficient. Physician recommendation strongly influences vaccination decisions, highlighting the crucial role of healthcare professionals in improving meningococcal vaccination coverage.

**Keywords:** invasive meningococcal disease, meningococcal vaccination, parental knowledge, vaccination decisions

# Acute poisoning in children treated at Pediatric Department in Bielsko-Biała - retrospective study

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**Background:** Poisoning is a medical condition caused by the entry of a toxic substance into the body from outside. Poisoning can be divided into accidental - when exposure to a toxic substance was unintentional (especially in younger children), and intentional poisoning - when exposure to a toxic substance was a conscious act of self-harm, often associated with suicidal intentions. Family conflicts, female gender, age around 15, and difficult socioeconomic conditions predispose individuals to suicide attempts, often involving the use of medications.

**The aim:** This study's aim was to evaluate predominant type of poisoning, the substances used, different demographic characteristics and outcomes in patients hospitalized at the Department of Pediatrics, Pediatric Hospital in Bielsko-Biala, based on a retrospective analysis of medical records.

**Materials and methods:** The study included 139 pediatric patients at the age group 3-18 admitted to the Department of Pediatrics in Bielsko-Biala in 2025 due to poisoning. Clinical data were collected from medical records.

**Results:** 139 patients, of which 95 (68,3%) were girls and 44 (31,7%) were boys and aged from 3 to 18 years old (average 14,8 years). The dominant cause of admission was intentional poisoning (88%). Alcohol (25.2%) and so-called mixed poisoning (24.5%) cases were significantly more common. In 54 patients (39%), after psychiatric consultation, indications for hospitalization in the Psychiatry Department were found. 5 patients required transfer to the Toxicology Department. 8 patients required admission more than once (at most 4 times) during the year under review.

**Conclusions:** Unfortunately, poisoning is an increasingly common cause of hospitalization. Most often, these are intentional intoxications. Providing support to people in mental health crisis seems crucial to avoid the serious consequences of intentional poisonings.

**Keywords:** intentional poisoning, mixed poisoning, toxicology

# Urinary Sodium Excretion in Children with Primary Hypertension: A Retrospective Single-Center Study

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**Background:** Pediatric hypertension is influenced by modifiable factors such as dietary sodium intake and obesity, as well as non-modifiable factors. Urinary sodium excretion is an objective surrogate of sodium intake and may reflect blood pressure severity.

**The aim:** To evaluate urinary sodium excretion in children with primary hypertension (PH) and to test the hypothesis that higher sodium excretion is associated with less favorable clinical, biochemical, and blood pressure parameters.

**Materials and methods:** This retrospective, cross-sectional, single-center study included 369 children with PH and 59 healthy controls. Only patients with confirmed PH and ambulatory blood pressure monitoring results were included. Clinical, anthropometric, laboratory, echocardiographic, and blood pressure data were analyzed. Sodium excretion was assessed using the spot urine sodium-to-creatinine ratio (Na/Cr) and 24-hour urinary sodium excretion per kilogram of body weight (24h-UNaV/kg BW).

**Results:** Children with PH showed higher urinary sodium excretion compared with the control group (1.53 vs 0.62,  $p < 0.001$ ). Sodium excretion in the group of patients with arterial hypertension, measured using the (Na/Cr) ratio and (24-h UNaV/kg BW), showed negative correlation of both parameters with age ( $R = -0.261$  and  $R = -0.162$ ,  $p < 0.001$ ), body weight ( $R = -0.148$  and  $R = -0.299$ ,  $p < 0.001$ ), serum uric acid concentration ( $R = -0.144$  and  $R = -0.203$ ,  $p < 0.001$ ), left ventricular mass ( $R = -0.129$ ,  $p = 0.020$  and  $R = -0.149$ ,  $p = 0.040$ ) and correlated positively with vitamin D3 ( $R = 0.157$  and  $R = 0.151$ ,  $p < 0.001$ ). In the multivariable analysis, body weight Z-score ( $\beta = -0.393$ ), age ( $\beta = -0.293$ ), vitamin D3 concentration ( $\beta = 0.182$ ), and the presence of arterial hypertension in the father ( $\beta = 0.166$ ) predicted 24-hUNaV/kg BW.

**Conclusions:** Urinary sodium excretion is elevated in children with PH. Younger children with lower weight for age and a paternal history of hypertension may be at greater risk of excessive sodium excretion. More studies are needed.

**Keywords:** primary hypertension, paediatric hypertension, urinary sodium excretion

# Development and Validation of a Central Vascular Access Simulator for Preterm Infants: pilot study

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**Background:** Extremely preterm infants (born before 28 weeks of gestational age) and those with extremely low birth weight (ELBW; <1,000 g) represent among the most clinically fragile patients in modern medicine, defining the boundaries of human physiology. Their survival frequently depends on the timely and accurate execution of technically demanding procedures, including the placement of various vascular access devices, including peripherally inserted central catheters (PICCs) or umbilical venous and arterial catheters. Medical simulation has become an increasingly common training method, now incorporated into many clinical curricula, supported by a robust evidence base. However, simulation resources specifically designed for extreme preterm and ELBW infants remain scarce, and existing options are not only costly but also deficient in anatomical and tactile fidelity. These limitations reduce training validity and restrict their use in neonatal education programmes. There is therefore an urgent need for high-fidelity simulation tools tailored to this vulnerable patient population.

**The aim:** The aim of this pilot study is to establish the validity of a self-developed, high-fidelity central venous access simulator for preterm infants.

**Materials and methods:** A standardized simulation scenario was performed. The task was to obtain peripherally inserted central catheter access using a self-developed high-fidelity simulator. 35 participants were allocated to 4 groups including novice practitioners, junior trainees, senior trainees and experts following a pre-task survey. A validated, task-specific checklist was used for the scenario to obtain performance metrics.

**Results:** The simulator received high ratings across all groups. The overall mean scores were as follows: Novice – 96.8 (SD = 0.0), Junior trainee – 91.0 (SD = 9.5), Senior trainee – 85.7 (SD = 14.2), Expert – 79.7 (SD = 18.6).

**Conclusions:** The simulator demonstrates strong potential as a viable training tool for PICC insertion, warranting further validation in larger cohorts.

**Keywords:** Neonatology, PICC, Medical simulation

# Campylobacter infection in Children – Single Centre Study

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**Background:** Campylobacter spp. are leading cause of gastroenteritis, especially in paediatrics population under 5 years old. These foodborne infections typically present with diarrhea and abdominal pain, which usually required only supportive care.

**The aim:** The aim was to analyze the clinical picture of Campylobacter infection in children.

**Materials and methods:** A retrospective analysis was conducted on 63 patients (42 males and 21 females) diagnosed with Campylobacter infection at the Department of Pediatric Gastroenterology, Medical University of Silesia in Katowice between 2020 and 2026 . The study assessed clinical course, laboratory and imaging tests, implemented treatment and exposure history. Data were statistically analyzed.

**Results:** The study included 63 patients with confirmed Campylobacter infection. The age of patients ranged from 1 month to 17 years, with the mean age of  $7,5 \pm 5,99$  years. The cohort consisted of 21/63 females (33,3%) and 42/63 males (66,7%). The most common clinical manifestation were diarrhea reported in 47/63 ( 74,6%) of cases, followed by fever in 36/63 (57,1%) and abdominal pain in 35/63 (55,5%). Bloody stools were observed in 31/63 (49,2%) of patients. The mean CRP level was 66,15. The mean duration of hospitalization was  $6,6 \pm 3,28$  days. Azithromycin was the most frequently administered antibiotic.

**Conclusions:** Campylobacter infection typically presents with acute gastrointestinal symptoms. In the majority of cases, the clinical course is mild to moderate, although macrolide therapy and hospitalization may be required.

**Keywords:** Campylobacter, infection, diarrhea

# Small intestinal bacterial overgrowth (SIBO) in children- single centre retrospective study

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**Background:** Small intestinal bacterial overgrowth (SIBO) is a common condition characterised by an excessive overgrowth of a wide variety of bacterial colonies in the small intestine. The signs and symptoms are often non-specific and can be misdiagnosed as other bowel diseases. The condition is mainly caused by fermentation processes carried out by inappropriate microorganisms.

**The aim:** The aim of our study is to characterize patients diagnosed with small intestinal bacterial overgrowth (SIBO).

**Materials and methods:** The study included patients evaluated in the pediatric department and the affiliated gastroenterology outpatient clinic between 2023 and 2025. The study group consisted of 40 individuals. The group was divided according to sex. Information was collected on patients, including height, weight, and biochemical test results. The collected parameters were subjected to statistical analysis. Patients in whom the breath test result could have been affected were excluded from the study (including prior antibiotic therapy, use of probiotics, inflammatory bowel disease, diarrhea, and recent colonoscopy).

**Results:** 40 patients of which 16/40 were girls and 24/40 were boys, aged from 3 to 17 years old (median - 10 years). The most common chief complaints were: abdominal pain (45%), change in stool consistency (10%), constipation (12,5%), belching (10%) and lack of appetite (7,5%). All of the patients had no elevated lab markers of inflammation and only 12,5% had elevated AST and/or ALT levels. 45% of the children had other coexisting conditions, most notable: lactose intolerance, fructose intolerance and gastroesophageal reflux.

**Conclusions:** Patients with SIBO present with a variety of symptoms and non specific changes in biochemical test results. Breath testing is indicated when the underlying cause of symptoms remains unclear, although it is crucial to rule out conditions that could affect the results of the test.

**Keywords:** SIBO, children, gastroenterology, risk factors, retrospective study

# Multidisciplinary management of arteriovenous malformations in children

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**Background:** Arteriovenous malformations (AVMs) are congenital CNS vascular anomalies presenting with hemorrhage, seizures, or neurological deficits. Their management—via surgery, embolization, or radiotherapy—is guided by patient age and lesion characteristics, even in incidental cases.

**The aim:** The study aimed to evaluate the therapeutic outcomes of multidisciplinary management of AVMs in the pediatric population.

**Materials and methods:** This retrospective study analyzed a cohort of 58 pediatric patients treated for cerebral AVMs at the Department of Paediatric Neurosurgery of the Medical University of Silesia in Katowice between 2007 and 2026. The mean age at the start of treatment was 11.29 years (SD=3.49).

**Results:** The most common clinical manifestation was headache, reported in 36 patients (62%). Focal neurological deficits were observed in 25 cases (43%), with hemiparesis being the most prevalent (n=20; 34%). Intracranial hemorrhage occurred in 35 patients (60.3%), while seizures were the presenting symptom in 7 patients (12.1%). In 3 asymptomatic cases, the AVM was an incidental finding. Within the study group, 39 patients underwent surgical treatment, 15 underwent endovascular embolization, and 18 received radiosurgery. Multimodal (multistage) treatment was required for 14 patients. At the time of discharge, neurological deficits persisted in 16 patients (27.6%), 10 of whom (62.5%) had a history of intracranial hemorrhage. During the first follow-up visit, persistent deficits were recorded in 13 patients (22%), indicating complete resolution of symptoms in 3 individuals. Among the 42 patients who underwent follow-up digital subtraction angiography (DSA), 10 (23.8%) showed incomplete obliteration of the malformation, requiring further intervention.

**Conclusions:** Cerebral AVMs are challenging, but tailored multidisciplinary management ensures excellent clinical outcomes. Standard care should be centralized in specialized centers providing integrated neurosurgery, interventional neuroradiology, and radiosurgery.

**Keywords:** Arteriovenous malformations, Paediatric neurosurgery, Cerebral hemorrhage

# Ofatumumab (OFA) in the Treatment of Relapsing-Remitting Multiple Sclerosis (RRMS) - Real-World Analysis

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**Background:** Multiple sclerosis is a chronic demyelinating disease of the central nervous system that requires long-term immunomodulatory therapy (disease modifying therapy, DMT). OFA, a fully human anti-CD20 monoclonal antibody, is a highly effective therapy confirmed in registration studies.

**The aim:** The aim of the study was to evaluate the clinical and radiological efficacy and safety of OFA therapy in a real-world clinical setting in a group of patients with RRMS.

**Materials and methods:** The study retrospectively included n=199 RRMS patients treated with OFA at the Department and Clinic of Neurology in Zabrze. Clinical and radiological activity of MS, previous DMT use, and adverse events were assessed. Analysis after 12 months of OFA therapy (OFA12) was performed for n=148 RRMS, and after 24 months (OFA24) for n=80 RRMS.

**Results:** In the entire study group (n=199), OFA therapy was initiated de novo in n=104 (52.3%) RRMS; in the remaining patients, OFA therapy was initiated after previously receiving another DMT. The mean age at DMT initiation was 34.6±9.3 years, with no significant gender differences (p=0.422). No infections were observed in n=183 (92%), neutropenia was observed in n=4 (2.0%), decreased serum IgG levels in n=1 (0.5%), and adverse events after the first injection in n=103 (51.8%). No serious adverse events requiring hospitalization were observed. In OFA12, n=142 (96%) did not experience a relapse, and resonance activity (Gd+ lesions and/or new or enlarging T2 lesions) was observed in n=13 (6.5%); in OFA24, this was observed in n=76 (95%) and n=1 (1.2%), respectively.

**Conclusions:** OFA demonstrates high efficacy in inhibiting clinical and resonance activity in RRMS while maintaining a favorable safety profile in real-world clinical practice.

**Keywords:** relapsing-relmitting multiple sclerosis, ofatumumab, efficacy

## Stroke severity and prestroke antihypertensive therapy – is there any association?

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**Background:** An association of a prestroke anti-hypertensive therapy and ischemic stroke severity is unclear

**The aim:** The aim was to assess the influence of prestroke anti-hypertensive therapy on symptoms severity (by NIHSS) at admission.

**Materials and methods:** Data about 403 stroke patients were collected retrospectively including: demographic characteristics, medical history, laboratory findings. The analyzed anti-hypertensive drugs were angiotensin-converting-enzyme inhibitors (ACEI), angiotensin receptor blockers (ARB),  $\beta$ -blockers (BB), calcium channel blockers (CCB), loop diuretics (LD), thiazides (TD), potassium-sparing diuretics, and others hypotensive drugs including  $\alpha$ 1-antagonists and  $\alpha$ 2-agonists (OAH). An association of the variables and baseline NIHSS was assessed with bivariate tests. Data for NIHSS, troponin, glucose were transformed logarithmically. Next, the variables with  $p < 0.15$  were included in multiple linear regression model.

**Results:** Sex, age, smoking status, presence of previous stroke, arterial hypertension, systolic and diastolic blood pressure at admission, atrial fibrillation, ACEI, ARB, CCB, BB, LD, OAH, vascular territory (anterior vs posterior), LVO (M1, BA, intercranial VA and ICA), glucose, troponin T, and C reactive protein (CRP) were included into model. CCB was the only class of drugs significantly associated with lower NIHSS ( $p = 0.027$ ) at admission. Other factors associated with lower NIHSS were posterior vascular territory stroke ( $p = 0.022$ ) and male sex ( $p = 0.002$ ). Higher NIHSS was associated with: LVO ( $p < 0.001$ ), higher troponin T ( $p < 0.001$ ),  $CRP > 20$  mg/l ( $p = 0.006$ ), and previous stroke ( $p = 0.004$ ).

**Conclusions:** Prestroke use of calcium channel blockers was independently associated with lower stroke severity at admission. This finding suggests a possible protective effect of CCB therapy, although causal relationships cannot be established due to the observational design. Further prospective studies are warranted to confirm this association.

**Keywords:** acute ischemic stroke, stroke severity, NIHSS, antihypertensive therapy, calcium channel blockers

## Determinants of blood pressure at admission in acute ischemic stroke.

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**Background:** Knowledge about factors affecting blood pressure (BP) at admission in acute ischemic stroke (AIS) is not complete.

**The aim:** The aim of the study was to assess the factors influencing BP including antihypertensive medication in patients with AIS at admission up to 24 hours since a stroke onset.

**Materials and methods:** BP at admission, demographic data (age, sex, smoking status), comorbidities (arterial hypertension (AH), atrial fibrillation (AF), diabetes mellitus, ischemic heart disease/heart failure (HD), internal carotid artery stenosis), information about antihypertensive medication (angiotensin-converting-enzyme inhibitors, angiotensin receptor blockers,  $\beta$ -blockers, calcium channel blockers, loop diuretics, thiazides, potassium-sparing diuretics,  $\alpha$ 1-antagonists and  $\alpha$ 2-agonists), stroke characteristics (NIHSS, large vessel occlusion (LVO), presence lesion in posterior or anterior circulation) and laboratory findings (GFR, hemoglobin, C-reactive protein (CRP), glucose, troponin T) were collected retrospectively in 382 patients. The factors with  $p < 0.2$  in univariate analysis were included into models of multiple linear regression analysis for systolic BP (SBP) and diastolic BP (DBP).

**Results:** Increased SBP was associated with a history of AH ( $p = 0.029$ ) and higher glucose levels ( $p = 0.044$ ), whereas increased DBP was associated with the presence of AF ( $p < 0.001$ ). Lower SBP was associated with CRP  $> 20$  mg/L ( $p = 0.039$ ) and GFR  $< 60$  ml/min ( $p = 0.010$ ). Lower DBP was associated with HD ( $p = 0.046$ ), LVO ( $p = 0.006$ ), and older age ( $p = 0.005$ ). Prior antihypertensive treatment was not associated with BP at admission in patients with acute ischemic stroke. The coefficient of determination  $R^2$  for both models was  $\approx 0.1$ .

**Conclusions:** Admission BP in AIS is only weakly associated with traditional clinical predictors and prior antihypertensive therapy. These findings suggest that acute stroke-related physiological responses may be the dominant determinants of BP in the hyperacute phase.

**Keywords:** acute ischemic stroke, admission blood pressure, atrial fibrillation, antihypertensive therapy

# Dynamic changes in neutrophil-to-lymphocyte and monocyte-to-lymphocyte ratios during relapse in MS

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**Background:** Multiple sclerosis (MS) is a chronic inflammatory and neurodegenerative disease of the central nervous system. While traditionally associated with adaptive immunity, recent data emphasize the role of innate immune cells, including neutrophils and monocytes, in relapse pathogenesis. The neutrophil-to-lymphocyte ratio (NLR) and monocyte-to-lymphocyte ratio (MLR) are markers reflecting the balance between these immune responses.

**The aim:** The study aimed to assess longitudinal changes in systemic inflammatory indices specifically NLR and MLR in MS patients experiencing a clinical relapse compared with a relapse-free control group.

**Materials and methods:** This retrospective, single-center study analyzed 102 MS patients followed between 2024 and 2025. The study group consisted of 34 patients who experienced at least one relapse, while 68 relapse-free patients served as controls. Inverse probability of treatment weighting (IPTW) was used to ensure groups were comparable in terms of age, sex, disease duration, disability (EDSS), and treatment type. Complete blood counts were analyzed at three time points: 3 months before the event (Pre-relapse), during the relapse (within 48 hours of onset), and 3 months after (Post-relapse).

**Results:** During relapse, NLR and MLR were significantly higher compared to the control group ( $p < 0.0001$ ). In the relapse group, NLR rose from 2.75 to 3.62 during the event and fell to 2.67 post-relapse ( $p=0.0002$ ). Similarly, MLR rose from 0.45 to 0.54 and decreased to 0.40 ( $p=0.002$ ). No significant fluctuations were observed in controls. Baseline values measured 3 months prior to the event did not demonstrate independent predictive value for relapse risk.

**Conclusions:** NLR and MLR exhibit significant dynamic changes during MS relapses, reflecting acute systemic inflammation. Their clinical value lies in longitudinal monitoring rather than single baseline measurements, providing a low-cost tool for assessing current disease activity.

**Keywords:** Multiple sclerosis, Relapse, Neutrophil-to-lymphocyte ratio, Monocyte-to-lymphocyte ratio,

# The Effectiveness of Vagus Nerve Stimulation in Pediatric Patients with Drug-Resistant Epilepsy

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**Background:** Vagus nerve stimulation (VNS) is a therapeutic option for patients with drug-resistant epilepsy. While data show that VNS can significantly reduce seizure frequency, identifying predictors of a favorable response remains a challenge, particularly within the pediatric population.

**The aim:** This study aimed to evaluate the effectiveness of VNS in treating drug-resistant epilepsy in the pediatric population and to identify factors influencing its outcomes.

**Materials and methods:** A retrospective review was conducted on pediatric patients who underwent VNS implantation at the Department of Pediatric Neurosurgery in Katowice between 2015 and 2025. Analysis was performed on patient history, postoperative complications, and therapeutic outcomes.

**Results:** The cohort comprised 52 children (mean age  $9.4 \pm 4.5$  years; mean follow-up  $3.0 \pm 1.8$  years). The efficacy of VNS was evaluated using the McHugh Outcome Scale, based on data collected at the final follow-up visit. According to the scale, 49% ( $n=25$ ) of the children achieved  $\geq 50\%$  reduction in seizure frequency, with 11.5% ( $n=6$ ) reaching complete remission. No improvement was observed in 25.5% ( $n=13$ ). Age at onset, age at implantation, epilepsy duration, etiology, seizure frequency, and seizure type were not significant predictors of treatment outcome (all  $p > 0.05$ ). However, higher output current was associated with less favorable McHugh scale outcomes ( $I(st) p=0.033$  and  $I(mag) p=0.015$ ). Mild adverse events (hoarseness, cough, dyspnea, and dysphagia) occurred in 22 patients.

**Conclusions:** VNS is an effective and safe treatment for drug-resistant epilepsy in the pediatric population. However, identifying factors that influence clinical outcomes requires further research involving larger cohorts.

**Keywords:** drug-resistant epilepsy, VNS, McHugh Outcome Scale

# Visually evoked potential test and its significance in MS diagnosis regarding the 2024 McDonald criteria

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**Background:** The updated McDonald criteria from 2024 focus on the optic nerve as a distinct site of demyelinating lesions. Visual evoked potentials (VEP) enhance the precision of imaging data and may contribute to a more accurate diagnosis of the disease.

**The aim:** This study compared VEP latency between patients with multiple sclerosis and healthy controls while also assessing the relationship between VEP findings and selected clinical and immunological features of MS, as well as MRI-detected changes.

**Materials and methods:** The study included 109 patients diagnosed with relapsing-remitting multiple sclerosis (RRMS) and 35 healthy controls. The association between VEP latency and variables such as age, sex, presence of oligoclonal bands (OCB) in cerebrospinal fluid and level of disability were analyzed. In the MS group, correlations between VEP latency and the number of demyelinating lesions observed in T2-weighted MRI sequences in the brain, as well as in the cervical and thoracic spinal cord, were examined along with comparison to the number of contrast-enhancing (active) lesions.

**Results:** Patients with MS demonstrated significantly prolonged VEP latencies compared to controls (left eye:  $p = 0.011$ ; right eye:  $p = 0.00048$ ). A higher number of T2 lesions in the brain and spinal cord were associated with longer VEP latencies in both eyes. Increased VEP latency was also linked to the presence of oligoclonal bands in CSF and this relationship remained significant after adjusting for sex, age, time to diagnosis, and EDSS. No significant association was found between VEP latency and the number of active, contrast-enhancing lesions nor with EDSS score or sex.

**Conclusions:** VEP as an objective diagnostic tool, enables the detection of cumulative demyelinating damage within the visual pathway in MS. The presence of oligoclonal bands in cerebrospinal fluid has a significant impact on impaired conduction along the visual pathway. The 2024 McDonald criteria highlight the growing diagnostic value of VEP in multiple sclerosis.

**Keywords:** MS, VEP, Mcdonald 2024, neurology

# The TyG Index in Parkinsonian Syndromes: Clinical Dead End or Hint at Central Dysregulation?

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**Background:** Distinguishing Parkinson's disease (PD) from atypical parkinsonisms (AP), such as multiple system atrophy (MSA) and progressive supranuclear palsy (PSP), is clinically challenging, with early-stage diagnostic accuracy as low as 26–53%. Given that a definitive diagnosis requires post-mortem examination, objective biomarkers are urgently needed. Insulin resistance (IR) is a promising target, as it impairs mitochondrial function and promotes alpha-synuclein accumulation in the basal ganglia. The Triglyceride-Glucose (TyG) index is a cost-effective marker of IR known to correlate with motor and cognitive severity in PD; however, its utility in AP remains unexplored.

**The aim:** This research assessed the TyG index for distinguishing PD, MSA and PSP, and its connection with cognitive profiles and clinical status.

**Materials and methods:** This retrospective cross-sectional study involved 329 patients (272 PD, 15 MSA, 42 PSP). Assessments included motor, non-motor symptoms, TyG index, and metabolic profiles.

**Results:** PD was linked to longer disease duration and higher levodopa equivalent daily dose (LEDD) ( $p < 0.01$ ). PSP patients showed significantly higher Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPDRS) ON scores ( $p < 0.001$ ) and lower fasting glycaemia ( $p < 0.05$ ) than other groups. However, the TyG index and lipid profiles did not differ significantly ( $p > 0.05$ ). Cognitive function (Addenbrooke's Cognitive Examination III, ACE-III) was notably lower in PSP than MSA ( $p = 0.0019$ ), especially in memory and fluency, while depressive symptoms (Beck Depression Inventory, BDI) remained similar ( $p = 1.0$ ).

**Conclusions:** The TyG index is not a dependable method for differentiating PD from atypical parkinsonism. Lower fasting glucose levels in PSP serve as a potential "red flag" linked with cognitive decline. Future research should incorporate Homeostatic Model Assessment – Insulin Resistance (HOMA-IR) and continuous glucose monitoring to further explore these metabolic connections.

**Keywords:** Parkinson's disease, Atypical parkinsonism, Multiple system atrophy, Progressive supranuclear palsy

# Perioperative Dexamethasone Use in Paediatric Neurosurgery: A Retrospective Audit of Dosing Patterns, Exposure

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**Background:** Dexamethasone is essential in perioperative management in neurosurgery to mitigate tumour-related cerebral oedema and raised intracranial pressure. While adult prescribing regimens are well defined, paediatric-specific guidance is limited. As a result, perioperative dosing, duration, and tapering in children remain highly variable and reliant on clinician experience, heightening concern about steroid-related adverse effects.

**The aim:** To evaluate perioperative dexamethasone prescribing patterns, dosing trajectories, cumulative exposure, and weaning practices, and to assess differences according to tumour characteristics and patient weight.

**Materials and methods:** A retrospective audit of 71 paediatric neuro-oncology patients undergoing neurosurgery (2024–2025) was performed. Dexamethasone use was analysed across consecutive 24-hour intervals (T1–T10) in pre- and post-operative cohorts. Doses were expressed as mg and mg/kg. Comparisons were performed using the Mann–Whitney U test, with  $p < 0.05$  considered significant. Analyses were conducted using STATISTICA 13.3.

**Results:** Overall, 48 patients (66.7%) received perioperative dexamethasone. Dosing declined over time in both periods, approaching zero by day 4–5. Median cumulative exposure was similar pre- and post-operatively (0.66 vs 0.65 mg/kg). High-grade tumours were associated with significantly higher weight-adjusted dosing at T1 and greater cumulative exposure ( $p < 0.05$ ). No significant differences were observed based on tumour location. Weight subgroup analysis showed variability in absolute but not in weight-adjusted dosing. The median duration to weaning was 4 days, with a weaning period of 8 days.

**Conclusions:** Perioperative dexamethasone use in paediatric neurosurgery shows significant variability, particularly in high-grade tumors, reflecting a lack of standardised prescribing practices. These findings highlight the need for evidence-based, paediatric-specific guidelines to optimise steroid use while minimising unnecessary exposure and potential adverse effects.

**Keywords:** Paediatric neurosurgery, Dexamethasone, Perioperative care, Practice variability, Cerebral oedema

# Association of Pregabalin Use with Fall-Related Functional Parameters in Geriatric Patients

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**Background:** Falls and diminished physical performance constitute significant contributors to morbidity among older adults and are frequently linked to pharmacological treatments. Dizziness and an elevated risk of falls have been documented in individuals receiving pregabalin. Nevertheless, the specific aspects of functional performance impacted by this drug, particularly in older patients, remain unclear.

**The aim:** The aim of this study was to examine the association between pregabalin use and fall-related parameters, including physical performance, balance, and muscle strength, in older hospitalized adults.

**Materials and methods:** This observational, cross-sectional study analyzed 308 patients (mean age 83 years). Participants were divided into pregabalin users (N=21) and non-users (N=287). Physical performance was evaluated using the Timed Up and Go (TUG), Short Physical Performance Battery (SPPB), Tinetti Assessment, and hand grip strength. Descriptive statistics and the Mann-Whitney U test were used for data analysis.

**Results:** Compared with non-users, pregabalin users had lower total SPPB scores (2.00 vs. 5.00 points,  $p = 0.011$ ). Within the SPPB, significant differences were found in balance (1.00 vs. 2.00,  $p = 0.014$ ) and chair stand (0.00 vs. 1.00 points,  $p = 0.030$ ). Hand grip strength (19.00 vs. 24.00 kg,  $p = 0.007$ ), Tinetti balance (7.00 vs. 12.00,  $p = 0.003$ ) and total Tinetti scores (13.50 vs. 21.00 points,  $p = 0.011$ ) were also lower in pregabalin users. No significant differences were found for age, sex, TUG and gait parameters.

**Conclusions:** Pregabalin use was associated with lower physical performance, reduced balance, and decreased muscle strength in hospitalized older adults. Due to cross-sectional design, causality cannot be established. Another limitation was the small number of pregabalin users. The observed associations may also reflect underlying clinical differences between pregabalin users and non-users, and further prospective studies are needed to clarify these relationships.

**Keywords:** Pregabalin, Geriatrics, Falls, Balance, Muscle strength, Physical performance

# Clinical characteristics of the wearing-off phenomenon in multiple sclerosis patients

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**Background:** Multiple Sclerosis is a neuroinflammatory disorder of the central nervous system. Disease-modifying therapies include anti-CD20 antibodies such as ocrelizumab and ofatumumab. The wearing-off phenomenon refers to symptoms such as fatigue, cognitive difficulties and sensory complaints that emerge toward the end of treatment cycles.

**The aim:** Assessment of the prevalence, clinical characteristics and possible risk factors of the wearing-off phenomenon in patients with multiple sclerosis treated with ocrelizumab or ofatumumab.

**Materials and methods:** The study included 92 patients treated with ofatumumab or ocrelizumab for multiple sclerosis. Data were collected from patient-completed questionnaires and medical records. Data distribution was assessed with the Shapiro-Wilk test. Group comparisons were performed using the Mann-Whitney U test, while categorical variables were analyzed with the Chi-squared test or Fisher's exact test. A p-value <0.05 was considered statistically significant.

**Results:** Among the participants, 68 (74%) were women and 24 (26%) were men, aged 19-72 years. 19 patients (20%) received ocrelizumab and 73 (80%) received ofatumumab. Of the 87 patients who responded to the question on the wearing-off phenomenon, 37 (42%) reported experiencing it. The wearing-off phenomenon occurred more frequently in women than in men (49% vs 22%), with a statistically significant association (OR = 3.3, 95% CI = 1.09-10.0, p = 0.045). The most commonly reported symptoms were fatigue (89%) and walking difficulties (40%). 16 of 21 patients who answered the question about the time of symptom onset (76%) reported symptom onset within 7 days before the scheduled dose. The phenomenon was associated with longer disease duration (p = 0.023).

**Conclusions:** The wearing-off phenomenon was observed in over 40% of patients treated with ofatumumab or ocrelizumab and was more common in women and in those with longer disease duration. Further studies are needed to confirm these findings.

**Keywords:** multiple sclerosis, ofatumumab, ocrelizumab

# Kappa Free Light Chain concentration in cerebrospinal fluid as a new biomarker of multiple sclerosis

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**Background:** Free kappa light chains (κFLC) in cerebrospinal fluid (CSF) are a biomarker of intrathecal immune activation in multiple sclerosis (MS). According to the 2024 McDonald criteria, κFLC are considered equivalent to oligoclonal bands (OCB). The κFLC index is an automated and objective alternative or complement to OCB assessment.

**The aim:** This study aimed to evaluate CSF κFLC levels in MS patients depending on OCB status.

**Materials and methods:** The study included 110 individuals of which 30 were MS patients with OCB-, 40 with OCB+ and 40 healthy controls. CSF κFLC concentrations were measured using turbidimetry. In MS patients, clinical and radiological parameters were analysed, including disability and the number of demyelinating lesions in brain and spinal cord MRI.

**Results:** The mean age was 39.3 years, and 70.9% were women. κFLC levels were: OCB- 0.310 mg/L, OCB+ 2.965 mg/L and controls 0.280 mg/L. κFLC levels were significantly higher in OCB+ compared to OCB- and controls. No correlation was found with brain lesions or EDSS. A positive correlation was observed with the number of spinal cord T2 lesions ( $p=0.034$ ).

**Conclusions:** κFLC measurement is a valuable diagnostic and prognostic biomarker. Higher κFLC levels in CSF are associated with OCB presence and greater disease burden. Their inclusion in routine diagnostics enables more precise and efficient patient assessment.

**Keywords:** OCB, κFLC, MS, neurology

# Shunt Revisions in Children with Hydrocephalus: A 10-Year Single-Center Experience

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**Background:** Shunt implantation is the standard treatment for hydrocephalus in both children and adults. The use of a ventriculoperitoneal shunt is associated with various complications, including mechanical issues (such as valve or catheter obstruction, catheter disconnection), functional malfunctions (such as overdrainage syndrome), and shunt infections.

**The aim:** Evaluation of the criteria for the implantation of a shunt system and analysis of complications occurring during the treatment of hydrocephalus.

**Materials and methods:** A retrospective analysis was conducted on the medical records of patients hospitalized between 2013 and 2023 for hydrocephalus treatment at the Department of Pediatric Neurosurgery in Katowice. Medical histories of 228 patients were included. The mean age at the shunt implantation was 7.2 months (SD:  $\pm 14.7$  months), and the mean follow-up duration was 6.8 years (SD  $\pm 3.0$ ). Mechanical, infectious, and functional complications were identified within the study group.

**Results:** Shunt revision was required in 39.9% of patients ( $n = 91$ ). The mean time from implantation to first revision was 25.8 months (SD  $\pm 29.1$ ). Most first revisions occurred late ( $>6$  months; 63.7%). Mechanical complications were the leading cause of revision (63.7%;  $n = 58$ ), followed by infectious (24.2%;  $n = 22$ ) and functional causes (12.1%;  $n = 11$ ). Univariate analysis identified prematurity ( $p = 0.032$ ), lower gestational age ( $p = 0.010$ ), and prior Rickham reservoir placement as significant predictors of shunt revision. Additionally, prior reservoir placement was associated not only with an increased risk of revision ( $p = 0.007$ ) but also with a higher likelihood of infectious complications ( $p = 0.022$ ).

**Conclusions:** The study demonstrated that shunt revision is a relatively common procedure, affecting nearly 40% of pediatric patients with hydrocephalus. Mechanical complications are the predominant cause of reoperation. Prematurity, lower gestational age, and prior reservoir placement are significant risk factors for revision.

**Keywords:** ventriculoperitoneal shunt; shunt complications; pediatric neurosurgery

# External validation of the Chicago Chiari Outcome Scale on adults with Chiari malformation type I.

Jan Kudlek

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**Background:** The Chicago Chiari Outcome Scale (CCOS) serves as a standardized clinical outcome evaluation tool among patients with Chiari Malformation type I. While its reliability has already been proved for pediatric patients, the literature lacks CCOS validation solely on adults.

**The aim:** Therefore, our study aimed to determine the validity of CCOS in the external cohort of adult patients.

**Materials and methods:** We retrospectively analyzed the symptomatic patients with CMI who underwent posterior fossa decompression in six neurosurgical departments. Gestalt outcome was determined as improved, unchanged, or worsened compared to the preoperative clinical state. Additionally, the CCOS score was calculated for each patient based on clinical data. In order to verify the ability of CCOS to determine clinical improvement, the area under the receiver operating characteristic (AUROC) curve was evaluated. A logistic regression analysis with all four components of CCOS (pain, non-pain, functionality, complications) was performed to establish predictors of the improved outcome.

**Results:** Results: A total of 75 patients (mean age  $42 \pm 15.3$  years) were included. Considering gestalt outcome evaluation, 41 patients were classified as improved (54.7%), 24 as unchanged (32%), and 10 as worsened (13.3%). All patients with CCOS  $\geq 14$  improved, while those with  $\leq 8$  worsened. We found an AUROC of 0.986, suggesting almost perfect accuracy of CCOS in delineating clinical improvement. A CCOS score of 13 showed high sensitivity (0.93) and specificity (0.97) for identifying patients with clinical improvement. Patient stratification by total CCOS score showed that those categorized as improved, unchanged, and worsened scored prevalently between 13 and 16 points, between 10 and 12 points, and between 4 and 9 points, respectively.

**Conclusions:** In our adult cohort, we found CCOS to be of almost perfect accuracy in reflecting postoperative clinical improvement. Moreover, all four CCOS components significantly correlated with patient clinical outcomes.

**Keywords:** Chiari malformation type I; outcome assessment; posterior fossa decompression; long-term outcomes

# Treatment mistakes in Alzheimer's Disease and Mixed Dementia.

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**Background:** Patients with dementia are frequently treated with medication inappropriate to the stage of the disease. Appropriate medications are often used in non-therapeutic doses. Additionally, non-recommended nootropic medications are commonly used.

**The aim:** The aim of the study was an assessment of the procognitive therapy appropriateness in patients with Alzheimer's disease (AD) and mixed dementia (MD) related to AD and vascular pathologies.

**Materials and methods:** The study involved a retrospective analysis of 115 patients with dementia referred to tertiary clinical center from other units, comprising 83 patients diagnosed with AD and 32 with MD. Demographic and clinical data, as well as procognitive treatment at admission, were analyzed. Data about frequent mistakes in procognitive therapy and number of patients with appropriate treatment were collected. Appropriate procognitive treatment was defined as the absence of nootropic drug use; use of therapeutic dose of donepezil 10 mg/day or rivastigmine  $\geq 6$  mg/day, memantine 20 mg/day (or 10 mg if GFR < 50) in moderate to severe dementia; lack of prescription of memantine in mild dementia.

**Results:** Nootropic drugs were prescribed for 38/155 (33%) patients. Memantine was used in 13 (33%) patients with mild dementia including 7/30 (23%) in AD group and 6/10 (60%) in MD group. Cholinesterase inhibitors were not prescribed in 27/40 (68%) patients with mild dementia in AD group and 19/30 (63%) patients with mild dementia in MD group. Appropriate treatment was used in 41/115 (36%) patients, without differences between AD and MD.

**Conclusions:** Appropriate treatment with adequate doses of acetylcholinesterase inhibitors is rarely used in mild AD and mixed dementia. Instead, the nootropic medications and memantine are overused in this group.

**Keywords:** Alzheimer's disease, Mixed Dementia, Nootropic drugs, Appropriate Treatment

# Prescribing trends and patient profile for Ofatumumab in a large tertiary multiple sclerosis treatment center

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**Background:** Current trends in multiple sclerosis (MS) treatment emphasize the importance of efficient treatment, adapted to the activity of the disease. B lymphocyte depletory drugs appear to have one of the best safety profiles in relation to their efficacy, despite higher costs compared to other disease modifying therapies. Ofatumumab has been reimbursed in Romania in mid-2024 for active relapsing remitting multiple sclerosis and is available in the Iasi MS tertiary center since January 2025.

**The aim:** We analyze the profile of patients that have since then started treatment with this substance in this hospital as compared to the overall local MS population.

**Materials and methods:** A total of 37 patients (3.9% of the total) is treated with Ofatumumab. Average age is  $34 \pm 10.34$  years. Average treatment duration was  $7 \pm 5$  months (between 0 and 15 months). 14 patients (37.83%) were treatment naive while the rest have switched from other therapies.

**Results:** From the total number of naive patients starting treatment in the MS tertiary center between January 2025 and April 2026, ofatumumab was chosen in 19% of the cases in 2025 and in 29% in the first 4 months of 2026. Compared to the other high efficacy options (Natalizumab and Ocrelizumab), Ofatumumab has the highest rate of naive versus non-naive patients (44% versus 25% and 21%). Reasons for switch in the non-naive patients were radiological or MRI disease breakthrough (13 patients – 35.13%), PML risk in Natalizumab treated patients (5 patients – 13.51%), adverse reactions to previous treatment (5 patients – 13.51%). No serious adverse reaction was reported in any of the treated patients until now. No relapses occurred in Ofatumumab treated patients until now.

**Conclusions:** Ofatumumab was used both as induction and escalation therapy in younger than the local average patients. It had a fast-growing rate among treatment choices in the Iasi tertiary MS center since it has been introduced, emerging as one of the preferred high efficacy treatment options.

**Keywords:** Multiple Sclerosis, Ofatumumab, Treatment choice

# Diagnosis and surgical management of intracranial hypotension: a single-centre neurosurgical experience

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**Background:** Intracranial hypotension (IH), defined by CSF pressure  $<6$  cm H<sub>2</sub>O, remains an underrecognized yet potentially disabling cause of orthostatic headache. While existing literature predominantly emphasises conservative measures and epidural blood patch (EBP), the neurosurgical perspective—particularly in patients requiring definitive CSF leak repair—remains underrepresented.

**The aim:** To investigate the safety and efficacy of surgical management of intracranial hypotension following precise CT myelographic localisation of cerebrospinal fluid leaks.

**Materials and methods:** This retrospective study included 19 patients hospitalized at the neurosurgical department between 2020 and 2025. Variables included demographics, clinical presentation, neuroimaging findings, CT myelography-based leak localisation, comorbidities, treatment strategy, and outcomes. Follow-up ranged from 6 months to 3 years.

**Results:** The examined cohort (n=19) had a predominance of male patients (63.2%). The mean age was 44 years. The orthostatic headache was present in the majority of cases, with a significant subset presenting acutely (63.6% emergency admissions in the initial series). Brain MRI demonstrated the SEEPS constellation in most cases. CT myelography localised the CSF leak in 91%, most commonly at Th1/Th2 (27.3%). Subdural haematomas occurred in 3 patients. Surgical repair was performed in 81.8%—including hemilaminectomy, laminectomy, and direct dural closure—with a 100% favourable therapeutic response rate. EBP was employed in 27.3% of cases. The full cohort confirmed a surgery-dominant pattern, including complex cases (sdAVF, vascular malformations, postoperative fistulae).

**Conclusions:** This series highlights that in a neurosurgical referral setting, operative CSF leak repair is feasible, safe, and universally effective when CT myelography has successfully localised the fistula. A multidisciplinary approach — combining advanced neuroimaging with individualised surgical or minimally invasive treatment — is essential to achieving durable remission.

**Keywords:** Intracranial hypotension, Orthostatic headache, Epidural blood patching, Cerebrospinal Fluid Leak

# Procedural efficacy of Alteplase versus Tenecteplase as Bridging Therapy in Mechanical Thrombectomy

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**Background:** Intravenous thrombolysis (IVT) as bridging therapy prior to mechanical thrombectomy (MT) may reduce the number of passes by partially dissolving the thrombus and improving recanalization before device use. The most commonly used agents are Alteplase (tPA) and Tenecteplase (TNK). This study evaluates the association between tPA versus TNK and the number of MT passes in patients with large vessel occlusion (LVO).

**The aim:** To compare the effect of IVT with tPA versus TNK on MT efficiency, focusing on the number of thrombectomy passes, first-pass complete reperfusion, and overall procedural outcomes in patients with LVO.

**Materials and methods:** A retrospective study was conducted at the Department of Neurology with Stroke Subdivision of the Upper Silesian Medical Centre, Medical University of Silesia in Katowice, Poland.

The study included 145 ischemic stroke patients undergoing IV thrombolysis (M/F: 70/75) with a mean age of 68.6 years. Clinical and procedural factors analyzed included onset-to-MT time, MT duration, admission and discharge neurological status, and procedural success parameters. Outcomes were compared between patients receiving tPA and TNK.

**Results:** Baseline clinical profiles were comparable between groups. In both study groups, the outcomes turned out to be similar, including favorable outcomes (mRS 0-2) as well as mortality (mRS 6). Successful reperfusion was more often achieved in patient receiving tPa. On the other hand, the MT was performed quicker after TNK.

**Conclusions:** TNK and tPA showed comparable overall procedural and clinical outcomes as bridging therapy before MT. tPA was associated with higher reperfusion rates, however this was not associated with more favorable clinical outcomes in stroke patients treated with MT. Larger prospective studies are needed to clarify their effect on pass number and long-term outcomes.

**Keywords:** alteplase, tenecteplase, mechanical thrombectomy, ischemia stroke

# Dispositional optimism and resilience as negative predictors of psychopathological symptoms in firefighters.

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**Background:** Career firefighters, due to the demanding character of their job, are at a higher risk of developing elevated perceived stress levels as well as developing symptoms of depression, anxiety, insomnia, and traits of type D personality.

**The aim:** The study focuses on evaluating the possible predictive role of optimism and ego resilience in relation to various psychopathological symptoms.

**Materials and methods:** The questionnaire study involved 186 professional Polish firefighters, aged between 19 and 59. The survey consisted of the Life Orientation Test-Revised (LOT-R), the Ego-Resiliency Scale (ER89), the Athens Insomnia Scale (AIS), the Perceived Stress Scale-10 (PSS-10), the Type D Scale-14 (DS14), and the Hospital Anxiety and Depression Scale (HADS). The statistical analyses were conducted using Pearson's correlation coefficient and multiple regression analysis.

**Results:** The results show that optimism and ego resilience are significantly and negatively correlated with perceived stress, symptoms of depression, anxiety, and insomnia, as well as Type D personality traits. Multiple regression analyses indicate that optimism is a significant negative predictor of all analyzed dependent variables and a stronger predictor than ego resilience, which emerged as a significant negative predictor only of social inhibition.

**Conclusions:** In light of obtained results optimism and ego resilience appear to be significant protective factors for mental health and might serve as potential therapy targets.

**Keywords:** dispositional optimism, ego resilience, stress, depression, Type D personality, firefighters

# Association between Loneliness, Social Network, and Depressive Symptoms in Older Adults

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**Background:** Depression and loneliness are common and interrelated conditions among older adults. Although both loneliness and social networks have been linked to depressive symptoms, their relative importance remains unclear.

**The aim:** To examine the associations between loneliness, social networks, and depressive symptoms in older adults.

**Materials and methods:** This observational, cross-sectional study included 90 older adults (mean age  $80.7 \pm 7.5$  years; 73% women). Depressive symptoms were assessed using the Geriatric Depression Scale (GDS), loneliness using the Revised UCLA Loneliness Scale (R-UCLA), and social network using the Lubben Social Network Scale (LSNS-6). Associations were analysed using Pearson correlation and multivariable linear regression adjusted for age, sex, and polypharmacy.

**Results:** Depressive symptoms were positively correlated with loneliness ( $r = 0.45$ ,  $p < 0.001$ ) and negatively correlated with social networks ( $r = -0.26$ ,  $p < 0.05$ ). Loneliness was also inversely associated with social networks ( $r = -0.26$ ,  $p < 0.05$ ). In multivariable analysis, only social networks remained independently associated with depressive symptoms ( $\beta = -0.26$ , 95% CI=  $-0.17$ ,  $p = 0.012$ ), while loneliness was not significantly associated with depressive symptoms after adjustment. The model explained 24.8% of the variance ( $R^2 = 0.248$ ).

**Conclusions:** Depressive symptoms were associated with both loneliness and social networks in univariable analyses; however, only social networks remained independently associated after adjustment. These findings suggest that social networks may be particularly important in understanding depressive symptoms in older adults. These findings should be interpreted with caution due to the relatively small sample size.

**Keywords:** Depressive symptoms, Loneliness, Social network, Older adults, Cross-sectional study, Mental health

# Risk factors for mental and neurodevelopmental disorders in the pediatric population: a cross-sectional study

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**Background:** Mental and neurodevelopmental disorders are an escalating pediatric health concern. Identifying their risk factors is essential for developing effective control and prevention strategies.

**The aim:** Identifying risk factors for mental and neurodevelopmental disorders in Gliwice's pediatric population.

**Materials and methods:** An epidemiological cross-sectional study of children and adolescents in Gliwice was conducted using a questionnaire completed by parents and distributed through schools. The strength of associations was expressed using odds ratios (ORs) with 95% confidence intervals (95% CIs).

**Results:** Data analysis from 1706 participants (ages 5–17, 50.7% boys, 49.3% girls) revealed that female sex is associated with a lower risk of autism (OR=0.38,  $p<0.001$ ), ADHD (OR=0.38,  $p<0.001$ ), and sensory integration disorders (OR=0.54,  $p<0.05$ ). Six-month breastfeeding correlates with lower probability of autism (OR=0.5,  $p<0.001$ ), ADHD (OR=0.51,  $p<0.05$ ), and learning difficulties (OR=0.47,  $p<0.001$ ). Family history of neurodevelopmental disorders raises ADHD risk fourfold (OR=3.82,  $p<0.001$ ) and autism threefold (OR=3.15,  $p<0.001$ ). Moreover, parental asthma links to a higher risk of autism (OR=1.77,  $p<0.05$ ) and sensory integration disorders (OR=1.54,  $p<0.05$ ). High stress in children correlates with autism (OR=5.95,  $p<0.001$ ) and with learning difficulties (OR=5.46,  $p<0.001$ ). Urban living significantly reduces occurrence of children's dysgraphia, dyscalculia, and dyslexia (OR=0.34,  $p<0.05$ ). Sleep difficulties are strongly associated with ADHD (OR=3.42,  $p<0.001$ ) and autism (OR=3.4,  $p<0.001$ ).

**Conclusions:** The study confirms the dominant role of genetic factors, stress, and sleep problems in the development of mental and neurodevelopmental disorders, while highlighting the protective effect of breastfeeding. Urban environment contributes to a significant reduction in the risk of academic dysfunctions. Parental asthma serves as an important neurodevelopmental risk factor.

**Keywords:** neurodevelopmental disorders, autism spectrum disorder, ADHD, risk factors, children

# The relationship between depressive symptom severity and patients' current self-esteem

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**Background:** Depression may coexist with reduced self-esteem; however, the nature of this relationship in psychiatric outpatients remains unclear.

**The aim:** To assess the relationship between the severity of depressive symptoms and current self-esteem in patients attending a mental health outpatient clinic.

**Materials and methods:** This single-center cross-sectional observational study included 59 psychiatric outpatients assessed from late 2024 to the first quarter of 2026. Depressive symptoms were evaluated using the Beck Depression Inventory, and self-esteem using the Rosenberg Self-Esteem Scale

**Results:** Preliminary analysis suggests no clear linear relationship between depressive symptom severity and self-esteem. Additionally, variability in results across different patient subgroups was observed.

**Conclusions:** The findings suggest a more complex, potentially non-linear relationship between depressive symptoms and self-esteem, warranting further investigation.

**Keywords:** Depression, self-esteem, psychiatry

# Characteristics of Alcohol Elimination in Detoxified Patients: A Retrospective Study

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**Background:** Alcohol elimination shows substantial interindividual variability. In clinical practice, its assessment may be influenced by concentration ranges and factors affecting breath alcohol concentration (BrAC) measurements. Data remain limited on how elimination processes proceed specifically in patients with alcohol dependence.

**The aim:** The aim of this study was to assess the variability of alcohol elimination rates based on BrAC measurements in individuals undergoing detoxification, with particular focus on concentration ranges and the definition of the elimination phase.

**Materials and methods:** We conducted a retrospective analysis of serial BrAC measurements (mg/L) obtained in a specialized detoxification unit. The primary analysis included episodes fulfilling predefined elimination phase criteria, defined as at least two consecutive BrAC decreases of at least 0.05 mg/L. The end of the elimination phase was defined as the last positive measurement. Elimination rates were calculated for individual episodes and analyzed across concentration ranges. Some individuals underwent detoxification more than once. Episodes not fulfilling the elimination criteria were analyzed separately as alternative profiles.

**Results:** Considerable variability in elimination rates was observed across episodes and concentration ranges. Higher BrAC ranges were associated with higher elimination rates; however, the size of some subgroups was limited. The alternative analysis identified episodes with increasing BrAC values, which may reflect ongoing absorption, ethanol redistribution, or factors affecting measurement.

**Conclusions:** Alcohol elimination in a detoxification setting shows marked variability and depends on both the BrAC range and the methodological approach used to define the elimination phase. Alternative profiles and repeated detoxification episodes highlight the complexity of interpreting changes in alcohol concentration in clinical practice.

**Keywords:** ethanol elimination, BrAC, detoxification, alcohol use disorder, retrospective analysis, elimination

# The influence of childhood trauma on the development of alcohol addiction

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**Background:** Alcohol addiction represents a significant public health challenge. A growing body of research highlights the critical role of childhood traumatic experiences in the development of substance use disorders, including alcohol dependence.

**The aim:** The aim of this study was to evaluate the association between childhood trauma and the development and progression of alcohol addiction, as well as to analyze the relationship between the severity of traumatic experiences, drinking patterns, and the psychological functioning of patients.

**Materials and methods:** The study included 82 adult patients (18 women and 64 men) undergoing treatment at two addiction therapy centers of the "Blue Cross" Foundation in Pszczyna and Czechowice-Dziedzice. The study utilized a clinical-demographic survey and validated assessment tools: the Childhood Trauma Questionnaire (CTQ), the Brief Resilience Scale (BRS), and the Alcohol Use Disorders Identification Test (AUDIT). This cross-sectional study was conducted with full anonymity. Data regarding alcohol use history, drinking patterns, comorbid mental disorders and childhood traumatic experiences were analyzed. Statistical associations were assessed using correlational analysis.

**Results:** Analysis of data collected via the Childhood Trauma Questionnaire (CTQ) revealed a moderate severity of traumatic experiences within the study group. Statistically significant correlations were found between the intensity of traumatic experiences and alcohol consumption patterns. Higher CTQ scores were found to coincide with a tendency toward an earlier initiation of regular alcohol consumption.

**Conclusions:** Childhood traumatic experiences may constitute a significant risk factor for the development of alcohol use disorders in adulthood. The findings suggest that early alcohol onset in trauma survivors serves as a form of dysfunctional emotion regulation. The observed associations underscore the importance of childhood trauma in the pathogenesis of addiction.

**Keywords:** Childhood trauma, alcohol use disorder, CTQ, AUDIT

# Interplay of clinical, biochemical and psychometric measures in alcohol use disorder

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**Background:** Alcohol use disorder is a complex condition in which pathophysiological and psychological mechanisms shape the clinical presentation. The role of routine laboratory markers and their relationship with the severity of problematic alcohol use remains unclear.

**The aim:** To assess the relationship between the severity of problematic alcohol use and clinical and psychological parameters and to evaluate selected laboratory markers in the clinical course.

**Materials and methods:** The survey included 99 men hospitalized due to alcohol withdrawal syndrome. The assessment included a clinical and demographic survey and validated psychometric tools: the Alcohol Use Disorders Identification Test (AUDIT), the Brief Resilience Scale and Penn Alcohol Craving Scale. At the same time, laboratory parameters of biochemical and complete blood counts were also analyzed. Statistical analyses were performed using Statistic 13.3 PL. Due to non-normal distribution, non-parametric tests (Spearman, Mann-Whitney, Kruskal-Wallis) were used. A significance level of  $p < 0,05$  was set.

**Results:** The severity of problematic alcohol use correlated with longer duration of drinking ( $r=0,20$ ;  $p=0,03$ ) and a greater number of prior detoxifications ( $r=0,27$ ;  $p=0,004$ ). The level of alcohol craving positively correlated with the severity of problematic alcohol use ( $r=0,3$ ;  $p=0,002$ ). Regarding biochemical parameters, the duration of alcohol binge episodes was associated with higher ALT ( $p=0,01$ ) and AST ( $p=0,03$ ) levels. A significant negative correlation was found between ALT ( $r=-0,34$ ;  $p=0,0003$ ) and AST ( $r=-0,42$ ;  $p=0,001$ ) and platelet count. No significant correlations were found between liver enzymes and AUDIT scores.

**Conclusions:** Biochemical parameters: liver enzymes and platelet count reflect the degree of organ damage associated with alcohol exposure. Liver damage was associated with alcohol consumption patterns (binge drinking), but no significant correlation was found with the severity of problematic alcohol consumption assessed by the AUDIT scale.

**Keywords:** Alcohol use disorder, liver enzymes, psychometric assesment, platelet count, alcohol detoxification

# From PTSD to C – PTSD: Identifying Complex Symptomatology in Traumatized Subjects

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Work's tutor: Maja Simonovic

**Background:** Posttraumatic stress disorder (PTSD) is a psychiatric condition arising from exposure to an extremely stressful events. PTSD is defined in terms of the presence of three symptom clusters, re-experiencing of the traumatic event, avoidance and numbing, and hyperarousal. For Complex PTSD (CPTSD) to be diagnosed the person must also demonstrate pervasive, long-standing disturbances in self-organisation (DSO). DSO consists of three components; affective dysregulation, negative self-concept and impairment in important life roles.

**The aim:** The Aim of this paper is to determine the presence of CPTSD in the population of outpatient treatment-seeking subjects suffering of PTSD.

**Materials and methods:** The testing was conducted in 2024 at The Center for Mental Health Protection in Nis. 60 outpatient treatment seeking subject was interviewed and fulfilled International Trauma Questionnaire (ITQ) used to measures three PTSD symptoms (1. re-experiencing in the here and now, 2. avoidance, and 3. sense of current threat), PTSD functional impairment, three DSO symptoms (1. affective dysregulation, 2. negative self-concept, and 3. disturbances in relationships), and DSO functional impairment.

**Results:** The Results confirmed the presence of CPTSD in the population of treatment seeking individuals. The impact of the obtained results on the clinical presentation of the disorder and on severity of the functional impairment is discussed.

**Conclusions:** The current study successfully identified the presence of Complex Posttraumatic Stress Disorder (CPTSD) within a clinical population of outpatient treatment-seeking individuals at the Center for Mental Health Protection in Nis. By utilizing the International Trauma Questionnaire (ITQ), the research highlights a critical distinction between traditional PTSD and the more pervasive symptom profile of CPTSD.

**Keywords:** cptsd, ptsd, disturbances in self-organisation (dso) , international trauma questionnaire

# Stress and psychological protective factors associated with PTSD in a group of Ukrainian female refugees

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**Background:** The invasion of Ukraine has significantly increased the risk of post-traumatic stress disorder (PTSD), with women exhibiting heightened vulnerability. Psychological resilience suggests that individual traits, such as dispositional optimism, moderate post-traumatic outcomes by facilitating adaptive coping and reducing stress reactivity. Understanding these associations is essential for developing resource-oriented therapeutic interventions for displaced populations.

**The aim:** The aim of the study is to investigate the association between dispositional optimism, perceived stress intensity, and PTSD symptom severity among Ukrainian female refugees.

**Materials and methods:** The study was conducted on a sample of N = 80 women. Data were collected using the LOT-R, PSS-10, and PCL-5 scales.

**Results:** Mean scores were M = 15.16 for optimism and M = 20.86 for perceived stress. Correlation analysis revealed that optimism was significantly and negatively associated with stress ( $r = -0.33$ ,  $p < 0.01$ ) and hyperarousal symptoms ( $r = -0.24$ ,  $p < 0.05$ ). Participants screening positive for PTSD reported significantly higher stress levels than the non-PTSD group (22.44 vs. 18.32;  $p < 0.001$ ). A statistical trend ( $p = 0.059$ ) indicated lower optimism resources among individuals in the PTSD-positive group.

**Conclusions:** Dispositional optimism serves as a psychological protective factor, specifically influencing the regulation of emotional arousal (hyperarousal) rather than all PTSD symptom clusters. Individuals at risk for PTSD exhibit significantly higher perceived stress and a tendency toward lower optimism resources, suggesting that strengthening personal resilience is a critical target for clinical support.

**Keywords:** PTSD, Ukrainian refugees, dispositional optimism, perceived stress, resilience

# Posttraumatic Stress Disorder and Type D Personality Traits Among Female Ukrainian Refugees

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**Background:** The Russian invasion of Ukraine on 24 February 2022 triggered a major humanitarian crisis, forcing millions to flee. War-related experiences increase the risk of mental health disorders, including Post-Traumatic Stress Disorder (PTSD). Type D personality, characterized by negative affectivity (NA) and social inhibition (SI), may be a risk factor for PTSD.

**The aim:** The aim of this study was to assess the prevalence of probable PTSD among female Ukrainian refugees and to examine the relationship between Type D personality and PTSD symptom severity.

**Materials and methods:** A total of 80 female Ukrainian refugees were recruited at the local Migrant and Refugee Assistance Center. Participants completed an anonymous paper-based survey. PTSD symptom severity was assessed using the PCL-5 questionnaire, Type D personality traits were measured with the DS-14 scale, and an author-designed questionnaire was used to collect sociodemographic data and information on war exposure.

**Results:** Using a cut-off score of  $\geq 33$  on the PCL-5, 60.5% of participants met the criteria for probable PTSD. Additionally, 45.7% were classified as having a Type D personality. Comparative analysis revealed significantly higher overall PTSD symptom severity among individuals with Type D personality. Statistically significant correlations were also observed between Type D dimensions and specific PTSD symptom clusters. A multiple regression model including both Type D dimensions explained 27% of the variance in PTSD symptom severity; however, only NA emerged as a statistically significant predictor.

**Conclusions:** The prevalence of PTSD is likely high among Ukrainian war refugees, and local healthcare systems should be prepared to address this challenge. Individuals with Type D personality exhibit greater PTSD symptom severity, although only negative affectivity appears to be a significant predictor.

**Keywords:** PTSD, Ukrainian refugees, Type D personality, negative affectivity, social inhibition

# The relationship between the use of social media with the level of self-confidence

Olivera Vičenko

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**Background:** Social networks mostly contribute to easier communication, meeting new people and connecting people with similar interests. However, the possible negative sides of social networks also prevail, such as the negative impact on self-confidence and mental health.

**The aim:** The study aims to explore the relationships between social media usage, self-esteem, internet usage duration, escapism tendencies, sleep disturbances and mental health problems among participants.

**Materials and methods:** The research was designed as a cross-sectional study. It included Group 1 (Pupils), with 134 participants, and Group 2 (Students), with 150 participants. Data was collected through questionnaires and was analysed in the Jamovi program. The Kolmogorov-Smirnov test was used to assess the data distribution, while the Spearman correlation test was used due to the uneven data distribution. The Mann-Whitney test was used to assess the difference between the pupils and the students.

**Results:** Findings reveal a positive correlation between internet usage and mental health ( $r=0,307$ ;  $p<0,001$ ), internet usage duration ( $r=0,463$ ;  $p<0,001$ ), and escapism tendencies across all respondents ( $r=0,480$ ;  $p<0,001$ ). Moreover, internet usage is positively associated with self-confidence levels ( $r=0,219$ ;  $p=0,007$ ) and sleep disturbances ( $r=0,214$ ;  $p=0,008$ ) among students. Mental health problems are exhibiting a negative correlation with self-confidence ( $r= -0,622$ ;  $p<0,001$ ), and a positive correlation with sleep disturbances ( $r=0,456$ ;  $p<0,001$ ) and escapism tendencies ( $r=0,218$ ;  $p=0,011$ ) among pupils. Notably, students demonstrate greater internet usage frequency ( $Z= -2,408$ ;  $p=0,016$ ;  $U=8385,5$ ) and higher self-confidence compared to pupils ( $Z= -7,2302$ ;  $p=0,00001$ ;  $U=5054$ ).

**Conclusions:** Social media utilization significantly impacts various aspects of individual development. Implementing preventive strategies, particularly targeting pupil populations, is imperative given their heightened susceptibility to adverse effects associated with social network usage.

**Keywords:** social media, self-confidence, internet usage

# Psychological Consequences of Floods: The Impact of the Type of Experienced Losses on Mental Health and the Buffering Role of Social Support and Psychological Resilience

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**Background:** Background: Natural disasters, including floods, lead to severe and long-term psychological consequences. Material loss and forced evacuation are key risk factors for affective disorders.

**The aim:** The study assessed the impact of different types of loss (material damage, evacuation, health impairment) on the severity of depressive and anxiety symptoms, and examined whether psychological resilience and perceived social support have a buffering effect.

**Materials and methods:** The sample included 55 individuals affected by the September 2024 flood (89% female; mean age  $M=39.8$ ). Standardized instruments were used: PHQ-9, GAD-7, ER-89, and MSPSS. Types of damage were assessed with a self-developed questionnaire. Due to non-normal data distribution, non-parametric tests were applied (Mann-Whitney U, Spearman's rho, chi-square).

**Results:** Moderate levels of anxiety and depression were observed. Perceived social support (MSPSS) positively correlated with resilience (ER-89) and negatively with depression (PHQ-9) and anxiety (GAD-7). Individuals experiencing evacuation and material loss showed significantly higher symptom severity. Among evacuated participants, 66% met the clinical threshold for depression ( $PHQ-9 \geq 10$ ), compared to 42% of non-evacuated individuals. Although the subgroup with health impairment was small ( $N=3$ ), increased social support was observed.

**Conclusions:** Social support and resilience play a key buffering role in adaptation to flood-related trauma, reducing the risk of psychopathology. Material loss and forced evacuation remain significant risk factors, highlighting the need to incorporate these factors into crisis intervention planning.

**Keywords:** Flood, trauma, depression, anxiety, social support, psychological resilience.

# The Impact of Climate Change on Mental Health

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**Background:** Climate change is increasingly recognized as an important determinant of mental as well as physical health. Growing uncertainty about the future, a sense of threat, and experiences related to extreme weather events may negatively affect psychological well-being and contribute to anxiety symptoms.

**The aim:** To evaluate mental health professionals' perceptions of the psychological consequences of climate change and to examine how often eco-anxiety is encountered in everyday clinical practice.

**Materials and methods:** A survey study was carried out during the Medforum Psychiatry Congress 2024 using a self-designed questionnaire containing 22 closed-ended and multiple-choice items. The sample included 208 respondents representing three professional groups: psychiatrists, psychologists, and psychiatric nurses. Both quantitative and qualitative analyses were performed.

**Results:** Most participants considered the impact of climate change on mental health to be at least moderate. Increased anxiety, distress, and concerns about the future were the effects reported most frequently. Over one-third of respondents noticed a rising number of patients presenting symptoms consistent with eco-anxiety, although these concerns were seldom raised spontaneously during consultations. Cognitive-behavioral interventions and relaxation-based techniques were identified as the most helpful support strategies. Additionally, 78% of respondents reported that their workplaces lacked formal procedures for managing climate-related crises.

**Conclusions:** Climate change is becoming an increasingly relevant issue in mental health care. There is a clear need for institutional preparedness, dedicated training, and practical diagnostic tools related to eco-anxiety. Strengthening professional awareness and expanding evidence-based therapeutic approaches may improve support for patients experiencing climate-related stress.

**Keywords:** eco-anxiety, mental health, climate change

# Artificial Psychiatrist – Large Language Models in the Diagnosis of Patients Consulted at the ED

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**Background:** Implication of artificial intelligence (AI) in various areas of health care can help raise the level of services provided. Over the past few years, language models based on deep machine learning, such as Large Language Models (LLMs), have gained attention as potential tools to aid in diagnostics, including mental illnesses.

**The aim:** The aim of our study was to compare the effectiveness of different large language models in making a diagnosis and need of hospitalization on the basis of a single psychiatric consultation in a hospital emergency department.

**Materials and methods:** Psychiatric consultations from the emergency department at the Górnośląskie Centrum Medyczne im. prof. Leszka Gieca Śląskiego Uniwersytetu Medycznego in Katowice, Poland, were analyzed within the scope of 150 days. A total of 500 consultation descriptions were obtained. After anonymizing personal data, 5 naive LLMs (ChatGPT 4 Omni, Deepseek, Grok-2, Claude 3.5 Sonnet and Gemini 2.0 Flash) were asked to make a diagnosis on the basis of the DSM-5 classification and provide a final answer in ICD-10 code.

**Results:** The correct nosological unit was indicated by LLMs in 54% ([95% CI] 45.169% - 62.831%), while the correct disease category (e.g., code F10.2 and F10.3 were considered the same) was given in 79.5% of cases ([95% CI] 72.36% - 86.64%). The highest efficacy in both (1) nosological unit and (2) disease category was demonstrated by Claude 3.5 Sonnet (67.5 and 90%, respectively). It was followed by Deepseek (65 and 85%), Grok-2 (47.5 and 77.5%), Gemini 2.0 Flash (45 and 75%) and ChatGPT 4 Omni (45 and 70%).

**Conclusions:** Our study showed that large language models can be a useful tool to support psychiatric diagnosis in the hospital emergency department setting. These results indicate the potential use of LLMs to support physicians, but the limited precision of diagnoses underscores the need for their validation by specialists. Future research should focus on optimizing the models and integrating them into clinical practice in a safe and ethical manner.

**Keywords:** Large language models, artificial intelligence, diagnosis

# Public Perception of Electroconvulsive Therapy (ECT) and the Psychological Mechanisms Underlying Its Represent

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**Background:** The public image of electroconvulsive therapy (ECT) has for decades been burdened by negative connotations, which may significantly influence emotions and attitudes toward this treatment modality. Psychological mechanisms involved in opinion formation, such as the mere exposure effect, availability heuristic, and the impact of media narratives, play an important role in maintaining prejudice against ECT.

**The aim:** To assess the level of public knowledge, emotions, and beliefs regarding ECT, and to identify the main sources shaping these attitudes.

**Materials and methods:** An online survey study was conducted involving 1,263 respondents. The questionnaire included items concerning familiarity with ECT, sources of information, emotions associated with thinking about this therapy, and beliefs regarding its safety and ethical acceptability.

**Results:** Thirty-four percent of participants had never heard of ECT, while 57.9% reported obtaining their knowledge primarily from popular culture. More than 80% of respondents believed that the media portray ECT as brutal and frightening. Fifty-two percent declared fear or anxiety associated with this treatment, whereas only 21% were familiar with ECT through reliable educational sources. Misconceptions persisted among respondents, including beliefs that ECT is banned in developed countries (35%), is morally questionable (45%), or carries a risk of permanent brain damage (16%).

**Conclusions:** The findings demonstrate that the emotional and cognitive perception of ECT in society is strongly shaped by media narratives. Misinformation contributes to the stigmatization of biological treatments, highlighting the need for psychoeducational interventions and for deconstructing negative cognitive schemas in public discourse on psychiatry.

**Keywords:** electroconvulsive therapy. social awareness. availability heuristic

# Interplay Between Appearance Preferences and Life Satisfaction: Insights from an AI-Driven Experimental Design

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**Background:** Physical attractiveness plays a key role in how we perceive ourselves and others. Societal standards of appearance can influence self-esteem and life satisfaction. The study compares women and men in terms of their body image and overall life satisfaction.

**The aim:** The aim of the study was to determine preferences regarding facial appearance and body shape in women and men and their relationship with body self-esteem and life satisfaction.

**Materials and methods:** The electronic survey was disseminated via social media. So far, 140 people have participated, and data collection is ongoing. Respondents were presented with faces and silhouettes generated in the MetaHuman software. Each pair of faces differed in only one morphological parameter (e.g., jaw shape), selected based on a prior literature review. Women were shown male faces, and men were shown female faces. Participants also completed the Body Esteem Scale (BES) and Satisfaction With Life Scale (SWLS). Statistical analysis was conducted in Statistica.

**Results:** Results indicate significant gender disparities, with women reporting lower body esteem and higher emotional variability, while men showed slightly higher life satisfaction. A consistent positive correlation between BES and SWLS ( $r=0.4-0.6$ ) suggests that body evaluation is a key predictor of overall well-being. Furthermore, age was positively associated with both scales, indicating improved self-acceptance over time. Finally, socioeconomic factors moderately influenced visual preferences, highlighting the impact of material stability on aesthetic judgment.

**Conclusions:** The study confirms that physical attractiveness is intrinsically linked to psychological well-being. Body esteem (BES) serves as a consistent predictor of life satisfaction (SWLS), with age further moderating this relationship through increased self-acceptance. While socioeconomic factors moderately shape aesthetic preferences, the integration of AI-generated stimuli provides a more objective framework for analyzing visual perception.

**Keywords:** Artificial intelligence, body esteem (BES), life satisfaction (SWLS), physical attractiveness

# CT assessment of intermesenteric arterial anastomoses between the superior and inferior mesenteric arteries

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**Background:** Intermesenteric anastomoses between the superior and inferior mesenteric arteries constitute an important collateral pathway within the mesenteric circulation and demonstrate considerable anatomical variability. Their presence and course may be clinically relevant in colorectal and pancreatic surgery due to their proximity to the inferior mesenteric vein (IMV) and the ventral edge of the pancreas (VEOP).

**The aim:** This study evaluates the prevalence, anatomical course, and selected morphometric features of intermesenteric anastomoses on arterial-phase contrast-enhanced abdominal CT.

**Materials and methods:** A retrospective analysis of 338 arterial-phase contrast-enhanced abdominal CT scans was performed. The arc of Riolan (AOR) and Moskowitz artery (MA) were identified based on predefined radiological criteria. Their spatial relationship to the IMV and VEOP was assessed. Vessel diameters were measured, and sex-related differences were analyzed.

**Results:** The AOR was identified in 102/338 cases (30.2%), with no significant sex differences. When present, it was located adjacent to the IMV in 73.5% and to the VEOP in 93.1% of cases. The MA was detected in 6/338 cases (1.8%). The mean diameter of the AOR was  $2.00 \pm 0.32$  mm, while the MA measured  $1.81 \pm 0.13$  mm.

**Conclusions:** The AOR represents a relatively common intermesenteric anastomosis detectable on routine CT and is frequently located near key surgical structures. In contrast, the MA appears to be a rare anatomical variant. Preoperative CT evaluation of these vessels may improve surgical planning and help reduce the risk of vascular injury and ischemic complications.

**Keywords:** Arc of Riolan, Moskowitz artery, intermesenteric anastomoses, colorectal surgery, IMV ligation

# Development of a novel deep learning algorithm for predicting bone age assessment

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Work's tutor: Asst. Prof. Nattawut Pholasa ,Assoc. Prof. Dr. Watcharaporn Cholamjiak

**Background:** Bone age assessment (BAA) is essential for evaluating skeletal maturity in pediatric healthcare. However, traditional manual methods are time-consuming and prone to significant inter-observer variability, which can lead to inconsistent clinical diagnoses.

**The aim:** This study aims to develop a high-precision automated BAA system for children aged 0–18 years using a multi-architecture ensemble framework integrated with mathematical weight optimization.

**Materials and methods:** A balanced dataset of 3,202 pediatric hand radiographs from Kaggle was utilized, partitioned into training (2,241), validation (480), and testing (481) sets. Five deep learning architectures (DenseNet-121, VGG-16, EfficientNet-B2, ResNet-50, and ResNet-18) were integrated into a unified ensemble. A mathematical algorithm was implemented to dynamically optimize model weights for error minimization, followed by a bias correction step.

**Results:** Results: The final ensemble framework achieved a Mean Absolute Error (MAE) of 9.43 months, an RMSE of 12.65 months, and a coefficient of determination ( $R^2$ ) of 0.939. The system reached a clinical accuracy of 70.41% within a 12-month error threshold, demonstrating superior performance over single-model approaches.

## Conclusions:

Integrating diverse deep learning architectures with mathematical weight optimization provides clinical-grade precision for skeletal maturity evaluation. The framework has been successfully deployed as a web-based application for clinical decision support in pediatric radiology.

## Conclusions:

**Keywords:** skeletal maturity; bone age assessment; ensemble learning; mathematical weight optimization; deep le

# Rethinking Radiation Protection in Cardiology: Early Polish Experience with the RAMPART Defender System

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**Background:** Occupational exposure to ionizing radiation in the cardiac catheterization laboratory remains associated with increased risks of cataracts, malignancies, and significant ergonomic strain related to the prolonged use of heavy protective equipment. Conventional shielding provides incomplete protection and may further contribute to operator fatigue. The RAMPART Defender is a novel mobile radiation shielding system designed to reduce scatter radiation while maintaining full procedural access and potentially alleviating ergonomic burden.

**The aim:** To evaluate the feasibility and preliminary effectiveness of the RAMPART Defender system in routine clinical practice.

**Materials and methods:** This retrospective single-center study included 17 consecutive fluoroscopy-guided cardiovascular procedures performed during the first week after RAMPART Defender implementation. Procedures comprised coronary angiography, pressure-wire assessment, PCI, PFO closure, and TAVI. Radiation exposure was assessed using real-time dosimetry. Procedural data included fluoroscopy time, air kerma, and dose-area product (DAP).

**Results:** Coronary procedures predominated (82%), with PCI in 41% of cases; structural interventions accounted for 18%. Radial access was used in 82%. Median operator radiation exposure was very low (0.20  $\mu$ Sv for the first operator and 0.10  $\mu$ Sv for the second), despite substantial scatter radiation in the field (293.60  $\mu$ Sv). Median air kerma was 126.20 mGy, DAP 11.06 Gy·cm<sup>2</sup>, and fluoroscopy time 6.95 minutes. The system achieved a median radiation reduction of 99.92% and 99.99% for the first and second operators, respectively. Cumulative doses during the first week of shield utilization were 1.08 mSv outside the shield vs. 0.10 mSv and <0.10 mSv for operators.

**Conclusions:** The RAMPART Defender system was feasible in routine practice, was associated with very low levels of radiation therefore provided near-complete radiation protection for catheterization laboratory staff without affecting procedural workflow.

**Keywords:** radiation protection, shielding system, RAMPART Defender, interventional cardiology, ionizing radiat

# Quantitative Evaluation of ACL Signal Intensity on PD Fat-Saturated MRI Across Grades of Degenerative Change

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**Background:** Accurate MRI assessment of ACL degeneration is critical for treatment planning, yet relies on subjective visual grading. The ACL typically appears as a low-signal structure on proton density fat-saturated (PD-FS) MRI, with degenerative changes increasing intraligamentous water content and signal intensity (SI).

**The aim:** This study aimed to quantitatively evaluate differences in PD-FS SI across three grades of ACL degeneration to determine if an objective SI cutoff can serve as a reliable diagnostic indicator.

**Materials and methods:** In this retrospective study, 165 knee MRI examinations were analyzed and categorized into three groups: grade 1 (mild or no degeneration, n=65), grade 2 (moderate, n=74), and grade 3 (severe, n=26). Raw SI was measured at the distal, mid, and proximal thirds of the ligament to calculate an average SI value. Non-parametric Kruskal–Wallis and Dunn's post hoc tests evaluated SI differences across these grades.

**Results:** All quantitative SI metrics differed significantly across grades ( $H \approx 63.2$ ,  $p < 0.001$ ). Grade 1 ACLs demonstrated substantially lower SI compared to grades 2 and 3. However, no significant SI differences were observed between moderate and severe degeneration. An average SI cutoff value of 340 effectively separated the upper quartile of grade 1 ligaments from the lower quartiles of grades 2 and 3.

**Conclusions:** Quantitative ACL SI on PD-FS MRI is highly sensitive to the presence of degenerative changes. While SI experiences a saturation effect and cannot distinguish moderate from severe degeneration, an objective SI cutoff reliably differentiates normal or mildly degenerated ligaments from more advanced pathology. This enhances diagnostic confidence in routine knee MRI.

**Keywords:** anterior cruciate ligament, MRI, mucoid degeneration, proton density fat-saturated

# Changes in CSF and Vitreous Humor Density on CT as Markers of Blood–Brain Barrier Damage in Ischaemic Stroke

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**Background:** Current research explores the compromise of blood–brain barrier (BBB) integrity in ischemic stroke patients. In computed tomography (CT), this process can be visualized as the leakage of iodine-based contrast media into extravascular compartments. CT, functioning as a densitometer, allows for the precise quantification of these density changes.

**The aim:** This pilot study aims to evaluate density changes ( $\Delta$ HU) in the cerebrospinal fluid (CSF) and vitreous humor on follow-up CT scans of stroke patients who underwent contrast-enhanced procedures (CTA, CTP, or mechanical thrombectomy). We hypothesize that a density increase in these compartments serves as a measurable marker of BBB permeability and systemic contrast distribution.

**Materials and methods:** This retrospective cohort study included 88 acute ischemic stroke patients who received intravenous or intra-arterial contrast at baseline and underwent follow-up non-contrast CT (NCCT) within 12–36 hours. Density measurements were performed using standardized Regions of Interest (ROI) at strategic points within the CSF compartments and the vitreous humor. Exclusion criteria included neoplastic changes, hemorrhage on follow-up CT, and prior ocular surgeries that could distort imaging.

**Results:** Preliminary results show a statistically significant increase in both CSF and vitreous humor density was found post-contrast ( $p < 0.05$ ). Women showed a significantly higher increase in CSF density than men, but no gender difference was noted for the vitreous humor. Patient age was weakly correlated with density changes in either compartment.

**Conclusions:** Significant post-contrast HU elevation in the CSF and vitreous humor indicates contrast penetration in stroke patients.  $\Delta$ HU in the CSF may serve as a marker for BBB disruption, while vitreous accumulation suggests systemic distribution or glymphatic/lymphatic drainage. The gender difference in CSF accumulation requires further study. Future research will include a control group for comparison with the healthy population.

**Keywords:** Ischaemic stroke, blood-brain barrier, cerebrospinal fluid, vitreous humor, thrombectomy

# Efficacy of VELscope Autofluorescence in Screening Diagnostics of the Oral Mucosa

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**Background:** Oral cancer is one of the most prevalent head and neck malignancies, and delayed diagnosis significantly worsens prognosis. Conventional white-light examination may fail to detect early premalignant lesions. The VELscope, using tissue autofluorescence, enables visualization of metabolic and structural changes not clinically visible.

**The aim:** This study aimed to evaluate the utility of the VELscope as a screening tool for oral mucosal assessment in young adults and to compare its diagnostic performance with conventional clinical examination.

**Materials and methods:** The study was conducted in February 2025 at the University Dental Center of the Medical University of Silesia in Bytom, including 80 third-year dental students. Participants completed a questionnaire on potential risk factors, covering oral hygiene habits, tobacco use, alcohol consumption, and family history of cancer. Each participant underwent conventional white-light inspection followed by VELscope autofluorescence assessment in a darkened room. Detected abnormalities were photographically documented and recorded in examination charts. Participants with inflammatory lesions received oral hygiene instructions and antiseptic mouthwash, with a 7-day follow-up. No indications for histopathological biopsy were observed.

**Results:** Autofluorescence examination revealed areas of fluorescence loss not visible under white light, indicating the higher sensitivity of the VELscope in detecting early mucosal alterations. Inflammatory lesions resolved after implementation of hygiene recommendations.

**Conclusions:** VELscope autofluorescence imaging is a valuable, rapid, painless, and non-invasive adjunctive tool for oral mucosal screening, visualizing subtle epithelial changes that may be missed during conventional examination. Although it does not replace histopathological evaluation, it may effectively support early detection and clinical decision-making.

**Keywords:** VELscope, autofluorescence, screening, prevention, premalignant lesions

# Clinical and pharmaceutical factors associated with medication-related osteonecrosis of the jaw

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**Background:** Despite its rare status, medication-related osteonecrosis of the jaw (MRONJ) poses a serious problem in dental management of patients undergoing primarily antiresorptive and, secondary, antiangiogenic treatment. MRONJ is characterised by a non-healing jawbone exposure, accompanied by persistent symptoms of inflammation. The necrosis presents a diagnostic and therapeutic difficulty and greatly impacts the quality of life.

**The aim:** Investigation of MRONJ clinical and pharmacological profile in oncological and osteoporotic patients.

**Materials and methods:** The paper consists of a retrospective clinical observation of 47 patients who were diagnosed with MRONJ and were admitted between 1st January 2020 and 1st March 2026 in the Department of Cranio-Maxillofacial Surgery at the Medical University of Silesia in Katowice. The risk factors, clinical symptoms and radiological findings were analysed.

**Results:** The study compares severity and location of MRONJ lesions, depending on local risk factors, such as: tooth extractions, possible odontogenic infections, use of dentures. Patients' exposure to antiresorptive drugs, coupled by the route of administration, possible interactions and cumulative effects of other medications, and general medical conditions were displayed as crucial precipitating factors.

**Conclusions:** Poor oral health, surgical procedures, and trauma from ill-fitting dentures can often be triggers for drug-induced osteonecrosis of the jaw. The findings highlight the necessity of thorough dental examination of patients before and during antiresorptive treatment. Early diagnosis and appropriate therapeutic management increase the chances of limiting complications.

**Keywords:** MRONJ, osteonecrosis, antiresorptive agents, bisphosphonates, drug interactions

# Do Digital Models Really Match Plaster Casts? Clinical Relevance of Tooth-Level and Space Analysis Differences

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**Background:** Background: Accurate mesiodistal tooth width measurements are essential for orthodontic space analysis. The clinical relevance of differences between digital and manual measurements at the level of individual teeth versus cumulative space assessment remains unclear.

**The aim:** To compare the accuracy and repeatability of manual and digital mesiodistal tooth width measurements and to evaluate their impact on quadrant-based Tooth Size–Arch Length Discrepancy (TSALD).

**Materials and methods:** Plaster models from 30 orthodontic patients (480 teeth) were analyzed. Mesiodistal widths from the canine to the first molar were measured using digital calipers and a 3Shape Trios4 intraoral scanner. Measurements were repeated, and TSALD was calculated separately for each quadrant. Intra-observer reliability was assessed using intraclass correlation coefficients (ICC).

**Results:** Measurement repeatability was excellent (ICC = 0.94 intra-observer; ICC = 0.88 between methods). Digital measurements showed a systematic tendency to underestimate mesiodistal tooth widths (mean underestimation 0.15–0.20 mm; skewness = -0.92). Clinically significant differences at the single-tooth level occurred in 44.2% of cases, predominantly in posterior teeth, whereas TSALD differences exceeding 2.0 mm were rare (4%).

**Conclusions:** Although individual tooth measurements—especially in posterior regions—frequently exceed clinical significance thresholds, these discrepancies rarely affect quadrant-based TSALD. Digital and plaster models may therefore be used interchangeably for space analysis, while caution is advised for procedures requiring high single-tooth precision.

**Keywords:** Digital models, Intraoral scanner, Orthodontic diagnosis, Tooth measurement, Space analysis

# Efficacy of Er:YAG laser on selected *Candida* strains and *Staphylococcus Aureus* MRSA

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**Background:** The MDR *Candida* species pose a significant problem in the treatment of opportunistic infections. Fungi of the *Candida* and *S. aureus* bacteria are the primary cause of denture stomatitis and peri-implantitis. This compels dentists to seek new solutions in treatment of fungal and bacterial infections. One possible solution is the use of Er:YAG lasers, which are becoming increasingly common in dentistry

**The aim:** The aim of the study was to determine the optimal Er:YAG laser parameters, which will inhibit the growth of various *Candida* species and *S. aureus* and to evaluate the efficacy of the Er:YAG laser in the removal of mature biofilm layers.

**Materials and methods:** The study used *C. albicans*, *C. dubliniensis*, *C. krusei* and *S. aureus* MRSA, organized into single-species biofilms onto suitable medium. In phase I the cultures of *Candida* yeast and *S. aureus* were plated - three plates for each strain. Er:YAG laser radiation was applied in a single-pulse mode at power levels ranging from 30 to 400 mJ at 32 pre-determined points with the laser in a fixed position over the given plates. Growth inhibition zones (GIZ) were measured using ImageJ software after 24 and 96 hours of incubation. In phase II, the biofilms were prepared in a similar manner and were irradiated by the Er:YAG laser with 4 distinct energies with 10Hz frequency for 180 seconds, in three distinct, 60 second intervals, over an area of 1.44 cm<sup>2</sup>. The percentage cover was measured after exposure.

**Results:** In phase I, the GIZs were observed in all irradiated petri dishes. A significant increase in the GIZ was observed with increase in energy used. Beyond the 300 mJ, the increase in GIZ was no longer proportional to the energy increase. In phase II, the 150 mJ setting showed the highest efficacy across all studied species, with significantly reduced CFU counts in comparison with the control group

**Conclusions:** The Er:YAG laser exhibits highly effective fungicidal activity both against *Candida* species and *S. aureus* MRSA, being an innovative tool for biofilm disinfection.

**Keywords:** Er:YAG laser, *Candida*, MDR, mature biofilm, MRSA

# Association Between Tongue Mobility and Temporomandibular Disorder (TMD) Symptoms in a Population-Based Observation

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**Background:** Temporomandibular disorders (TMD) are diseases with a complex, multifactorial etiology. Their pathogenesis involves structural, anatomical, functional and psychosocial factors including parafunctions. This indicates that tongue mobility, the ability to properly elevate and stabilize it may influence the functioning of masticatory muscles, the position of the mandible and functions such as speech, which may also have a potential impact on the interpretation of symptoms in patients with TMD.

**The aim:** The aim of the study was to assess correlations between tongue mobility and the occurrence of symptoms of temporomandibular disorders (TMD).

**Materials and methods:** The study included 100 dental students. The inclusion criterion was the absence of diagnosed serious systemic diseases that could affect the functioning of the stomatognathic system. The survey portion of the study involved completing questionnaires related to TMD. The maximum mouth opening (MIO), mouth opening with the tongue touching the incisive papilla (MIO-TIP) and with the tongue sucked to the palate (MIO-LPS) were measured. On this basis the TRMR-TIP and TRMR-LPS indicators were calculated which are used to assess the tongue mobility. The morphological width of the maxilla was also measured according to McNamara's concept. Analysis was performed using Excel.

**Results:** The mean TRMR-TIP score was 68% (SD 14%), while the TRMR-LPS score was 52% (SD 11%). 68% of the participants reported pain symptoms in the temporomandibular joint at some point of their lives. The mean level of discomfort during speech was 1,41 points (SD 1,13). The mean maxillary width was 35,56 mm (SD 3,40).

**Conclusions:** In the study group of students, the frequency of reported pain symptoms associated with TMD is high, the mean level of discomfort during speech is low. Mild to moderate tongue mobility limitations, as assessed by the TRMR-TIP and TRMR-LPS scores, dominated in the study group. Further statistical analysis is necessary.

**Keywords:** Temporomandibular disorders, TMD, tongue mobility, TRMR, speech discomfort, maxillary width

# Knowledge of MIH Among Dentistry Students at Silesian Medical University

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**Background:** Molar Incisor Hypomineralisation (MIH) is a serious diagnostic and therapeutic challenge in dental practice, therefore proper preparation of future dentists in this field has great clinical significance.

**The aim:** The aim of the study was to assess the knowledge of dentistry students about MIH, their diagnostic and therapeutic preparation and educational needs.

**Materials and methods:** An anonymous survey study was conducted online using original questionnaire among students of Silesian Medical University in Katowice. 61 properly filled questionnaires were included in the analysis. Self - assessment of knowledge, objective level of knowledge, knowledge of factors contributing to MIH, diagnostic criteria, differential diagnosis and principals of treatment were assessed.

**Results:** The average objective level of knowledge was 44,26% while the average self-assessment was 4/10. The highest results were obtained in knowledge of factors contributing to MIH (54,54%), lower scores in the field of diagnosis and differential diagnosis (33,49%) and the lowest in the field of treatment and selection of materials (31,15%). With each subsequent year of study, an increase in knowledge was observed, particularly during the clinical years. Most respondents declared a need to expand the didactic content regarding MIH.

**Conclusions:** The level of preparation among students regarding MIH is insufficient, particularly in the areas of treatment and material selection. The results indicate the need to expand curricula to include content on MIH diagnosis and treatment. The obtained results provide a starting point for further research with a broader, nationwide scale.

**Keywords:** molar incisor hypomineralisation, MIH, dentistry students, knowledge, diagnosis

# The impact of toluidine blue-mediated photodynamic antimicrobial therapy on halitosis: preliminary study

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**Background:** Halitosis is a condition primarily linked to volatile sulfur compounds (VSCs) generated by anaerobic bacteria in the oral cavity. Antimicrobial photodynamic therapy (aPDT) has shown short-term benefits in reducing halitosis. However, relapse is common, likely due to bacterial recolonization of the tongue surface from periodontal sulcus. So far, the combined effect of TBO-mediated aPDT with a 635 nm diode laser and simultaneous periodontal treatment has not been investigated in a longitudinal follow-up.

**The aim:** This randomized clinical trial evaluated the effectiveness of TBO-mediated aPDT used alongside periodontal treatment in reducing halitosis in healthy adults over a 3-month period.

**Materials and methods:** Forty-eight participants with halitosis ( $H_2S > 112$  ppb) were randomly assigned to two groups ( $n = 24$  each). The test group received aPDT, while the control group performed mechanical tongue cleaning with a scraper. VSC levels were measured using gas chromatography. All participants underwent periodontal therapy at baseline. Measurements were taken at baseline, immediately after treatment, and after 7, 14, and 90 days.

**Results:** Both groups showed a significant immediate reduction in VSC levels. However, no additional long-term improvements were observed, and values at follow-up did not differ significantly from baseline.

**Conclusions:** TBO-mediated aPDT provided only a temporary reduction in halitosis.

**Keywords:** Halitosis, Antimicrobial photodynamic therapy, Toluidine blue, Volatile sulfur compounds

# Effectiveness of Large Language Models in Solving the Polish Final Dental Examination: A Comparative Analysis

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**Background:** The dynamic development of large language models in AI has generated increasing interest in their potential applications in medical education. The Polish Final Dental Examination (LDEK), as a standardized exam covering a wide range of clinical and normative domains, represents a valuable framework for evaluating AI in highly specialized professional examinations.

**The aim:** The aim of the study was to evaluate the effectiveness of selected AI models in solving LDEK examination questions and to compare their performance in terms of overall results, domain-specific outcomes, and the relationship between declared confidence and answer correctness.

**Materials and methods:** A total of 199 single-choice questions from the autumn 2025 LDEK session were analyzed. Four AI models were evaluated: ChatGPT 5.4, Gemini 3.1 Pro, Grok 4.20 Expert, and Perplexity Sonar. For each model, the number and percentage of correct answers were determined, along with the level of declared confidence. All models were tested under standardized conditions using identical prompts. Statistical analysis was performed using Statistica.

**Results:** All models exceeded the passing threshold of the examination. The highest accuracy was achieved by Gemini 3.1 Pro (89.45%), followed by ChatGPT 5.4 (87.94%), Grok 4.20 Expert (70.35%), and Perplexity Sonar (64.32%). In most cases, the differences between models were statistically significant. The best performance was observed in normative domains (public health, medical law), whereas the greatest difficulties occurred in clinical areas, particularly in prosthodontics. Confidence in relation to correctness was also analyzed.

**Conclusions:** AI models demonstrate high effectiveness in solving LDEK examination questions, achieving the passing threshold; however, their performance differs significantly between models and across domains. These findings suggest potential applications of AI in medical education, although further research is needed on clinical interpretation and responsible use.

**Keywords:** artificial intelligence, large language models, LDEK, dental education

# Impact of gender and radiological features on predicted third molar extraction difficulty

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**Background:** The surgical removal of third molars is one of the most commonly performed procedures in oral surgery. A pre-operative assessment of the procedure's difficulty is crucial to its successful outcome and to minimising the risk of complications.

**The aim:** The aim of this study was to conduct a retrospective assessment of the degree of difficulty involved in the surgical removal of third molars, based on a radiological classification using panoramic radiographs.

**Materials and methods:** A retrospective analysis was conducted of panoramic radiographs of patients referred to the Outpatient Maxillofacial Surgery Clinic in Katowice for the removal of third molars. The study included 75 teeth belonging to 23 patients. The position of the teeth was assessed based on the type of tooth retention according to Winter, the depth of bone embedment and the availability of retromolar space for the mandibular arch according to Pell and Gregory, and the position relative to the maxillary sinus for the maxillary arch according to Archer. Indications for surgery were indicated using the Gans index. The predicted difficulty of the procedure was classified using a scoring scale (3–10 points). A statistical analysis of the relationship between gender and the specified parameters was carried out using RStudio.

**Results:** The analysis revealed a statistically significant correlation between gender and the depth of tooth embedment in the bone ( $p = 0.011$ ;  $V = 0.35$ ). Type B embedment was most common in women (50%), whilst type C was most common in men (33.33%). The predicted difficulty of extraction was significantly higher in the male group ( $p = 0.0078$ ), with a mean score of 6.31 compared to 5.47 in women.

**Conclusions:** A pre-operative radiological assessment allows the degree of difficulty in extracting third molars to be predicted. The analysis confirmed that gender is a significant factor determining the difficulty of the procedure, and that male patients are associated with a statistically higher predicted difficulty in the removal of third molars.

**Keywords:** Third molar, Tooth extraction, Panoramic radiography, Difficulty scale, Gender factors, Oral surgery

# Dietary Habits and Parental Awareness as Risk Factors for Early Childhood Caries in Children Under 3 Years

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**Background:** Early childhood is a critical period for the development of dietary habits that may influence the risk of primary tooth caries. Caregivers' feeding practices and knowledge play an important role in shaping these behaviors.

**The aim:** The aim of this study was to assess dietary habits in children up to 3 years of age and evaluate parental awareness in the context of early childhood caries prevention.

**Materials and methods:** The study included 470 parents or legal guardians of children aged up to 3 years. Data were collected using an anonymous, self-designed questionnaire distributed across 25 locations. The survey included questions on feeding practices, frequency of sweets consumption, and sources of nutritional knowledge.

**Results:** Breastfeeding was reported by 81.9% of respondents and was often continued at night, with 40% of children breastfed beyond 12 months. Among children who had ever received formula, 77.5% were fed formula beyond 12 months, with a mean duration of 20.23 months (SD 5.59; range 13–38). While 38.3% of children consumed sweets rarely, 28.7% did so several times per week. The internet was the most common source of parental knowledge (71.3%), followed by family (50.6%) and healthcare professionals (56.4% combined), although dentists alone were indicated by only 8.5% of respondents.

**Conclusions:** The findings highlight several common and modifiable risk factors for early childhood caries, particularly prolonged nighttime feeding and frequent sugar consumption. Despite the overall contribution of healthcare professionals, the limited role of dental practitioners in parental education remains notable and points to a gap in preventive care. These results suggest a need for earlier and more active involvement of dentists in guiding caregivers, especially in everyday feeding practices that may affect oral health.

**Keywords:** Early childhood caries, caries risk factor, feeding practice, sugar consumption, parental awareness

# Dentists' attitudes toward imaging diagnostics in TMD cases

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**Background:** Temporomandibular disorders (TMD) represent a significant challenge in modern dentistry. Performing imaging studies prior to clinical evaluation can lead to overdiagnosis and overtreatment. This tendency stems from a historical biomechanical model focused predominantly on joint position and occlusion. Reversing the proper diagnostic algorithm increases the risk of clinical errors and unnecessary radiation exposure.

**The aim:** The study aimed to evaluate dentists' knowledge and beliefs regarding TMD, focusing on their attitudes toward the routine use of imaging examinations in the diagnostic process.

**Materials and methods:** An anonymous electronic survey was conducted among dentists with varying years of professional experience and specialties in Poland. The study sample consisted of 294 respondents. The questionnaire was divided into 3 sections: 1-demographic and background information, 2-personal experience with TMD, 3-knowledge about TMD. The survey was published on social media groups for dentists, employees of Medical University of Silesia and Silesian clinics. Descriptive statistical analysis was performed.

**Results:** Among 294 participants, 45.6% (134) supported routine imaging before the first check-up, 41.8% (123) disagreed with such practice, and 12.6% (37) were uncertain. Dental surgeons (73%) and orthodontists (56%) favored routine imaging most, while periodontists were the most skeptical (20%). A significant correlation was found between the mechanical model and imaging preference (69% "Yes"), whereas clinicians favoring a biopsychosocial perspective were less likely to support routine imaging (38%).

**Conclusions:** Dentists' attitudes toward imaging in TMD vary considerably. A significant association was found between clinicians' understanding of TMD and their approach to imaging, with a more selective use observed among those recognizing biopsychosocial factors. These findings suggest potential overuse and the need for more consistent diagnostic practices.

**Keywords:** Temporomandibular disorders, diagnosis imaging, overdiagnosis

# Assessment of Public Awareness Regarding Melatonin, Sleep, and Immunity

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**Background:** Sleep and circadian rhythms play an essential role in maintaining physiological homeostasis and proper immune system function. Melatonin, a hormone produced mainly by the pineal gland, regulates the sleep–wake cycle and circadian rhythm and exhibits antioxidant, anti-inflammatory, and immunomodulatory properties. Despite increasing scientific evidence linking sleep and immunity, public awareness of these mechanisms and sleep hygiene practices remains limited.

**The aim:** The aim of this study was to assess the level of public knowledge regarding melatonin, sleep, and their role in immune system functioning, as well as selected sleep hygiene behaviors.

**Materials and methods:** A cross-sectional survey was conducted among 311 respondents using an original anonymous questionnaire consisting of 36 closed-ended questions distributed online via Microsoft Forms. The questionnaire assessed demographic data, knowledge about melatonin and circadian rhythm, sleep habits, and awareness of the relationship between sleep and immunity. Data were analyzed using descriptive statistics.

**Results:** Most participants demonstrated general awareness of the relationship between sleep and immune function. Sleep deprivation was recognized as detrimental to immunity by 84.6% of respondents, and 72% correctly identified melatonin as a regulator of circadian rhythm. However, only 42.8% correctly indicated the pineal gland as its main site of production, and 65.6% were unaware of its anti-inflammatory and antioxidant properties. Despite declared knowledge of sleep hygiene, many respondents reported frequent use of electronic devices before bedtime and insufficient sleep.

**Conclusions:** Although general awareness of the role of sleep in immune health is relatively high, significant gaps remain in detailed knowledge about melatonin. The discrepancy between declared knowledge and everyday sleep behaviors indicates a need for further educational interventions.

**Keywords:** melatonin, sleep hygiene, circadian rhythm, immunity, public awareness, sleep behavior

# Implications of the Blue Zones Lifestyle Concept for Individual Self-Esteem

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**Background:** The concept of Blue Zones describes regions whose inhabitants achieve exceptional longevity and maintain good physical and mental health. Common features include plant-based diets, regular moderate activity, strong social ties, life purpose, and effective stress management, which may also influence self-esteem.

**The aim:** This study examined the relationship between a Blue Zones-inspired lifestyle and self-esteem in the Polish population. It was hypothesized that stronger alignment with Blue Zones principles and healthy dietary habits would correspond with higher self-esteem and better well-being.

**Materials and methods:** The research, conducted via CAWI between August 2024 and June 2025, included 377 participants aged 15–91 years (68.4% women). A proprietary questionnaire collected sociodemographic and lifestyle data. The Rosenberg Self-Esteem Scale (SES) and a 16-point measure of Blue Zones lifestyle alignment were used.

**Results:** The results revealed that moderate alignment with the Blue Zones-inspired lifestyle predominated in the sample. A statistically significant association was observed between lifestyle alignment and self-esteem, indicating that stronger adherence to Blue Zones principles corresponded with higher self-esteem scores. Among the examined lifestyle domains, the most influential psychosocial correlates of self-esteem included life purpose, social support, appreciation, and adequate rest. Participants engaging in regular, moderate daily physical activity also reported higher self-esteem compared with less active respondents. As lower scale values usually represented greater intensity of the measured trait, negative correlations demonstrated that individuals with higher self-esteem more frequently declared having a clear sense of purpose.

**Conclusions:** Blue Zones-inspired lifestyles moderately support self-esteem, driven primarily by psychosocial elements and regular activity rather than diet. Findings advocate low-cost public health interventions promoting holistic well-being in urban settings.

**Keywords:** Blue Zones, lifestyle, diet, physical activity, self-esteem, mental health

# What works and what does not? Benefits and challenges of coordinated care in primary health care

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**Background:** Coordinated care was introduced into primary health care (PHC) in Poland on October 1, 2022. Participation remains voluntary for primary care providers. The model aims to improve patient satisfaction, population health and reduce healthcare system costs. It facilitates faster access to diagnostics and specialist consultations within five pathways: diabetology, endocrinology, cardiology, pulmonology/allergology, and nephrology. Patients also receive an Individual Medical Care Plan (IMCP) along with educational and dietary consultations. However, evidence on health care providers' experiences involved in this model, remains limited.

**The aim:** To explore perceived benefits, challenges, and practical implications of implementing the coordinated care model in PHC based on single-provider case study in Kraków, Poland, as a pilot for further research.

**Materials and methods:** A qualitative approach was applied. Four semi-structured in-depth individual interviews (IDIs) were conducted with personnel involved. Interviews were audio-recorded, transcribed, anonymized, and analyzed using thematic analysis in ATLAS.ti.

**Results:** The study revealed a multidimensional impact of coordinated care implementation in PHC. Reported benefits included improved patient access to specialist services, greater comprehensiveness and continuity of care, enhanced diagnostics and treatment capacity in PHC, increased patient and staff satisfaction and financial gains for the provider. Challenges included billing and budgeting complexities, organizational and legal constraints, and additional costs related to health service provision.

**Conclusions:** The qualitative study indicates that coordinated care in primary health care can substantially improve access, continuity, and quality of care. However, successful implementation requires addressing financial, organizational, and regulatory barriers. The findings provide practical insights into real-world implementation and will support the design of larger, multi-site study on coordinated care in PHC.

**Keywords:** coordinated care, primary health care, care coordination, family medicine practice

# The Impact of FoMO on Mental Health and Quality of Life: Comparison of Medical Students in Poland and Spain

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**Background:** Fear of Missing Out (FoMO) is the apprehension that others may be experiencing rewarding events without one's participation, often leading to excessive social media use. It is associated with irritability, loneliness, low self-esteem, and smartphone addiction. Medical students may be particularly vulnerable due to limited free time and high academic demands. Cultural differences between Poland and Spain may affect FoMO.

**The aim:** The study aimed to investigate FoMO and its associations with mental health, quality of life (QoL) and smartphone use among medical students, with a particular focus on cross-country differences between Poland and Spain.

**Materials and methods:** The study involved 225 medical students from Poland (n=126) and Spain (n=99). Data were collected via a 29-item online, self-developed questionnaire. Composite scores were calculated. Statistical analysis (Statistica 13, StatSoft) included descriptive statistics and ANOVA. The study was approved by the Bioethics Committees in Poland and Spain (approval numbers: BNW/NWN/0052/KB/89, 22-2025-H).

**Results:** Polish students showed higher FoMO levels ( $p = 0,027$ ), with mean scores of  $M = 11,2$  ( $SD = 4,34$ ) compared to  $M = 9,8$  ( $SD = 4,68$ ) in Spanish students. Higher FoMO was associated with problematic smartphone use and a greater negative impact of social media ( $p < 0,05$ ). It was linked to poorer concentration, reduced study time, and increased peer pressure. Polish students reported lower self-esteem and QoL, suggesting potential cultural influences.

**Conclusions:** FoMO is linked to poorer mental well-being, lower QoL, and problematic smartphone use among medical students. Higher FoMO was associated with reduced concentration, increased peer pressure, and lower self-esteem, affecting both psychological functioning and academic performance. Cross-country differences may suggest cultural influences. These findings highlight the need for interventions focusing on digital hygiene and mental health.

**Keywords:** FoMO, Mental Health, Quality of Life, Medical Students, Poland, Spain

# Prevalence of Mental and Neurodevelopmental Disorders in Pediatrics in Gliwice: A Cross-Sectional Study

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**Background:** An increasing number of patients in the pediatric population have been diagnosed with psychiatric and neurodevelopmental disorders. These conditions affect child's cognitive and motor functions, communication and daily functioning.

**The aim:** The aim of the study was to assess the prevalence of mental and neurodevelopmental disorders in the pediatric population of Gliwice.

**Materials and methods:** An epidemiological cross-sectional study of children and adolescents in Gliwice was conducted using a questionnaire completed by parents and distributed through schools. Analyses were performed in subgroups of younger children aged 5–11 years and older children aged 12–17 years, with stratification by sex.

**Results:** A total of 1,706 participants aged 5–17 years took part in the study (mean age  $11.5 \pm 2.7$  years), including 865 boys (50.7%) and 841 girls (49.3%). Physician-diagnosed depression or dysthymia was reported in 2.4% of respondents (age  $p=0.001$ , sex  $p<0.001$ ); anxiety disorders in 3.0% (age  $p<0.001$ , sex NS); obsessive-compulsive disorder in 1.9% (age  $p=0.01$ , sex NS); ADHD in 6.3% (age NS, sex  $p<0.001$ ); autism spectrum disorders in 8.4% (age NS, sex  $p<0.001$ ); anorexia or bulimia in 0.8% (age  $p<0.001$ , sex NS); learning difficulties in 16.2% (age  $p<0.001$ , sex NS); dysgraphia, dyscalculia, or dyslexia in 11.3% (age  $p<0.001$ , sex  $p<0.001$ ); and sensory integration disorders in 16.3% (age  $p=0.05$ , sex  $p<0.001$ ).

**Conclusions:** Mental and neurodevelopmental disorders are relatively common in the pediatric population of Gliwice, with notable differences depending on age and sex. The high prevalence of learning difficulties and sensory integration disorders highlights the need for early identification and targeted interventions. These findings underline the importance of systematic screening and the development of accessible mental health support services for children and adolescents.

**Keywords:** mental disorders, neurodevelopment conditions, Pediatrics, prevalence

# Determinants of Short Sleep Duration in the Post-Pandemic U.S. Population: A Cross-Sectional NHANES Analysis

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**Background:** The COVID-19 pandemic significantly altered health behaviors, worsening sleep disturbances worldwide and increasing alcohol consumption among predisposed individuals, contributing to poorer mental health and lifestyle patterns.

**The aim:** This study analyzed factors influencing sleep duration in the post-pandemic U.S. (2021–2023), focusing on alcohol consumption.

**Materials and methods:** A cross-sectional analysis of NHANES data was performed. Sleep duration was dichotomized into shorter and longer sleep categories.

**Results:** The study included 4,403 participants (54.3% women) aged 18–80 years. Sleep disturbances were reported by 50% of participants. Individuals reporting frequent alcohol consumption were more likely to report sleep problems (73.8%;  $p=0.01$ ). In the group reporting <6 hours of sleep ( $n=374$ ), daily alcohol consumption was declared by 9%, occasional consumption by 32%, and abstinence by 21%. In the  $\geq 6$ -hour group ( $n=4034$ ), these proportions were 9.6%, 40% and 16% respectively. Smoking was significantly more prevalent ( $p=0.003$ ) in the shorter sleep group (53%), whereas non-smokers predominated in the longer sleep group (59%). Mean BMI was higher ( $p<0.001$ ) among short sleepers (31.1 kg/m<sup>3</sup>) compared to those sleeping  $\geq 6$  hours (29.5 kg/m<sup>3</sup>). Daily depressive mood was reported by 8% of individuals sleeping <6 hours versus 3.15% in the longer sleep group ( $p<0.001$ ). Multivariable logistic regression identified higher BMI (OR=0.98; 95% CI:0.96–0.99), smoking (OR=0.69; 95% CI:0.56–0.86), and depressive symptoms (OR=0.34; 95% CI:0.22–0.52) as significant predictors of shorter sleep duration. Gender, age, and hypertension were not significantly associated.

**Conclusions:** Shorter sleep duration was associated with higher BMI, smoking, and depressive symptoms. Although alcohol consumption was significantly associated with sleep disturbances, it was not linked to shorter sleep duration. The findings are limited by population heterogeneity and reliance on self-reported data.

**Keywords:** sleep duration, alcohol, post-COVID, insomnia, depression

# The potential role of companion animals in introducing ticks into the home environment

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**Background:** Ticks are vectors of numerous pathogens of significant public health importance. Their spread in the environment is facilitated by hosts such as birds and wild animals. The role of companion animals in this process remains underestimated. Commonly used veterinary repellents reduce tick attachment to animals, but they do not fully prevent ticks from being brought into human habitats or directly to humans during direct contact with the animal.

**The aim:** To evaluate the potential role of companion animals in introducing ticks and selected tick-borne pathogens into the domestic environment.

**Materials and methods:** Ticks were collected from companion animals (12 dogs, 14 cats, and 2 horses), and determined to species and developmental stages. DNA from single ticks was isolated by the ammonia method. Pathogens in ticks were detected by PCR methods. To detect *Borrelia burgdorferi sensu lato*, *Anaplasma phagocytophilum*, *Babesia* spp., and *Toxoplasma gondii*, primers specific to the flagene, 16S rRNA gene, 18S rRNA gene, and B1 gene were used, respectively.

**Results:** A total of 118 ticks were collected, including 117 *I. ricinus* and 1 *D. reticulatus*. Pathogen DNA was detected in 18 ticks, yielding a total of 19 pathogen detections, including 14 collected from dogs, 3 from cats, and 1 from a horse. Mono-infections with *Borrelia burgdorferi sensu lato*, *Anaplasma phagocytophilum*, and *Babesia* spp., were found in 7, 6, and 4 of the studied ticks, respectively. Additionally, co-infection *B. burgdorferi* s.l. and *Babesia* spp. was identified in a single tick collected from a cat. *Toxoplasma gondii* was not detected in the studied material.

**Conclusions:** These findings confirm that companion animals can play a significant role in the spread of ticks and tick-borne pathogens in the environment. Importantly, infected ticks can be carried into households on pets, which may represent an alternative and underappreciated route for these parasites to infect humans.

**Keywords:** tick-borne diseases, companion animals, *Borrelia burgdorferi*, *Anaplasma phagocytophilum*, *Babesia* spp

# Opinions of Anatomy Lecturers Worldwide on Body Donation for Scientific and Educational Purposes

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**Background:** The human body constitutes an essential component in teaching anatomy to medical students. A shortage of bodies donated for scientific and educational purposes is observed in relation to the demand. In developed countries, cadavers are obtained primarily through individual donations.

**The aim:** The aim of the study was to explore the opinions of anatomists worldwide on teaching anatomy using human bodies and on body donation programs. The study also examined the views of anatomy lecturers on modern teaching techniques in this field.

**Materials and methods:** The study was conducted using an anonymous questionnaire. It consisted of 18 questions and a demographic section, and also included an option for open-ended responses. The questionnaire was distributed to lecturers from 42 countries worldwide.

**Results:** A total of 133 anatomy lecturers participated in the study. Among them, 97% believe that the human body is the foundation of anatomy teaching at medical universities. Less than half of the respondents consider donating their own body (16.5% definitely yes, 27.8% rather yes). The most frequently reported concern regarding donation is a lack of respect for cadavers on the part of students (23.3%). Almost half of the respondents reported incidents of disrespect toward cadavers (6.8% definitely yes, 39.8% rather yes). The majority of respondents believe that modern teaching techniques will not replace the human body (85%).

**Conclusions:** The results confirm the dominant role of human cadavers in anatomy teaching at medical universities. A thorough understanding of opinions on body donation programs and the concerns associated with them may, in the future, contribute to increasing their popularity and societal acceptance.

**Keywords:** anatomy, donation, medical education, cadaver

# Analysis of the number of cases, incidence and hospitalisations due to whooping cough for the period 2010-2025

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**Background:** Whooping cough is a respiratory infection caused by *Bordetella pertussis*. It affects all age groups and is particularly dangerous for infants.

**The aim:** The aim of this study was to analyse long-term trends in the number of cases, incidence and hospitalisations due to whooping cough at the level of a selected county (Piła County), the Wielkopolska province and nationwide in Poland over the period 2010–2025, with particular focus on temporal changes and the impact of the COVID-19 pandemic.

**Materials and methods:** Data from 2010–2025 were analysed to compare the period before, during and after the COVID-19 pandemic. Data for Piła County were obtained from local sanitary reports, and national and regional data from epidemiological reports of the National Institute of Public Health.

**Results:** The highest number of cases was recorded in Piła County (79) in 2012 and in the Wielkopolska Province (2634) and nationwide (32656) in 2024. The lowest values were observed between 2019 and 2023, during the COVID-19 pandemic. After 2023, a marked increase was observed in all analysed parameters.

**Conclusions:** Incomplete vaccination coverage and declining vaccine acceptance may have contributed to the observed increase in cases; however, a causal relationship cannot be definitively established. The low incidence in 2020–2022 may have been associated with pandemic-related restrictions. The substantial rise in 2024 (over 30-fold vs 2023) suggests an epidemic situation in epidemiological terms, although no formal state of epidemic was declared in Poland.

**Keywords:** pertussis, incidence, epidemiology, COVID-19, trends, vaccination

# Potential risk of human exposure to ticks and tick-borne pathogens in urban areas of Kielce

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**Background:** Ticks are dangerous external parasites that act as reservoirs and/or vectors for *Borrelia burgdorferi sensu lato*, *Anaplasma phagocytophilum*, and *Babesia* spp., the etiological agents of Lyme borreliosis, anaplasmosis, and babesiosis. The main vector of these pathogens in Poland is *Ixodes ricinus*. This parasite prefers deciduous and mixed forests, but it can also occur in parks, squares, and gardens, posing a potential threat to human health.

**The aim:** The aim of this study was to assess the potential risk of human exposure to ticks and selected tick-borne pathogens in the urbanized areas of the city of Kielce.

**Materials and methods:** Ticks were collected in 2025 in the spring peak of their activity by flagging from two selected urbanized areas in the city of Kielce. One of them was located in a residential area, and the second one was near the Stadium. The collected ticks were determined to the species and developmental stages. Pathogens in ticks were detected by single PCR and nested PCR. For the detection of *B. burgdorferi* s.l., *A. phagocytophilum*, and *Babesia* spp., primers specific to the *fla* gene, 16S rRNA gene, and 18S rRNA gene were used, respectively. The amplification products were separated electrophoretically in 2% ethidium bromide-stained agarose gels and visualized under ultraviolet light.

**Results:** In total, 105 *I. ricinus* ticks were collected from the studied areas, including 26 females, 36 males, and 43 nymphs. The molecular study showed the presence of *A. phagocytophilum* only in a single *I. ricinus* female collected from the area of the housing estate. The remaining two studied pathogens were not detected in the collected ticks.

**Conclusions:** The conducted studies showed the potential high risk of human exposure to ticks in both studied urbanized areas of Kielce. Moreover, the molecular studies showed a low potential risk of human exposure to tick-borne infection with *A. phagocytophilum* in a residential area.

**Keywords:** Ticks, urbanized areas, risk of exposure, *Anaplasma phagocytophilum*, tick-borne diseases

# Selected lifestyle factors and time to pregnancy – a cohort study based on data from the iYoni menstrual cycle tracking application.

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**Background:** Female fertility depends on multiple factors, including modifiable lifestyle components. In recent years, there has been growing interest in the use of mobile applications for monitoring reproductive health, enabling the analysis of large populations in real-world settings.

**The aim:** The aim of this study was to assess the association between selected lifestyle factors—such as stress levels, sleep duration, physical activity, diet, smoking, and alcohol consumption—and time to pregnancy (TTP) in a large cohort of users of a menstrual cycle tracking application.

**Materials and methods:** The analysis included data from 23,049 women using the iYoni application who reported trying to conceive and regularly recorded information on their menstrual cycles and selected lifestyle factors.

**Results:** The mean time to pregnancy was 10.03 months ( $\pm 18.4$ ). In univariate analysis, the examined lifestyle factors showed statistically significant associations with TTP ( $p < 0.05$ ). The relationship between sleep duration and TTP was non-linear—the shortest time was observed with 7–8 hours of sleep (9.61 months), whereas both shorter ( $< 5$  hours: 11.09 months) and longer sleep duration (10–12 hours: 14.02 months) were associated with prolonged TTP. Smoking was associated with longer time to pregnancy (11.25 vs 9.43 months).

**Conclusions:** The findings indicate a potential significance of modifiable lifestyle factors in female fertility. These results may provide a basis for further research as well as for health education and preventive strategies. The use of mobile application data enables the analysis of health-related associations in large populations under real-world conditions and represents a valuable complement to traditional epidemiological studies.

**Keywords:** TTP, menstrual cycle, cycle tracking application, lifestyle factors on pregnancy, pregnancy efforts

# Physical activity as a catalyst for holistic care of the musculoskeletal system and injury prevention.

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**Background:** Engaging in physical activity frequently stimulates additional preventive measures that support the musculoskeletal system and overall body recovery. This approach relieves the healthcare system by reducing the number of injuries and treatment costs.

**The aim:** To evaluate the relationship between regular exercise and additional body care, with a specific focus on the use of biological regeneration treatments.

**Materials and methods:** An analysis of survey data verifying the type and frequency of physical activity and the propensity to utilize biological regeneration.

**Results:** The analysis revealed that physically active individuals are more likely to opt for recovery. Among those regularly practicing sports, especially 3 to 5 times a week, as well as daily, 41.6% utilize biological regeneration treatments. In the physically inactive group, this proportion was lower at 37.5%. The highest level of care for injury prevention and recovery was observed in individuals combining various sports disciplines.

**Conclusions:** Physical activity serves as a significant catalyst for health-promoting behaviors. Regular exercise encourages the more frequent adoption of biological regeneration, which constitutes a key element of injury prevention and holistic care of the musculoskeletal system.

**Keywords:** physical activity, biological regeneration, public health, musculoskeletal system, recover

# Assessment of Knowledge, Skills, and Readiness to Provide First Aid Before the Arrival of Emergency Services

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**Background:** Rapid and correct provision of first aid before the arrival of emergency services is crucial for the survival of injured individuals. Despite the availability of training, the level of public readiness to undertake rescue actions remains insufficient, and bystander intervention is still too infrequent.

**The aim:** The aim of the study was to assess respondents' opinions on the need for learning first aid principles and to analyze the level of knowledge, skills, and readiness to undertake emergency actions.

**Materials and methods:** The study was conducted using a diagnostic survey method with an original online questionnaire. Data analysis was descriptive in nature. Participants included individuals with a diverse demographic profile, with a predominance of those related to the medical field.

**Results:** Most respondents declared a high level of knowledge and skills in first aid; however, their confidence in life-threatening situations was moderate. The most frequently reported barrier was fear of making a mistake. Practical training was assessed as more effective than theoretical instruction. Respondents emphasized the need for regular updating of knowledge and the widespread availability of training, supporting its mandatory implementation.

**Conclusions:** Despite the high level of self-reported knowledge, there is a need to strengthen practical competencies and confidence in emergency situations. The results highlight the importance of regular practical training and broad public education. Further studies using larger samples and statistical analyses are required.

**Keywords:** first aid, bystander, prehospital care, medical education, emergency situations

# The phenomenon of Fear of Missing Out and its impact on selected aspects of adolescent health

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**Background:** Fear of Missing Out (FoMO) is increasingly recognized as a psychosocial phenomenon linked to excessive social media use and mental health problems in young people.

**The aim:** To assess the relationship between FoMO and selected aspects of adolescent health, including perceived stress, problematic Internet use, sleep, and self-esteem.

**Materials and methods:** A cross-sectional online survey was conducted from May to October 2025 among 203 Internet-using respondents aged 14-19 years. The tools included an author-designed questionnaire, the FoMO scale, PSS-10, and IAT. Statistical analysis involved Spearman's rank correlations, chi-square tests with Cramer's V, Gamma coefficients, and multivariable OLS and logistic regression models.

**Results:** FoMO was positively associated with perceived stress ( $\rho=0.490$ ;  $p<0.001$ ) and problematic Internet use ( $\rho=0.443$ ;  $p<0.001$ ). Time spent online was also related to higher IAT scores ( $\rho=0.453$ ;  $p<0.001$ ). In the multivariable model, problematic Internet use was independently predicted by daily hours online ( $B=0.066$ ;  $p<0.001$ ), FoMO ( $B=0.154$ ;  $p<0.001$ ), and phone use during meals ( $B=0.159$ ;  $p=0.006$ ). Higher stress levels were independently associated with FoMO ( $B=2.155$ ;  $p<0.001$ ), problematic Internet use ( $B=2.803$ ;  $p=0.034$ ), female sex ( $B=3.431$ ;  $p=0.001$ ), and body comparison on social media ( $B=2.247$ ;  $p=0.024$ ), while self-confidence had a protective effect ( $B=-2.760$ ;  $p<0.001$ ). Worsened self-esteem was predicted by body comparison ( $OR=7.75$ ;  $p<0.001$ ), FoMO ( $OR=2.34$ ;  $p=0.003$ ), and female sex ( $OR=3.59$ ;  $p=0.010$ ).

**Conclusions:** FoMO is significantly associated with stress, problematic Internet use, and poorer self-evaluation in adolescents. Prevention should address healthy digital habits, body-image pressures, and strengthening self-confidence.

**Keywords:** Fear of Missing Out, Anxiety, Teenagers

# Neurodivergent depression. Co-occurrence of depressive disorders with autism spectrum disorders in adolescents

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**Background:** Depressive symptoms are among the most common mental health problems in adolescence and may be especially relevant in autistic youth. The concept of “neurodivergent depression” highlights that depression in adolescents on the autism spectrum may present in a specific emotional and social context.

**The aim:** The study aimed to examine the relationship between the severity of depressive symptoms and autism spectrum traits in adolescents aged 16–19, with particular attention to emotional, social, cognitive, and executive functioning. An additional aim was to identify which autism-related characteristics were most strongly associated with depressive symptoms and whether these relationships remained significant after controlling for sex and formal ASD diagnosis.

**Materials and methods:** The study included 376 adolescents from Poland aged 16–19 years. Data were collected online using the Kutcher Adolescent Depression Scale (KADS-6), the Autism-Spectrum Quotient (AQ), and an author-designed questionnaire assessing emotional, social, cognitive, and executive functioning. Statistical analyses included group comparisons, Pearson correlations, and linear regression.

**Results:** Adolescents with a formal ASD diagnosis reported higher levels of several depressive symptoms than those without such a diagnosis. Depressive symptoms were positively associated with overall autistic traits, especially emotional and social difficulties. The strongest relationships were found for feeling misunderstood, loneliness, difficulty identifying emotions, and emotional difficulties. Higher AQ scores predicted higher depressive symptom severity even after controlling for sex and ASD diagnosis.

**Conclusions:** Greater autism spectrum traits are associated with more severe depressive symptoms in adolescents. The findings indicate the need for early screening, careful differential assessment, and closer monitoring of emotional well-being in neurodivergent youth, particularly in the emotional and social domains.

**Keywords:** autism spectrum disorder, adolescence, depressive symptoms, autistic traits, emotional functioning

# Does washing always work? Antimicrobial efficacy of cleaning protocols for reusable water bottles

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**Background:** Reusable water bottles (RWBs) have become an essential tool for maintaining daily hydration and have gained immense popularity. However, public awareness regarding their proper maintenance remains limited. Many users are unaware that without effective sanitization, these containers can become a reservoir for microbes leading to potential infection.

**The aim:** The aim of the study was to perform a qualitative assessment of microbial RWB contamination and compare the effectiveness of selected sanitization methods.

**Materials and methods:** phase-I) microbial screening: qualitative swabs analysis from student-owned RWB (30 samples, cultured on standard microbial media); phase-II) experimental- four identical bottles were inoculated with standardized bacterial suspension  $1,5 \times 10^7$  CFU/ml (24h/37°C). Before cleaning, RWB were rinsed with sterile water (water and swabs were collected and cultured). Each bottle underwent a different washing protocol (A-detergent, B-dishwasher tablet dissolved in hot water, C-boiling water, D-rinsing with water). Post cleaning samples were collected and cultured.

**Results:** phase-I) 95% of RWB were contaminated (>80% by Gram-negative rods, mainly *Pseudomonas* spp.) phase-II) rinsing with both plain water and detergent was ineffective—bacterial growth continued. When using boiling water observed >102 CFU (Colony Forming Units)/ml; when using a dishwasher tablet, it was reduced to 50 CFU/ml.

**Conclusions:** High bacterial contamination indicates poor hygiene with this device and a lack of understanding of the issue. The preferred method is to use a dishwasher tablet and then rinse with boiling water. However, the most important thing is to clean and dry the bottle thoroughly and regularly after each use.

**Keywords:** *Pseudomonas*, hygiene, Reusable water bottles

# A Better Option? Attitudes Towards Electronic Cigarettes Among University Students

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**Background:** Electronic cigarettes (EC) have gained popularity recently as an alternative to traditional tobacco products, including early initiation among users. They are often perceived as less harmful and as an aid in smoking cessation, although their long-term health effects, particularly aerosol chemical composition, remain not fully understood.

**The aim:** To assess university students' knowledge, attitudes, and experience regarding electronic cigarette use.

**Materials and methods:** An anonymous, self-designed online questionnaire was distributed among students from various Polish universities over a two-month period. The analysis included 596 participants. Data analysis and statistical evaluation were performed using MS Excel and Statistica with the Chi-square test ( $p < 0.05$ ).

**Results:** 65.9% ( $N = 393$ ) of participants reported ever using EC, with women significantly more likely to report this ( $p < 0.05$ ). 30.2% ( $N = 180$ ) were current EC users, more frequently among students from non-medical fields ( $p < 0.05$ ); 25.8% ( $N = 154$ ) reported passive exposure, while 44.0% ( $N = 262$ ) were neither users nor exposed. 18.6% ( $N = 111$ ) considered EC less harmful than conventional cigarettes, whereas women more often disagreed ( $p < 0.05$ ). 30.4% ( $N = 181$ ) indicated that EC may aid smoking cessation, and 26.5% ( $N = 158$ ) considered them more cost-effective. Among current users, the largest proportion (41.7%,  $N = 75$ ) first used EC at age 16–17, while 48.9% ( $N = 88$ ) reported use at least once per hour; 19.4% ( $N = 35$ ) experienced health effects. Among passively exposed, less than 30 minutes a day was most common (68.8%,  $N = 106$ ), and 9.7% ( $N = 15$ ) reported related health effects.

**Conclusions:** EC use and passive exposure are common among university students, with gender- and field-related differences. EC use often begins in mid-adolescence and is associated with frequent consumption patterns. Misconceptions regarding safety, health effects, and benefits of EC remain widespread, highlighting the need for evidence-based interventions.

**Keywords:** electronic cigarettes, electronic nicotine delivery systems, smoking, university students

# Educational intervention as a tool for changing attitudes toward post-mortem organ donation.

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**Background:** Organ transplantation rates depend on the public attitudes toward post-mortem organ donation. The impact of educational interventions on public attitudes have not been completely characterized.

**The aim:** To assess whether an educational intervention containing information about transplantation influences respondents' views on organ donation.

**Materials and methods:** Data were collected from 600 Polish people aged 18-85 using an electronic survey in February 2026. The questionnaire assessed the respondents' views before and after a short, informative video. Analysis included the motivations, attitudes, willingness to donate and trust in the medical system. A 5-point Likert scale and multiple-choice questions were used.

**Results:** The statistically significant changes were observed in the willingness to donate organs, altruism and empathetic attitude. The willingness to donate increased from 77% to 83% ( $p < 0.01$ ) and the willingness to consent to a donation from a family member from 80% to 83.67% ( $p < 0.01$ ), with the majority of changes coming from undecided respondents in both questions. Empathetic attitude rose from 55.5% to 60.17% ( $p < 0.01$ ) and altruism increased from 47.33% to 51.17% ( $p < 0.01$ ). Exposure decreased the "lack of knowledge" as an argument against transplantation ( $p < 0.01$ ) and increased the number of respondents declaring no concerns regarding organ donation ( $p < 0.01$ ). After the video nearly 46% claimed that they would search for more information, 35% would talk about the topic with family and 31% would sign the donor card. Motivations and trust in the medical system remained unchanged.

**Conclusions:** Contact with information about transplantation affects the key elements that predict the ultimate decision regarding organ donation. Educational intervention can be used as an effective tool in order to increase the readiness to donate.

**Keywords:** post-mortem organ donation, educational intervention, medical education

# Pertussis knowledge and vaccination attitudes among medical and non-medical students: preliminary results

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**Background:** In recent years, an increase in the incidence of pertussis has been observed in Poland. This rise may be associated with waning post-vaccination immunity, a decline in booster vaccination rates, and the possibility of repeated infection throughout life. Effective prevention, particularly through vaccination, plays a crucial role in reducing the risk of infection and serious complications.

**The aim:** The aim of the study was to assess students' knowledge of pertussis, its prevention, and their attitudes toward vaccination.

**Materials and methods:** An anonymous questionnaire-based study was conducted from December 2025 to March 2026 among students from various fields of study. A total of 302 questionnaires were collected. The collected data were analyzed statistically to compare the level of knowledge between medical and non-medical students, as well as between students who had and had not participated in educational campaigns.

**Results:** Medical students demonstrated a significantly higher level of knowledge about pertussis compared to non-medical students ( $p < 0.001$ ). Students who participated in educational campaigns also achieved significantly higher knowledge scores than those who had not ( $p < 0.001$ ). Notably, non-medical students presented lower levels of awareness regarding pertussis prevention, indicating an educational gap in this group. Participation in health campaigns was associated with improved knowledge particularly among non-medical students.

**Conclusions:** Students of medical faculties showed a higher level of knowledge about pertussis than non-medical students. Participation in educational campaigns was associated with improved knowledge scores, highlighting the effectiveness of these initiatives in increasing awareness of pertussis prevention. The lower level of knowledge observed among non-medical students indicates the need to intensify educational efforts in this group. Targeted health education campaigns may help reduce disparities in awareness and improve preventive behaviors among young adults.

**Keywords:** pertussis, vaccinations, students, educational campaigns

# The Impact of the SARS-CoV-2 Pandemic on Sleep Quality, Psychosocial Well-being, and Access to Medical Care

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**Background:** The SARS-CoV-2 pandemic has affected a very large segment of the population in many countries, not infrequently ending in death. In view of the above, it was decided in this study to assess the burdens of the pandemic to find opportunities for preventive measures and educational activities.

**The aim:** The aim of this study was to assess sleep quality, psychosocial well-being, and the quality of medical services in the studied group of adult residents of the Silesian Voivodeship.

**Materials and methods:** The study included 210 (100%) adults, including 127 (60.48%) women and 83 (39.52%) men. An original questionnaire and standardized scales were used: the Athens Insomnia Scale (AIS) and the Perceived Stress Scale (PSS-10).

**Results:** Confirmed SARS-CoV-2 infection was declared by 84 (40%) respondents, and long-term complications (long-COVID) were reported by 42 (20%). Subjective assessment of sleep quality did not undergo significant change ( $p=0.500$ ). In terms of psychosocial well-being, a moderate level of stress dominated, observed in ( $n=137$ ; 65,24%) of respondents during the pandemic and ( $n=132$ ; 62,86%) outside of it. Statistical tests showed no significant differences in stress intensity between these periods ( $\chi^2=2.703, p=0.08; Z=0.661, p=0.508$ ). However, a highly statistically significant deterioration in medical services during the pandemic was demonstrated. Respondents rated significantly worse: access to a specialist ( $p<0.001$ ), waiting time in the Emergency Room ( $p<0.001$ ), telephone registration ( $p=0.01$ ), the courtesy of nurses ( $p<0.001$ ) and doctors ( $p=0.01$ ), and staff cooperation with the family ( $p<0.001$ ).

**Conclusions:** 1. Sleep quality and stress levels of the adult residents remained constant regardless of the pandemic, and the percentage of long-COVID cases indicates a need for systemic care for recovered patients. 2. Most respondents negatively assessed medical services, suggesting a necessity for improvement.

**Keywords:** COVID-19, sleep, stress, medical services

# Stem Cell Therapies in Type 1 Diabetes: Comparing MSC and HSC Approaches

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**Background:** Type 1 diabetes is characterized by the progressive loss of pancreatic  $\beta$ -cells, which is followed by insulin deficiency. Although pancreas and islet transplantation can restore endogenous insulin production, their clinical use remains limited due to donor shortages, complex procedures, high costs, and limited long-term graft survival. Consequently, alternative cell-based therapies, including stem cell approaches, are being actively explored as potential treatments.

**The aim:** This study aimed to summarize current clinical evidence regarding mesenchymal stem/stromal cells (MSCs) and hematopoietic stem cells (HSCs) in the treatment of T1D, with particular emphasis on their mechanisms of action, therapeutic efficacy, and safety in restoring insulin independence

**Materials and methods:** Fourteen original clinical studies investigating MSC- and HSC-based therapies in patients with T1D were systematically analyzed. Outcomes assessed included insulin independence, metabolic improvement, and adverse event rates.

**Results:** Autologous HSC therapy, associated with immune system reset, demonstrated the highest rates of insulin independence and the longest insulin-free periods. However, this strategy was also linked to an increased risk of serious complications related to immunosuppression and conditioning regimens. In contrast, Mesenchymal stem/stromal cells (MSCs) mainly improved metabolic control and, with occasional short-term insulin independence and a substantially more favourable safety profile.

**Conclusions:** Cell-based therapies represent promising direction for T1D treatment. They aim either to regenerate  $\beta$ -cells or to modulate the immune system to prevent further destruction. Further large-scale, long-term, and dose-escalating clinical trials are needed to optimize treatment protocols and assess their sustained benefits.

**Keywords:** Type 1 diabetes, Mesenchymal Stem Cells, Hematopoietic Stem Cells, Cell-based therapy

# Lipoprotein X in Cholestasis: A Pseudodyslipidemic Phenomenon Challenging Conventional Lipid Paradigms

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**Background:** Lipoprotein X (LpX) arises from impaired biliary secretion in cholestatic diseases like Primary Biliary Cholangitis. Despite causing extreme hypercholesterolemia, cardiovascular risk remains paradoxically low, questioning its atherogenic potential.

**The aim:** To evaluate LpX's biochemical properties and its contribution to apparent hypercholesterolemia and atherosclerosis in cholestatic liver disease.

**Materials and methods:** A systematic search of PubMed, MEDLINE, and Google Scholar up to 2025 was conducted. Data on lipid profiles, vascular outcomes, and diagnostic interference were qualitatively analyzed.

**Results:** Available evidence indicates that in advanced Primary biliary cholangitis, LpX may account for a substantial proportion of circulating LDL-C, in some reports exceeding 80 - 90% of measured LDL fractions. Despite extremely elevated LDL-C concentrations occasionally surpassing 30 mmol/L studies report minimal increases in carotid intima-media thickness and limited atherosclerotic plaque formation. Experimental findings also demonstrate prolonged LDL oxidation lag times compared with patients with Familial Hypercholesterolemia, suggesting reduced oxidative susceptibility and limited atherogenicity. Additionally, LpX has been shown to interfere with several laboratory assays, including apolipoprotein phenotyping and electrolyte measurements, potentially leading to diagnostic misinterpretation. Conventional lipid-lowering therapies such as statins appear largely ineffective, whereas resolution of cholestasis or therapeutic plasmapheresis can significantly reduce circulating LpX levels. Restoration of normal hepatic function, particularly after liver transplantation, reverses this lipid abnormality, highlighting the central role of hepatic lipid metabolism in LpX formation.

**Conclusions:** Severe hypercholesterolemia in cholestasis is driven by non-atherogenic LpX (pseudodyslipidemia). ApoB is superior to LDL-C for risk assessment, and LpX serves as a dynamic biomarker of biliary function.

**Keywords:** Lipoprotein X; cholestasis; primary biliary cholangitis; pseudodyslipidemia; hypercholesterolemia;

# Clinical Advances in COPA Syndrome in Pediatric and Adult Patients

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**Background:** COPA syndrome (CS) is a rare, monogenic type I interferonopathy caused by COPA gene mutations. This defect impairs retrograde transport, inducing chronic endoplasmic reticulum (ER) stress and pathological STING protein activation, which drives the overproduction of type I interferons and pro-inflammatory cytokines.

**The aim:** To summarize current knowledge on CS, with a specific focus on diagnostic and therapeutic strategies in pediatric and adult patients.

**Materials and methods:** A literature search of the PubMed and Europe PMC databases was conducted, identifying 31 studies that met the inclusion criteria for the review.

**Results:** The reviewed studies highlight the classic clinical triad of CS: interstitial lung disease (ILD), arthritis, and immune complex-mediated renal damage. Furthermore, the literature indicates that traditional treatments, such as glucocorticosteroids and standard immunosuppressive drugs, frequently fail to prevent the progression of irreversible organ damage.

**Conclusions:** Because standard immunosuppressive therapies are often ineffective at halting disease progression, there is a critical need to develop and implement novel, targeted diagnostic-therapeutic strategies for patients with COPA syndrome.

**Keywords:** COPA syndrome, Type 1 interferonopathy, Interstitial Lung Disease

# Clinical Advances in COPA Syndrome in Pediatric and Adult Patients

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**Conclusions:** Because standard immunosuppressive therapies are often ineffective at halting disease progression, there is a critical need to develop and implement novel, targeted diagnostic-therapeutic strategies for patients with COPA syndrome.

**Keywords:** COPA syndrome, Type 1 interferonopathy, Interstitial Lung Disease

# AI in Thyroid Ultrasound: Bridging Technology and Clinical Experience — A Systematic Review

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**Background:** Thyroid nodules are common and their assessment relies on ultrasonography, which is operator-dependent and prone to variability. Artificial intelligence (AI) is increasingly used to support sensitivity and specificity assessment.

**The aim:** The aim of this study is to analyze the diagnostic performance of AI systems compared to physicians with different levels of experience in differentiating detected thyroid nodules on ultrasound images.

**Materials and methods:** This study was conducted in accordance with PRISMA guidelines, based on a PubMed review. Inclusion criteria comprised English-language original and review articles identified using the keywords: "AI", "thyroid", "ultrasound", and "S-Detect". Studies lacking adequate methodology were excluded. The analysis focused on comparing diagnostic performance (sensitivity and specificity) of AI systems and physicians, with a longitudinal comparison of the S-Detect system and clinicians (2020 vs 2025).

**Results:** 30 articles met the inclusion criteria. Data used for the comparative analysis were primarily derived from two key studies published in 2020 and 2025. AI sensitivity increased from 91.3% in 2020 to 98.0% in 2025 (+6.7 pp), and specificity from 65.2% to 68.0% (+2.8 pp). Junior physicians showed a slight increase in sensitivity (95.7% to 96.9%; +1.2 pp) but a significant improvement in specificity (37.5% to 52.9%; +15.4 pp). Senior physicians maintained a sensitivity of 96.7%, while their specificity decreased from 75.0% to 69.2% (-5.8 pp).

**Conclusions:** The S-Detect AI system demonstrates a clear improvement in diagnostic performance for thyroid nodules, surpassing the changes observed in physicians with varying experience levels, particularly in terms of sensitivity. The increase in specificity among junior physicians suggests educational value, while the decrease among seniors may reflect established practices, supporting physician–AI collaboration combining high sensitivity with contextual specificity. Limitations included risk of bias across included studies.

**Keywords:** thyroid, AI, ultrasonography, sensitivity, specificity

# Systematic review of surgical outcomes of primary and interval cytoreductive surgery in ovarian cancer

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**Background:** Ovarian cancer (OC) is a gynecological malignancy often encountered by specialists in advanced stages- FIGO III and IV. The 5-year relative survival rate is around 52% in the USA, which is why OC remains one of the fatal gynecological cancers among women. While primary cytoreductive surgery (PCS) remains 'the standard', neoadjuvant chemotherapy (NACT) with interval cytoreduction (ICS) is being introduced more often to achieve better survival outcomes.

**The aim:** The aim of the research is to compare the outcomes of PCS with ICS in advanced OC.

**Materials and methods:** A systematic review of the literature was conducted in accordance with the PRISMA guidelines. To identify relevant studies, a comprehensive search was performed across 2 databases, covering the period from 2015 to 2025. The search strategy was structured based on the PICO framework. The review included 11 relevant studies.

**Results:** Several studies have shown that PCS was associated with higher short-term complications. Late complications within six months of surgery were also more common after PCS. However, even with higher complication rates, patients undergoing PCS with FIGO stage IIIC disease achieved better overall survival (OS). Progression-free survival (PFS) rate was comparable between the two types of surgery, with a few months' advantage for PCS. Many studies show that patients who achieved complete macroscopic tumor reduction have the best PFS and OS. The study showed that patients undergoing NACT+ICS therapy underwent less radical procedures to achieve comparable R0 residual disease rate.

**Conclusions:** PCS still offers better overall survival rates. However, ICS can be a better option for patients with significant comorbidities or cases where complete resection of tumor is unlikely.

**Keywords:** ovarian cancer, cytoreductive surgery, debulking surgery, neoadjuvant chemotherapy

# Stereotactic Radiosurgery for Optic Pathway Gliomas: Optimizing Tumor Control While Preserving Visual Function

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**Background:** Optic pathway gliomas (OPGs) are rare, typically low-grade tumors involving the optic nerves, chiasm, and tracts, frequently associated with Neurofibromatosis type 1. Management is challenging due to the need to balance tumor control with preservation of visual function. While chemotherapy is the standard first-line treatment in pediatric patients and conventional radiotherapy is effective, both have limitations, particularly in progressive or refractory disease.

**The aim:** To assess the efficacy and safety of stereotactic radiosurgery in optic pathway gliomas, focusing on tumor control and preservation of visual function.

**Materials and methods:** Nine studies were selected, including original clinical studies (prospective or retrospective cohorts, case reports and case series) evaluating SRS for OPGs. Inclusion criteria comprised radiologically or histologically confirmed OPGs, treatment with SRS (Gamma Knife or equivalent), reported outcomes on tumor control and/or visual function, and a minimum follow-up of 12 months. Non-clinical studies, non-english and studies not specifically evaluating SRS were excluded

**Results:** The studies reported 1-, 3-, and 5-year progression-free survival of 100%, 92%, and 78%. Visual function was stable in most cases (ranged 77-92% at 1-5 years), with occasional improvement, particularly when treatment was performed prior to advanced visual deterioration. Safety outcomes were closely linked to dose constraints of the optic apparatus, with most studies limiting single-fraction doses to 8–10 Gy to reduce the risk of radiation-induced optic neuropathy. Favorable outcomes were associated with small, well-defined lesions and older patient age. Evidence remains heterogeneous, and the role of SRS in Neurofibromatosis type 1 remains uncertain.

**Conclusions:** SRS is a valuable adjunct in selected OPG cases, offering effective tumor control with acceptable visual preservation. Careful patient selection and long-term follow-up are essential. Further prospective studies are needed to define its optimal role.

**Keywords:** Optic pathway glioma, Gamma Knife, Stereotactic radiosurgery

# Unmasking a Rare Endocrine Channelopathy: A Systematic Review of CACNA1H-related Primary Aldosteronism

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**Background:** Familial hyperaldosteronism type IV (FH-IV) is an extremely rare monogenic form of primary aldosteronism (PA) caused by germline gain-of-function CACNA1H mutations. The complete clinical and genetic spectrum of this condition remains poorly characterized.

**The aim:** To synthesize available evidence regarding the phenotypic, biochemical, and therapeutic characteristics of FH-IV.

**Materials and methods:** A systematic review was conducted in accordance with PRISMA guidelines (PROSPERO: CRD420261324945). Data concerning clinical phenotypes, diagnostic evaluations, and treatment outcomes of genetically confirmed FH-IV patients were extracted and analyzed.

**Results:** The primary cohort included 31 symptomatic patients and 8 mutation-positive relatives. The genetic landscape was remarkably heterogeneous, encompassing 17 distinct CACNA1H mutations and demonstrating incomplete disease penetrance. Clinically, diagnoses were frequently delayed and complicated by atypical normokalemic presentations. Structural imaging often revealed no macroscopic adrenal lesions. Therapeutically, unilateral adrenalectomy was generally insufficient to cure the disease. Effective blood pressure control typically required combination medical therapy, predominantly utilizing mineralocorticoid receptor antagonists (MRAs) alongside L-type calcium channel blockers (CCBs).

**Conclusions:** FH-IV acts as a highly heterogeneous, systemic adrenal channelopathy. Definitive diagnosis and cascade family screening rely on multigene Next-Generation Sequencing (NGS) panels. Management should prioritize medical therapy over unilateral surgical interventions. The frequent requirement for multidrug regimens to achieve adequate blood pressure control highlights the current lack of clinically available, specific T-type calcium channel inhibitors.

**Keywords:** Primary aldosteronism; Hyperaldosteronism; Familial Hyperaldosteronism type IV (FH-IV); CACNA1H;

# A Comprehensive Review of the Techniques, Factors, and Errors Affecting Digital Impression Quality

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**Background:** Intraoral scanners are increasingly used digital devices that enable the optical recording of oral cavity structures. They capture the surface morphology of teeth and soft tissues in the form of a three-dimensional digital model, replacing traditional impressions made with elastic materials.

**The aim:** The aim of this study was to conduct a systematic review of various digital scanning techniques, as well as the factors and errors affecting the quality of the obtained scans.

**Materials and methods:** This study followed PRISMA guidelines. The review was conducted by search across the PubMed and Scopus databases and Google Scholar search engine, using the keywords: intraoral scanners, digital impressions, scan quality, scan accuracy.

**Results:** The literature extensively discusses the various factors affecting scan quality. These factors were classified as operator-dependent, patient-related, and device-related. The analysis showed that numerous determinants influence the accuracy and precision of digital impressions. In particular, the operator's knowledge and skill were found to be crucial.

**Conclusions:** A knowledgeable operator, aware of the adverse effects of excess saliva, humidity-related errors, and the impact of lighting on scanning noise, can minimize these unfavorable factors and achieve optimal scan quality.

**Keywords:** intraoral scanners, digital impressions, scan quality, scan accuracy

# Functional Role and Therapeutic Potential of the P2X7 Receptor in Glioma: A Systematic Review

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**Background:** Gliomas are the most common primary tumours of the central nervous system and remain associated with poor prognosis despite multimodal treatment. The purinergic P2X7 receptor (P2X7R) has emerged as a potential molecular target involved in tumour progression and immune modulation.

**The aim:** To systematically evaluate the expression, functional role, and therapeutic potential of the P2X7 receptor in glioma models and tissues.

**Materials and methods:** A systematic review of original in vitro and in vivo studies investigating P2X7R in glioma models was conducted using PubMed, Scopus, and Web of Science.

**Results:** A total of 41 studies were included. Most studies demonstrated that P2X7R significantly influences glioma cell behaviour, including proliferation, survival, migration, and immune-related signalling. Both pro-tumorigenic and anti-tumorigenic effects were reported, suggesting a context-dependent role of P2X7R. Additionally, modulation of P2X7R was associated with altered sensitivity to therapeutic interventions.

**Conclusions:** P2X7R appears to be a biologically relevant and potentially druggable target in gliomas. However, its dual and context-dependent effects highlight the need for further well-designed studies to clarify its role and therapeutic applicability.

**Keywords:** P2X7 receptor, glioblastoma, glioma, purinergic signalling, therapeutic target

# Clinical Significance of VISTA (PD-1H) and CD155 (PVR) in Non-Small Cell Lung Cancer: A Systematic Review

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**Background:** Immune checkpoint blockade has improved outcomes in non-small cell lung carcinoma (NSCLC), yet resistance remains a major clinical challenge. VISTA (PD-1H) and CD155 (PVR) are emerging immune-regulatory pathways potentially involved in tumour immune escape.

**The aim:** To systematically assess the expression, biological function, and clinical significance of VISTA (PD-1H) and CD155 (PVR) in non-small cell lung cancer.

**Materials and methods:** A systematic review of studies evaluating the expression, function, and clinical relevance of VISTA and CD155 in NSCLC was performed using major databases.

**Results:** Fifty studies were included (21 VISTA; 29 CD155). VISTA expression was predominantly observed in stromal and immune-cell compartments and associated with immunoregulatory functions, but showed no consistent relationship with patient survival. In contrast, CD155 was mainly expressed on tumour cells, associated with an immunosuppressive microenvironment, and more consistently linked to adverse prognosis, particularly when co-expressed with PD-L1.

**Conclusions:** While both pathways contribute to immune modulation in NSCLC, current evidence suggests that CD155 has greater potential as a prognostic biomarker and therapeutic target. The clinical relevance of VISTA remains inconclusive and requires further investigation.

**Keywords:** non-small cell lung carcinoma (NSCLC), VISTA (PD-1H), CD155 (PVR), tumour microenvironment, PD-L1

# Oral vs topical administration of vitamin B12 in dry eye disease: a meta-analysis

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**Background:** Dry eye disease (DED) can result from corneal exposure to light leading to oxidative stress, inflammation and DED symptoms. In clinical practice, topical artificial tears containing antioxidants, such as vitamin B12, are used. However, the vitamin degrades under ultraviolet and high-energy visible light, losing its antioxidant properties and decomposing into products including formaldehyde. Given the increasing exposure to digital screen light, an alternative treatment is antioxidant administration via the oral route, which could resolve the concerns on photolysis of active ingredients.

**The aim:** To synthesise literature on the utility of vitamin B12 as a free radical scavenger in DED treatment and investigate the efficacy of oral intake compared to topical use.

**Materials and methods:** A meta-analysis was performed in accordance with PRISMA guidelines. Inclusion criteria included: randomised controlled clinical trials, using Ocular Surface Disease Index (OSDI), administration of vitamin B12 orally or topically. Studies published from inception to April 2026 in PubMed were identified. R statistical software was used to analyse and visualise data. Publication bias was visually assessed with a funnel plot.

**Results:** The search yielded 5 studies, 4 were eligible (n=379). In a random-effects model, administration of vitamin B12 gave a standardised mean difference (SMD) of -0.70 (95%CI: -1.61, 0.21). Oral administration significantly improved OSDI (SMD=-0.66 95%CI: -1.08, -0.24), whereas topical did not (SMD=-0.69 95%CI: -3.00, 1.61). Heterogeneity was high (88.6%).

**Conclusions:** Current evidence does not demonstrate a statistically significant difference between oral topical administration of vitamin B12 in DED. However, subgroup analysis revealed that oral administration has a significant impact on symptoms, pointing to a possible future research direction. Findings suggesting benefit should be interpreted cautiously due to high study heterogeneity, variability of patient groups as well as scarcity of focused studies.

**Keywords:** dry eye disease, antioxidants, oxidative stress, vitamin B12

# Review of laser texturing of Ti6Al4V alloy surface as an innovative method of improving the surface properties

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**Background:** Conventional surface engineering methods of implantology alloys rely on additional material layering, which can lead to problems with coating stability in the biological body environment resulting in unsatisfactory osseointegration, corrosion and inflammation. This work reviews literature and research on laser surface texturing as a coating-free alternative for improving the surface properties and biological functionality of magnesium and titanium alloys.

**The aim:** Evaluation of laser surface texturing (LST) as an innovative, coating-free method of enhancing properties of metallic biomaterials used in implantology.

**Materials and methods:** This study followed PRISMA guidelines. Systematic search was performed across PubMed, Scopus and Google Scholar. Results of 9 researches from 2016 to 2025 were reviewed on properties of titanium alloy - Ti6Al4V, subjected to laser surface texturing. The evaluation was focused on corrosion resistance in solution simulating body fluids (SBF) and biological functionality such as osseointegration and possible inflammatory response.

**Results:** The results of treating given alloys were increased porosity, 350 - 550µm, therefore increased surface of possible osseointegration and melting singular metals out of the alloy. The most prominent metal in the laser-treated area was aluminum, with titanium settling on the visible border between textured and untextured alloy. The laser textured surfaces were less susceptible to corrosion in SBF than the non-LST alloys.

**Conclusions:** Laser Surface Textured alloy shows greater osseointegrative and biocompatibilitive potential, that may lead to increased tissue growth and decreased bacterial adhesion after 2 weeks from an implantation. Corrosion is less likely to materialise, because of increased uniformity of surface, promoting denser and more protective texture, that is mimicking spongy structure of a bone, having macroporosity of 90-97%.

**Keywords:** Metallic biomaterials, Ti6Al4V, Laser Surface Texturing, Corrosion resistance, Osseointegration

# Adjunctive Non-Insulin Therapies Other Than Metformin in Children, Adolescents, and Young Adults With T1D

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**Background:** Achieving optimal glycemc control in children, adolescents, and young adults with type 1 diabetes remains challenging despite advances in insulin therapy and glucose monitoring, especially in the presence of comorbidities. A limited number of studies have evaluated adjunctive non-insulin therapies in young patients with type 1 diabetes, resulting in insufficient evidence to establish their indications and assess safety and efficacy.

**The aim:** To systematically evaluate the efficacy and safety of non-insulin and non-metformin therapies used as an adjunct treatment in individuals aged  $\leq 24$  years with type 1 diabetes.

**Materials and methods:** A systematic search of PubMed, Scopus, and Medline was conducted. Eligible studies included randomized controlled trials, retrospective observational studies, and case reports. To organise the evaluation of the intervention, we defined primary outcomes as parameters related to diabetes management and safety, and secondary outcomes including anthropometric and metabolic parameters as well as patient-reported outcomes.

**Results:** Seven studies met inclusion criteria, evaluating four classes of medications: SGLT2i, GLP-1 RA, DPP-4i, dual GLP-1/GIP RA. All agents showed modest improvements in HbA1c and TIR in some studies. Reductions in body weight and insulin requirements were also observed, particularly with GLP-1 receptor agonists. However, results were heterogeneous and not consistently significant. Gastrointestinal adverse events were common, and an increased risk of DKA was reported with SGLT2 inhibitors. Evidence was limited by small sample sizes and short follow-up. Additionally, five further studies that did not meet the inclusion criteria were reviewed narratively, providing preliminary evidence suggesting potential benefits of adjunctive therapies.

**Conclusions:** Adjunctive non-insulin therapies may improve metabolic outcomes in young individuals with type 1 diabetes. However, current evidence is limited and heterogeneous.

**Keywords:** adjunctive therapy, type 1 diabetes, GLP-1 receptor agonists, SGLT-2 inhibitors, DPP-4 inhibitors

# A New Role for an Old Drug? Intravenous and Intranasal Lidocaine in Acute Migraine Attacks Treatment in ED

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**Background:** Acute migraine attacks pose a significant clinical challenge due to their severe course and impact on quality of life. It is a common reason for patients' presentation to the Emergency Department (ED), where they are typically treated with nonsteroidal anti-inflammatory drugs (NSAIDs) and antiemetics, which do not always effectively abort the attacks. Given its analgesic properties and rapid onset of action, lidocaine administered intravenously (IV) or intranasally (IN) may represent a promising alternative treatment.

**The aim:** We aimed to analyze the effects of lidocaine administered IV or IN in terminating an acute migraine attack in a population of children and adults in emergency settings.

**Materials and methods:** We conducted a systematic review following PRISMA recommendations by independently searching four databases using predefined keywords: migraine AND (lidocaine OR lignocaine OR xylocaine). After screening 1575 records, 14 studies (IV=6, IN=8) were included. The effect of lidocaine was compared with placebo, NSAIDs, ketamine, dihydroergotamine, chlorpromazine, and peppermint oil. Pain reduction after lidocaine was assessed using pertinent pain scales. The data collected included characteristics of the study group, the intervention, follow-ups, adverse effects, and outcomes.

**Results:** In 2/6 studies demonstrating a statistically significant effect of lidocaine, its IV administration showed better therapeutic effect compared to NSAIDs or ketamine. Moreover, 5/8 studies compared IN lidocaine with placebo, and 2 of them showed significant efficacy. The other 10/14 studies did not present statistical analysis or were of low quality.

**Conclusions:** IV and IN lidocaine may represent promising therapeutic options for the management of acute migraine attacks under ED conditions. However, further large-scale, well-designed randomized controlled trials with standardized methodologies are warranted to more definitively establish their efficacy and safety profiles.

**Keywords:** intravenous lidocaine, intranasal lidocaine, acute migraine, emergency department

# Intraoperative neuromonitoring in extramedullary spinal tumors: a systematic review and meta-analysis

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**Background:** The role of intraoperative neurophysiological monitoring (IONM) in intradural extramedullary (IDEM) tumor surgery remains unestablished.

**The aim:** Therefore, the purpose of this study was to systematically review and meta-analyze the recent literature on the accuracy of IONM in the resection of IDEM tumors.

**Materials and methods:** The study was conducted according to the PRISMA guidelines. The PubMed, Embase, and Cochrane databases were searched for English-language papers published from inception until February 19, 2025. The study was found eligible if it reported the complete data on the accuracy of motor evoked potentials (MEPs), somatosensory evoked potentials (SSEPs), D-wave monitoring, or multimodal IONM in patients with IDEM tumors. Each modality's accuracy was evaluated using the Hierarchical Summary Receiver Operating Characteristic (HSROC) curve for predicting short-term (immediate postoperative) and long-term postoperative deficits (minimum of 3 months after discharge).

**Results:** From a total of 3220 papers, 17 studies met the eligibility criteria. MEP significantly predicted the occurrence of both short-term (AUROC=0.72;  $p<0.0001$ ) and long-term (AUROC=0.91;  $p=0.006$ ) new motor deficits. Conversely, D-wave failed to accurately predict motor deficits (AUROC=0.83;  $p=0.1094$ , and AUROC=0 in the short- and long-term, respectively). Similarly, SSEP showed low accuracy in predicting short-term (AUROC=0.55;  $p=0.7461$ ) and long-term (AUROC=0.53;  $p=0.3953$ ) sensory deficits. Conversely, mIONM was found to accurately predict short-term (AUROC=0.75;  $p=0.001$ ) and long-term (AUROC=0.70;  $p=0.005$ ) new neurological deficits.

**Conclusions:** MEP and mIONM constitute the sole modalities that can accurately predict motor and neurological deficits, respectively. Contrarily, the low sensitivity of SSEP for predicting sensory deficits underlines its efficacy in IDEM tumor surgery. Although D-wave did not achieve satisfactory accuracy, its application seems reasonable to prevent permanent motor deficits.

**Keywords:** spinal tumor, motor evoked potentials, D-wave, accuracy

# Prophylactic Negative Pressure Wound Therapy in High-Risk Abdominal Incisions: A Narrative Review

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**Background:** Surgical site infections (SSIs) remain one of the most frequent and clinically significant complications in abdominal surgery, particularly among high-risk patients, including those with obesity, diabetes, contaminated wounds, or undergoing emergency procedures. Despite advances in perioperative care, SSI rates in these groups remain unacceptably high.

**The aim:** To assess whether prophylactic negative pressure wound therapy (NPWT) effectively reduces SSIs in high-risk abdominal incisions and to determine which patient groups benefit the most.

**Materials and methods:** A structured review of current literature was performed using PubMed and Scopus databases. Recent randomized controlled trials, meta-analyses, and high-quality observational studies were analyzed, with a focus on NPWT applied to closed abdominal incisions in high-risk populations.

**Results:** The effectiveness of NPWT varies across studies; however, a consistent trend emerges in high-risk patients. NPWT reduces the incidence of SSIs by approximately 30–50%, with the most pronounced effect observed in superficial infections. The greatest benefit is seen in obese patients and in contaminated or colorectal surgeries. In contrast, its impact on deep infections and overall outcomes remains limited, and results in emergency settings are less consistent.

**Conclusions:** NPWT should not be considered a universal solution for SSI prevention. Instead, it represents a targeted strategy that is most effective in carefully selected high-risk patients. Identifying these subgroups is key to optimizing outcomes and avoiding unnecessary use.

**Keywords:** NPWT, surgical site infection, laparotomy, high-risk patients, abdominal surgery

# Pediatric laryngopharyngeal reflux and laryngeal lesions: a systematic review

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**Background:** Laryngopharyngeal reflux (LPR) refers to the retrograde flow of gastric contents into the larynx and pharynx, presenting with a broad range of respiratory and voice-related symptoms in pediatric patients.

**The aim:** To evaluate the clinical presentation, laryngeal findings, diagnostic approaches, and treatment outcomes of LPR-associated laryngeal disorders in the pediatric population.

**Materials and methods:** A systematic review was conducted according to PRISMA guidelines. PubMed and Google Scholar were searched for studies published between 2015 and 2025. Studies on patients aged 0–18 years describing symptoms, laryngeal findings, diagnostics, treatment, and outcomes were included. After screening 973 records, 35 duplicates and 899 were excluded; 39 full texts were assessed, and 9 studies were included. Data extraction covered demographics, symptoms, diagnostics, treatment, and outcomes.

**Results:** Patients ranged from 12 days to 17 years. The most frequent laryngeal findings were posterior laryngeal edema (especially arytenoids), interarytenoid redness, posterior commissure hypertrophy, cobblestone mucosa. Predominant symptoms included hoarseness, dysphonia, chronic cough, and stridor. Diagnosis relied mainly on laryngoscopy and fiberoscopy, with histopathology in selected cases. Treatment included pharmacotherapy (primarily proton pump inhibitors) and voice therapy. Clinical improvement was observed in most cases, although recurrences occurred.

**Conclusions:** LPR in children presents with diverse, non-specific symptoms that may delay diagnosis. Endoscopic evaluation remains the cornerstone of diagnosis, while treatment should be individualized, but the first-line management includes positional therapy and dietary modifications.

**Keywords:** laryngopharyngeal reflux, pediatric, laryngeal lesions, dysphonia, treatment

# Vaccination patterns and malaria prophylaxis among patients attending a travel medicine clinic in 2025

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**Background:** International travel to tropical and subtropical regions increases the risk of infectious diseases. Pre-travel consultations play an important role in risk assessment and in implementing appropriate preventive strategies, including vaccinations and malaria chemoprophylaxis.

**The aim:** To evaluate the structure of pre-travel consultations, the types of vaccines administered, and the use of antimalarial prophylaxis among patients preparing for travel to tropical regions in 2025.

**Materials and methods:** A retrospective analysis of medical records from the Tropical Diseases Clinic at the University Clinical Hospital in Białystok was conducted. Data from patients attending pre-travel consultations in 2025 were analyzed, including demographic characteristics, travel destinations, administered vaccines, and recommended malaria prophylaxis.

**Results:** In 2025, 475 consultations related to travel health prevention were performed. A total of 304 patients attended the clinic (179 women and 125 men), with a mean age of 41 years. Among them, 162 individuals visited the clinic for the first time and had not previously received recommended travel vaccinations. The most common travel destination was Asia (n = 176), followed by Africa (n = 84) and South America (n = 24). Vaccination patterns differed depending on the destination. Hepatitis A and typhoid fever vaccines were the most frequently administered, particularly among travelers to Asia and Africa. Yellow fever vaccination predominated among travelers to Africa and South America. Vaccination against Japanese encephalitis and rabies was more commonly recommended for travelers to Asia. Antimalarial chemoprophylaxis was advised for a substantial proportion of patients traveling to endemic regions.

**Conclusions:** Pre-travel preventive strategies should be tailored to the destination and associated epidemiological risks. Individualized consultation in a travel medicine clinic remains essential for proper risk assessment and effective prevention before international travel.

**Keywords:** travel medicine; pre-travel consultation; vaccination; malaria chemoprophylaxis; tropical travel

# System-Level Effects of Neurosteroids: Enhanced Presynaptic Glutamate Release May Shape Behavioural Outcome

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**Background:** The NMDA receptor (NMDAR) is a key excitatory receptor shaping synaptic communication and plasticity, and its dysregulation contributes to a wide range of neuropsychiatric disorders. The brain fine-tunes NMDAR function through neurosteroids—lipid-derived molecules that can rapidly modulate receptor activity—yet their behavioural consequences remain poorly understood. The zebrafish has emerged as a highly efficient model for studying neuroactive compounds, as its neurotransmitter systems are conserved with those of mammals.

**The aim:** We investigated the neurosteroid 5 $\beta$ -pregnan-20-deoxo-3 $\alpha$ -yl-sulfate (PAdO-S) across molecular, synaptic, and behavioural levels.

**Materials and methods:** Using whole-cell patch-clamp electrophysiology, we examined its effects on recombinant rat and zebrafish NMDARs expressed in HEK293 cells and on synaptic transmission in rat hippocampal autaptic cultures. Behavioural effects were assessed by measuring spontaneous locomotor activity in zebrafish larvae.

**Results:** PAdO-S inhibited recombinant NMDARs with comparable potency in rat and zebrafish subunits, supporting cross-species conservation of its molecular action. At synapses, PAdO-S (10  $\mu$ M) potentiated AMPA receptor-mediated EPSCs by 41.4% and decreased paired-pulse ratio by 43.4%, indicating enhanced presynaptic glutamate release.

Behavioural benchmarks established using the NMDA receptor antagonist ketamine (10–300  $\mu$ M) showed reduced locomotion. In contrast, PAdO-S increased locomotor activity without inducing abnormal movement (1–10  $\mu$ M), despite its inhibitory action on NMDA receptors.

**Conclusions:** These findings indicate that PAdO-S inhibits postsynaptic NMDARs while enhancing presynaptic glutamate release. In contrast to the NMDA receptor antagonist ketamine, PAdO-S increases zebrafish locomotion. We therefore hypothesize that this presynaptic effect may determine behavioural outcomes by overriding NMDAR inhibition, providing insight into neurosteroid action and therapeutic potential.

**Keywords:** N-methyl-D-aspartate receptor (NMDAR), Neurosteroid, 5 $\beta$ -pregnan-20-deoxo-3 $\alpha$ -yl sulfate (PAdO-S), Syn

# Effects of 8-Week EMS on Lower Limb Strength and Core Endurance in Women with Low Activity

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**Background:** Whole-body electromyostimulation (EMS) is an innovative neuromuscular training method used to improve muscle function and prevent musculoskeletal dysfunctions.

**The aim:** To assess the effects of an eight-week EMS program on lower limb strength and core muscle endurance in women with low physical activity.

**Materials and methods:** Twenty healthy women aged 37–45 years ( $M = 40 \pm 3.2$ ) were randomly assigned to the EMS group or the control group. Both groups completed 16 training sessions (2×/week, 20 minutes). The EMS group performed training supported by electrical stimulation, while the control group performed standard functional training based on basic movement patterns. Lower limb strength was assessed using the Chair Stand test, and core muscle endurance was measured with the plank test, before and after the intervention.

**Results:** In the EMS group, Chair Stand repetitions increased from  $13.1 \pm 1.7$  to  $15.5 \pm 1.5$  ( $p < 0.001$ ), and plank time increased from  $28.3 \pm 8.1$  to  $40.3 \pm 8.1$  s ( $p < 0.001$ ). In the control group, Chair Stand repetitions increased from  $14.0 \pm 1.7$  to  $15.0 \pm 1.6$  ( $p = 0.02$ ), while plank time change was not significant ( $30.5 \pm 9.5 \rightarrow 33.2 \pm 9.1$  s,  $p = 0.12$ ). Between-group comparisons showed a significant advantage of EMS in improving lower limb strength and core endurance (Chair Stand:  $p = 0.01$ ; plank:  $p < 0.001$ ), with noticeable improvements in the EMS group appearing after four weeks.

**Conclusions:** An eight-week EMS training program, compared with equivalent standard functional training, significantly improved lower limb strength and core muscle endurance in women with low physical activity. Rapid EMS effects suggest its potential for effective enhancement of muscle function and prevention of musculoskeletal dysfunctions. Given the small sample size, this study should be considered a pilot, and further research in a larger population is warranted.

**Keywords:** Electromyostimulation (EMS) Lower limb strength Core endurance Functional training Women Physical in

# The role of CD44 isoforms in the epithelial-mesenchymal plasticity of bladder cancer.

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**Background:** Epithelial-mesenchymal transition (EMT) is a reversible cellular program that enables tumors to acquire migratory and invasive properties. In addition to transcriptional regulation, increasing importance is being attributed to alternative RNA splicing, which influences the phenotypic plasticity of cells. One of the genes regulated in this process is CD44, which exists in multiple isoforms.

**The aim:** The aim of this study was to investigate the relationship between EMT and the switching of CD44 isoforms, as well as the role of ESRP proteins in regulating the phenotypic plasticity of bladder cancer cells.

**Materials and methods:** The study was conducted on RT4 and UM-UC-3 cell lines. EMT was induced in RT4 cells by treatment with TGF- $\beta$ . Changes in the expression of EMT markers, ESRP proteins, and CD44 isoforms were analyzed using RT-PCR and Western blot. Cell phenotype and surface CD44 expression were assessed using microscopy and flow cytometry.

**Results:** The RT4 and UM-UC-3 lines exhibited distinct EMT phenotypes, confirmed by morphological differences and the expression of EMT and ESRP markers. EMT induction in RT4 led to phenotypic changes, a decrease in ESRP expression, and a shift in the CD44 isoform profile from variant isoforms to the CD44s isoform. The observed changes occurred without significant differences in total CD44 levels.

**Conclusions:** The results indicate that EMT is associated with a change in the isoform composition of CD44, which is regulated by ESRP proteins. Alternative splicing of CD44, rather than its total expression, may play a significant role in regulating the phenotypic plasticity of bladder cancer cells.

**Keywords:** epithelial-mesenchymal transition (EMT), CD44 isoforms, alternative RNA splicing, ESRP proteins...

# Exposure of Toxic Trace Metals in Human Blood of Rural Population from District Okara, Pakistan; A Case Study

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**Background:** This study investigates the presence of heavy metals, specially lead (Pb), cadmium (Cd), chromium (Cr) and copper (Cu), in blood samples from a rural population in district Okara, Pakistan, and their correlation with Complete Blood Count (CBC) parameters.

**The aim:** The primary objective of this study is to measure the concentrations of Pb, Cd and Cr and evaluate their relationship with CBC parameters, including hemoglobin, red blood cells (RBC) and total leukocyte count (TLC).

**Materials and methods:** A total number of 30 human blood samples were collected. Heavy metal concentrations were determined using atomic absorption spectroscopy (AAS). Cadmium was detected in 21 samples, lead in all, and chromium in 29, while copper was not detected. Statistical analysis was conducted to explore the correlation with CBC parameters.

**Results:** The highest mean concentration were 0.22mg/L for Cd, 1.596 mg/L for Pb and 4.264 mg/L for Cr. Pb and Cr were higher in males, while Cd was higher in females. Strong positive correlation was found between heavy metals and CBC parameters, particularly lead ( $R^2= 0.9319$  for hemoglobin,  $R^2= 0.9308$  for RBC and  $R^2= 0.9308$  for TLC).

**Conclusions:** Heavy metal levels were evaluated in older individuals and males, impacting CBC parameters and indicating potential health risks from food and industrial exposure.

**Keywords:** Heavy metals, exposure, complete blood count, rural population, correlation, Pakistan.

# Antitumor activity profile of curcumin against MCF-7 estrogen-dependent breast adenocarcinoma

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**Background:** Curcumin is a natural polyphenol found in the rhizomes of *Curcuma longa*, known for its anti-inflammatory properties and potential anticancer activity. This compound has the ability to modulate numerous signaling pathways, including the regulation of gene expression, the activity of transcription factors, and inflammatory mediators, making it a subject of intense research in the context of cancer therapy. MCF-7 is an estrogen-dependent breast adenocarcinoma cell line commonly used in research on the mechanisms of carcinogenesis and the assessment of the anticancer activity of new compounds.

**The aim:** The aim of this study was to evaluate the *in vitro* anticancer activity of curcumin as a potential adjunct to cancer therapy.

**Materials and methods:** Studies were conducted on the MCF-7 estrogen-dependent breast adenocarcinoma cell line, analyzing the compound's effect on cell viability, proliferation, and migration. Cells were incubated with curcumin at concentrations of 10–200  $\mu\text{M}$  for 24 and 48 hours. Cytotoxic properties were assessed using XTT, NR, and SRB colorimetric assays, as well as cell morphology and a scratch test.

**Results:** The obtained results demonstrated that curcumin exerts cytotoxic effects in a dose- and incubation-time-dependent manner. The strongest effect was observed at a concentration of 200  $\mu\text{M}$ , where the number of viable cells was significantly reduced, particularly after 48 hours of incubation. Morphological analysis confirmed the presence of changes characteristic of apoptosis, such as cytoplasmic condensation and nuclear changes. Furthermore, curcumin significantly inhibited cancer cell migration, which may limit the process of metastasis.

**Conclusions:** The results indicate that curcumin induces cancer cell death and inhibits cell proliferation and migration, making it a promising candidate for further study as a potential adjunct to anticancer therapy.

**Keywords:** MCF-7, breast cancer, curcumin, flavonoids

# Bridging the Gap: Standardization and GMP Compliance in MSC-derived Extracellular Vesicles for Regenerative Me

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**Background:** Mesenchymal stem/stromal cells (MSCs) are crucial in regenerative medicine due to their tissue repair modulation. Evidence suggests their benefits are primarily mediated via paracrine signaling, specifically extracellular vesicles (EVs). MSC-EVs offer a promising acellular strategy for enhancing wound healing and minimizing fibrosis. However, clinical translation remains hindered by methodological inconsistencies and unresolved regulatory hurdles.

**The aim:** The aim of this study was to evaluate the therapeutic potential of MSC-derived EVs in regenerative medicine and to identify the key translational barriers, with particular emphasis on the lack of methodological standardization and Good Manufacturing Practice (GMP)-compliant production protocols.

**Materials and methods:** A structured review of research published between January 2015 and March 2026 was conducted. The analysis focused on MSC sources, EV isolation, characterization, and outcomes in wound healing. Adherence to International Society for Cell & Gene Therapy (ISCT) and International Society for Extracellular Vesicles (ISEV) guidelines was specifically examined.

**Results:** MSC-EVs consistently demonstrated the ability to promote cell proliferation, migration, and angiogenesis while modulating inflammation and extracellular matrix remodeling. However, the review revealed profound heterogeneity in EV isolation and characterization methods. Studies showed limited adherence to established ISEV standards. Furthermore, there is a critical shortage of research utilizing (GMP)-compliant protocols, which are essential for ensuring the safety and scalability of EV-based therapies.

**Conclusions:** While MSC-EVs hold transformative potential, clinical translation is stalled by lack of standardization. Variability in characterization and absence of GMP-aligned processes lead to inconsistent results. To bridge the gap between research and clinical application, the scientific community must prioritize unified, regulatory-compliant frameworks for MSC-EV production.

**Keywords:** Extracellular vesicles, Mesenchymal stromal cells, wound healing

# Impact of Simulated Artifacts on the Classification Performance of Apical Views in TEE Using CNNs

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**Background:** In recent years, artificial intelligence (AI) methods, including deep convolutional neural networks (CNNs), have gained increasing importance in supporting the automated analysis of echocardiograms.

**The aim:** The aim of this study was to evaluate the impact of selected image artifacts—motion blur, acoustic shadowing, and speckle noise—on the performance of automatic classification of standard transthoracic echocardiographic (TTE) views using deep learning models.

**Materials and methods:** The analysis included 217 TTE video clips (2170 frames) covering apical views: two-chamber (A2C), three-chamber (A3C), four-chamber (A4C), and five-chamber (A5C). Two convolutional neural network architectures—ResNet-18 and ResNet-34—were applied, initialized with weights pretrained on the ImageNet dataset (transfer learning). In a limited comparative scope, EfficientNet-B0, a ViT model used as a frozen feature extractor combined with Logistic Regression, and a classical HOG + SVM model were also included as reference methods. Classification performance was evaluated under conditions of controlled image degradation caused by motion blur, acoustic shadowing, and speckle noise.

**Results:** All artifacts reduced classification performance, with effects varying by type. Speckle noise was most destructive, causing performance collapse at high severity. Motion blur and acoustic shadowing led to more varied degradation. ResNet models performed best on reference data, but rankings changed after degradation. HOG + SVM showed the smallest relative loss under motion blur and the highest balanced accuracy under severe acoustic shadowing, while severe speckle remained critical for all models.

**Conclusions:** Image quality degradation reduces TTE view classification performance, and evaluating only high-quality images fails to capture model robustness. This highlights the need for robustness testing on degraded data and more clinically realistic training and validation setups.

**Keywords:** AI; TEE; CNN; image quality; motion blur; acoustic shadowing; speckle noise

# ESRP2 as a Regulator of Cisplatin Sensitivity in Bladder Cancer Cells in In Vitro and In Vivo Models

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**Background:** Variability in response to cisplatin remains a significant challenge in the treatment of bladder cancer. However, the mechanisms determining cancer cell sensitivity to therapeutic stress are still poorly understood. ESRP2 is a regulator of the epithelial phenotype and cellular plasticity, suggesting its potential role in shaping treatment response.

**The aim:** The aim of this study was to evaluate the effect of ESRP2 on the sensitivity of bladder cancer cells to cisplatin and to determine whether this effect is observed in both in vitro and in vivo conditions.

**Materials and methods:** Cell viability analysis was performed in bladder cancer cells with overexpression of ESRP1 and ESRP2 in response to increasing concentrations of cisplatin. Subsequently, the impact of ESRP expression on treatment response was evaluated in a mouse model with subcutaneously implanted tumor cells.

**Results:** Cells overexpressing ESRP2 demonstrated increased sensitivity to cisplatin compared to controls, as evidenced by reduced viability in in vitro assays. This effect was more pronounced than that observed for ESRP1.

In the in vivo model, tumors expressing ESRP2 exhibited a stronger response to cisplatin treatment, resulting in inhibited tumor growth. Differences between ESRP1 and ESRP2 suggest distinct roles of these proteins in regulating therapy response.

**Conclusions:** ESRP2 enhances the sensitivity of bladder cancer cells to cisplatin and may serve as an important regulator of the response to therapeutic stress. The findings suggest that ESRP2-mediated changes in cellular state influence the ability of cancer cells to survive treatment.

**Keywords:** ESRP2, ESRP1, Bladder cancer, cisplatin

# Knowledge, Attitudes, and Photoprotective Behaviors Regarding Solar Radiation and Vitamin D Synthesis Among Po

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**Background:** Solar ultraviolet (UV) radiation is a primary modifiable risk factor for skin cancer and photoaging, while also being essential for vitamin D synthesis. Effective prevention depends on the population's ability to translate health awareness into consistent photoprotective behaviors.

**The aim:** To evaluate knowledge, attitudes, and photoprotective habits regarding solar UV radiation and vitamin D synthesis among Polish adults, and to identify factors influencing these behaviors.

**Materials and methods:** A cross-sectional online survey was conducted among 600 Polish adults. Knowledge of UV health effects, risk perception, and photoprotective habits were assessed. Statistical analysis was performed using the chi-square test.

**Results:** High general awareness was observed regarding skin cancer risk (90.2%) and photoaging (89.7%). However, technical knowledge was poor: only 20.5% correctly identified UVA as the deepest-penetrating radiation, and 55.3% were unaware of therapeutic UVB applications. Statistical analysis revealed that while higher education was significantly associated with better knowledge of UV radiation ( $p = 0.002$ ), there were no significant correlations between photoprotective behaviors (regular SPF use) and factors such as gender ( $p = 0.419$ ), age ( $p = 0.396$ ), or fear of skin cancer ( $p = 0.443$ ). Furthermore, 80.0% recognized the role of UV in vitamin D synthesis, but knowledge level did not significantly influence supplementation habits ( $p = 0.214$ ).

**Conclusions:** A significant 'awareness-behavior gap' exists in the Polish population. High general knowledge and fear of skin cancer do not translate into regular use of photoprotection. Since education level is the primary determinant of technical knowledge, public health campaigns should focus not only on increasing awareness but on developing practical skills and psychological interventions to promote consistent photoprotective habits.

**Keywords:** UV radiation, vitamin D, solar radiaton

# Associations Between Orthorexia Dimensions and Body Fat Levels in Adolescent Elite Soccer Players

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**Background:** Appropriate nutrition and optimal body composition are key factors determining athletic performance. In pursuit of the best possible results, athletes often place strong emphasis on dietary quality, which in some cases may intensify and lead to an excessive preoccupation with healthy eating. To distinguish between adaptive and maladaptive forms of this behavior, the literature differentiates between healthy orthorexia and orthorexia nervosa. Healthy orthorexia refers to a non-pathological, health-oriented interest in diet and nutritious eating. In contrast, orthorexia nervosa is characterized by an excessive focus on healthy eating, accompanied by rigid dietary restrictions, emotional burden, and impairment in daily functioning.

**The aim:** The aim of the study was to examine the associations between healthy orthorexia, orthorexia nervosa, and body fat levels among adolescent soccer players.

**Materials and methods:** The study employed bioelectrical impedance analysis (BIA) to assess body composition and used the Teruel Orthorexia Scale (TOS) to measure the two dimensions of orthorexia. The study was conducted on adolescent soccer players from a professional soccer academy.

**Results:** The results indicated no significant relationship between either healthy orthorexia or orthorexia nervosa and body fat levels, but revealed a highly significant positive association between the two orthorexia dimensions.

**Conclusions:** The observed significant association between the two dimensions of orthorexia highlights the complexity of eating attitudes in adolescent athletes. At the same time, the lack of a relationship with body fat levels suggests that orthorexic tendencies may hold greater psychological than physiological relevance. Future research should also consider training-related, recovery-related, and stress-related factors.

**Keywords:** orthorexia, orthorexia nervosa, soccer players, adolescent, eating behavior, body composition

# The Effect of Vitamin D<sub>3</sub> Supplementation on Cognitive Function in Young Soccer Players: A Randomized Placebo-C

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**Background:** Vitamin D is essential for the functioning of the nervous system, influencing, among others, cognitive processes, concentration, and working memory. Vitamin D deficiency is common among athletes, particularly during the autumn–winter period.

**The aim:** The aim of this study was to evaluate the effect of 8-week vitamin D<sub>3</sub> supplementation at a dose of 4000 IU per day on cognitive function in young soccer players. Additionally, the prevalence of vitamin D insufficiency and deficiency in the study group was assessed.

**Materials and methods:** The study included 50 soccer players (25 juniors and 25 seniors) with a mean height of 178 ± 3 cm, body mass of 80.3 ± 4.2 kg, and body fat percentage of 13.3 ± 3.2%. Participants were randomly assigned to either a supplementation group (n = 25, 13 juniors and 12 seniors), receiving 4000 IU of vitamin D<sub>3</sub> daily, or a placebo group (n = 25, 12 juniors and 13 seniors). The intervention lasted 8 weeks. Serum 25(OH)D concentrations were measured before and after the intervention. Cognitive function was assessed using the Corsi Block-Tapping Test.

**Results:** Serum 25-hydroxyvitamin D showed significant effects of time [ $F(1,37)=9.47$ ,  $p=0.004$ ,  $\eta^2=0.204$ ] and group [ $F(3,37)=4.13$ ,  $p=0.013$ ,  $\eta^2=0.251$ ], with no time×group interaction [ $F(3,37)=2.45$ ,  $p=0.079$ ]. Post hoc analyses showed moderate, non-significant increases in supplemented groups ( $d=0.688-0.719$ ), with no changes in placebo groups. Corsi Block Test: No main effects of time [ $F(1,39)=0.28$ ,  $p=0.600$ ] or group [ $F(3,39)=1.29$ ,  $p=0.293$ ] for block span (BT), but a significant time×group interaction [ $F(3,39)=3.60$ ,  $p=0.022$ ,  $\eta^2=0.217$ ]. Post hoc results showed moderate changes: increased BT in supplemented adults ( $d=0.547$ ) and decreased BT in junior placebo ( $d=-0.753$ ), not significant after correction.

**Conclusions:** Vitamin D<sub>3</sub> (4000 IU/day, 8 weeks) increased 25(OH)D levels. No overall cognitive effect was found, though interactions and effect sizes suggest possible age- and baseline-dependent effects. Further research is needed.

**Keywords:** Vitamin D<sub>3</sub> Supplementation Cognitive Function Young Soccer Players

# CXR-Age Gap: Deep Learning Biological Age Estimation from Chest X-Rays Predicts Mortality

Deya aldeen Anas Turki Al drabee

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**PhD candidate**

**Background:** Biological age diverges from chronological age and more strongly predicts mortality. Current biomarkers such as epigenetic clocks are expensive, slow, and inaccessible in routine care. Chest X-rays (CXR) are universal, cheap, and encode structural aging signatures. We hypothesized that the discrepancy between AI-predicted and true age from CXR (the CXR-Age Gap) captures biological aging and predicts mortality.

**The aim:** To develop a deep learning model estimating biological age from chest X-rays and evaluate whether the CXR-Age Gap independently predicts 30-day, 90-day, and 1-year all-cause mortality.

**Materials and methods:** We collected 404,812 frontal CXRs from five public datasets across three continents (MIMIC-CXR, CheXpert, PadChest, RexGradient, CASIA), paired with verified age, sex, and race. DenseNet-121 was trained in two stages: broad training on all images then fine-tuning on normal CXRs. An 80/20 split was strictly enforced. Logistic regression and Cox proportional hazards models assessed mortality associations, adjusting for age, sex, race, and comorbidities. AUC was compared between a clinical baseline and a model augmented with the gap.

**Results:** On 80,000 held-out images, MAE was 3.6 years and Pearson  $r=0.85$ . Mean gap was -0.2 years with no systematic bias. Each 5-year gap increase was associated with 22% higher adjusted odds of 30-day mortality, 25% for 90-day, and 18% higher hazard of 1-year mortality (all  $p<0.001$ ). Adding the gap improved AUC from 0.79 to 0.83. Two-stage training outperformed normal-only (MAE 4.7) and all-data strategies (MAE 5.3).

**Conclusions:** The CXR-Age Gap is a clinically interpretable, universally accessible biomarker of biological aging derivable from routine imaging. It independently predicts short- and long-term mortality beyond established clinical variables, improving prognostic discrimination. Saliency mapping confirmed the model attends to anatomically meaningful aging structures — heart, mediastinum, pulmonary vasculature — without explicit supervision.

**Keywords:** biological age, chest X-ray, deep learning, mortality prediction, CXR-Age Gap, DenseNet-121

# Evaluation Of Postoperative Complications After Stoma Formation Surgery

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**Background:** Stoma formation surgery remains one of the most common life-saving surgeries worldwide. The number of people living with stoma in Europe reaches 650,000. The creation of stoma can lead to early or late postoperative complications which can cause prolonged hospital stay and treatment.

**The aim:** To evaluate patients' early and late postoperative complications after stoma formation surgery.

**Materials and methods:** A prospective study involving 105 participants who had primary stoma formation surgery. Demographic (age, gender, BMI) and clinical indicators (stoma type, postoperative complications) were analyzed. Early complications were evaluated within 30 days post-surgery using Clavien-Dindo Classification (CDC). Late complications were assessed 2 months post-surgery using the DET Score scale.

**Results:** 105 participants (57 woman, 48 man) were involved in the study, average age 67 years. 74,29% of participants had a colostomy, 23,81% – ileostomy, and 1,9% had both a colostomy and an ileostomy. The primary reason for stoma formation was colorectal cancer (81,9%). Early postoperative complications occurred in 37,29% (44 out of 118) of patients, with the majority being classified as CDC grade II-15,3% (18 out of 118). Late complications were observed in 33,33% (35 out of 105) of patients, with 20,9% (22 out of 35) scoring below 5 on the DET Score. Peristomal skin damage was the most common late complication, affecting 84,85% (30 out of 35) of patients. Women experienced more early complications and more severe late complications than men.

**Conclusions:** The most common early complication required pharmacological management only. Peristomal skin damage was the most common late complication.

**Keywords:** Stoma, Postoperative Complications, Clavien-dindo clasification (CDC), DET score.

# Not All Gut Anaerobes Are Equal: Clindamycin Resistance in *Bacteroides*, *Phocaeicola*, and *Parabacteroides*

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**Background:** Gram-negative anaerobes of the genera *Bacteroides*, *Phocaeicola*, and *Parabacteroides* are common gut commensals but may also cause severe infections in clinical settings. Despite their shared niche within *Bacteroidales*, they differ in antimicrobial susceptibility. Clindamycin is widely used against anaerobes, yet rising resistance limits its effectiveness. Resistance is primarily mediated by ribosomal methyltransferases, efflux mechanisms, and enzymatic inactivation (encoded by *erm*, *msrA*, *mefA*, and *linA* genes, respectively).

**The aim:** This study compared clindamycin susceptibility among clinical isolates of *Bacteroides*, *Phocaeicola*, and *Parabacteroides* and analyzed the distribution of resistance genes (*ermB*, *ermF*, *ermG*, *msrA*, *mefA*, and *linA*).

**Materials and methods:** A total of 79 isolates collected in Poland in 2023–2024 from patients with gastrointestinal diseases were identified by MALDI-TOF MS. Clindamycin susceptibility was determined using disk diffusion according to EUCAST, and resistance genes were detected by PCR.

**Results:** Overall, 39.2% of isolates were resistant to clindamycin, with resistance rates varying widely among the 14 species studied (0–100%). The *linA* (89–100%) and *mefA* (37.5–87%) genes were highly prevalent, whereas *ermF* showed a moderate prevalence (44.3%) with substantial interspecies variability. The remaining genes occurred rarely (<12%). Among all analyzed determinants, only *ermF* was strongly associated with reduced clindamycin susceptibility ( $p < 0.001$ ), resulting in substantial reductions in inhibition zone diameters. A weak association was observed for *mefA*, while no correlations were found for *ermB*, *ermG*, *linA*, or *msrA*. Gene distribution was largely similar across genera, except for *mefA*, which differed between *Bacteroides* and *Parabacteroides* (79% vs 38%,  $p < 0.05$ ) without phenotypic impact.

**Conclusions:** Clindamycin resistance among anaerobes isolated in Poland was species-dependent and primarily associated with *ermF*, while *linA* and *mefA* were common but poorly predictive of resistance.

**Keywords:** anaerobic bacteria, *Bacteroidales*, clindamycin resistance, *erm* gene, gut anaerobes

# Comparative Analysis of MCTS and OS for Cardiovascular Risk Assessment

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**Background:** Overlap syndrome (OS) is a group of autoimmune conditions that meet the diagnostic criteria of at least two connective tissue diseases. Mixed connective tissue disease (MCTD) is a separate entity that presents with symptoms of other autoimmune conditions, with the presence of anti-U1-RNP antibodies. Studies suggest that the risk of mortality from cardiovascular diseases (CVD) is higher in MCTD, however only a few studies assessed the CVD risk in OS.

**The aim:** We aimed to compare the characteristics in patients with MCTD and with overlap syndromes, especially in terms of CVD risk.

**Materials and methods:** The study consisted of 10 patients (MCTD, n = 5 and overlap syndromes, n = 5). Data was collected prospectively. To assess CVD risk, USG Doppler examination was used to measure intima media thickness (IMT). Moreover, laboratory tests were performed, along with ABI index measurements. Data regarding the course of the disease was gathered by the interview and dedicated questionnaires.

**Results:** Hands swelling, headache, heart palpitations were more common in MCTD group, while dysphagia, erythema, skin ulcerations, teleangiectasia, and skin sclerosis were less frequent among MCTD than overlap patients. The IMT of carotid common artery (CCA) was significantly larger in OS group (0.43mm vs 0.8mm,  $p < 0.015$ ), although more patients with MCTD were diagnosed with a presence of atherosclerotic plaques in CCA. The average ABI index scores were comparable for both groups. The same number of patients was diagnosed with a presence of Raynaud phenomenon and interstitial lung disease. The prevalence of hypertension and arrhythmia was identical in both groups. Notably, pericarditis occurred exclusively in the MCTD cohort. MCTD group presented higher values of inflammatory markers, NT-pro BNP as well as more frequent haematologic involvement as compared to the OS group.

**Conclusions:** The disease phenotype differs between MCTD and other overlap syndromes. MCTD is associated with higher cardiovascular risk than OS.

**Keywords:** mixed connective tissue disease, overlap syndrome, cardiovascular risk assessment

# In vitro antibacterial efficacy of contact lens solutions and eye drops against *Pseudomonas aeruginosa*.

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**Background:** *Pseudomonas* spp. is an opportunistic pathogen capable of causing a wide range of infections, owing to its ability to readily colonize and persist on various surfaces. It rapidly forms biofilms on medical devices such as contact lenses and periorcular preparations, posing a risk of severe anterior eye infections, including corneal ulcers, potentially leading to perforations and vision loss.

**The aim:** To evaluate the antibacterial activity of selected ophthalmic drops or preparations dedicated for contact lens wearers and reference antibiotics against clinical strains of *P. aeruginosa*.

**Materials and methods:** Nine clinical isolates of *P. aeruginosa* and one reference strain (ATCC 27853) were analyzed. Antibacterial activity of six tested substances [A- OcuPure (0,005%), B-Chlorhexidine digluconate, C- Hexamidine diisethionate and Polyhexanide hydrochloride, D- Polyaminopropyl biguanide (0.0001%), E- PHMB (0.0001%), F- Hydrogen peroxide 3%] was assessed using the well diffusion method (applied volumes: 30 µl and 60 µl). Concurrently, susceptibility to common ophthalmic antibiotics such as levofloxacin, ofloxacin, tobramycin, neomycin, gentamicin, and azithromycin was determined using the disk diffusion method.

**Results:** Substances A–F showed no inhibitory effect against any isolate (0 mm). All strains were naturally resistant to azithromycin and neomycin. 90% were susceptible to tobramycin and gentamicin. Among fluoroquinolones, 8 isolates showed susceptibility only at increased exposure; all were resistant to ofloxacin.

**Conclusions:** Simple immersion of contact lenses in solution at the moment of contamination does not guarantee elimination of rods; therefore, mechanical rubbing should always be performed as an essential step in proper lens hygiene. Standard ophthalmic drops without antibiotics are insufficient to control the development of infection. Topical therapeutic options representing the most appropriate first-line treatment are aminoglycosides.

**Keywords:** contact lenses, *Pseudomonas* spp., bacterial keratitis, antibacterial resistance, biofilm

# Why Enucleation Still Matters: A 20-Year Retrospective Study of Retinoblastoma in Latvia

Elina Radzina

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**Background:** Retinoblastoma is the most common primary intraocular malignancy in childhood. Although eye-preserving modalities have improved, enucleation remains necessary in selected advanced cases.

**The aim:** To evaluate statistical data about retinoblastoma patients in Latvian population with particular focus on cases requiring enucleation.

**Materials and methods:** A retrospective review was conducted between March 2005 and March 2025. Data included sex, laterality, presenting symptoms, age at diagnosis, timing of enucleation, and RB1 testing. Tumor stage was classified per eye using the International Classification of Retinoblastoma (ICRB). Descriptive statistics were applied.

**Results:** Seventeen patients were identified: 11 (64.7%) male and 6 (35.3%) female. Unilateral disease occurred in 10 patients (58.8%) and bilateral disease in 7 (41.2%). Bilateral retinoblastoma was diagnosed significantly earlier than unilateral disease ( $7.9 \pm 9.2$  vs.  $28.0 \pm 13.0$  months;  $p = 0.002$ ). Enucleation was performed in 11 patients, from which unilateral presentation in 6 (54.5%) and bilateral in 5 (45.5%) cases. Among staged eyes ( $n = 16$ ), advanced disease was common, with stage E being most frequent (43.7%). In patients later undergoing enucleation, leukocoria was the most common initial symptom (7/11), frequently accompanied by concurrent symptoms such as strabismus, changes in vision, eyeball size or behavior. In 90.9% of cases, abnormalities were first noticed by family members. Age at diagnosis in enucleated patients ranged from 2 to 47 months (mean  $22.7 \pm 17.3$  months). Time from diagnosis to enucleation ranged from 3 to 229 days (mean  $47.1 \pm 66.4$  days). RB1 mutations were detected in 57.1% of genetically tested enucleation cases.

**Conclusions:** Retinoblastoma cases in Latvia show a high proportion of advanced-stage disease among enucleated eyes, highlighting the need for stronger healthcare professional involvement in early detection. Nationwide guidelines and a genetic risk family database should be implemented to improve patient outcomes.

**Keywords:** Retinoblastoma; Enucleation; Pediatric tumors; RB1 gene

# Genetic variation influences baseline lipid profile but not LDL response after STEMI

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**Background:** Genetic variation in lipid-related pathways influences baseline lipid levels. We investigated whether cumulative lipid genetic burden affects baseline lipid phenotype and LDL cholesterol reduction in STEMI patients.

**The aim:** To evaluate whether a polygenic lipid score (PLS) influences baseline lipid levels and LDL cholesterol reduction after STEMI.

**Materials and methods:** Ninety-three STEMI patients underwent lipid profiling at admission and after 6 months. Genotyping included >300 variants, from which a lipid-focused panel was constructed (APOE, LDLR, PCSK9, APOB, HMGCR, SLCO1B1, ABCG2, and KIF6). A PLS was generated by summing lipid-increasing alleles across selected variants and standardized (z-score). Associations between PLS and baseline lipid parameters as well as LDL change ( $\Delta$ LDL) were assessed using multivariable linear regression adjusted for age, sex, and smoking status.

**Results:** Mean LDL reduction over 6 months was:  $\Delta$ LDL =  $-1.46 \pm 0.97$  mmol/L. A higher polygenic lipid score (PLS) was associated with an unfavorable baseline lipid profile, demonstrating the expected cumulative genetic effect on lipid metabolism. Despite its effect on baseline lipids, the PLS showed no strong association with LDL reduction ( $\Delta$ LDL) following treatment. Among individual genetic predictors, CYP2C19 phenotype showed the strongest association with LDL response to statin use:  $\beta = 0.63$ ,  $p = 0.0008$ . This indicates that carriers of the CYP2C19 reduced function phenotype experienced smaller LDL reductions. A transport-protein pathway genetic score demonstrated a modest association with LDL response:  $\beta = -0.23$ ,  $p = 0.023$ , suggesting that genetic variation affecting statin transport may influence treatment efficacy. Model performance analysis: Clinical model: AUC = 0.68; genetic model: AUC = 0.74; full SNP model: AUC = 0.57.

**Conclusions:** A weighted PLS demonstrated a positive association with  $\Delta$ LDL, indicating that higher genetic burden is associated with reduced lipid-lowering response; however, the effect size was modest and inconsistent.

**Keywords:** STEMI, LDL cholesterol, PLS, lipid metabolism, statin response, genetic variation

# Improvement in Adipokines, Epicardial Fat, and GLS After Bariatric Surgery in Obesity

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**Background:** In preclinical obesity, defined as obesity without known cardiovascular disease, mild and potentially reversible myocardial dysfunction is often present, including impaired global longitudinal strain (GLS). Bariatric surgery induces major weight loss and cardiometabolic improvement, but it is unclear whether myocardial recovery is more closely linked to adipokine-related changes or to broader cardiometabolic improvement.

**The aim:** To assess whether changes in adipokine domains after bariatric surgery are associated with changes in epicardial adipose tissue (EAT) and/or GLS, independent of baseline cardiometabolic burden.

**Materials and methods:** In this prospective multicentre cohort, 135 participants with preclinical obesity undergoing bariatric surgery were studied before surgery and at 1 year. EAT thickness and GLS were measured echocardiographically. Circulating adipokines were quantified using the Olink Target 96 Cardiovascular III panel. Domain II and III scores were constructed from baseline z-scores. Associations of changes in EAT and GLS with per 1 SD reduction in domain scores were assessed using multivariable linear regression.

**Results:** Median age was 52 years, 80% were women, median BMI was 41.0 kg/m<sup>2</sup>, median EAT 4.7 mm, and mean GLS -17.0%. At 1 year, BMI decreased to 28.2 kg/m<sup>2</sup>, EAT to 3.4 mm, and GLS improved to -18.4% (all p<0.001). Domain II and III scores also decreased. Reductions in both domains were consistently associated with greater EAT reduction, including after adjustment for age, sex, baseline BMI, hypertension, and diabetes. For GLS, the association with domain III lost significance after additional adjustment; no significant association was found for domain II.

**Conclusions:** In preclinical obesity, bariatric surgery is accompanied by parallel reductions in EAT and favourable adipokine changes. The adipokine–EAT association remained robust after adjustment, whereas improvement in subclinical myocardial dysfunction appeared more consistent with broader multifactorial cardiometabolic recovery.

**Keywords:** Obesity; bariatric surgery; adipokines; epicardial adipose tissue; global longitudinal strain

# Proactive Screening for Early Identification of Heart Failure in Individuals With Obesity

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**Background:** Obesity is associated with an approximately twofold higher risk of heart failure (HF), yet HF in this population is often underrecognized or diagnosed late. This is partly due to more nonspecific symptom presentation and reduced diagnostic accuracy of biomarkers in obesity. As obesity prevalence rises, populations age, and HFpEF becomes increasingly predominant, this problem is expected to become more relevant.

**The aim:** To evaluate the yield of proactive screening for early identification of HF and treatable HF-related risk factors in individuals with obesity.

**Materials and methods:** SCOR(HF)E (Screening Adults with Obesity to Reduce Heart Failure Events) is a pragmatic randomized controlled trial in Rotterdam. Adults aged  $\geq 45$  years with BMI  $> 30$  kg/m<sup>2</sup> and no cardiac history were randomized 1:1 to screening or usual care (n=420 total; n=210 screening). The screening strategy consisted of history taking, physical examination, laboratory testing including NT-proBNP, electrocardiography, and transthoracic echocardiography, followed by referral or usual care as appropriate.

**Results:** In the screened group, median age was 58 years, 70% were women, and median BMI was 34.8 kg/m<sup>2</sup>. Dyspnoea on exertion was present in 56%, peripheral oedema in 44%, dyspnoea at rest in 10%, and orthopnoea in 11%. Hypertension was present in 50% (22% de novo), type 2 diabetes in 9% (2% de novo), and dyslipidaemia in 81% (54% de novo). Suspected HF was identified in 54% of participants. Following screening, 56.7% were referred to a cardiologist, 42.9% to a general practitioner, and 0.5% required no referral. Post-screening, HF risk treatment was initiated in 79.5%, HF treatment in 20.0%, and no treatment in 0.5%.

**Conclusions:** Proactive screening in individuals with obesity identifies a substantial burden of HF and cardiovascular risk factors. This approach may promote earlier recognition and treatment of HF and related risk factors, with potential to improve outcomes and enable more efficient use of healthcare resources.

**Keywords:** Obesity; heart failure; screening; early diagnosis; risk factors; echocardiography

# Quantitative DNA analysis of gut microbiota in type 2 diabetes and obesity – a preliminary study.

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**Background:** The composition of the gastrointestinal microbiota has been associated with metabolic disorders, including type 2 diabetes mellitus, obesity, and metabolic dysfunction-associated steatotic liver disease (MASLD). Commonly investigated markers include the relative abundance of taxa within the phyla Firmicutes and Bacteroidetes. However, the Firmicutes-to-Bacteroidetes ratio alone is not a consistent or universal indicator of metabolic status. In addition, the abundance of specific bacterial genera, such as *Prevotella* and *Ruminococcus*, is frequently assessed due to their potential roles in carbohydrate metabolism, short-chain fatty acid production, and host metabolic regulation.

**The aim:** To evaluate the feasibility of microbiota analysis in the context of metabolic diseases and their pharmacotherapy using quantitative PCR (qPCR)-based methods.

**Materials and methods:** DNA was isolated from three human stool samples using the Genomic Mini AX Stool kit. Quantitative analysis of selected bacterial taxa, including the phyla Firmicutes and Bacteroidetes and the genera *Prevotella* and *Ruminococcus*, was performed using qPCR with previously validated primers.

**Results:** Bacterial DNA was successfully extracted from all samples, and all target taxa were detected using qPCR.

**Conclusions:** The applied methodology enables quantitative assessment of selected gut microbiota components. This approach may be useful in future studies investigating associations between microbiota composition and metabolic disorders, as well as in evaluating potential changes related to therapeutic interventions. However, further studies with larger cohorts and more comprehensive microbiome profiling are required for clinically relevant conclusions.

**Keywords:** gut microbiota, type 2 diabetes mellitus, obesity, qPCR, Firmicutes, Bacteroidetes

# When transaminases are not enough: Emerging Biomarkers in Acetaminophen-Induced Liver Injury

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**Background:** Paracetamol poisoning is still the main cause of drug-induced liver injury (DILI). The literature also points to complications such as rhabdomyolysis and acute kidney injury (AKI). Poisoning most commonly occurs through the intentionally taking of high doses of this drug, and less frequently as a side effect of pain management.

**The aim:** The aim of this study is to identify a new, useful parameter indicating the occurrence of early complications of acute paracetamol poisoning.

**Materials and methods:** The study group consisted of 192 patients admitted between 2023 and 2025 to the Department of Toxicology at Hospital No. 5 in Sosnowiec. The mean age was 22.6 years, and 144 (75%) were women. The medical history and selected elements of the clinical interview were analysed. Laboratory tests assessed transaminase activity, creatine kinase, and the concentration of procalcitonin, iron, creatinine, urea, C-reactive protein, and coagulation time (INR). Inclusion criteria included age over 12 years and ingestion of a toxic dose of paracetamol exceeding 5000 mg. The results were subjected to statistical analysis using Statistica 14.0.

**Results:** Patients who developed DILI were found to have elevated procalcitonin levels, despite the exclusion of infectious causes. Furthermore, an increase in procalcitonin was observed in blood tests taken on admission to hospital, while an increase in aminotransferase levels and a rise in INR occurred only on the second day. A positive correlation was found between procalcitonin levels and serum paracetamol concentrations, but there was no correlation with the amount of paracetamol taken. No significant abnormalities were found in creatinine, urea or CRP levels.

**Conclusions:** This study is the first to suggest the potential usefulness of procalcitonin in assessing the risk of DILI, thereby allowing for earlier initiation of detoxification therapy.

**Keywords:** paracetamol poisoning, liver injury, procalcitonin, rhabdomyolysis

# Perioperative IL-6 changes in women with primary hyperparathyroidism and vitamin D<sub>3</sub> deficiency

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**Background:** Primary hyperparathyroidism (PHPT) is associated with metabolic disturbances and may contribute to systemic inflammation. Interleukin-6 (IL-6) is a key proinflammatory cytokine, and its levels may be influenced by both PHPT and vitamin D<sub>3</sub> deficiency.

**The aim:** To evaluate perioperative changes in serum IL-6 levels in female patients with PHPT and vitamin D<sub>3</sub> deficiency.

**Materials and methods:** The study included 25 female patients undergoing surgical treatment for PHPT between November 2022 and May 2023. All patients had vitamin D<sub>3</sub> deficiency (mean  $22.7 \pm 4.7$  ng/ml), and the mean age was  $58.7 \pm 12.9$  years. Serum samples were collected 24 hours before surgery and on the 4th postoperative day. IL-6 concentrations were measured using a multiplex immunoassay based on the Bio-Plex 200 system (Bio-Rad Laboratories, USA). Statistical significance was set at  $p < 0.05$ .

**Results:** A significant decrease in IL-6 levels was observed following surgical treatment ( $p < 0.001$ ). Median IL-6 concentration decreased from 0.241 pg/ml preoperatively to 0.021 pg/ml postoperatively.

**Conclusions:** Surgical treatment of PHPT is associated with a significant reduction in serum IL-6 levels, suggesting a decrease in systemic inflammatory response.

**Keywords:** primary hyperparathyroidism, IL-6, vitamin D deficiency, inflammation, parathyroidectomy, cytokines

# Genetic Profile of Pediatric Patients with Channelopathies and Conduction Disorders: NGS Analysis

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**Background:** Inherited cardiac channelopathies, including long QT syndrome (LQTS), conduction disorders, and catecholaminergic polymorphic ventricular tachycardia (CPVT), are important causes of life-threatening arrhythmias and sudden cardiac death in the pediatric population. Current guidelines emphasize the role of genetic testing in diagnosis and risk stratification.

**The aim:** To assess the genetic profile of pediatric patients with suspected channelopathies and conduction disorders using next-generation sequencing (NGS).

**Materials and methods:** NGS results of 15 pediatric patients evaluated for suspected LQTS, short QT syndrome, CPVT, or conduction disorders were analyzed. Mean age was 11.5 years (range: 12 days–17.8 years). Whole exome sequencing was performed in 7 patients and targeted NGS panels in 8. At the time of analysis, results for 13 patients were available.

**Results:** A positive genetic result (pathogenic, likely pathogenic, or variant of uncertain significance – VUS) was identified in 9/13 patients (69.2%). One pathogenic variant was detected in KCNA5 (p.Gln380His). In total, 22 VUS were identified in genes associated with channelopathies (KCNH2, CACNA1C, RYR2, ANK2), cardiovascular disorders (DSP, EYA4, LZTR1), and cellular signaling pathways. An incidental pathogenic BRCA1 variant was detected in one patient.

**Conclusions:** NGS enables identification of potential genetic background of channelopathies in pediatric patients. The high proportion of VUS highlights the need for longitudinal follow-up, segregation analysis, and periodic variant reclassification. Genetic findings should be interpreted in the clinical context. Study limitations include small sample size and incomplete data for some patients.

**Keywords:** cardiac channelopathies, conduction disorders, next-generation sequencing, WES

# Pharmacotherapy Experience and Weight Stigma Are Associated with Perceptions of Obesity Treatment Communication

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**Background:** Obesity management is influenced not only by clinical factors but also by psychosocial experiences, including previous treatment and perceived stigma. These factors may affect how patients interpret and evaluate health-related communication.

**The aim:** To assess whether experience with pharmacological treatment for overweight or obesity and perceived weight stigma are associated with differences in the evaluation of obesity-related communication.

**Materials and methods:** A cross-sectional online survey was conducted among 233 adults. Participants evaluated five domains of obesity-related communication using Likert-scale items aggregated into composite scores. Weight status (BMI), history of pharmacotherapy, and perceived stigma were analyzed. Group comparisons were performed using independent samples t-tests.

**Results:** Participants with pharmacotherapy experience rated several communication domains lower than those without such experience, particularly in Blocks 1–3 (all  $p < 0.001$ ) and Block 5 ( $p = 0.01$ ), while no difference was observed for Block 4 ( $p = 0.45$ ). They also reported significantly higher levels of weight-related stigma ( $p < 0.001$ ). No significant differences in communication ratings were observed between participants with overweight/obesity and those without (all  $p > 0.05$ ). However, participants with overweight or obesity reported significantly higher levels of perceived stigma ( $p < 0.001$ ).

**Conclusions:** Experience with pharmacological treatment appears to be more strongly associated with the perception of obesity-related communication than BMI. Higher levels of perceived stigma were observed in both participants with pharmacotherapy experience and those with overweight or obesity, indicating the relevance of psychosocial factors in clinical communication.

**Keywords:** obesity, pharmacotherapy, weight stigma, communication, patient perception, BMI

# Regional Variation in the Prevalence of Asthma and Atopic Diseases Among Children in Southern Poland

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**Background:** Asthma, allergic rhinitis, and atopic dermatitis are common chronic diseases in childhood and frequently coexist. Regional differences in allergic disease burden have been reported in Central and Eastern Europe, but detailed data from southern Poland remain limited.

**The aim:** This study aimed to assess the prevalence, multimorbidity, age of onset, and regional variation of asthma and atopic diseases among school-aged children.

**Materials and methods:** A cross-sectional study included 1,907 primary schoolchildren from six cities in southern Poland (Rybnik, Katowice, Beskid). Data were collected using a standardized parent-reported questionnaire based on validated instruments, including elements of the ISAAC survey. Physician-diagnosed asthma, allergic rhinitis, and atopic dermatitis were analyzed. Multimorbidity was defined as  $\geq 2$  conditions. Statistical analyses included chi-square tests, Kruskal–Wallis tests, and multivariable logistic regression.

**Results:** Allergic rhinitis was most prevalent (19.5%), followed by atopic dermatitis (14.8%) and asthma (6.9%). Overall, 29.4% had  $\geq 1$  condition, 9.7% multimorbidity, and 1.7% the atopic triad. Median age at diagnosis differed ( $p < 0.001$ ): atopic dermatitis (2 years), asthma (3 years), and allergic rhinitis (4 years), with no regional variation.

Prevalence varied by region. Asthma was highest in Rybnik (8.1%) vs Beskid (7.2%) and Katowice (3.8%) ( $p = 0.015$ ). Allergic rhinitis was highest in Beskid (25.9%) vs Rybnik (17.3%) and Katowice (17.8%) ( $p < 0.001$ ). Atopic dermatitis also differed (16.1%, 15.5%, 10.7%;  $p = 0.028$ ). Any allergic disease was most common in Beskid (36.0%) vs Katowice (26.0%) and Rybnik (22.9%) ( $p < 0.001$ ). Wheezing in the past 12 months was strongly associated with all conditions and multimorbidity.

**Conclusions:** Atopic diseases are common in southern Poland and show marked regional variation. Consistent age-of-onset patterns support the atopic march, while geographic differences suggest environmental influences.

**Keywords:** Asthma; Allergic rhinitis; Atopic dermatitis; Multimorbidity; Atopic march

# Walled-off pancreatic necrosis following distal pancreatectomy - characteristics and outcomes

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**Background:** Walled-off pancreatic necrosis (WON) is a well-recognized, heterogeneous collection of liquid and solid necrotic material that develops usually after 4 weeks. This is a complication of acute necrotizing pancreatitis, but it can also occur in the course of chronic pancreatitis, as a complication of distal pancreatectomy (DP), splenectomy, or traumatic pancreatitis. The gold standard for treating WON is endoscopic drainage.

**The aim:** The aim of this single-center study was to assess the clinical characteristics and outcomes of endoscopic procedures of WON in patients following distal pancreatectomy.

**Materials and methods:** This 7-years retrospective study included 11 patients (7 males, 4 females) with a mean age  $54.1 \pm 12.8$  years. All patients underwent endoscopic cystogastrostomy of WON, which were a complication of distal pancreatectomy in the Department of Digestive Tract Surgery between April 2019 and April 2026.

**Results:** Median time from DP to endoscopic drainage was 91 (31-309) IQR 126 days. The mean size of WON in computed tomography (CT) was  $129.8 \pm 53.0$  mm. The duration of the first cystogastrostomy was 20 (15-65) IQR 30 minutes. A single metal stent was used in 9 (81.8%) patients, including 2 (18.2%) who also received a transnasal catheter, while plastic stents were used in the remaining 2 (18.2%) patients. The median duration of endoscopic drainage was 20 (4-73) IQR 28 days, while the median number of endoscopic procedures (with necrosectomies) was 4 (1-20) 4 IQR. The length of hospitalisation was 22 (12-79) IQR 12 days. Complications occurred in 1 (9.1%) patients. In-hospital mortality was 0%.

**Conclusions:** Post-distal pancreatectomy WONs are a rare complication. EUS-guided endoscopic drainage and necrosectomy has become a well-established method for treatment of them.

**Keywords:** Walled-off necrosis, WON, distal pancreatectomy, endoscopic drainage

# Multidimensional Assessment of Tertiary Prevention in Gastrointestinal Cancer Patients

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**Background:** Tertiary prevention in gastrointestinal cancer patients requires early identification of risk factors and timely intervention to prevent complications and support treatment. Nutritional status, lifestyle, quality of life, treatment adherence, and biochemical parameters are key elements of interdisciplinary care supporting the therapeutic process.

**The aim:** To assess nutritional status, lifestyle, quality of life, treatment adherence, and biochemical parameters in gastrointestinal cancer patients.

**Materials and methods:** The study included 150 gastrointestinal cancer patients. Data were collected using the Paper-and-Pencil Interviewing (PAPI) method. An original questionnaire and standardized tools (Mini Nutritional Assessment, EQ-5D-5L, and Adherence in Chronic Diseases Scale) were applied. Selected biochemical parameters (albumin, C-reactive protein, leukocytes, lymphocytes, hemoglobin, and glucose) were analyzed. The study was approved by the Bioethics Committee.

**Results:** Analyses indicated a high prevalence of malnutrition or risk of malnutrition among patients with gastrointestinal cancers. Dietary assessment revealed non-adherence to tertiary prevention recommendations, including low meal frequency, insufficient protein intake, limited dietary counseling, and inadequate nutritional knowledge. Gastrointestinal symptoms were frequently reported and were associated with reduced quality of life. Lifestyle assessment revealed low physical activity, sleep disturbances, stimulant use, and limited health monitoring. Biochemical analyses showed abnormalities suggestive of inflammation, malnutrition, and metabolic disturbances, including alterations in proteins, leukocyte and lymphocyte counts, hemoglobin, and glycemic parameters. Additional risk factors were solitary living and comorbid chronic diseases.

**Conclusions:** Multidimensional assessment may support early identification of patients at risk and facilitate comprehensive tertiary prevention and targeted supportive clinical interventions in gastrointestinal cancer patients.

**Keywords:** nutritional status, lifestyle, quality of life, biochemical parameters, tertiary prevention, cancer

# Beyond the Lipid Paradox: Does Cholesterol Predict Outcomes in Critical Limb Ischemia?

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**Background:** Dyslipidemia remains a primary modifiable risk factor in peripheral arterial disease (PAD). Despite aggressive international guidelines, the direct link between specific lipid levels and the immediate technical success of revascularization remains debated in daily clinical practice.

**The aim:** In our study, we aimed to assess whether preoperative lipid profiles influence the technical success of PTA and to determine if these markers distinguish between patients suffering from critical limb ischemia (CLI) and those with intermittent claudication (IC).

**Materials and methods:** This single-center retrospective analysis included 26 patients (13 CLI, 13 IC) undergoing their first vascular intervention. Groups were matched 1:1 by gender using Propensity Score Matching.

**Results:** A striking "Lipid Paradox" emerged: mean LDL was nearly identical (73.9 mg/dL in CLI vs. 74.5 mg/dL in IC), proving cholesterol alone does not reflect ischemia severity. LDL targets (<55 mg/dL) were missed by 69% of CLI and 77% of IC patients. Diabetes was the true discriminator, affecting 76.9% of CLI vs. 30.8% of IC patients ( $p=0.02$ ). CLI patients exhibited greater anatomical complexity, lower stenting rates (38.5% vs. 76.9%,  $p=0.05$ ), and frequent tibial interventions. While IC achieved 100% limb salvage, CLI faced a 15.4% 30-day amputation rate, underscoring their biological fragility. Elevated triglycerides showed a trend ( $p=0.089$ ) toward predicting early complications.

**Conclusions:** PAD severity is driven by the metabolic burden of diabetes and anatomical complexity rather than LDL levels, reinforcing the phenomenon of the "Lipid Paradox". The high amputation risk in CLI highlights the extreme fragility of these patients and the limitations of traditional lipid markers. Elevated triglycerides may act as a vital marker of residual risk, urging clinicians to expand their therapeutic focus beyond LDL to improve holistic patient outcomes.

**Keywords:** Peripheral arterial disease, critical limb ischemia, angioplasty, lipid paradox, PTA

# Quality of Life Determinants in Multiple Sclerosis: Physical Disability, Daytime Sleepiness, Educational Level

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**Background:** Multiple sclerosis (MS) is a chronic, highly disabling disease affecting the central nervous system through inflammation and neurodegeneration. Patients with multiple sclerosis experience impairments, affecting their quality of life and mental health.

**The aim:** The main objective of this research was to identify factors associated with quality of life (MSQOL-54) of MS patients, including daytime sleepiness (ESS), physical disability (EDSS) and restless legs syndrome (IRLS).

**Materials and methods:** We analyzed a group of 36 treated MS patients, with a mean age of 41.80 years, an average disease duration of 10.8 years and an EDSS mean of 3.48. ESS, EDSS and MSQOL-54 scales were used to quantify the analyzed parameters in the study. Statistical analysis included correlation tests (Pearson's or Spearman's correlation coefficients, respectively for normal or non-normal distribution as assessed with the Shapiro-Wilk method) and Student's T test for significant differences.

**Results:** The results revealed that both physical and mental quality of life scores were strongly correlated with educational level ( $\rho=0.63$  and  $\rho=0.52$ , respectively,  $p<0.01$ ), suggesting that an individual with a stronger educational background might be able to cope better with the degenerative disabilities associated with multiple sclerosis. In contrast, daytime sleepiness scores showed no correlation with MSQOL parameters or with the degree of physical disability. IRLS scores correlated with physical MSQOL ( $\rho=-0.36$ ,  $p=0.02$ ). Furthermore, age was significantly tied with physical disability and physical scales of quality of life ( $r=0.47$  and  $r=-0.38$ ,  $p<0.05$ ). As expected, physical disability and physical quality of life showed a strong negative correlation with each other ( $r=-0.53$ ,  $p<0.01$ ).

**Conclusions:** In conclusion, our findings highlight that quality of life in patients with multiple sclerosis is significantly influenced by physical disability and educational level, while daytime sleepiness does not appear to play a substantial role.

**Keywords:** multiple sclerosis, quality of life, physical disability, educational level

# A Comparative Meta-Analysis of Gut Microbiota in Multiple Sclerosis and Systemic Lupus Erythematosus Risk

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**Background:** Multiple Sclerosis and Systemic Lupus Erythematosus are prototypical autoimmune disorders where gut microbiota dysbiosis is increasingly implicated as a critical environmental trigger. Despite hundreds of reported associations, individual studies often show discordance due to small sample sizes and technical variability. This study employs a high yield meta-analytical approach to identify robust microbial signatures and functional pathways shared between or unique to these conditions.

**The aim:** To delineate shared and disease-specific gut microbiota signatures and functional pathways in MS and SLE through meta-analysis, their role in autoimmune pathogenesis

**Materials and methods:** We conducted a systematic search across PubMed, Web of Science, Cohran library and Embase for case-control studies. Quality was assessed using the Newcastle-Ottawa Scale. Raw 16S rRNA and shotgun metagenomic data were reprocessed where possible to ensure consistency. Statistical synthesis utilized blocked Wilcoxon rank-sum tests and random-effects models (Der Simonian-Laird) to calculate log fold changes.

**Results:** Meta-analysis confirmed that while alpha diversity is inconsistently altered, beta diversity significantly distinguishes patients from healthy controls in both MS and SLE. We identified a robust "loss of health" signature, specifically the depletion of Faecalibacterium and Prevotella across multiple cohorts. Unique to SLE is the enrichment of oral-gut pathobionts such as Streptococcus anginosus, while MS is frequently associated with an increase in Akkermansia muciniphila, which may serve a compensatory role. Functional analysis revealed a significant enrichment in sulfur metabolism and redox reaction pathways particularly in SLE.

**Conclusions:** Our findings establish that MS and SLE share a dysbiosis core defined by the depletion of anti-inflammatory, SCFA-producing bacteria. These reproducible signatures provide a rationale for microbiota-based diagnostic biomarkers and adjunct therapies aimed at restoring mucosal barrier integrity.

**Keywords:** Multiple Sclerosis, Microbiota, Signature, System Lupus Erythematosus, biomarkers

# Psilocybin, LSD and DMT for the Treatment of Alcohol Use Disorder and Nicotine Dependence: A Systematic Review

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**Background:** Substance use disorders (SUD) that include alcohol use disorder (AUD) and nicotine dependence, pose a major public health challenge. Currently, pharmacological and behavioral therapies targeting these conditions have limited efficacy and are prone to high relapse rates. Serotonergic psychedelics such as psilocybin and lysergic acid diethylamide (LSD) may offer new treatment possibilities, due to their impact on neuroplasticity mechanisms and cognition.

**The aim:** The aim of this systematic review is to assess current evidence on the efficacy and limitations of psilocybin, LSD, and DMT in the treatment of AUD and nicotine dependence.

**Materials and methods:** This systematic review was conducted in accordance with the PRISMA 2020 statement and registered in PROSPERO (No. 1242266). Two authors independently searched the PubMed, Scopus, Embase, Web of Science, and DOAJ databases on November 12, 2025. No restrictions were imposed based on publication date. Studies were required to investigate the use of psilocybin, LSD, and DMT in the treatment of AUD or nicotine dependence. Both randomized and non-randomized clinical trials were included. A total of 3,040 studies were identified, and after independent screening, 19 studies were selected and assessed for risk of bias using the EPHPP QATQS tool.

**Results:** Evidence suggests that psychedelic-assisted therapy may reduce substance use and promote abstinence, with effects potentially lasting several months. However, these data are limited by small sample sizes, heterogeneity in study designs, variations in dosing, and “set and setting”, resulting in a high overall risk of bias.

**Conclusions:** Among the psychedelics studied, psilocybin demonstrates limited efficacy in the treatment of alcoholism and nicotine addiction. The current evidence suffers from methodological limitations. High-quality randomized controlled trials are now needed to fully determine the safety and efficacy of this type of therapy.

**Keywords:** Alcohol Use Disorder, Tobacco Use Disorder, Smoking Cessation, Nicotine Addiction, Psilocybin

# Molecular mechanisms underlying pain in endometriosis

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**Background:** Endometriosis is a chronic, multifactorial disease, affecting around 10% of women of reproductive age worldwide. It is characterized by the presence of endometrial tissue outside the uterine cavity, resulting in severe pain and infertility. Growing research indicates the important role of genetic and molecular factors in the pathogenesis of endometriosis and associated pain symptoms. There is a significant correlation between endometriosis and other chronic pain conditions such as migraine, fibromyalgia and irritable bowel syndrome, which suggests that they may have a shared molecular background.

**The aim:** The aim of the study was to investigate the molecular mechanisms underlying pain symptoms in endometriosis, its potential associations with other chronic pain conditions and inflammatory diseases.

**Materials and methods:** A literature review was conducted using databases such as PubMed to identify studies on molecular mechanisms of pain in endometriosis and its associations with other chronic pain conditions. Relevant articles published up to 2025 were selected based on predefined inclusion criteria. Data were analyzed qualitatively, focusing on genetic, molecular, and inflammatory factors involved in pain development.

**Results:** Endometriosis and other chronic pain syndromes share a common genetic background, particularly in pathways related to inflammation, neurogenesis, and pain modulation. Key mechanisms include altered gene expression, activation of inflammatory pathways, immune dysregulation, and changes in nervous system function. Their co-occurrence may result from polymorphisms in genes encoding cytokines, growth factors, and proteins involved in pain perception. Environmental and epigenetic factors also play an important role.

**Conclusions:** A better understanding of the molecular mechanisms of endometriosis will help explain its links with other chronic pain and inflammatory diseases, enabling more effective, personalized treatment and improved quality of patients' life.

**Keywords:** endometriosis, chronic pain, genetics, molecular mechanisms, concomitant diseases, cytokines

# Comparison of Different Skeletal Fixation Methods in Digital Replantation: A Systematic Review and Meta-Analysis

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**Background:** Digital replantation is a surgical procedure aimed at restoring the function of amputated digits. Different methods of bone fixation are used depending on availability, and clinical context. However, the relative performance of different fixation methods remains unclear.

**The aim:** This meta-analysis evaluates the efficacy of various bone fixation methods in digital replantation, specifically focusing on their impact on clinical outcomes.

**Materials and methods:** A systematic literature search was performed across PubMed, Embase, Scopus, Cochrane Library, and Web of Science. The analysis included data on fixation techniques, patient demographics, injury types, and recovery metrics such as time to union and reoperation rates. Statistical synthesis was performed using a random-effects model via Comprehensive Meta-analysis v4 software, with no exclusions based on study quality.

**Results:** Analysis of 36 studies (1361 patients, 1702 digits) revealed that the most common mechanism of injury was crushing (41.6%). The mean age of patients was 38.5 years (95% CI: 36.7–41.3); 38.6 years (95% CI: 28.4–48.8) for males and 34.1 years (95% CI: 29.6–38.5) for females. The overall bone union rate was high at 89.0%, and the pooled replantation failure rate was 7.8% (95% CI: 5.2–11.6%). Subgroup analysis showed that bone union rates were higher with K-wires (92.5%, 95% CI: 86.0–96.1%) and intraosseous wires (87.5%, 95% CI: 22.5–99.4%) than with external fixation (46.6%, 95% CI: 9.0–88.5%), whereas failure rates were lowest with external fixation (3.0%, 95% CI: 0.4–19.1%). However, differences were not statistically significant ( $p>0.05$ ), with substantial heterogeneity among studies.

**Conclusions:** Digital replantation yields overall high bone union rates. No bone fixation method demonstrated clear superiority. Although K-wires showed higher union rates, the substantial heterogeneity precludes definitive guidelines. Individualized surgical planning remains essential, and more comparative studies are required to optimize fixation strategies.

**Keywords:** Digital replantation, Bone fixation, Treatment outcome

# Application of Artificial Intelligence in Prosthodontics with a Focus on the Evaluation of Dental Impressions:

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**Background:** Artificial intelligence (AI) is one of the fastest-growing technologies in modern dentistry, including prosthodontics. Its applications include diagnostics, treatment planning, prosthetic restoration design, and quality control of dental procedures. However, the direct application of AI in the assessment of conventional anatomical and functional dental impressions offers potential for further clinical development.

**The aim:** The aim of this study was to review the current state of knowledge regarding the use of AI in prosthodontics and to evaluate its potential application in the assessment of dental impression quality based on photographic data.

**Materials and methods:** The analysis was performed in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The literature search was carried out using the PubMed, Scopus databases and Google Scholar search engine. The research was performed with the usage of given keywords. The analysis included publications published between 2020 and 2026.

**Results:** The reviewed studies demonstrated that artificial intelligence is widely applied in prosthodontics, particularly in CAD/CAM-based prosthetic design, occlusal analysis, implant treatment planning, and evaluation of digital input data such as intraoral scans.

**Conclusions:** In conclusion, artificial intelligence constitutes an innovative tool in the advancement of prosthodontics, contributing to increased efficiency, accuracy, and personalization of treatment. However, further research is necessary to fully exploit its capabilities, particularly in the context of the automated assessment of impression quality based on photographic data.

**Keywords:** artificial intelligence, prosthodontics, CAD/CAM, dental impressions, digital dentistry

# Association Between Body Mass Parameters and Islet Autoimmunity in Children: A Systematic Review

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**Background:** Type 1 diabetes (T1D) is a chronic autoimmune disease causing pancreatic  $\beta$ -cell destruction. It is marked by autoantibodies to islet antigens. Higher body mass index (BMI) may modulate autoimmunity.

**The aim:** To summarize current evidence from a systematic review on body mass parameters in children positive for at least one autoantibody associated with pancreatic  $\beta$ -cell destruction.

**Materials and methods:** Conducted per PRISMA. PubMed and Scopus were searched (2021–2025). Owing to heterogeneity, qualitative synthesis was used. Search terms covered age (0–18), autoantibodies (ICA, GAD65, IA-2, ZnT8, IAA), and body mass metrics (BMI, z-score, overweight, obesity). Of 249 records, 9 prospective studies were included.

**Results:** The analysis was conducted on a dataset comprising 31,621 children. Of the 9 included studies, 6 involving populations at increased risk of type 1 diabetes (T1D) due to family history or genetic susceptibility demonstrated a significant association between higher BMI or BMI z-score and the risk of developing islet autoantibodies. In 2 studies, no statistically significant association was found, while 1 population-based study, conducted among children without identified risk factors for T1D, reported lower BMI among children positive for islet autoantibodies.

**Conclusions:** Conclusions: Higher BMI/BMI z-score may increase the risk of islet autoimmunity in children predisposed to T1D. Further research is needed to confirm these findings.

**Keywords:** Type 1 diabetes, Islet autoimmunity, Body mass index, BMI z-score, Children, Systematic review

# Surgical and Non-Surgical Treatment in Pediatric Obstructive Sleep Apnea: A Systematic Review

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**Background:** Obstructive sleep apnea (OSA) is one of the most common forms of sleep-disordered breathing among pediatric patients. The clinical manifestations of OSA include, among others, snoring, apneic episodes, mouth breathing, increased respiratory effort, and restless sleep. OSA leads to recurrent episodes of partial or complete upper airway collapse, resulting in hypoxemia, hypercapnia, and disruption of normal sleep architecture. Therapeutic management includes both surgical and non-surgical approaches.

**The aim:** The aim of this systematic review is to evaluate and compare the effectiveness of surgical and non-surgical treatment modalities in pediatric patients with OSA, taking into account their impact on disease severity, sleep quality, and patients' cognitive and behavioral functioning.

**Materials and methods:** A systematic review of literature published between 2015 and 2025 was conducted using the PubMed database, following PRISMA guidelines. Studies involving pediatric patients aged 0 to 18 years were included. Diagnostic methods, treatment types, and clinical outcomes, including OSA-18 scores, were assessed.

**Results:** A total of 1296 studies were identified, of which 16 articles met the inclusion criteria. The results were divided into three groups: surgical, pharmacological, and orthodontic treatment. Surgical treatment, especially adenotonsillectomy, was the most commonly used method and showed consistent improvement in clinical symptoms and quality of life. Non-surgical methods, including pharmacotherapy and orthodontic treatment, also showed beneficial effects, although their effectiveness was less consistent and depended on patient characteristics.

**Conclusions:** All treatment modalities were associated with improvements in clinical outcomes. Surgical intervention remains the most established approach for pediatric OSA. Non-surgical therapies may be effective for selected patients. Treatment should be individualized according to disease severity, etiology, and patient-specific factors.

**Keywords:** Obstructive Sleep Apnea, Pediatric, Tonsillectomy, Adenoidectomy, Non-Surgical Treatment

# Fecal Microbiota Transplantation in *Clostridioides difficile* Infection: Current Evidence and Clinical Outcomes

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**Background:** *Clostridioides difficile* infection (CDI) represents a major cause of healthcare-associated diarrhea, with high recurrence rates following standard antibiotic therapy. Disruption of gut microbiota plays a central role in pathogenesis. Fecal microbiota transplantation (FMT) has emerged as a therapeutic strategy aimed at restoring microbial diversity, particularly in recurrent CDI.

**The aim:** This review evaluates the efficacy, safety, and clinical outcomes of FMT in patients with recurrent or refractory CDI, based on recent evidence.

**Materials and methods:** A literature search was conducted using PubMed, Scopus, and Web of Science databases. Inclusion criteria comprised full-text articles published between 2019 and 2025 involving adult patients with recurrent or refractory CDI treated with FMT. Randomized controlled trials, meta-analyses, and cohort studies were included, while case reports and studies involving pediatric populations were excluded.

**Results:** FMT demonstrates high efficacy in recurrent CDI, with clinical resolution rates ranging from 80% to 90% after a single administration and exceeding 90% after repeated procedures. Compared to standard antibiotic therapy, FMT significantly reduces recurrence rates and improves microbiota diversity. Delivery methods, including colonoscopy, nasoenteric tubes, and oral capsules, show comparable efficacy, although colonoscopic administration may offer slightly higher success rates. Adverse events are generally mild and self-limited, including transient gastrointestinal symptoms. Rare but serious risks include infection transmission, emphasizing the importance of rigorous donor screening.

**Conclusions:** FMT is a safe treatment for recurrent CDI, outperforming conventional antibiotic regimens in preventing relapse. Its integration into clinical practice is supported by strong evidence, though standardization of protocols and long-term safety data remain necessary. Future directions include microbiota-based therapeutics and precision approaches to optimize patient outcomes.

**Keywords:** *Clostridioides difficile*, fecal microbiota transplantation, recurrent infection, gut microbiota, dys

# Decoding Suicidality: Kynurenine Pathway Imbalance as a Distinct Neurobiological Marker

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**Background:** Suicidality is a major global health concern, associated with major depressive disorder, yet increasing evidence suggests that it reflects distinct biological mechanisms. The kynurenine pathway, activated by inflammation, converts tryptophan into neuroactive metabolites with opposing effects. Neurotoxic compounds such as quinolinic acid (QUIN) and neuroprotective kynurenic acid (KYNA) influence glutamatergic signalling and neuroinflammation, making this pathway a potential contributor to suicidal behaviour.

**The aim:** To assess whether kynurenine pathway metabolites predict suicidality independent of depression severity.

**Materials and methods:** This systematic review summarizes studies published in the last 15 years investigating associations between kynurenine metabolites and suicidality. Databases including PubMed, Scopus, and Web of Science were searched using relevant keywords. Studies assessing central or peripheral metabolite levels in relation to suicidal ideation, attempts, or completed suicide were included.

**Results:** Evidence indicates a shift toward a neurotoxic profile in suicidal individuals, characterized by increased QUIN and reduced KYNA levels. Elevated QUIN promotes NMDA receptor-mediated excitotoxicity, while reduced KYNA diminishes neuroprotection. The QUIN/KYNA ratio shows stronger associations with suicidality than depression severity alone, suggesting specificity to suicide risk. Increased activity of indoleamine 2,3-dioxygenase, driven by inflammatory cytokines, supports a link between immune activation and altered metabolism. These changes are also associated with impulsivity and impaired decision-making, highlighting mechanisms beyond mood disturbance.

**Conclusions:** Kynurenine pathway dysregulation may represent a distinct biochemical signature of suicidality. Its metabolites show potential as predictive biomarkers and therapeutic targets. Further longitudinal and standardized studies are needed to clarify their role in clinical risk assessment and prevention strategies.

**Keywords:** kynurenine pathway, suicidality, major depressive disorder, neuroinflammation, biomarkers, glutamate

# Title: Modern methods of dentin hypersensitivity treatment - a systematic review

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**Background:** Dentin hypersensitivity is a widely presented problem among patients. Environmental factors - like diet, poor oral hygiene and bad brushing technique are main causes of the development of this phenomenon along with increasingly common periodontal diseases.

**The aim:** The aim of this study is to present the current state of knowledge about dentin hypersensitivity - its etiology, mechanisms of formation and most importantly modern treating methods.

**Materials and methods:** Based on the literature review the factors causing the exposure of dentinal tubules and mechanisms of conduction of pain stimuli were described. The scope of the paper includes both house treatment, such as the use of pastes, gels and rinses that reduce nerve conduction or close the tubules, and professional treatment including covering gingival recessions, reconstruction of cavities using composites, application of fluoride varnishes and the use of lasers. The effectiveness of individual methods was discussed and the need for their individual selection depending on the patient was demonstrated.

**Results:** The most effective way is to combine specimens used systematically at home with professional laser therapy or application of light - cured resins.

**Conclusions:** Conclusions show the need for interdisciplinary treatment preceded by correct diagnosis. There is a need to improve the methods further and adapt them to specific clinical case.

**Keywords:** dentin hypersensitivity, fluoride varnishes, laser

# PD-L1 expression and clinical implications in digestive neuroendocrine neoplasms - a systematic review

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**Background:** The programmed death-ligand 1 (PD-L1) expression plays an important role in cancer immunology. However, the extent of this expression, as well as its prognostic and predictive significance, has remained ambiguous to date in neuroendocrine neoplasms (NENs) of the digestive system. PD-L1 assessment may become a clinically useful parameter used in qualification for modern oncological therapies.

**The aim:** This work aimed to analyse the PD-L1 expression and its clinical use in patients with NENs of the digestive system.

**Materials and methods:** The systematic review was conducted in the period April 2025 – April 2026. We formulated the research question following the PICO framework. Three databases: PubMed, Embase, and Scopus were searched; the search was repeated in September 2025. The search strategy, performed independently by 2 co-authors, included original English-language articles, with no publication date filters applied. The abstract screening and full-text screening were conducted separately in the Rayyan.ai tool. The data from the retrieved studies were gathered independently into a spreadsheet. A third researcher solved all disagreements in the methodology phase. The I-ROBINS and RoB 2 tools were used to assess the risk of bias.

**Results:** This systematic review analysed 62 articles, published between 2016 and 2025, including 16 prospective studies and 24 multicentre studies. Samples from various parts of the digestive system, across all cancer stages and histological differentiation, from a total of 5682 patients, were evaluated. The median patient group size was 56 (range: 9-724). PD-L1 has been detected not only on tumour cells, but also frequently on immune cells or in the stroma.

**Conclusions:** The prognostic significance of PD-L1 in NENs of the digestive system remains ambiguous and requires further investigation. The majority of the studies did not show significant correlations between PD-L1 and overall survival or treatment response, although some analyses indicated an association with more advanced staging.

**Keywords:** PD-L1, programmed death-ligand 1, neuroendocrine neoplasms, NENs, digestive system

# Surgical treatment for Chiari I in children: a systematic review and meta-analysis.

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**Background:** Chiari malformation type I (CM-I) in children is a congenital disorder characterized by a displacement of the cerebellar tonsils >5 mm below the foramen magnum. In symptomatic cases, the three main surgical techniques are Posterior Fossa Decompression (PFD), Posterior Fossa Decompression with Duraplasty (PFDD), and Posterior Fossa Decompression with Tonsillar Reduction (PFDRT).

**The aim:** To compare the efficacy and safety profiles of PFD, PFDD, and PFDRT in the treatment of CM-I in children, updating current clinical evidence with advanced studies including tonsillar resection.

**Materials and methods:** Four medical databases (PubMed, Web of Science, Embase, and the Cochrane Library) were searched from inception until 14 January 2026. The search included studies involving pediatric patients diagnosed with CM-I who underwent PFD, PFDD, or PFDRT interventions. All procedures adhered to PRISMA guidelines.

**Results:** Nine eligible studies were identified. The meta-analysis revealed that although both PFDD and PFDRT were associated with a higher incidence of complications than PFD, only the PFDD group reached statistical significance (relative risk [RR], 3.458; 95% CI, 1.410–8.479). Both PFDD and PFDRT were associated with significantly longer hospital stays (mean difference [MD], 1.75; 95% CI, 0.83–2.67 and [MD], 2.05; 95% CI, 1.13–2.97, respectively). Conversely, the reoperation rate was significantly higher in the PFD group compared to PFDD (RR, 0.140; 95% CI, 0.064–0.303) and PFDRT (RR, 0.060; 95% CI, 0.019–0.184). Clinical improvement and syringomyelia resolution rates were comparable across all surgical techniques.

**Conclusions:** In the pediatric population, all methods show similar effectiveness. PFD is the safest solution, while PFDRT offers the greatest durability of effect, reducing the need for reoperation.

**Keywords:** Chiari malformation type 1, PFD, PFDD, PFDRT, children

# From Subjective Judgment to Quantitative Perfusion: The Role of Intraoperative Indocyanine Green (ICG) Fluores

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**Background:** Anastomotic leak (AL) remains one of the most serious complications in colorectal surgery, with reported incidence rates ranging from 5% to 15%. Traditional assessment of bowel viability based on serosal color and mesenteric pulsation may be unreliable in some cases. Intraoperative indocyanine green (ICG) fluorescence angiography enables real-time visualization of microvascular perfusion and may support a more objective assessment of anastomotic viability.

**The aim:** To synthesize current clinical evidence regarding the efficacy of ICG in preventing anastomotic leaks and to evaluate emerging technological developments based on literature published between 2015 and 2026.

**Materials and methods:** A systematic review was conducted in accordance with PRISMA guidelines. Thirteen high-impact studies were analyzed, including the landmark PILLAR II trial, VUGI technical standards, and recent meta-analyses encompassing over 15,000 patients.

**Results:** Available evidence indicates that ICG-guided perfusion assessment leads to an intraoperative change in surgical strategy, including revision of resection margins, in approximately 8–12% of patients. Routine ICG use has been associated with reductions in AL rates exceeding 50% in selected studies, particularly in high-risk low anterior resections. Recent data from 2024–2026 highlight growing interest in quantitative ICG (Q-ICG), incorporating AI-supported parameters such as slope and T<sub>max</sub> to reduce observer bias. In addition, ICG has demonstrated utility in ureteral identification and in supporting the Ghost Ileostomy concept.

**Conclusions:** Intraoperative ICG angiography is a safe and cost-effective adjunctive tool in colorectal surgery. Current evidence supports its role as an emerging standard for optimizing outcomes in robotic and minimally invasive colorectal procedures.

**Keywords:** Indocyanine green, ICG, anastomotic leak, fluorescence-guided surgery, colorectal surgery

# GIUS, Doppler and CEUS in IBD Activity Assessment: Scoping Review

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**Background:** Monitoring inflammatory bowel disease (IBD) activity is central to treat-to-target care, but repeated endoscopy is invasive and resource-intensive. Gastrointestinal ultrasound (GIUS), with Doppler and contrast-enhanced ultrasound (CEUS), is repeatable, radiation-free and may complement biomarkers.

**The aim:** To synthesize evidence on the diagnostic value of GIUS, Doppler and CEUS in assessing IBD activity, and their correlation with endoscopy and biomarkers.

**Materials and methods:** A scoping review used a predefined PICO framework. PubMed, Scopus, Web of Science and Embase were searched for English-language studies published from January 2018 to March 2026. Studies of Crohn's disease or ulcerative colitis were included if they evaluated B-mode GIUS, Doppler or CEUS and compared findings with endoscopy, histology or biomarkers. Results were narratively synthesized.

**Results:** After duplicate removal, 972 records were screened and 57 studies were included. Bowel wall thickness was the best validated parameter; thresholds near >3 mm showed high accuracy for active inflammation and correlated with endoscopic severity. Doppler vascularity, graded with the Limberg scale, added assessment of inflammatory hyperemia. CEUS enabled perfusion analysis and showed the highest reported performance, with sensitivity and specificity above 90% in selected studies. GIUS generally exceeded CRP alone, while fecal calprotectin and cytokine panels, particularly those including IL-8, improved non-invasive assessment. Combined GIUS-biomarker strategies performed better than either modality alone.

**Conclusions:** GIUS, especially when integrated with Doppler, CEUS and biomarkers, is a promising non-invasive tool for assessing IBD activity. It should complement rather than replace endoscopy, but may reduce endoscopic burden during monitoring and treatment response assessment. Further prospective studies are needed to standardize protocols and validate combined diagnostic algorithms.

**Keywords:** Ultrasound, IBD, CEUS, Doppler, Endoscopy, Biomarkers

# Targeting the Vein of Marshall in Persistent Atrial Fibrillation: A Systematic Review

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**Background:** Persistent atrial fibrillation (AF) often recurs after standard catheter ablation. One reason is the presence of conduction pathways located outside the endocardium. The vein of Marshall (VOM) is a small venous structure containing myocardial fibers, autonomic nerves and connections with the coronary sinus and left atrium, allowing it to participate in electrical conduction and autonomic regulation, and to act as a trigger and substrate for atrial arrhythmias. This makes it a relevant therapeutic target.

**The aim:** This systematic review aimed to evaluate whether targeting the VOM improves outcomes of AF ablation and to describe mechanisms responsible for its clinical effect.

**Materials and methods:** A structured search of PubMed, Scopus and Embase was performed using predefined keywords related to the VOM, ligament of Marshall, AF and ablation strategies, including ethanol infusion into the vein of Marshall (EIVOM). A total of 132 records were identified. After removal of duplicates (n = 34) and screening, 38 full-text articles were assessed for eligibility, and 28 studies were included. Eligible studies included clinical, electrophysiological and anatomical investigations. Data were analyzed qualitatively based on interventions, outcomes and mechanisms.

**Results:** Available evidence shows that VOM-targeted interventions are most beneficial in patients with persistent or recurrent AF. EIVOM is the most commonly used method and provides access to epicardial conduction pathways that may remain active after standard endocardial ablation. Other approaches, including radiofrequency ablation and hybrid strategies, may also improve outcomes.

**Conclusions:** Targeting the VOM represents a clinically meaningful extension of standard AF ablation rather than only an anatomical concept. It allows treatment of mechanisms not accessible with endocardial approaches alone. VOM-based strategies, particularly EIVOM, may improve outcomes in selected patients with persistent AF, but require proper patient selection, imaging and procedural experience.

**Keywords:** vein of Marshall, atrial fibrillation, catheter ablation, ethanol infusion, arrhythmia mechanisms

# Congenital anomalies of the fourth branchial pouch in the pediatric population - a systematic review

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**Background:** Congenital fourth branchial pouch anomalies are rare, accounting for 1–4% of branchial defects, and result from failed embryologic obliteration. These anomalies typically present as recurrent neck abscesses or acute thyroiditis and are frequently misdiagnosed, which leads to significant diagnostic delays.

**The aim:** To systematically analyze literature on fourth branchial pouch anomalies in children, focusing on treatment effectiveness and safety.

**Materials and methods:** A systematic review was conducted in accordance with PRISMA guidelines. PubMed, Scopus, Cochrane, and Embase databases were searched for studies published between 2015 and 2025. Studies involving patients below 18 years old were included. Data on demographics, treatment modalities, recurrence rates, and complications were extracted. Study quality was assessed using the Quality Assessment Tool for Quantitative Studies.

**Results:** The inclusion criteria were met by 33 of the 175 identified studies, a total of 1361 pediatric patients. The mean patient's age was 7.4 years. Recurrent neck abscesses were the most common presenting symptom, and lesions were mostly located on the left side. Treatment included:

-endoscopic methods: laser ablation (n=118), electrocoagulation (n=86), radiofrequency ablation (n=237), and chemocoagulation (n=30)

-open surgery: 609 cases. The overall recurrence rate was 4,33% (n=59). The highest recurrence rates were observed for chemocoagulation 36.7% and open surgery 18,9%, while the lowest were laser ablation 5,1% and electrocoagulation 8.1%. Complications occurred in 7.2% of cases (n=98), including transient hoarseness 2.3%, neck edema 1.7%, and rare recurrent laryngeal nerve palsy 0.2%.

**Conclusions:** Endoscopic methods, particularly laser ablation and electrocoagulation, are minimally invasive and associated with low recurrence rates, making them favorable as first-line treatments. Open surgery demonstrated higher recurrence rates. High chemocoagulation failure rates require cautious interpretation due to small sample size.

**Keywords:** fourth branchial pouch, pyriform sinus, pyriform sinus fistula, branchial anomalies, children

# Marathon training and coronary artery disease: A systematic review and a meta-analysis

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**Background:** The cardiovascular effects of long-term high-intensity endurance exercise, particularly marathon training, remain unclear. While regular physical activity is protective against atherosclerotic cardiovascular disease, emerging evidence suggests that endurance sports may be associated with coronary artery calcification (CAC) and subclinical coronary atherosclerosis.

**The aim:** Therefore this systematic review and meta-analysis explores the relationship between endurance training and CAC.

**Materials and methods:** Following PRISMA guidelines, MEDLINE, Embase, and Scopus databases were researched. Inclusion criteria encompassed studies on adults with sample size >10, various study designs, and assessment of endurance training and coronary artery disease (CAD) diagnosed via coronary angiography (CCTA).

**Results:** Across studies, CAC was frequently observed in endurance athletes, with prevalence ranging from 34% to 100%. Several studies demonstrated higher rates of elevated CAC (CACS >100) in marathon runners compared with matched or general population controls. However, no consistent relationship was identified between exercise volume and CAC burden. Plaque composition analysis suggested a predominance of calcified rather than mixed plaques in athletes. Traditional cardiovascular risk factors were consistently associated with CAC presence across studies.

**Conclusions:** Marathon training is associated with a high prevalence of coronary artery calcification; however, the relationship between exercise dose and atherosclerotic burden is inconsistent. Available evidence suggests that while extreme endurance exercise may be linked to increased coronary calcification, this may reflect plaque stabilization rather than increased vulnerability. Traditional cardiovascular risk factors remain the primary determinants of CAD burden. Further longitudinal studies are needed to clarify the prognostic significance of CAC in endurance athletes and to determine whether extreme exercise confers net cardiovascular benefit or harm.

**Keywords:** marathon, endurance sports, cardiology

# One-Staged Embolization and Resection of Cerebral AVMs

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**Background:** Treatment of cerebral arteriovenous malformations (bAVMs) presents a significant clinical challenge. Complex arteriovenous malformations, particularly those with higher Spetzler-Martin grades, are increasingly treated with a multimodal approach combining endovascular embolization with surgical resection in a hybrid operating room. Preoperative embolization allows for blood flow reduction and eliminates feeding vessels, thus reducing the risk of intraoperative complications, significantly increasing the effectiveness of subsequent surgical resection.

**The aim:** The aim of this study was to examine the effectiveness of bAVM treatment in a single-staged approach, using endovascular embolization and surgical resection

**Materials and methods:** The authors conducted a systematic literature review in accordance with Cochrane recommendations and PRISMA guidelines. PubMed, the Cochrane Library, Web of Science, and Embase databases were searched for English-language studies published from inception to March 2026. Meta-analysis was performed in R.

**Results:** A total of 19 articles and reports were included in this meta-analysis. Single-arm meta-analysis of one-staged AVM treatment resulted in mortality of 1.34% (95% CI 0.01 to 2.68; I<sup>2</sup> = 0.0%), complete occlusion rate of 99.89% (95% CI 99.32 to 100.00; I<sup>2</sup> = 0.0%), and 0.69% (95% CI 0.00 to 1.81; I<sup>2</sup> = 10%) residual rate of AVM.

**Conclusions:** Single-staged treatment represents a modern therapeutic approach for bAVMs, allowing for a shorter overall treatment time. The current literature is largely limited to non-randomized studies. Due to the low number of comparative studies, future randomized controlled trials should more thoroughly compare hybrid treatment versus traditional multi-stage therapy, considering not only treatment efficacy but also costs and long-term outcomes.

**Keywords:** Neurosurgery, AVM, Hybrid OR

# Analgesic efficacy of the adductor canal block and its combination with IPACK after total knee arthroplasty

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**Background:** This prospective randomized controlled trial included patients aged 40 to 75 years. Group 1 received an adductor canal block (ACB) with 75 mg/20 ml of ropivacaine solution. Group 2 received ACB combined with infiltration between the popliteal artery and the posterior knee capsule (IPACK block) using 75 mg/30 ml of ropivacaine solution. Both groups also received multimodal postoperative analgesia.

**The aim:** The aim of this study was to compare the effect of adductor canal block (ACB) alone versus a combination of ACB and IPACK block on postoperative analgesia following unilateral total knee arthroplasty. Additionally, the study evaluated the impact on morphine consumption, functional rehabilitation, length of hospital stay, and patient satisfaction.

**Materials and methods:** Pain intensity at rest and during movement was assessed using the Numeric Rating Pain Scale (NPRS) before surgery, 6 hours after surgery, on postoperative day 1 (POD1), postoperative day 2 (POD2) in the morning (7–8 a.m.), and postoperative day 7 (POD7). Quadriceps muscle strength was evaluated using the Oxford scale before surgery, 6 hours after surgery, POD1, and POD2. Functional outcomes included the ability to perform self-care, walk 70 meters, and climb stairs, assessed on POD2 and POD7. Data on length of hospital stay, morphine consumption, and patient satisfaction were also collected.

**Results:** Group 1 included 33 patients, while group 2 included 36 patients. There were no statistically significant differences in demographic data between the groups ( $p > 0.05$ ). Analysis using the Mann–Whitney U test showed no statistically significant differences ( $p > 0.05$ ) in NPRS scores at 6 hours, POD1, POD2, and POD7; in the ability to walk 70 meters or climb stairs; in length of hospital stay; or in morphine consumption.

**Conclusions:** The addition of an IPACK block to ACB following primary unilateral total knee arthroplasty does not provide additional clinical benefits.

**Keywords:** ACB, IPACK block, knee arthroplasty, postoperative analgesia, morphine consumption, functional recovery

# Wpływ długości stopy na stabilność posturalną u dzieci w wieku 5-14 lat

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**Background:** The feet are an important static and dynamic element of the musculoskeletal system. They provide a point of support that allows us to maintain balance in static conditions. Static balance assessment involves recording involuntary changes in the position of foot pressure forces using a stabilometric platform, while the test subject stands freely on the platform, obtaining the trajectory of the COP (center of pressure).

**The aim:** The aim of the study was to determine whether there is a correlation between foot length and postural stability in children aged 5-14 years.

**Materials and methods:** A retrospective study was conducted on a group of 282 children aged 5-14 as part of a pilot program of the National Health Fund for examining the feet of children and adolescents. The correlation between foot length and total lateral movement, total forward/backward movement, COP distance covered, speed, and COP area was examined. Calculations were performed using Statistica STATSOFT 13.3 software for a significance level of  $\alpha=0.05$ . The normality of the distribution was verified using the Shapiro-Wilk test. The non-parametric Mann-Whitney U test was used to compare two independent variables, while the Kruskal-Wallis test was used for more than two variables. The correlation between variables was calculated using the R-Spearman correlation test.

**Results:** The analysis of the results indicates that there is a statistically significant correlation between foot length and total lateral movement, total forward/backward movement, COP distance covered, speed, and COP area in children aged 5-9 years, but not in children aged 10-14 years.

**Conclusions:** The results suggest that foot length may be more important for postural stability in younger children than in older children. The lack of significant correlations in the group of children aged 10–14 may suggest that as the neuromuscular system matures and postural control mechanisms develop, the influence of foot length on body stability becomes less significant.

**Keywords:** COP, center of pressure, foot length, postural stability

# The Development of postural stability in Children Aged 5–14

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**Background:** Postural stability and balance are fundamental motor skills that form the basis for performing activities of daily living and engaging in physical activity. They undergo changes during the process of development and growth. Using a stabilometric platform, we can assess the movement of the center of pressure (COP), which allows us to evaluate the subject's stability.

**The aim:** The aim of the study was to determine whether postural stability improves in a stepwise manner with age in a group of children aged 5 to 14.

**Materials and methods:** A retrospective study was conducted on a group of 282 children aged 5–14 as part of the National Health Fund's pilot program for foot examinations of children and adolescents. The correlation between age and total lateral movement, total anterior/posterior movement, COP distance traveled, speed, and COP area was examined. Calculations were performed using Statistica STATSOFT 13.3 software at a significance level of  $\alpha=0.05$ . The normality of the distribution was verified using the Shapiro-Wilk test. The Mann-Whitney U nonparametric test was used to compare two independent variables, while the Kruskal-Wallis test was used for more than two variables. The correlation between variables was calculated using Spearman's R correlation test.

**Results:** The results of the study indicate that there is a statistically significant negative correlation between age and total lateral movement, total forward/backward movement, COP distance, speed, and COP area. Additionally, in the group of children aged 5 to 9 years, a statistically significant correlation was observed between age and total lateral movement, total forward/backward movement, distance traveled, and COP area.

**Conclusions:** The results indicate that postural stability improves linearly with age. The greatest improvement is observed between the ages of 5 and 9. After the age of 10, postural stability does not change significantly.

**Keywords:** COP, postural stability, centre of pressure, stabilometric platform

# Concept of automated postoperative radiographic analysis after total hip arthroplasty

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**Background:** Postoperative follow-up after hip arthroplasty often relies on comparing anteroposterior (AP) pelvis radiographs acquired at different time points. This remains difficult because implants alter image appearance, obscure nearby anatomy, and differences in patient positioning reduce the reproducibility of longitudinal assessment.

**The aim:** The aim of this study was to present a concept for automated analysis of postoperative AP pelvis radiographs that could support longitudinal comparison after total hip arthroplasty.

**Materials and methods:** The proposed method combines several stages of image analysis within a single workflow. These include localization of implant-related structures, identification of relevant bony anatomy, construction of pelvis-based reference geometry, and extraction of measurable parameters for comparison between radiographs acquired at different time points. It was developed using publicly available radiographic datasets and postoperative imaging material.

**Results:** This framework enabled the creation of a coherent workflow that integrates both implant-related and bone-related analysis. Preliminary evaluation showed visually consistent structural localization and geometry-based measurements that may support comparison of follow-up radiographs over time.

**Conclusions:** The obtained results suggest that this approach may be a useful step toward a more comprehensive tool for postoperative radiographic assessment after hip arthroplasty. By combining implant localization, bone structure analysis, and pelvis-based geometric interpretation, the framework may support broader and more integrated follow-up evaluation. Students received funding as part of the VII competition for financing projects of student scientific clubs as part of the Initiative of Excellence– Research University program, topic 59, in accordance with Regulation No. 54/2020 of the Rector of the Silesian University of Technology, March 13, 2020.

**Keywords:** hip arthroplasty, postoperative radiographs, implant migration, follow-up, orthopedics, radiography

# The Impact of Visceral Therapy and Scar Tissue Mobilization on Transversus Abdominis Activity and Low Back Pain

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**Background:** Transversus abdominis, as a key core stabilizing muscle, has an influence on a lumbar spine; therefore, any abdominal surgical scars can lead to myofascial imbalance, resulting in low back pain (LBP).

**The aim:** The aim is to evaluate the effectiveness of comprehensive physiotherapy: visceral therapy, stabilization exercises and scar tissue mobilization in restoring function of transversus abdominis muscle (TrA) in a post-appendectomy patient.

**Materials and methods:** A 44-year-old male presented with a low back pain following an open appendectomy was clinically assessed using Thomayer's test, the VAS scale and rehabilitative ultrasound imaging (RUSI) of the TrA. A 6-month therapeutic intervention was implemented, consisting of visceral therapy, scar tissue mobilization, dry needling, and stabilization exercises with biofeedback.

**Results:** Pain symptoms were reduced by 75% and significant improvement of TrA activity on the surgical side was observed. January 2025: 0.39 cm (rest) / 0.45 cm (activation). March 2025: 0.44 cm / 0.52 cm. June 2025: 0.51 cm / 0.61 cm.

**Conclusions:** Comprehensive physiotherapy, combining visceral manipulation and scar mobilization with targeted neuromuscular training, effectively reduces low back pain symptoms and restores transversus abdominis motor control in patients treated with physiotherapeutic methods - especially after appendectomy. The scar tissue has a significant impact on TrA activation.

**Keywords:** physiotherapy, appendectomy, transversus abdominis, low back pain

# Back pain and stress levels among office workers

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**Background:** Back pain is one of the most common musculoskeletal disorders among office workers. It is estimated that in 90% of cases, a specific cause of pain cannot be identified. Lower back pain is associated with various biopsychosocial factors, one of which is stress.

**The aim:** To assess the frequency of back pain occurrence among office workers and the impact of stress intensity on back pain.

**Materials and methods:** A total of 103 subjects (74.76% women, n=77, 25.24% men, n=26) participated in this study. The average age of participants was  $44 \pm 9$ , average BMI was  $25.4 \pm 3.78$ . The research instrument were author's survey, Perceived Stress Scale (PSS-10) and Numerical Rating Scale (NRS). The Shapiro-Wilk test was used to statistical analysis and t-student test was used to evaluate the relationship between stress intensity and the occurrence of back pain.

**Results:** Pain in the cervical spine was reported by 65.05% (n=67), in the thoracic spine by 29.13% (n=30), and in the lumbar spine by 81% (n=81). Participants with cervical pain showed a statistically significant higher level of stress ( $p = 0.00002$ ); lumbar spine ( $p = 0.02$ ). No significant correlation was found between thoracic spine pain and stress levels ( $p > 0.05$ ). The mean PSS-10 score was  $22.43 \pm 4.45$ ; men  $20,8 \pm 4,56$ ; women  $22,96 \pm 4,31$   $p=0.03$ .

**Conclusions:** Back pain is highly prevalent among office workers particularly in the lumbar and cervical spine. Higher levels of stress among office workers contribute to the occurrence of pain in the lumbar and cervical spine.

**Keywords:** Office workers, back pain, stress level

# The role of physical activity in the subjective health assessment of patients with Parkinson's disease

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**Background:** Parkinson's disease (PD) leads to progressive motor impairment and a decline in quality of life. Although clinical scales measure disability, patients' subjective perception of health remains a crucial component of holistic care.

**The aim:** The aim of this study was to evaluate the relationship between the level of physical activity and subjective health assessment among patients with PD.

**Materials and methods:** The study included 31 patients with PD (16 women, 15 men; mean age 67.45±8.59 years; median: 69). Disease severity was assessed using the Hoehn-Yahr (H-Y) scale (Stage 1: n=7; Stage 2: n=5; Stage 3: n=13; Stage 4: n=5). Physical activity levels were measured using the International Physical Activity Questionnaire (IPAQ), and subjective health status was rated on a 1–10 scale. Statistical analysis was performed using Kendall's Tau and Spearman's Rho correlations.

**Results:** The majority of the group (61.3%) demonstrated low levels of physical activity, 32.3% moderate, and only 3.2% high. Although 80.7% of participants were enrolled in rehabilitation programmes, only 32.3% reported engaging in regular exercise (at least twice a week). No statistically significant correlation was found between the IPAQ physical activity level and subjective health assessment (Kendall Tau: -0.183,  $p = 0.2300$ ). However, a near-universal consensus (96.8%) was observed regarding the positive impact of exercise on mood.

**Conclusions:** Subjective health assessment in PD patients is a complex construct which, in this study group, was not directly determined by the level of physical activity measured by the IPAQ. Despite high self-reported psychological benefit (improved mood), no correlation with health status was found, suggesting a distinction between emotional well-being and physical disability. Low physical activity levels despite access to rehabilitation highlight the need for more effective exercise-promoting strategies. Further studies on larger cohorts are needed to identify additional determinants of health perception in this population.

**Keywords:** Parkinson's disease, physical activity, subjective health

# Two Wheels, Different Severity: Pediatric E-Scooter Versus Bicycle-Related Head Trauma in a Comparative Cohort

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**Background:** Electric scooters represent a distinct urban trauma mechanism. Although comparable to bicycles as two-wheel vehicles, differences in speed, stability, fall dynamics, and helmet use may generate a more severe neurotrauma phenotype. Pediatric comparative data remain scarce, particularly for intracranial injury severity and acute-care burden.

**The aim:** To compare injury severity, intracranial lesion patterns, and acute-care burden in children after e-scooter- versus bicycle-related head trauma.

**Materials and methods:** This single-center retrospective cohort included patients <18 years admitted in 2023–2025 with bicycle- or e-scooter-related head trauma and complete clinical/neuroimaging data. Outcomes included ISS, regional AIS, intracranial injury phenotype, treatment, and hospital course. Mann–Whitney U,  $\chi^2$ , and Fisher's exact tests were used; ORs with 95% CIs were calculated.

**Results:** Ninety-nine children were included. Groups were comparable in age and sex. E-scooter trauma was associated with more frequent absence of contact at admission (OR 3.59, 95% CI 1.09–11.83). Global severity was higher after e-scooter accidents, with greater odds of ISS  $\geq 15$  (OR 2.80, 95% CI 1.16–6.78), higher median ISS ( $p=0.030$ ), and higher median AIS ( $p=0.038$ ). E-scooter injuries showed greater cranial severity, including AIS head/neck  $\geq 4$  (OR 2.94, 95% CI 1.15–7.53) and  $\geq 3$  cranial regions (OR 5.50, 95% CI 1.15–26.30). Intracranial burden was greater for SAH (OR 4.44), cerebral edema (OR 8.80), and ventricular abnormalities (OR 19.0). Hospital stay was longer after e-scooter trauma ( $p=0.039$ ), while operative rates were similar.

**Conclusions:** Pediatric e-scooter head trauma was associated with higher systemic severity, broader cranial involvement, and a more severe intracranial phenotype than bicycle trauma. These injuries should be regarded as high-risk mechanisms requiring neuroimaging review, serial assessment, and targeted prevention.

**Keywords:** Neurotrauma, electric scooter, bicycle, traumatic brain injury

# Clinical Utility of the IgG4/IgG Ratio in the Differential Diagnosis of IgG4-Related Disease

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**Background:** Serum IgG4 >135 mg/dL is a primary laboratory criterion for IgG4-related disease (IgG4-RD). However, its diagnostic specificity decreases in polyclonal hypergammaglobulinemia, where a non-specific elevation of all IgG subclasses leads to false-positive results. Precise differentiation between selective IgG4 overproduction and generalized immune activation is critical to avoid unnecessary invasive diagnostics and misclassification of classical autoimmune disorders.

**The aim:** To evaluate the prevalence of IgG4-RD markers and assess the diagnostic accuracy of the IgG4/IgG ratio (>10%) in differentiating IgG4-RD from other immune-mediated conditions.

**Materials and methods:** A retrospective analysis of 582 patients hospitalized at the University Clinical Center MUW was performed. Serum concentrations of total antibodies (IgG, IgM, IgA, IgE) and subclasses (IgG1-IgG4) were quantified using the turbidimetric method. For 449 patients with a complete profile, the IgG4/IgG ratio was calculated. The mean age of the patients was 38.6 years (range: 0–81).

**Results:** In the total cohort, IgG4>135-mg/dL was identified in 30 patients (5.2%). Applying the IgG4/IgG ratio >10% reduced the number of cases with laboratory suspicion of IgG4-RD to 21 (3.6%). Isolated IgG4 elevation (ratio <10%) occurred mainly in systemic connective tissue diseases, e.g., systemic lupus erythematosus, accompanied by a significant concurrent increase in IgG1 and IgG2. High variability of the ratio in the pediatric subpopulation (n=10) suggests that adult-based thresholds may be suboptimal for younger groups.

**Conclusions:** Isolated IgG4 elevation lacks specificity for IgG4-RD in autoimmune populations. The IgG4/IgG ratio >10% reduces false-positive results caused by polyclonal hypergammaglobulinemia. Turbidimetric quantification of the full IgG subclass profile is necessary for precise differential diagnosis.

**Keywords:** autoimmunity, IgG4-RD, IgG4/IgG ratio, IgG, laboratory medicine, hypergammaglobulinemia

# What does „undetermined” mean in QuantiFERON-TB Gold Plus results and why sometimes it should not be ordered?

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**Background:** The QuantiFERON-TB Gold Plus (QFT-Plus) assay is an Interferon-Gamma Release Assay (IGRA) that serves as a gold standard in the diagnosis of Latent Tuberculosis Infection (LTBI). It measures interferon-gamma (IFN- $\gamma$ ) released by T-lymphocytes after stimulation with Mycobacterium tuberculosis antigens. In clinical practice, it is routinely used for screening patients prior to biological therapy or transplantation, where exclusion of LTBI is crucial to prevent reactivation under immunosuppression.

A significant diagnostic challenge is posed by "undetermined" results, caused by either lack of response in positive control (immune anergy) or high background levels in the negative control. These results are non-informative, increase costs, and may delay treatment.

**The aim:** To retrospectively assess the frequency and causes of undetermined QFT-Plus results and identify patient groups at risk of non-diagnostic outcomes.

**Materials and methods:** The study included 3,093 patients admitted to the University Clinical Center in Warsaw between January and December 2025. Patients came from multiple departments, including cardiology, hepatology, surgery, internal medicine, gastroenterology, transplantology, neurology, nephrology and dermatology.

The QFT-Plus assay was performed on incubated whole blood samples with IFN- $\gamma$  concentration measured using the ELISA method.

**Results:** Among all results, 2696 were negative, 280 positive, and 117 undetermined. The highest proportion of undetermined results was observed in hepatology (22 results, which is 3.2% of all tests ordered in the department), surgery (15 results, 5.5%) and transplantology (15 results, 5.8%). These results were most frequent in patients receiving immunosuppressive therapy, including transplant recipients and patients with autoimmune diseases.

**Conclusions:** Greater awareness of the underlying principles of the QuantiFERON-TB Gold Plus assay is crucial to prevent unnecessary patient blood collection and to minimize the generation of clinically non-informative laboratory results.

**Keywords:** QuantiFERON-TB Gold Plus, latent tuberculosis infection, undetermined result, immunosuppression,

# Early Detection of Naturally Occurring ABO IgM Antibodies in Neonates Within the First 24 Hours of Life

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**Background:** Natural antibodies are a fundamental component of the humoral immune response. The ABO blood system is unique in that naturally occurring antibodies are physiologically present in the serum. These antibodies are directed against antigens absent on an individual's own red blood cells and predominantly belong to the IgM class. The synthesis of natural antibodies begins in the first months of life, reaches peak levels in young adulthood, and subsequently declines gradually with age. Their production is thought to result from cross-reactivity with environmental antigens, particularly those derived from the intestinal microbiota.

**The aim:** Due to the lack of consensus regarding the timing of the onset of production of natural anti-ABO IgM antibodies in newborns, this study assessed the presence of these antibodies in venous blood during the first day of life.

**Materials and methods:** A cohort of 105 newborns was recruited from the neonatal ward. ABO and RhD blood typing was performed using a routine, automated method. Samples from patients with AB blood group were excluded from the further analysis. Naturally occurring antibodies were identified using a semi-automated column agglutination method with A and B red blood cells.

**Results:** In the study cohort, 46 newborns were group A, 20 - B, 31-O, and 8 -AB. Overall, 21.9% of newborns tested positive for naturally occurring antibodies. IgM were observed in 6.5% of group A (two cases, titre 2), 5% of group B (two cases, titre 2), and 51.6% of group O (titre 2 in seven cases, titre 4 in four cases, and titre 8 in four cases). In summary, antibody positivity was markedly more frequent in newborns with blood group O compared to groups A and B, indicating a stronger and more variable serological response in this group.

**Conclusions:** The conducted study demonstrates the presence of naturally occurring antibodies as early as the first day of life, with both the timing of their initial production and their titres varying depending on the infant's blood group.

**Keywords:** natural antibodies, newborns, ABO, IgM

# Comparative Structural Validation of PrP-NMR Models Reveals Species-Specific Differences in Local Geometry and Stability Associated with Disease Susceptibility

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**Background:** Prion diseases are rare, rapidly progressive, and fatal neurodegenerative diseases affecting 1-2 people, per million per annum. They occur due to conformational changes in the prion protein (PrP). The resulting abnormal prions aggregate and lead to characteristic spongiform degeneration in the brain. It should be noted that curative therapy doesn't exist yet. This highlights the importance of understanding its structure. Interestingly, humans exhibit higher susceptibility compared to other mammals- probably due to flexible regions in PrP.

**The aim:** To analyze and plot the structural quality and local geometric features of PrP-NMR models from four different species and relate them to disease susceptibility.

**Materials and methods:** NMR structures of 3KU4 (horse), 1QM0 (human), 1DWZ (cow), and 1AG2 (rat) were analyzed from the protein data bank. Structural validation of metrics such as Plane outliers, atomic clashes and angle outliers was assessed for local irregularities. Data were also collected from peer-reviewed articles published in English and analyzed.

**Results:** The 3KU4 showed the lowest number of structural deviations, indicating most ideal geometry, whereas the 1QM0 exhibited highest and 1DWZ and 1AG2 displayed intermediate characteristics. This suggests that human protein has increased local disorder which may relate to increased susceptibility to prion diseases. This result is consistent with  $\beta$ 2- $\alpha$ 2 loop rigidity, in which the increased structural order correlates with resistance to the disease.

**Conclusions:** Though different species exhibit structural similarity, differences in local geometry and secondary structure can be related to species specific susceptibility to prion misfolding and disease. This study might help for better understanding of protein stability and help in the development of curative treatment, as such does not exist so far. However, these might be influenced by several other factors and need to be studied further.

**Keywords:** PrP, NMR, Prion diseases, 3KUR, 1AM0, 1DWZ, 1AG2

# Evaluation of lipoprotein(a) concentration in children and adolescents with type 1 diabetes mellitus

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**Background:** Type 1 diabetes mellitus (T1DM) is an autoimmune disorder characterized by vascular complications induced by hyperglycemia and oxidative stress, leading to endothelial injury and chronic inflammation. Lipoprotein(a) [Lp(a)] is an independent risk factor for atherosclerotic cardiovascular disease and ischemic stroke. The elevated cardiovascular risk inherent to T1DM may be exacerbated by increased Lp(a) levels.

**The aim:** This study aimed to evaluate blood Lp(a) concentrations in children and adolescents with T1DM, and to determine their correlation with lipid profile parameters and the degree of glycemetic control.

**Materials and methods:** This study included 40 children with T1DM (aged 2-17 years; disease duration  $5.18 \pm 3.87$  years). Lp(a) concentrations were measured using an immunoturbidimetric assay. Selected clinical and biochemical parameters (lipid profile, HbA1c, CRP) were also evaluated.

**Results:** In children with T1DM, the median serum concentration of Lp(a) was 19.3 mg/dL, with desirable Lp(a) values ( $<30$  mg/dL) observed in 57.5% of the subjects. Conversely, in 42.5% of the patients, serum Lp(a) concentrations exceeded 30 mg/dL, including 8 children with T1DM exhibiting Lp(a) levels  $>50$  mg/dL. Furthermore, significant correlations were found between Lp(a) concentrations and total cholesterol, LDL-C, and non-HDL-C. However, no significant association was observed between serum Lp(a) concentrations and age, sex, disease duration or HbA1c.

**Conclusions:** Elevated Lp(a) concentrations may predispose children with T1DM to premature atherosclerotic lesions. This study demonstrated that Lp(a) levels are not directly associated with HbA1c. However, the correlation between Lp(a) and both LDL-C and non-HDL-C indicates that Lp(a) is strongly linked to highly atherogenic lipoprotein particles. These findings underscore the rationale for measuring Lp(a) levels in children with T1DM at least once during the disease course to identify patients at increased cardiovascular risk and intensify preventive strategies.

**Keywords:** type 1 diabetes mellitus, lipoprotein(a), cardiovascular risk, HbA1c, LDL-C, cardiovascular diseases

# The New Era of Craniostenosis: From Prenatal Gene Silencing to Robot-Assisted Preservation

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**Background:** Craniostenosis management is shifting from reactive postnatal remodeling toward early detection and biotechnological intervention. Modern protocols now integrate robot-assisted microsurgery, 3D-printed scaffolds, and prenatal molecular therapies to prioritize functional "preservation" over traditional reconstruction.

**The aim:** To evaluate the efficacy of newly discovered treatment modalities—specifically robot-assisted surgery, spring-mediated cranioplasty, and experimental gene therapies—compared to conventional surgical standards.

## **Materials and methods:**

**Results:** Robot-assisted endoscopy showed a 30% increase in precision for osteotomy lines, with blood loss reduced to 150–300 mL (a 40–80% decrease). Spring-assisted cranioplasty significantly shortened hospital stays. Prenatal 3D ultrasound and fetal MRI demonstrated inconclusive sensitivity for early detection. Most notably, breakthrough RNA-nanoparticle gene therapy successfully maintained suture patency in preclinical models. Furthermore, 3D-printed bioactive scaffolds improved bone regeneration, reducing secondary hardware-removal surgeries by 68%.

**Conclusions:** The "hospital of the future" utilizes a "prenatal-to-postnatal" pipeline. Discovery of gene-silencing nanoparticles suggests a future where surgery is supplemented by molecular therapy. Currently, robot-assisted and spring-mediated techniques represent the gold standard for reducing morbidity and optimizing neurodevelopmental outcomes.

**Keywords:** Robot-assisted surgery, craniostenosis, 3D-printed scaffolds

# Dementia - what don't we know about prevention?

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**Background:** Dementia is a syndrome resulting from various brain disorders, leading to a progressive decline in cognitive functions and the ability to perform daily activities. Although it is incurable, its onset and progression may be delayed or partially prevented by modifying risk factors. However, the effectiveness of prevention depends on the level of knowledge and beliefs in the population.

A cross-sectional survey was conducted between January 22, 2025, and March 15, 2026, using an anonymous questionnaire in both electronic and paper-based forms. The study included 1,053 respondents with diverse sociodemographic characteristics. Beliefs regarding the impact of lifestyle, cognitive activity, and physical activity on dementia risk were analyzed.

**The aim:** The study aimed to assess beliefs regarding the possibility of preventing dementia in the general population, with particular emphasis on the perceived role of cognitive and physical activity.

## **Materials and methods:**

**Results:** Most respondents (83.1%) believed that lifestyle influences the development of dementia. A vast majority (94.0%) indicated that mentally stimulating activities, such as solving crosswords or sudoku puzzles, support cognitive function. Meanwhile, a smaller proportion (79.3%) attributed a protective effect to physical activity, while uncertainty in this regard was higher than in relation to cognitively engaging activities (15.7% vs. 3.9%). These findings indicate a disparity in the perceived importance of different preventive strategies.

**Conclusions:** Despite a relatively high level of awareness regarding the impact of lifestyle on dementia risk, notable inconsistencies were observed in the assessment of the effectiveness of specific preventive measures in the studied population. Greater importance was placed on cognitively engaging activities than on physical activity. These findings suggest for targeted educational interventions in dementia prevention.

**Keywords:** dementia, prevention, public awareness, cognitive exercises, physical activity, modifiable risk fact

# The Role of Real-World Evidence in the Preliminary Verification of AI-Generated Drug Repositioning Candidates

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**Background:** Drug repositioning has emerged as a promising strategy to address the innovation crisis in pharmaceutical development. While artificial intelligence enables efficient in silico hypothesis generation, clinical translation remains challenging.

**The aim:** This study evaluates the integration of Real-World Evidence (RWE) as a validation layer for drug-repositioning candidates identified via artificial intelligence (AI). Specifically, the research aims to categorize dominant AI methodologies, such as network-based algorithms and natural language processing, used for hypothesis generation. It further assesses the utility of diverse RWE sources, including Electronic Health Records and insurance databases, in providing retrospective clinical validation. Additionally, the study analyzes translational success across various therapeutic areas such as neurodegenerative and psychiatric diseases to determine the clinical viability of the AI-RWE pipeline. Finally, it outlines implementation barriers, focusing on data quality and standardization needed to bridge the gap between computational discovery and clinical practice.

## Materials and methods:

**Results:** Network-based algorithms and natural language processing dominated AI-driven hypothesis generation. Validation using Electronic Health Records and insurance databases enabled retrospective assessment of drug efficacy across large populations. Successful applications were identified in neurodegenerative, metabolic, infectious, autoimmune, and psychiatric diseases.

**Conclusions:** The integration of AI-based analytics with RWE provides a promising framework for the preliminary verification of computational predictions, potentially informing the translational pathway toward clinical practice. However, the effectiveness of this approach remains dependent on data quality and the specific therapeutic context, requiring further standardization of clinical data.

**Keywords:** drug repositioning; artificial intelligence; real-world evidence; electronic health records; *precisi*

# Natural Antimicrobial Agents in Food Technology: Mechanisms, Efficacy and Challenges in Application

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**Background:** Ongoing changes in the food industry, together with increasing consumer expectations regarding food quality and safety, have intensified the search for healthier and more sustainable preservation strategies. Although synthetic food additives exhibit high antimicrobial efficacy, their use remains controversial because of concerns related to consumer acceptance as well as their potential health and environmental implications.

**The aim:** This review aims to present the major groups of natural antimicrobial agents and to evaluate their implementation potential, with particular emphasis on their mechanisms of action, in vitro and in situ efficacy, technological limitations, regulatory aspects in the European Union and the United States, and existing research gaps.

**Materials and methods:**

**Results:** The efficacy of natural antimicrobial agents depends on food matrix composition and application method. Synergistic combinations with other preservation strategies show the greatest potential.

**Conclusions:** Increasing the practical applicability of natural preservatives requires the development of standardized and chemically stable biopreservation systems, as well as further in situ studies integrating technological and regulatory considerations.

**Keywords:** food safety, food technology, natural antimicrobial agents

# **Piriformis syndrome: anatomical basis, morphological variability and clinical implications — a narrative review**

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**Background:** Piriformis syndrome (PS) is an underrecognized cause of buttock pain and is frequently misdiagnosed as sciatica. The condition results from compression or irritation of the sciatic nerve by the piriformis muscle, leading to local inflammation, neural irritation or injury, and pain symptoms. Two principal pathophysiological mechanisms are involved in the development of this syndrome.

**The aim:** The aim of this review is to summarize the anatomical background, pathophysiological mechanisms, clinical features, diagnostic challenges, and current treatment strategies of PS

## **Materials and methods:**

**Results:** Anatomical variations of the sciatic nerve may increase susceptibility to piriformis syndrome, particularly in individuals presenting with variants B, C, D, E, and F. These variants may also elevate the risk of iatrogenic sciatic nerve injury during surgical procedures involving the hip region. Diagnosis remains primarily clinical and is based on detailed medical history, physical examination, and provocative maneuvers, while imaging and electrodiagnostic studies are mainly used to exclude alternative causes of symptoms, as no universally accepted diagnostic criteria have been established. Management of PS is typically stepwise and includes three escalating therapeutic stages. First-line treatment consists of physical therapy and nonsteroidal anti-inflammatory drugs (NSAIDs). In cases refractory to conservative therapy, intramuscular injections of local anesthetics, corticosteroids, or botulinum toxin may be administered. Surgical intervention, involving tendon release to decompress the sciatic nerve, is reserved for severe and treatment-resistant cases.

**Conclusions:** Greater awareness of anatomical variability and the multifactorial nature of this condition may improve diagnostic accuracy and therapeutic outcomes. Further research is required to establish standardized diagnostic criteria and optimize evidence-based management strategies.

**Keywords:** Piriformis, Piriformis syndrome, Sciatic nerve

# Contemporary Dentistry with the Use of Optical Magnification – A Literature Review.

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**Background:** Contemporary dentistry increasingly utilizes optical magnification, such as loupes and microscopes, to improve the visibility of the operative field. These solutions are gaining importance in everyday clinical practice, influencing both the quality of treatment and the ergonomics of the dentist's work.

**The aim:** The aim of this study was to present the benefits of using magnification systems in dentistry based on current literature.

## **Materials and methods:**

**Results:** The use of dental loupes and microscopes increases the precision and effectiveness of procedures, improves work ergonomics, and reduces musculoskeletal complaints. An improvement in diagnostic capabilities was also demonstrated, particularly in the detection of caries. Additional benefits include increased confidence, time savings, and enhanced motor skills. Moreover, the microscope allows for changes in magnification during procedures, as well as photographic and video documentation. Clinical studies have shown higher effectiveness of endodontic treatment when using a microscope.

**Conclusions:** Magnification systems have a significant positive impact on the quality of dental treatment and the comfort of the dentist's work. Their use is becoming a standard in modern dentistry and is likely to continue to expand.

**Keywords:** dental loupes, dental operative microscope, optical magnification

# NGS-Based Analysis of the Gut Microbiota in Relation to Diet, Gastrointestinal Symptoms, and Comorbidities

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**Background:** In recent years, there has been a dynamic increase in research on the relationships between gut microbiota composition, health status, gastrointestinal symptoms, and lifestyle factors, particularly diet. Disruptions in gut microbiota balance (dysbiosis) have been associated with the development of numerous chronic diseases, including metabolic disorders, inflammatory bowel diseases, irritable bowel syndrome, and immune dysfunctions. Diet is one of the key factors modulating the composition and function of the gut microbiota, influencing both its diversity and structural composition.

**The aim:** The aim of this review is to summarize current evidence on the relationships between diet, gut microbiota composition, gastrointestinal symptoms, and overall health status.

## **Materials and methods:**

**Results:** The analysis of available evidence indicates significant associations between dietary patterns, health status, and gut microbiota composition. Specific dietary components may promote the development of either beneficial (e.g. Bifidobacterium, Lactobacillus, Faecalibacterium prausnitzii) or unfavorable (e.g. potentially pathogenic taxa such as Clostridium difficile, Escherichia coli, Enterobacteriaceae) microbial profiles, which in turn influence gastrointestinal function and overall health outcomes

**Conclusions:** Despite the growing body of evidence on the role of gut microbiota in health and disease, the mechanisms underlying host–microbiota interactions are not yet fully understood. Further research and educational efforts promoting the importance of diet in maintaining a healthy microbiome are needed.

**Keywords:** gut microbiota, dysbiosis, diet, NGS, metabolic health

# Is Anticoagulation Enough? Adherence and the Hidden Risk of Brain Injury in Atrial Fibrillation

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**Background:** Atrial fibrillation (AF) is a major risk factor for ischemic stroke, but its neurological impact extends beyond clinically overt events. Patients with AF are at increased risk of cognitive decline and dementia, even without prior stroke or transient ischemic attack.

**The aim:** To evaluate the relationship between AF and silent brain injury, and to assess the impact of oral anticoagulation (OAC) and treatment adherence on cognitive outcomes.

## Materials and methods:

**Results:** Neuroimaging studies reveal a high prevalence of silent cerebral infarcts, white matter lesions, and cerebral microbleeds in patients with AF. These subclinical abnormalities are strongly associated with impaired cognitive function and may represent a key link between AF and neurodegeneration. Proposed mechanisms include recurrent microembolization, cerebral hypoperfusion, and systemic inflammation.

OAC effectively reduces the risk of stroke and is associated with a lower incidence of cognitive decline. However, it does not fully eliminate the risk of silent brain injury. Importantly, most studies evaluate treatment exposure rather than real-world adherence, leaving uncertainty about its true effectiveness. Suboptimal adherence may contribute to ongoing microvascular damage and accelerate cognitive deterioration, particularly in patients with paroxysmal AF, where symptom variability may affect treatment persistence.

**Conclusions:** Silent brain injury is a significant and underrecognized burden in AF patients. While anticoagulation remains central to stroke prevention, its protective effect on cognition likely depends on consistent use. Improving adherence and awareness of its neurological consequences may enhance long-term outcomes and should be an integral part of AF management.

**Keywords:** atrial fibrillation, silent cerebral infarcts, cognitive decline, oral anticoagulation, adherence

# Brain On Fire: Is Treatment-Resistant Depression a Hidden Inflammatory Disease? A Systematic Review of (Neuro)

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**Background:** Treatment-resistant depression (TRD) remains a major challenge in modern psychiatry, as many patients fail to achieve remission despite multiple adequate pharmacological trials. This suggests that mechanisms beyond monoaminergic imbalance may be involved. Increasing evidence indicates that chronic low-grade inflammation may contribute to the pathophysiology of TRD, supporting the concept of an inflammatory subtype of depression.

**The aim:** The aim of this systematic review was to summarize current knowledge on immunological mechanisms underlying TRD and to evaluate whether inflammation may explain treatment resistance in a distinct subgroup of patients.

## Materials and methods:

**Results:** The review was conducted in accordance with PRISMA 2020 guidelines, including 78 studies published between 2016 and 2026. Most studies reported elevated CRP levels and increased concentrations of proinflammatory cytokines (IL-6, TNF- $\alpha$ , IL-1 $\beta$ ) in a subgroup of TRD patients. Transcriptomic analyses revealed activation of interferon signaling pathways. Higher inflammatory burden was associated with more severe anhedonia, psychomotor slowing, and vegetative symptoms. Elevated neurofilament light chain levels suggested potential neuroaxonal damage, though findings were not consistently linked to clinical outcomes. Interventional studies showed mixed results. Ketamine demonstrated rapid antidepressant effects, often preceding measurable changes in inflammatory markers. Anti-inflammatory augmentation strategies (e.g., celecoxib, minocycline) appeared more effective in patients with elevated baseline inflammation, although results were inconsistent.

**Conclusions:** Overall, the evidence supports the presence of an inflammatory biotype of TRD. CRP and TNF- $\alpha$  may serve as promising biomarkers; however, further large-scale studies are needed to confirm their predictive value and clinical utility.

**Keywords:** treatment-resistant depression, chronic inflammation, proinflammatory cytokines, immunological biom

# A minimally invasive revolution in dentistry: ICON resin infiltration for the treatment of white spots.

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**Background:** In recent years, significant progress has been made in research on the treatment of early carious lesions, enabling the increasingly widespread use of minimally invasive methods. Consequently, strategies are being developed to treat the stages of enamel demineralization before a cavity forms.

**The aim:** The aim of this study was to summarize the current state of knowledge regarding the efficacy of ICON DMG resin infiltration in the treatment of early enamel demineralization lesions, with particular emphasis on WSL-type lesions resulting from orthodontic treatment with fixed appliances.

## **Materials and methods:**

**Results:** A systematic literature review was conducted using PubMed, Google Scholar, and the resources of the Library of the Medical University of Silesia in Katowice. The review included in vivo clinical studies, in vitro studies, systematic reviews, and meta-analyses.

**Conclusions:** The collected data indicate that infiltration with a low-viscosity resin is an effective treatment for early enamel lesions. The mechanism of action is based on the resin's penetration into the porous structure of the enamel, which leads to the closure of micropores and a reduction in the diffusion of cariogenic acids. Compared to other remineralization methods, ICON demonstrates greater efficacy in terms of penetration depth and stabilization of demineralization lesions. Additionally, a significant improvement in the optical properties of the enamel and a reduction in the visibility of WSL are observed.

**Keywords:** resin infiltration, ICON, WSL, enamel demineralization, minimally invasive dentistry

# Nanoformulations of NSAIDs: evaluating gastroprotective potential

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**Background:** Nonsteroidal anti-inflammatory drugs (NSAIDs) are widely used due to their analgesic, anti-inflammatory, and antipyretic effects. Their long-term use is associated with a significant risk of gastrointestinal adverse events. These include both upper gastrointestinal damage, such as gastric ulcer disease and lower intestinal involvement. The crucial mechanism of gastrotoxicity is the inhibition of cyclooxygenase (COX-1), a constitutive enzyme with a protective role in the gastric mucosa. In recent years, NSAID nanoformulations have garnered increasing interest as a strategy to reduce these adverse effects.

**The aim:** The aim of this study is to review the latest scientific literature and present formulation strategies for nonsteroidal anti-inflammatory drugs and their therapeutic applications in the context of reducing gastrotoxicity.

## **Materials and methods:**

**Results:** Studies on nanoformulations of naproxen sodium have demonstrated a significant reduction in gastrotoxicity, compared to conventional form. A developed nanoformulation of flurbiprofen has shown high drug encapsulation efficiency and pH-dependent release, along with the ability to reduce oxidative stress and lower levels of pro-inflammatory cytokines. Moreover, the use of nanoparticle systems for poorly soluble drugs, such as ibuprofen, allows for increasing their bioavailability and reducing the frequency of side effects from the digestive system.

**Conclusions:** Nanoformulations of NSAIDs represent a promising approach to improving the safety of pharmacotherapy by reducing gastrotoxicity while maintaining or enhancing therapeutic effect, highlighting their gastroprotective potential in the modern treatment of inflammatory diseases.

**Keywords:** NSAIDs, nanoformulations, gastrotoxicity, COX-1

# Pertussis: Clinical Presentation and Diagnostic Challenges

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**Background:** Pertussis, caused by *Bordetella pertussis*, remains a significant public health concern despite long-standing vaccination programs. In recent years, a resurgence of cases has been observed, which has been attributed to waning post-vaccination immunity - particularly following acellular vaccines - as well as pathogen adaptation to immune pressure. Variability in clinical presentation and diagnostic limitations further hinder effective disease control.

**The aim:** The aim of this study was to analyze the clinical presentation of pertussis and to identify current diagnostic challenges, taking into account the role of vaccination in shaping the epidemiology of the disease.

## **Materials and methods:**

**Results:** The clinical course of pertussis comprises three stages, with considerable variation depending on the patient's age. In infants, the disease is often severe and associated with a high risk of complications, whereas in adults it frequently presents atypically. Bacterial toxins that modulate the host immune response play a key role in pathogenesis. Diagnosis remains challenging due to the low sensitivity of culture, limited specificity of molecular methods, and difficulties in interpreting serological results. A significant problem is waning immunity, particularly following acellular vaccines, and the emergence of strains with altered antigen expression.

**Conclusions:** Pertussis remains a clinical and epidemiological challenge. Given the lack of data on booster vaccination for adults, diagnostic limitations, and changes in post-vaccination immunity, it is advisable to optimize diagnostic and vaccination strategies and to continue monitoring the evolution of the pathogen.

**Keywords:** *Bordetella pertussis*, vaccination, vaccine-induced immunity

# Beyond Sleep: Melatonin-Driven Circadian Synchronization and the Maintenance of Systemic Homeostasis

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**Background:** Melatonin is a key chronobiotic hormone that acts as a biological signal of darkness and a regulator of the sleep–wake cycle. It also exhibits immunomodulatory, anti-inflammatory, and antioxidant properties, suggesting a role in integrating chronobiological, neuroendocrine, and metabolic processes and maintaining organismal homeostasis.

**The aim:** The aim of this study was to provide a comprehensive analysis of randomized clinical trials published between 2010 and 2025 evaluating the effects of oral melatonin supplementation on circadian rhythm modulation, sleep parameters, immune function, the hypothalamic–pituitary–adrenal (HPA) axis, and selected metabolic and cardiovascular indices in adults.

## **Materials and methods:**

**Results:** A total of 21 randomized clinical trials were included following PRISMA guidelines. The most consistent effect of melatonin supplementation was a reduction in sleep latency and improvement in subjective sleep quality, particularly in older adults and patients with circadian rhythm disorders, whereas effects were limited in individuals without circadian dysregulation. Melatonin showed chronobiotic activity, significantly shifting dim-light melatonin onset (DLMO), especially when administered at appropriate timing, with effects potentially enhanced by light exposure. Some studies indicated modulation of the morning cortisol surge, suggesting involvement in HPA axis synchronization. Evidence regarding metabolic and cardiovascular outcomes was inconclusive and varied depending on study populations.

**Conclusions:** Melatonin should not be regarded solely as a hypnotic agent but rather as a regulator of chronobiological processes with potential relevance to maintaining systemic physiological balance.

**Keywords:** melatonin; circadian rhythm; dim-light melatonin onset (DLMO); sleep; homeostasis; immunomodulation;

# Membrane Transport Dynamics in CRRT: A Mechanistic Review of Diffusion, Convection and Adsorption

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**Background:** Continuous Renal Replacement Therapy (CRRT) represents more than a volume management tool, it is a functional substitute for the failing nephron in the setting of extreme hemodynamic instability. In the intensive care unit, systemic inflammation and metabolic derangement alter the solute profile, necessitating an extracorporeal system that can precisely restore and maintain solute homeostasis through defined membrane transport principles.

**The aim:** To evaluate, through a narrative review, the biophysical determinants of solute transport: diffusion, convection and adsorption, and their relative efficacy in clearing uremic toxins and inflammatory mediators during critical illness.

## Materials and methods:

**Results:** Solute removal kinetics are strictly governed by the interplay between molecular weight and membrane pore characteristics. Diffusion, driven by concentration gradients, is highly efficient for small molecules, such as urea and electrolytes, often reaching saturation due to the low dialysate flow rates typical of CRRT. Convection utilizes hydrostatic pressure to transport solutes across the membrane, effectively bypassing the size-dependent limitations of diffusion for “middle molecules”, including pro-inflammatory cytokines. Adsorption contributes a non-linear clearance component via protein-membrane surface adhesion. In hybrid modalities (CVVHDF), diffusive and convective clearances are cumulative, although their efficiency is frequently modulated by concentration polarization and the formation of a secondary protein cake layer on the membrane surface.

**Conclusions:** Precision CRRT requires a transition from standardized protocols to individualized molecular kinetics. Modality selection must be dictated by the patient's specific metabolic phenotype: prioritizing diffusive flux for severe azotemia or convective flux for the immunomodulation of the cytokine storm. Mastery of these transport principles is fundamental to achieving hemodynamic and metabolic homeostasis in the critically ill.

**Keywords:** CRRT, Extracorporeal Organ Support, solute transport kinetics, sieving coefficient, cytokine removal

# Melioidosis—a forgotten or underestimated disease? Epidemiology, clinical presentation, diagnostics, and treat

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**Background:** Melioidosis, an infection caused by the environmental Gram-negative bacillus *Burkholderia pseudomallei*, is an underestimated public health burden associated with high lethality. Despite a mortality rate exceeding 50% in low-resource regions and a nonspecific clinical manifestation (frequently misdiagnosed as sepsis or tuberculosis), epidemiological vigilance remains low. Climate change, global migration, and the rising incidence of diabetes (the primary predisposing factor) are driving the expansion of endemic areas, rendering melioidosis an emerging threat on an international scale.

**The aim:** To systematize data concerning the epidemiology, clinical polymorphism, diagnostic challenges, and therapeutic strategies, as well as to demonstrate the necessity of intensifying epidemiological surveillance for *B. pseudomallei* infections.

## **Materials and methods:**

**Results:** Mathematical models indicate a radical underestimation of disease incidence: approximately 165,000 cases annually, with a mortality rate of 54% (89,000 deaths). The heterogeneity of the clinical picture, combined with the low sensitivity of standard microbial cultures, results in diagnostic delays and errors. The obligatory, biphasic antibiotic therapy is associated with a risk of infection recrudescence, while growing antimicrobial resistance necessitates the exploration of innovative approaches, such as phage therapy.

**Conclusions:** Melioidosis is not a forgotten disease, but rather a systematically underestimated one. Optimizing diagnostic algorithms and increasing clinical awareness are priorities in the field of infectious diseases, essential for reducing mortality on a global scale.

**Keywords:** Melioidosis, *Burkholderia pseudomallei*, public health

# Hidden Burden of Bone Loss in Crohn's Disease: Mechanisms and Clinical Risk

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**Background:** Crohn's disease (CD) is a chronic inflammatory condition with a substantial yet underrecognized impact on skeletal health. Progressive bone loss and increased fracture risk significantly contribute to long-term morbidity.

**The aim:** To critically evaluate the mechanisms, magnitude, and clinical implications of bone metabolism disorders in patients with Crohn's disease.

## **Materials and methods:**

**Results:** Bone involvement in CD is common and clinically relevant. Osteopenia affects up to 40% of patients, while osteoporosis occurs in 7–15%. The overall fracture risk is increased by 30–40%, with a particularly high risk of vertebral fractures (OR=2.26) and a significant increase in hip fractures (HR≈1.4). The pathophysiology is driven by increased osteoclastic activity without adequate compensatory bone formation. Chronic inflammation, especially TNF- $\alpha$  signaling, promotes bone resorption via dysregulation of the RANKL/OPG axis. Additional contributors include corticosteroid therapy, vitamin D deficiency, malnutrition, low BMI, and reduced physical activity. Anti-TNF therapy may partially improve bone mineral density, particularly when introduced early.

**Conclusions:** Bone metabolism disorders in Crohn's disease represent a significant but often overlooked clinical challenge. Early identification of high-risk patients and implementation of targeted strategies—including inflammation control, nutritional optimization, and limitation of corticosteroid exposure—are essential to reduce fracture risk and improve long-term outcomes.

**Keywords:** Crohn's disease, osteoporosis, bone metabolism, TNF- $\alpha$ , RANKL/OPG, fracture risk

# The genetic cause of chronic pancreatitis - a case of patient with CTRC and TRPV6 variants.

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**Background:** Chronic pancreatitis (CP) is an inflammatory condition of the pancreas most commonly caused by chronic alcohol misuse, although rare cases with a genetic etiology have also been identified. Mutations in the CTRC gene, which reduce the secretion or activity of the digestive enzyme chymotrypsin C, have been recognised as risk factors for chronic pancreatitis. However, complexity and co-occurrence of different variants may result in modification of the patient's clinical presentation.

**The aim:** Our study aimed to show the importance of considering variant co-occurrence and clinical context in the diagnostic process, as they may reveal complex molecular mechanisms underlying chronic pancreatitis of unknown etiology.

## **Materials and methods:**

**Results:** An 8-year-old female patient with severe abdominal pain after three episodes of pancreatitis underwent NGS testing, which revealed the presence of a heterozygous deletion c.738\_761del (p.Lys247\_Arg254del) and a homozygous substitution c.180C>T (p.Gly60Gly) in the CTRC gene, as well as a heterozygous substitution c.896T>A (p.Leu299Gln) in the TRPV6 gene. Sanger sequencing performed on the patient's parents revealed the presence of c.180C>T in the mother and both CTRC variants in the father, both with no history of disease symptoms. Although the c.180C>T variant is common and synonymous (~10% of the European population) may affect splicing and increase the risk of chronic pancreatitis by 2–5 times. The c.738\_761del variant leads to a reading frame shift and affects CTRC function. Moreover, missense variants and microdeletions in the CTRC gene increase the risk of this disease by 3-7 times.

**Conclusions:** Through the use of genetic diagnostic methods, we were able to identify both mutations in the CTRC gene, which may be responsible for the symptoms observed in the patient. The pathogenic deletion c.738\_761del is likely to be the main predisposing factor for the disease, while the synonymous variant c.180C>T may act as a risk modifier.

**Keywords:** chronic pancreatitis, pediatrics, TRPV6 gene, CTRC gene, genotype-phenotype relationship

# Management of Paravalvular Leak After Mitral Valve Replacement: Percutaneous Failure and Surgical Success

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**Background:** A 54 year-old man, cachectic was admitted to the cardiology department due to the progressively worsening dyspnea, fatigue, shortness of breath and high fever.

**The aim:** Echocardiography revealed severe organic mitral regurgitation due to the perforation of the anterior leaflet, the image corresponds to a ruptured mycotic aneurysm. Additionally, it showed bicuspid aortic valve with moderate regurgitation and moderate tricuspid regurgitation, normal left ventricular function.

**Materials and methods:** Laboratory parameters showed elevated inflammatory markers, NT-pro BNP, and blood culture showed the presence of *S. Haemoliticus* which corresponds to infective endocarditis. After initial antibiotic treatment the patient was qualified for the mitral valve replacement with implantation of the bioprosthesis, aortic valve replacement with implantation of the bioprosthesis, and tricuspid annuloplasty. Echocardiography examination showed good effect of the procedure. However, two months after the operation, the patient experienced a sudden deterioration of his clinical condition, recurrence of dyspnea with large paravalvular leakage observed at the mitral annulus on echocardiography.

**Results:** Due to clinical condition and recent cardiac surgery the patient was qualified for implantation of the Amplatzer occluder in order to close the paravalvular leak. The early effect of the procedure was good- a reduction in leakage was achieved. Notwithstanding hemolytic anemia requiring multiple blood transfusions was observed in a blood test few weeks later. Based on the clinical picture and additional tests the patient was referred to the reoperation of mitral valve-removal of Amplatzer occluder and reimplantation of bioprosthesis.

**Conclusions:** The perioperative period was uncomplicated. The patient was discharged in stable condition. At follow-up, he had no shortness of breath. Echocardiography revealed a good outcome of the operation, in addition reduction of left-sided heart chambers were observed.

**Keywords:** infective endocarditis, paravalvular leakage, bioprosthesis

# Orbital abscess progressing to bilateral orbital phlegmon in therapy-induced immunodeficiency

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**Background:** Orbital abscess with progression to bilateral orbital phlegmon represents a potentially life-threatening complication in patients with multimorbidity and therapy-induced secondary immunodeficiency. Rapid progression can lead to vision loss and systemic complications, requiring prompt, multidisciplinary management.

**The aim:**

**Materials and methods:**

**Results:** A 72-year-old female patient with IgM kappa monoclonal gammopathy, secondary cryoglobulinemia, cold agglutinin disease, previously treated with rituximab and bendamustine, with secondary hypogammaglobulinemia, was admitted with severe orbital soft tissue infection complicated by abscess formation. Emergency endoscopic right frontosphenoidectomy with abscess drainage was performed. Despite targeted antibiotic therapy, the infection progressed rapidly to bilateral orbital phlegmon with marked periorbital edema and visual impairment. Revision surgery included bilateral orbital abscess drainage, medial orbitotomy, and canthotomy. The clinical course was further complicated by periorbital tissue necrosis, acute kidney injury, and *Clostridioides difficile* infection. The patient received comprehensive multidisciplinary care. Treatment comprised renally adjusted broad-spectrum antimicrobial therapy, intravenous immunoglobulin replacement, blood product transfusions, albumin supplementation, parenteral nutrition, analgesic and anticoagulant medications, and systemic glucocorticoid therapy. Gradual clinical improvement was achieved, with normalization of inflammatory markers, stabilization of renal function, and preservation of visual acuity.

**Conclusions:** Orbital infections in patients with multimorbidity and therapy-induced immunodeficiency can progress rapidly from unilateral abscess to bilateral phlegmon. Early advanced imaging, timely surgical intervention, individualized antimicrobial and immunomodulatory therapy, and close multidisciplinary collaboration are critical for achieving favorable outcomes.

**Keywords:** otorhinolaryngology, therapy-induced immunodeficiency, orbital abscess, multimorbidity

# Surgical Management of Silent Sinus Syndrome with Patient-Specific 3D-Printed Orbital Implant

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**Background:** Silent sinus syndrome (SSS) is an atraumatic maxillary sinus atelectasis that enlarges the ipsilateral orbital cavity, producing facial asymmetry, enophthalmos, and hypoglobus. SSS often presents without sinonasal symptoms and is typically identified on imaging showing maxillary sinus opacification, ostiomeatal obstruction and inferior displacement of the orbital floor. Management typically restores sinus ventilation and orbital volume, though the sequence of interventions and use of mirrored 3D modeling versus custom implants remain debated.

**The aim:**

**Materials and methods:**

**Results:** A 42-year-old man presented to the Department of Maxillo-Facial Surgery with five months history of progressive left-sided enophthalmos, hypoglobus, and diplopia at extreme upgaze, without sinonasal symptoms or history of trauma or surgery. Computed tomography showed an atelectatic, opacified left maxillary sinus with retraction of its bony walls and descent of the orbital floor. The patient underwent single-stage sinus reventilation and patient-specific, pre-contoured orbital floor reconstruction using a mirrored 3D-printed model. Postoperatively, globe position improved immediately, whereas early diplopia persisted only at extreme upgaze and resolved. At 6 months, ocular alignment and motility were normal, facial symmetry restored, sensation intact, and no lid or canthal deformity was present. Postoperative imaging confirmed stable implant position and patent antrostomy.

**Conclusions:** SSS should be suspected in patients with spontaneous enophthalmos and hypoglobus without a history of trauma or significant sinus symptoms. A thorough evaluation, including imaging, is essential for prompt diagnosis. Combining endoscopic maxillary sinus reventilation with simultaneous orbital floor reconstruction can successfully restore normal orbital anatomy and paranasal function in SSS. Using a mirrored 3D-printed orbital model to pre-shape a titanium mesh offers a patient-specific, cost-effective alternative to custom implants.

**Keywords:** silent sinus syndrome, maxillary atelectasis, orbital reconstruction, titanium mesh; sinus surgery

# Effective non-transplant treatment of multiple myeloma: a case report of 20-year-long survival.

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**Background:** Multiple myeloma (MM) is the 2nd most common malignancy of the lymphoid system which resulted in over 1300 deaths in Poland in 2022 alone. It can be characterised by an uncontrolled growth of plasma cells which produce monoclonal immunoglobulins and cytokines responsible for symptoms of disease. Despite the fact that it is achievable for some MM patients to experience remission, prognosis remains poor for the vast majority - 5 years survival rate is 61.1% .

**The aim:** The aim was to analyse this patient's clinical management in the context of emerging MM treatment strategies to understand the mechanisms underlying long-term survival.

## Materials and methods:

**Results:** A 59-year-old female was diagnosed with IgG lambda multiple myeloma in clinical advancement IIIA in 2005. She underwent 9 lines of myeloma treatment without a bone marrow transplant, ultimately reached CR, surviving 20 years, and counting. Despite unfavorable cytogenetics, additional sickness burden and numerous complications such as thrombophlebitis, osteonecrosis of the jaw, Clostridioides Difficile colitis, she greatly surpassed the median survival rate which makes her a fascinating case to analyse and to learn from.

**Conclusions:** Modern treatments such as immunotherapy and targeted therapies played a key role in achieving remission. In 2005, at diagnosis, clinical management options were severely limited. The patient's long-term survival is likely attributable to a sequential combination therapy incorporating novel drugs developed over the last two decades— such as immunomodulatory drugs (pomalidomide), monoclonal (belantamab) and bispecific antibodies (teklitamab). By leveraging diverse mechanisms of action, this multidimensional approach resulted in complete remission. It seems that sequential therapy with novel agents is by far the most effective treatment option for MM patients due to greater efficacy and lower toxicity which translates into prolonged survival despite disease-related or patient-related factors.

**Keywords:** Multiple myeloma, long-term survival, sequential therapy

# Leadless Pacing After VSD Closure and Endocarditis: A Modern Cardiology Alternative to Surgery

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**Background:** Transcatheter closure of perimembranous ventricular septal defect (VSD) can be complicated by complete atrioventricular block (AVB). Managing young patients with AVB is challenging due to the long-term risks of pacing, including cardiac device-related infective endocarditis (CDRIE), venous access depletion, and the inevitable need for multiple generator replacements over a lifetime.

**The aim:** To describe a complex case of a young patient with post-VSD closure AVB and prior CDRIE who successfully underwent the extraction of a depleted leadless pacemaker (Micra VR) and its replacement with a next-generation leadless device (Micra AV) to restore atrioventricular synchrony.

## **Materials and methods:**

**Results:** A young female with a history of pediatric VSD closure and subsequent AV block developed Staphylococcus aureus sepsis and CDRIE involving her endocardial pacing system. Following complete system extraction and temporary pacing, a leadless MICRA VR was implanted to reduce recurrent infection risk and preserve venous patency. Seven years later, the patient presented with battery depletion. Given her age and the hemodynamic benefits of AV synchrony, the old device was electively extracted, and a novel MICRA AV was successfully implanted. The procedure was uncomplicated, and the patient was discharged with stable device parameters and restored atrioventricular sequential pacing.

**Conclusions:** This case demonstrates that leadless pacemaker extraction and upgrade (VR to AV) is a feasible and effective strategy in experienced centers. Such an approach optimizes long-term outcomes for young adults with congenital heart defects by maintaining AV synchrony and minimizing infectious risks. Furthermore, these advanced interventional techniques highlight how modern cardiologists can successfully manage complex complications while avoiding the significant morbidity and risks associated with repeat cardiac surgery.

**Keywords:** Leadless pacemaker, Ventricular septal defect, Micra VR extraction, Micra AV, Infective endocarditis

# A newborn with acute myocardial ischemia – a case report

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**Background:** The estimated incidence of myocardial infarction in term neonates is approximately 1 in 5,000. Mortality varies between 40-50%, due to diagnostic challenges of non-specific symptoms, such as sudden clinical deterioration and cardiac arrest. Diagnostic tools, like electrocardiogram (ECG), cardiac troponins, and imaging findings, are no different from those in the adult population. Short-term complications, including arrhythmia and cardiogenic shock, can lead to cardiovascular failure.

**The aim:** This study aims to present an extremely rare case of a myocardial infarction in a newborn after a sudden respiratory arrest during feeding.

## **Materials and methods:**

**Results:** A 4-hour-old female neonate aspirated milk during feeding. The patient experienced sudden cardiopulmonary arrest requiring resuscitation. Intubation, mechanical ventilation, and therapeutic hypothermia were used to stabilize her condition. Acute respiratory failure led to myocardial ischemia; symptoms of myocardial necrosis were revealed in further monitoring. ECG and echocardiography (ECHO) were used to confirm ischemic changes in the heart muscle and later to monitor the therapeutic process. Cardioprotective pharmacotherapy was initiated, including lisinopril, spironolactone, and acetylsalicylic acid. At 6 months of age, cardiac magnetic resonance imaging, ECG, and ECHO confirmed a stable condition. Currently, the patient continues cardioprotective treatment and is developing normally.

**Conclusions:** Diagnosing myocardial infarction in newborns requires distinguishing from congenital heart defects, infections, and hypoxia. Since ECG and ECHO may initially fail to reveal abnormalities, immediate initiation of circulatory support is crucial to minimize myocardial damage. The limited sensitivity of these screening methods may delay both recognition and intervention. There is still an urgent need to develop standard guidelines to improve the diagnosis and treatment of this rare and life-threatening disease in such young patients.

**Keywords:** Neonate, acute myocardial ischemia, hypoxia, therapeutic hypothermia

# Pars plana vitrectomy with ILM peeling and SF<sub>6</sub> gas endotamponade in the management of macular subretinal hemor

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**Background:** Subretinal hemorrhage is defined as the accumulation of blood in the subretinal space, often in the macular region, leading to an acute deterioration of visual acuity. It typically develops secondary to conditions associated with increased venous pressure, such as elevated intra-abdominal pressure, resulting in increased intracranial pressure and vascular rupture. Pars plana vitrectomy (PPV) is a key therapeutic modality that enables mechanical removal of blood, release of vitreoretinal traction, and the use of gas endotamponade to promote retinal reattachment.

**The aim:** A 58-year-old male presented to the Vitreoretinal Surgery Clinic with decreased vision in the left eye (LE) of approximately 10 days' duration, following an episode of severe coughing accompanied by vomiting. On initial examination, best-corrected visual acuity (BCVA) was: right eye (RE) 20/20, LE 0.01; intraocular pressure (IOP): RE 15 mmHg, LE 16 mmHg. Based on the clinical findings and additional diagnostic tests, the patient was qualified for surgical intervention. Pars plana vitrectomy (PPV) was performed with internal limiting membrane (ILM) peeling in the macular area, followed by endotamponade with 25% sulfur hexafluoride (SF<sub>6</sub>) gas in the left eye.

## Materials and methods:

**Results:** At the 14-day follow-up, BCVA improved to RE 20/20, LE 20/20; IOP was RE 26 mmHg, LE 26 mmHg. Follow-up ophthalmic examination revealed significant resorption of the subretinal hemorrhage in the macular region, with improvement in retinal anatomy.

**Conclusions:** Pars plana vitrectomy with ILM peeling and SF<sub>6</sub> gas endotamponade proved to be an effective and safe treatment for subretinal hemorrhage, resulting in complete restoration of visual acuity. This technique should be considered in cases involving macular elevation.

**Keywords:** subretinal hemorrhage, pars plana vitrectomy, internal limiting membrane peeling, gas endotamponade

# Hemoperitoneum: A rare complication of peritoneal dialysis

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**Background:** In peritoneal dialysis (PD) patients, hemoperitoneum is an extremely rare complication. Differential diagnosis between benign (ovulation, menstruation in women) and severe causes (cancer, vascular malformations, Encapsulating Peritoneal Sclerosis) remains a clinical challenge. Vascular abnormalities are an exceedingly rare etiology.

**The aim:** Presenting a case of hemoperitoneum caused by a pseudoaneurysm of the pancreaticoduodenal artery and to evaluate the feasibility of continuing PD despite hemorrhagic complications.

## **Materials and methods:**

**Results:** The study analyzes the medical records of a 70-year-old male with stage 5 chronic kidney disease secondary to diabetes, treated with PD. The patient was urgently admitted with symptoms of "acute abdomen" and blood-stained dialysate. Diagnostic procedures included laboratory tests, dialysate and blood cultures, CT, and angio-CT. Initial suspicion of peritonitis (dialysate cell count 1109/uL) was not confirmed by cultures. Angio-CT revealed a large retroperitoneal hematoma (88x44x144 mm) and pseudoaneurysm of a pancreaticoduodenal artery branch. Empirical antibiotics were administered, and 2 units of RBCs were transfused due to a hemoglobin drop to 8.2 g/dL. Given the patient's clinical stability and spontaneous regression of the aneurysm in follow-up imaging, surgical or endovascular intervention was deferred. PD parameters were modified (volume reduction to 5.0 L per session, performed every other day), leading to the resolution of hemoperitoneum, normalization of inflammatory markers, and stabilization of hemoglobin levels (>10.0 g/dL).

**Conclusions:** Hemoperitoneum caused by vascular malformations is a highly unusual complication of PD. Although literature often suggests conversion to hemodialysis, this case shows that individualized PD modification is a safe and effective alternative.

**Keywords:** hemoperitoneum, peritoneal dialysis, peritonitis, pseudoaneurysm

# A rare variant of type XI in the Michel's classification of common hepatic artery branching

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**Background:** Anatomical abnormalities affecting the branches of the common hepatic artery (CHA) and thus affecting the blood supply to the liver and surrounding organs, pose a challenge for specialists interfering with the upper abdominal area. It therefore seems essential to constantly extend the knowledge of new or less common variants such as presented in this case.

**The aim:** Our case report describes a rare case of the CHA branching, found during the routine dissection of an 82-year-old male specimen. We did not find a similar previously described variation. Such variations encourage specialists involved in diagnostic imaging and performing abdominal procedures to deepen their knowledge of potentially rare variants.

## **Materials and methods:**

**Results:** The CHA, arising from the coeliac trunk (CT), measured 5.43 mm in diameter and 28.27 mm in length. The gastroduodenal artery (GDA), right hepatic artery (RHA) and left hepatic artery (LHA) branched off from CHA, had, respectively, 4.38 mm, 6.13 mm and 3.27 mm in diameter. RHA gave off cystic artery (CA) (diameter, 2.80 mm) and middle hepatic artery (MHA) (diameter, 1.67 mm). LHA gave rise to right gastric artery (RGA) (diameter, 1.91 mm) and MHA (diameter, 3.92 mm). This branching is classified as type XI in Michels classification. During our review of the literature, we did not come across any reports where these three variations occurred simultaneously, which makes our findings extremely rare.

**Conclusions:** Although these findings are extremely rare, they are significant in the fields of transplantology, surgery and radiology of upper abdomen. It is vital to extend the anatomical knowledge and document any abnormalities found to improve the quality of medical care for both the clinician and the patient.

**Keywords:** common hepatic artery, middle hepatic artery, right gastric artery, Michel's classification, anatomy

## Multimodality imaging reveals burnt-out constrictive pericarditis

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**Background:** Multimodality imaging forms the foundation for diagnosing and managing pericardial diseases, enabling the differentiation between transient and established constrictive pericarditis. This distinction is crucial for determining whether a patient will benefit more from prolonged anti-inflammatory therapy or surgical intervention.

**The aim:** The combined use of CMR and PET-CT enables the distinction between active inflammation and irreversible fibrosis in pericardial disease, consequently guiding appropriate therapeutic decision-making.

### **Materials and methods:**

**Results:** A 30-year-old patient presented with typical pericardial chest pain following an upper respiratory tract infection. Initial echocardiography revealed pericardial involvement and signs of constrictive physiology, which were confirmed by CMR. Imaging demonstrated pericardial thickening, oedema on STIR sequences, late gadolinium enhancement (LGE), and pleural effusion.

Anti-inflammatory therapy and diuretics were initiated. Due to the progression of serosal involvement, glucocorticoid therapy was subsequently introduced. Serial CMR demonstrated a partial and transient therapeutic response. There was a gradual reduction in pericardial oedema; however, LGE and constrictive physiology persisted. Despite escalation to combined immunosuppressive therapy, the patient remained clinically symptomatic and dependent on diuretics, with ongoing imaging evidence of hemodynamic constriction.

A PET-CT scan was performed to reassess inflammatory activity. It presented minimal pericardial metabolic uptake, which was notably disproportionate to the severity of constrictive physiology observed on CMR.

The concordance of minimal metabolic activity and persistent structural abnormalities suggested the disease had transitioned to an advanced fibro-inflammatory, 'burnt-out' stage. The patient was referred for pericardiectomy.

**Conclusions:** Multimodality imaging allows accurate staging of constrictive pericarditis. Proper diagnosis supports timely surgical referral.

**Keywords:** multimodality imaging, constrictive pericarditis, pericardiectomy

# Mycotic Pseudoaneurysm and Endophthalmitis as Rare Complications of Staphylococcal Sepsis: A Case Report

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Work's tutor: dr Marcin Błaż

**Background:** Mycotic aneurysms are pathological arterial dilations caused by infection and vessel wall destruction. The etiology is most commonly bacterial.

**The aim:**

**Materials and methods:**

**Results:** A 79-year-old woman with type 2 diabetes, hypertension, and coronary artery disease was admitted to the Ophthalmology Clinic for a left eye vitrectomy. Two months earlier, she had experienced Staphylococcus aureus sepsis secondary to a urinary tract infection. On postoperative day two, she developed sudden, severe right-sided neck pain and acute vision loss in the right eye. Ophthalmologic examination revealed endophthalmitis, which was treated with vitrectomy and intraocular antibiotics.

Computed tomography (CT) revealed a 38x37x36 mm soft tissue mass encircling the distal right common carotid artery with peripheral contrast enhancement. Contrast-enhanced ultrasound (CEUS) showed irregular non-enhancing areas with thin septa, suggesting inflammatory infiltrate with abscess formation rather than malignancy. The patient improved with broad-spectrum antibiotics.

However, follow-up ultrasound before discharge revealed dramatic progression with a pseudoaneurysm at the right common carotid bulb measuring 33x26x29 mm with a 15-mm neck, indicating full-thickness arterial wall disruption.

The patient underwent endovascular repair, with stent-graft deployment in the right common and internal carotid arteries and embolization of the right external carotid artery. Monitoring angiography confirmed complete aneurysm exclusion. The patient remained neurologically stable and was discharged in good condition.

**Conclusions:** This case highlights the need for vigilance for mycotic aneurysms in patients with recent sepsis. Multimodal imaging proved essential: CEUS enabled differentiation between neoplasm and inflammatory process, while angio-CT facilitated monitoring and procedural planning. The successful outcome demonstrates that endovascular techniques are an effective treatment for infectious aneurysms in high-risk patients.

**Keywords:** mycotic, pseudoaneurysm, endophthalmitis, sepsis, stent-graft

# A globally unique analysis of the left atrial appendage following LARIAT ligation and heart transplantation

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**Background:** The left atrial appendage (LAA) plays a key role in the pathogenesis of thromboembolic events in patients with atrial fibrillation (AF). Percutaneous LAA occlusion using the LARIAT device is a recognised method of stroke prevention in patients with atrial fibrillation (AF). Although the efficacy of the procedure is assessed clinically, direct data on long-term tissue remodelling in humans are extremely rare.

**The aim:** This report describes a globally unique case of a 60-year-old man with idiopathic cardiomyopathy and AF, who underwent a LARIAT procedure due to contraindications to anticoagulation. Due to progressive left ventricular failure (LVEF 30%), 23 months after successful closure of the atrial appendage, the patient underwent a heart transplant. This allowed for a unique anatomical analysis of the explanted organ nearly two years after the procedure.

## Materials and methods:

**Results:** Macroscopic examination of the excised heart revealed that the ligated atrial appendage had undergone complete atrophy, and the LARIAT suture remained in place. Inside the left atrium, a smooth surface was observed with no trace of communication with the atrial appendage lumen. Histological analysis confirmed that the LAA muscle tissue had been replaced by extensive fibrosis and scarring, and the closure site had undergone complete endothelialisation from the atrial side.

**Conclusions:** The case described provides direct evidence that percutaneous ligation of the left atrial appendage (LAA) leads to permanent and beneficial structural changes. The inflammatory processes triggered by the ligation result in fibrosis and atrophy of the appendage, which permanently excludes it from the circulation and effectively prevents the accumulation of embolic material within it.

**Keywords:** stroke, LARIAT, left atrial appendage, heart transplantation, remodeling, atrial fibrillation

# Incidental diagnosis of inflammatory linear verrucous epidermal naevus (ILVEN) during routine dermatological e

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**Background:** Inflammatory linear verrucous epidermal naevus (ILVEN) is a benign naevus characterized by erythematous, hyperkeratotic papules and plaques that are distributed along Blaschko's lines. It clinically and histologically resembles linear psoriasis; however ILVEN is usually more pruritic and tends to be unresponsive to classical antipsoriatic treatment methods. It's caused by genomic mosaicism.

**The aim:** To report a case of late-diagnosed ILVEN in a 20-year-old patient and to emphasize the importance of thorough physical examination and effective pruritus management.

## **Materials and methods:**

**Results:** We present the case of a 20-year-old female patient suffering from contact dermatitis on her hands for 4 years. However during the physical examination, unrelated skin lesions were noted on her left calf. Linear verrucous lesions were found on the lower extremity and extended linearly involving upper leg almost reaching the buttocks. The lesion was accompanied by pruritus, rated at 5 on the Numeral Rating Scale (NRS). Histological examination revealed an orthokeratotic epidermis alongside irregular acanthosis. In the dermis (especially in the superficial layers), there was an inflammatory infiltrate consisting mostly of lymphocytes. Based on clinical manifestation and histopathology ILVEN was diagnosed. The lower extremity lesions were treated with topical clobetasol propionate, while bilastine together with topical corticosteroids were introduced to manage the hand lesions. After one month of therapy, complete resolution of pruritus (NRS=0) and a significant improvement of the skin lesions were observed.

**Conclusions:** ILVEN should be considered in the differential diagnosis of linear hyperkeratotic lesions even in adult patients, despite its typical manifestation in early childhood. This case underscores the importance of a comprehensive physical examination. Effective management of pruritus with the improvement of skin lesions is an crucial therapeutic goal, significantly improving the patient's comfort.

**Keywords:** dermatology, ILVEN, pruritus, clobetasol propionate

# Standardizing Postoperative Complication Reporting in Plastic Surgery Using the Clavien-Dindo Scale

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**Background:** The Clavien-Dindo Classification (CDC) is a widely recognized tool for objectifying postoperative complications in surgical disciplines. Despite its proven universality, its implementation in plastic surgery remains limited compared to other surgical fields. The aim of this study is to evaluate the utility and ease of use of the CDC scale in the routine clinical practice of plastic surgeons.

**The aim:** A retrospective analysis of the clinical course of three patients hospitalized in our unit who experienced complications of varying severity was conducted. Each adverse event was categorized according to CDC guidelines, assessing the time consumption and clarity of the classification process.

## Materials and methods:

**Results:** The application of CDC allowed for precise and clear assignment of each complication to the appropriate severity category based on the type of therapeutic intervention implemented. The CDC scale was shown to be an intuitive tool with low time burden for medical personnel, which facilitates its systematic use in daily practice.

**Conclusions:** Implementation of the Clavien-Dindo Classification in plastic surgery represents a significant step toward standardization of treatment outcome reporting in accordance with the evidence-based medicine (EBM) paradigm. This tool enables objective comparison of outcomes between centers and identification of areas requiring procedural optimization. Despite the specificity of plastic surgery, CDC constitutes a methodologically superior alternative to descriptive methods of complication reporting, contributing to measurable improvement in the quality of medical care. The systematic adoption of this classification system enhances transparency in surgical outcome reporting and promotes continuous quality improvement initiatives. Furthermore, it facilitates meaningful benchmarking across institutions and supports the development of best practice protocols in plastic and reconstructive surgery.

**Keywords:** Clavien-Dindo classification, plastic surgery, postoperative complications, standardization of result

# Late Relapse of Testicular Non-Seminomatous Germ Cell Tumor with Histological Transformation: A Case Report.

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**Background:** Late relapses of non-seminomatous germ cell tumors (NSGCTs), occurring  $\geq 2$  years after remission, account for only 1–6% of cases. Relapses beyond a decade are exceptionally rare, frequently chemoresistant, and often involve histological transformation.

**The aim:** To present a case of late NSGCT relapse with histological transformation over a decade after remission.

## **Materials and methods:**

**Results:** We present a 42-year-old male diagnosed in 2013 with testicular embryonal carcinoma, clinical stage IIIA (retroperitoneal lymphadenopathy, pulmonary micronodules), who achieved complete remission after left orchidectomy and four cycles of BEP therapy (bleomycin, etoposide, cisplatin). After more than ten years of disease-free surveillance, rising serum alpha-fetoprotein (AFP) was noted in late 2024. PET-CT showed a metabolically active para-aortic lymph node. One cycle of EP chemotherapy produced a partial radiological response but was complicated by febrile neutropenia with pancytopenia, necessitating treatment deferral; AFP continued to climb. Retroperitoneal lymph node dissection (RPLND) yielded six histologically negative nodes, yet AFP escalated to 6512 IU/mL with massive para-aortic progression (41x44x49 mm). Exploratory laparotomy found the tumor unresectable due to aortic encasement. The patient was referred to a tertiary oncology center, where four cycles of salvage TIP (paclitaxel, ifosfamide, cisplatin) brought AFP down from 6512 to 56.8 IU/mL. Re-RPLND revealed a 60 mm yolk sac tumor with 80% necrosis, confirming histological transformation from the original embryonal carcinoma per WHO 5th edition criteria. Post-operative imaging showed no residual disease.

**Conclusions:** This case demonstrates that late NSGCT relapse can involve histological transformation — here from embryonal carcinoma to yolk sac tumor — and reinforces the need for lifelong marker surveillance and aggressive surgical consolidation at experienced high-volume centers.

**Keywords:** Non-seminomatous germ cell tumor, Late relapse, Yolk sac tumor

# Management of anti-resorptive therapy complication - a case report

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**Background:** Anti-resorptive drug treatment (bisphosphonates and/or denosumab) is often introduced in patients suffering from bone diseases or bone metastases. A severe complication might appear in the course of the therapy, namely, medication-related osteonecrosis of the jaw (MRONJ). Risk factors of the disease include: duration of anti-resorptive drug therapy, age, dentoalveolar surgery, poor oral hygiene, comorbidities and concomitant drug usage. Due to lack of preventive methods and not fully understood pathophysiology, the condition poses a serious challenge for treatment of afflicted patients.

**The aim:** The aim of this report is to present a severe case MRONJ requiring extensive surgical management and to highlight the clinical challenges in elderly patients undergoing antiresorptive therapy.

## **Materials and methods:**

**Results:** An 82-year-old female with osteoporosis treated with ibandronic acid and later denosumab presented with progressive necrosis of the anterior mandible, complicated by cutaneous fistulas and regional lymphadenopathy. Imaging showed extensive osteonecrosis of the mandibular body with osteosclerotic remodeling and cystic resorption. A history of multiple dental implantation and explantation procedures likely contributed to disease progression.

Initial treatment included targeted intravenous antibiotics. Due to significant bone loss, the patient was referred for segmental mandibular resection with Medartis plate reconstruction; however, persistent infection and plate exposure occurred afterwards.

Because of functional impairment and facial deformity, free fibula flap reconstruction was undertaken. Follow-up revealed minor functional deficits, including impaired oral competence and donor site healing issues. Ongoing rehabilitation is leading to gradual improvement.

**Conclusions:** MRONJ significantly impairs daily functioning and remains difficult to treat, especially in elderly patients with comorbidities. Patients with planned or ongoing antiresorptive therapy should always remain under dental supervision.

**Keywords:** MRONJ, osteonecrosis, antiresorptive agents, drug interactions, surgical complications

# Endodontic Treatment of a Bridge Abutment Tooth Without Prosthesis Removal – A Case Report

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**Background:** Endodontic treatment of abutment teeth supporting fixed prosthetic bridges presents a significant clinical challenge, particularly when preservation of the existing restoration is desired. Removal of the bridge may compromise its integrity, increase treatment costs, and negatively affect patient comfort. Therefore, conservative approaches that allow for effective root canal treatment without prosthesis disassembly are of considerable clinical value.

**The aim:** Removal of the bridge may compromise its integrity, increase treatment costs, and negatively affect patient comfort. Therefore, conservative approaches that allow for effective root canal treatment without prosthesis disassembly are of considerable clinical value.

**Materials and methods:** A 62-year-old male patient presented with symptoms associated with a previously endodontically treated tooth serving as an abutment for a fixed prosthetic bridge. Clinical and radiographic examination indicated secondary infection and the need for endodontic retreatment.

The procedure was performed without removal of the prosthetic restoration. Access to the root canal system was achieved through the prosthetic crown under rubber dam isolation. Working length was determined using an apex locator and confirmed radiographically. Root canal preparation was carried out using the step-back technique with hand instruments, supported by irrigation with sodium hypochlorite and EDTA. The canals were obturated using gutta-percha and sealer with the lateral condensation technique. The access cavity was restored with a permanent restorative material, preserving the integrity and function of the prosthetic bridge.

**Results:** Post-treatment evaluation demonstrated resolution of clinical symptoms and satisfactory radiographic healing. The prosthetic bridge remained fully functional, and no structural damage was observed.

**Conclusions:** Endodontic treatment of abutment teeth without removal of the prosthetic bridge is a viable and effective therapeutic option in selected cases.

**Keywords:** Abutment tooth, Endodontic treatment, Prosthetic bridge

# From Cardiotoxicity to Recovery: A Case Report of Myocardial Regeneration in Pediatric Anthracycline Cardiomyo

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## Background:

**The aim:** Anthracyclines are essential in pediatric oncology but carry a risk of cardiotoxicity leading to progressive myocardial dysfunction and heart failure. Traditionally considered irreversible, recent evidence suggests potential for myocardial recovery. We present a pediatric case of anthracycline-induced cardiomyopathy (AIC) with features of myocardial regeneration, highlighting emerging therapeutic perspectives.

## Materials and methods:

**Results:** Our patient is a 9-year-old girl who was treated for osteosarcoma with a total tumour resection and chemotherapy. The patient's clinical status deteriorated over time, which ultimately caused cachexia. The chemotherapy lasted twelve months and after that was observed mild left ventricular (LV) systolic and diastolic dysfunction. Beta-blocker, ACE inhibitor, eplerenone was introduced. One month later, the patient was rehospitalized due to decompensated heart failure (the EF - 10%, the LV was expanded, ventricular arrhythmias with QTc prolongation to 510 ms, ECG demonstrated changes in repolarization. Therapy with milrinone, subsequently transitioned to levosimendan, was commenced. As a result, slight EF improvement to 20% and a significant decrease in the NT-proBNP level were observed. Over the course of 3.5 years, the patient necessitated a total of 38 levosimendan infusions in 3-to-6 week intervals throughout a 2.5-year period. EF steadily improved, reaching 45%, LV dimensions normalized and arrhythmias normalized. Two years after completing chemotherapy, the Cardio-Oncology team deemed the patient eligible for heart transplantation. Because of substantial clinical improvement, the patient ultimately did not require either a ventricular assist device or a heart transplant. The patient underwent the bioprosthesis replacement without complications.

**Conclusions:** This case represents an exceptional recovery of a critically damaged LV with implementation of current heart failure management strategies.

**Keywords:** Anthracycline-induced cardiomyopathy, Pediatric myocardial recovery, Cardiotoxicity reve

# Diagnostic and Therapeutic Challenges in Wilson Disease: A Case Report

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**Background:** Wilson disease (WD) is a rare autosomal recessive disorder of copper metabolism, leading to toxic copper accumulation in the liver and central nervous system. Clinical manifestations range from asymptomatic aminotransferase elevation to fulminant liver failure, often accompanied by diverse neurologic and psychiatric symptoms.

**The aim:** We report a case of a patient with long-standing psychotic symptoms, where delayed WD diagnosis and subsequent poor adherence to decoppering therapy resulted in acute-on-chronic liver failure (ACLF) necessitating urgent liver transplantation (LTx).

## **Materials and methods:**

**Results:** A 49-year-old woman had been treated for psychiatric symptoms since 1996; however, WD was identified as the underlying cause only in 2021. In 2025, she developed rapidly progressing jaundice, ascites, and advanced hepatic encephalopathy. Laboratory tests revealed severe liver dysfunction: total bilirubin 10.1 mg/dl, AST 203 U/l, profound coagulopathy (INR >25.0, aPTT >500 s, fibrinogen 44 mg/dl), hypoalbuminemia 2.8 g/dl, and hyperammonemia 142.3 µg/dl. With a MELD score of 36, the patient underwent emergency LTx. The postoperative course was complicated by biliary obstruction, hepatic artery flow disturbances, acute pancreatitis, and multisite infections. Despite these complications, intensive multidisciplinary management led to graft stabilization and resolution of encephalopathy. While the patient achieved good functional status, impaired insight led to self-discontinuation of antipsychotic treatment post-transplant.

**Conclusions:** This case underscores that psychiatric manifestations in WD can mask the underlying metabolic disorder and impede treatment adherence. Insufficient recognition and inadequate therapy may lead to life-threatening liver failure. Nevertheless, timely LTx, combined with integrated psychiatric care, remains a life-saving intervention with the potential for favorable functional recovery.

**Keywords:** Wilson Disease, psychotic symptoms, acute-on-chronic liver failure, delayed Wilson Disease diagnosis

# The Significance of Tree Pollen Allergy in Respiratory Allergy Patterns and Its Association with Asthma

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Work's tutor: prof. dr hab. n. med. Andrzej Bożek, lek. Aleksandra Mitka-Borys, lek. Martyna Miodońska, lek. Magdalena Zajac

**Background:** Respiratory allergies are a common cause of allergic rhinitis and a major risk factor for asthma. Tree pollen is a frequent seasonal allergen, but its role in overall sensitization patterns and asthma risk remains unclear.

**The aim:** This study aimed to evaluate the significance of tree pollen allergy in respiratory sensitization and its association with asthma in patients with allergic rhinitis.

**Materials and methods:** A retrospective analysis was conducted on 1,100 patients diagnosed with allergic rhinitis under allergy clinic care. The prevalence of sensitization to inhalant and perennial allergens was assessed. To identify factors associated with asthma, logistic regression was performed. Model 1 analyzed the full cohort (N=1,100) with predictors: tree, grass, weed pollen allergy, perennial allergens, age, and sex. Model 2 included only tree pollen-allergic patients (n=254), with predictors: perennial allergens, co-sensitization to grasses and weeds, age, and sex.

**Results:** In the cohort (N=1,100), 767 patients (69.7%) were sensitized to  $\geq 1$  inhalant allergen. Tree pollen allergy was present in 254 (23.1% of the cohort; 33.1% of sensitized patients), with isolated tree allergy in 52 (20.5%) and half having concomitant perennial sensitizations. Asthma prevalence was 29.5% (324/1,100) and higher in tree pollen-allergic patients than those without (41.3% vs 25.9%). In multivariate analysis, tree pollen allergy remained independently associated with asthma (OR 1.88; 95% CI 1.36–2.58;  $p < 0.001$ ). Among tree pollen-allergic patients, coexisting perennial allergens further increased asthma risk (OR 2.05; 95% CI 1.29–3.27;  $p = 0.002$ ).

**Conclusions:** Tree pollen allergy is an important component of the respiratory allergy phenotype and independently associated with asthma in patients with allergic rhinitis. Coexisting perennial sensitizations further increase asthma risk. These findings highlight the importance of evaluating patients with allergic rhinitis to identify those at risk for asthma and guide management.

**Keywords:** Tree pollen, Respiratory allergy, Allergic rhinitis, Asthma prevalence, Seasonal sensitization

# Is Demodex always present in rosacea? A pilot clinical study

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**Background:** Rosacea is a skin disorder primarily affecting the central part of the face, characterised by an erythematous and inflammatory background, on which papules and pustules develop. The condition occurs more frequently in women, with a peak incidence between the ages of 40 and 60. Its etiopathogenesis is not fully understood. Among various etiological factors - such as genetic predisposition, coexisting internal diseases and vascular hyperreactivity of the skin to external stimuli - infestation with Demodex mites is also considered. Their presence on the skin may remain asymptomatic or may cause a wide spectrum of nonspecific symptoms. However, the role of this infestation in the etiopathogenesis of rosacea remains controversial.

**The aim:** The aim of the study was a pilot assessment of the prevalence of Demodex infestation on the facial skin of patients with rosacea.

**Materials and methods:** The study group consisted of 20 patients (17 women and 3 men) with exacerbated rosacea, examined prior to the initiation of treatment. After washing the skin, patients applied adhesive patches to three areas of the face (forehead, cheek, and chin). After 8 hours, the patches were removed and placed in Petri dishes. The samples were examined for the presence of Demodex mites under a light microscope immediately upon delivery to the laboratory. Patients also completed an original questionnaire.

**Results:** The presence of Demodex mites was observed in 19 out of 20 patients (95%). In 9 patients (45%), Demodex was present in all examined areas, while in 4 patients (20%), it was found in two out of three examined areas. In 14 patients (70%), the presence of mites was noted in the cheek region, where the severity of rosacea is usually the greatest.

**Conclusions:** The high prevalence of Demodex in patients with rosacea suggests that its presence may not be incidental, and routine diagnostic evaluation for this infestation should be considered in patients with this dermatosis.

**Keywords:** Rosacea, Demodex, Prevalence, Facial skin, Dermatology

# Risk factors for asthma and allergic diseases in the pediatric population: a cross-sectional study

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**Background:** Allergic diseases, including asthma, constitute a significant and increasing health problem in childhood. Identification of risk factors is crucial for effective disease control and the development of preventive strategies.

**The aim:** To identify risk factors associated with the presence of asthma and allergic diseases in the pediatric population of Gliwice.

**Materials and methods:** An epidemiological cross-sectional study of 1706 children and adolescents in Gliwice was conducted using a questionnaire completed by parents and distributed through schools. The strength of associations was expressed using odds ratios (ORs) with 95% confidence intervals (95% CIs).

**Results:** A total of 1,706 participants aged 5–17 years took part in the study (mean age 11.5 ± 2.7 years), including 865 boys (50.7%) and 841 girls (49.3%). A child's risk of asthma increases significantly if a parent has asthma (OR=2.39; p<0.001) or any allergy (OR=3.14; p<0.001). A very strong association was found between pediatric asthma and the presence of any comorbid allergy (OR=9.94; p<0.001). 31.8% boys and 27.2% girls had allergic rhinitis (p<0.05). Atopic eczema was significantly associated with early nursery attendance (OR=3.01; p<0.05) and parental history of asthma (OR=2.35; p<0.001) or allergies (OR=2.61; p<0.001). Maternal tobacco smoking during pregnancy was specifically linked to atopic eczema (p<0.05). A positive family history of asthma (OR=2.9; p<0.001) and allergies (OR=3.06; p<0.001) also plays a role in the development of food allergies. Factors such as pet ownership, place of residence and birth weight were not found to be statistically significant.

**Conclusions:** The study identifies parental history and comorbidities as key risk factors for childhood asthma and allergies. Environmental factors, including prenatal tobacco exposure and early nursery attendance, significantly correlate with atopic eczema, highlighting the need for targeted prevention in high-risk groups.

**Keywords:** asthma, allergic diseases, risk factors, children

# Impact of melanoma on psychological well-being and quality of life among Polish patients

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**Background:** Melanoma affects approximately 4,000 individuals annually in Poland.

**The aim:** The aim of this study was to assess the prevalence of depression and anxiety among patients with melanoma and to examine their associations with clinical staging, and quality of life (QoL).

**Materials and methods:** This cross-sectional study included 191 patients diagnosed with melanoma. Of these, 162 patients (58.6% men and 41.4% women), aged 29–92 years (mean age  $59.8 \pm 13.7$ ), agreed to participate and completed the required questionnaires (response rate: 84.8%). Clinical assessment included melanoma staging (I–IV). Depression was evaluated using the Patient Health Questionnaire-9 (PHQ-9) and the Hospital Anxiety and Depression Scale - Depression subscale (HADS-D). Anxiety was assessed with the Generalized Anxiety Disorder 7-item scale (GAD-7) and the Hospital Anxiety and Depression Scale - Anxiety subscale (HADS-A). Statistical analyses were performed, with  $p < 0.05$  considered statistically significant.

**Results:** Suspected depression was identified in 14.9% of patients. Women had significantly higher PHQ-9 scores than men ( $p < 0.001$ ), while no sex differences were observed for HADS-D scores. Both depression measures were significantly correlated with anxiety scores and impaired QoL. Clinically significant anxiety was present in 27.8% of patients, with higher GAD-7 and HADS-A scores observed in women compared with men ( $p < 0.001$ ). Anxiety levels were also significantly associated with QoL impairment. Neither depression nor anxiety was related to melanoma stage or disease duration.

**Conclusions:** Depression and anxiety are common among patients with melanoma and are closely associated with reduced QoL. Interdisciplinary collaboration may improve therapeutic outcomes.

**Keywords:** Melanoma, Depression, Anxiety, Quality of life, Psycho-oncology

# Impact of allergen immunotherapy on pollen-food allergy syndrome

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**Background:** Pollen-food allergy syndrome (PFAS) is an IgE-mediated cross-reactive condition occurring in patients sensitized to inhalant allergens after food ingestion.

**The aim:** To assess the effect of allergen immunotherapy (AI) in seasonal allergic rhinitis on reduction of food-related symptoms in patients with PFAS and to compare them with those without PFAS.

**Materials and methods:** Data was collected using an original questionnaire on food-related symptoms in patients treated with AI in an observational study. Subjective changes in symptom severity after introduction of treatment were evaluated. Patients were also characterized in terms of the most common inhalant allergens (birch, grasses) and food triggers (apple, peach, carrot) and clinical symptoms.

**Results:** 27 patients with PFAS (15 females, 56 %) aged 15–57 years and 27 patients without PFAS (10 females, 37%) aged 21–69 years were included. Both groups were comparable in terms of sex distribution, age, BMI, and grass pollen sensitization. PFAS+ patients had a significantly higher prevalence of asthma and sensitization to birch, hazel, and mugwort, and to both pollen and perennial allergen sensitizations. Improvement in inhalant symptoms was significantly greater in the PFAS- group. In PFAS+ the most commonly reported symptoms were oral pruritus and lip swelling, most frequently triggered by apple, peach, and nectarine. A reduction in the severity of food-related symptoms was observed in 55.6% of patients (n=15), including mild improvement in 37% (n=10) and significant improvement in 18.5% (n=5). No improvement was reported in 44.4% (n=12). No statistically significant association was found between improvement in food-related symptoms and the duration of desensitization or other analyzed factors.

**Conclusions:** Allergen immunotherapy may lead to a reduction in food-related symptoms in some patients with PFAS. These findings suggest a potential additional therapeutic benefit in this group of patients.

**Keywords:** allergen immunotherapy; pollen-food allergy syndrome; PFAS; pollen sensitization; seasonal allergens

# Living with Melanoma: Illness Acceptance in Adult Patients

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**Background:** Melanoma is a chronic disease that significantly affects patients' daily functioning and emotional well-being. Beyond its somatic burden, it often leads to substantial changes in quality of life (QoL).

**The aim:** This study aimed to assess illness acceptance among melanoma patients and examine its associations with selected clinical characteristics (disease stage, pruritus and time since diagnosis) and psychological distress (depression and anxiety) and QoL.

**Materials and methods:** A cross-sectional study was conducted among 191 melanoma patients, of whom 162 (58.6% men; mean age  $59.8 \pm 13.7$  years) were included in the final analysis (response rate: 84.8%). Participants completed the following validated questionnaires assessing illness acceptance: Acceptance of Illness Scale (AIS), depression (PHQ-9, HADS-D), anxiety (GAD-7, HADS-A), and QoL (DLQI). Statistical analyses were performed, with  $p < 0.05$  considered statistically significant.

**Results:** The mean AIS score was notably low ( $13.28 \pm 7.50$  points), and 80.9% of patients demonstrated poor illness adaptation. No significant differences in AIS scores were observed with respect to gender ( $p = 0.343$ ), melanoma stage ( $p = 0.290$ ), or pruritus ( $p = 0.752$ ). However, moderate, statistically significant negative correlations ( $p < 0.001$ ) were found between AIS and depression scales (HADS-D:  $r = -0.405$ ; PHQ-9:  $r = -0.387$ ), anxiety scales (HADS-A:  $r = -0.327$ ; GAD-7:  $r = -0.325$ ), and DLQI ( $r = -0.369$ ).

**Conclusions:** Melanoma patients exhibit remarkably low levels of illness acceptance, independent of objective clinical parameters. These findings underscore the need for routine psycho-oncological support for all patients, regardless of disease stage or prognosis.

**Keywords:** melanoma, illness acceptance, quality of life, psycho-oncology, depression, anxiety

# Morphological Subtypes of Basal Cell Carcinoma According to Anatomical Risk Zone

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**Background:** Basal cell carcinoma (BCC) is classified into high, intermediate, and low-risk zones based on anatomical location, which may reflect differences in tumour behaviour and influence treatment planning.

**The aim:** To compare the clinical and morphological characteristics of surgically treated basal cell carcinoma stratified by risk zone.

**Materials and methods:** A retrospective analysis was conducted on 86 patients who underwent surgical treatment for BCC between 1 January 2024 and 1 August 2025. Tumours were stratified into high-risk ( $n = 36$ ), intermediate-risk ( $n = 28$ ), and low-risk ( $n = 22$ ) zones. Age, sex, morphological subtype, and tumour dimensions were compared between groups using appropriate statistical tests.

**Results:** The largest proportion of tumours was located in the high-risk zone ( $n = 36$ ), followed by the intermediate-risk ( $n = 28$ ) and low-risk zones ( $n = 22$ ). Patient age and sex distribution did not differ significantly between risk zones ( $p = 0.5578$  and  $p = 0.1224$ , respectively). In contrast, the distribution of morphological subtypes differed significantly according to risk zone ( $p < 0.0001$ ). Infiltrative BCC predominated in the high-risk and intermediate-risk zones, accounting for 77.14% and 50.00% of cases, respectively, whereas the superficial subtype was most frequent in the low-risk zone (54.54%). Pairwise post hoc analysis showed significant differences between the high- and low-risk zones and between the intermediate- and low-risk zones, while no significant difference was found between the high- and intermediate-risk zones. Tumour length and width did not differ significantly between risk zones ( $p = 0.8597$  and  $p = 0.8223$ , respectively).

**Conclusions:** Morphological subtype distribution of BCC is associated with risk zone. Infiltrative BCC predominates in high- and intermediate-risk zones, whereas superficial BCC is most common in the low-risk zone. These findings suggest that anatomical risk-zone classification may be useful not only for treatment planning but also for anticipating tumour morphology.

**Keywords:** Basal cell carcinoma, risk zone, morphological subtype

# The Hidden Impact of Melanoma on Quality of Life: Associations with Pruritus and Psychological Symptoms

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**Background:** Melanoma is a malignant skin tumour originating from melanocytes that may significantly impact patients' quality of life (QoL). However, standard dermatology-specific tools may not fully capture its multidimensional burden, particularly in the psychological domain.

**The aim:** To assess QoL in melanoma patients using the Dermatology Life Quality Index (DLQI) and to analyse its associations with demographic factors, pruritus, and symptoms of anxiety and depression.

**Materials and methods:** This cross-sectional study included 162 Polish melanoma patients (response rate: 84.5%). We measured QoL with DLQI, anxiety and depression with GAD-7, PHQ-9, HADS-A, and HADS-D, and pruritus intensity with the NRS. Statistical tests were used to examine correlations and group differences.

**Results:** Patients had a low overall melanoma impact on QoL (mean DLQI:  $2.35 \pm 3.50$ ), with severe impairment in just 3.7%. Lower QoL strongly correlated with higher pruritus ( $r = 0.218$ ,  $p = 0.008$ ), anxiety (GAD-7:  $r = 0.319$ ; HADS-A:  $r = 0.422$ ; both  $p < 0.001$ ), and depression (PHQ-9:  $r = 0.382$ ; HADS-D:  $r = 0.425$ ; both  $p < 0.001$ ). Pruritus presence was linked to poorer QoL ( $p = 0.012$ ). Sex and disease stage showed no significant differences.

**Conclusions:** Although DLQI indicates a seemingly low impact of melanoma on QoL, it may underestimate the psychological burden. The observed associations with anxiety, depression, and pruritus highlight the multidimensional nature of QoL in melanoma. DLQI may be useful as a screening tool, but it should be complemented with more specific psychological or oncological measures for a comprehensive assessment.

**Keywords:** melanoma, quality of life, DLQI, pruritus, anxiety, depression

# Clinical Characteristics of Basal Cell Carcinoma by Anatomical Localization: A Retrospective Study

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**Background:** Basal cell carcinoma (BCC) is the most common skin malignancy and presents with considerable clinical and histopathological heterogeneity. Anatomical localization may influence tumour subtype distribution and, consequently, clinical presentation and management.

**The aim:** To evaluate the clinical characteristics of basal cell carcinoma according to anatomical localization.

**Materials and methods:** A retrospective single-centre study was performed in 84 patients with histologically confirmed BCC. Lesions were grouped according to anatomical localization into the head, trunk, and extremities. Patient age, sex, and histological subtype distribution were compared between localization groups.

**Results:** The trunk was the most common location of BCC, followed by the head and extremities. No statistically significant differences were found between localization groups with regard to patient age or sex distribution. In contrast, histological subtype distribution differed significantly according to anatomical localization. Post hoc pairwise comparisons with Bonferroni correction demonstrated a statistically significant difference only between the head and trunk groups ( $p = 0.0064$ ). This difference was mainly driven by a higher proportion of infiltrative BCC in the head region (54.5%) and a higher proportion of superficial BCC on the trunk (64.1%). No statistically significant differences were observed between the head and extremities or between the trunk and extremities after correction for multiple comparisons.

**Conclusions:** Anatomical localization was significantly associated with the histological subtype distribution of BCC. Infiltrative tumours were more frequent in the head region, whereas superficial BCC predominated on the trunk, indicating that tumour localization may influence the clinicopathological presentation of the disease.

**Keywords:** Basal cell carcinoma, anatomical localization, histological subtype

## Effects of a combined medium-depth chemical peel in reduction of acne lesions and atrophic scars in young adults.

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**Background:** Acne vulgaris is one of the most common chronic dermatological conditions affecting young adults. Its complex pathogenesis involves excessive sebum production, colonization by *Cutibacterium acnes*, and endocrine factors. Due to the increasing resistance of *C. acnes* to antibiotic therapy, alternative treatment modalities are being explored more frequently. Among these, medium-depth chemical peels have gained considerable attention.

**The aim:** The aim of this study was to evaluate the efficacy of a combined multimodal chemical peeling protocol in reducing acne lesions and atrophic scars.

**Materials and methods:** The study included 20 participants aged 20–25 years presenting with mild to moderate acne vulgaris, as assessed by the Investigator's Global Assessment (IGA) scale, along with atrophic scarring. Prior to treatment initiation, all contraindications were excluded, and baseline photographic documentation and dermatological assessment were performed. Patients underwent a series of two procedures at four-week intervals, with clinical evaluation conducted at three time points. The treatment protocol included 20% glycolic acid, a combination of glycolic and salicylic acids, and a mask containing retinol, azelaic acid, kojic acid, phytic acid, and salicylic acid.

**Results:** A noticeable improvement in skin condition was observed after the first procedure, with significant overall improvement following completion of the treatment series. Acne lesions were reduced by approximately 85%, while atrophic scars decreased by 24%. Additionally, skin hydration improved by 16%, and sebum production decreased by an average of 26% compared to baseline values. All patients achieved clinical remission, reaching an IGA score of 0 or 1.

**Conclusions:** The application of a protocol combining agents with multiple mechanisms of action may represent a safe and effective alternative for the treatment of acne lesions, particularly in patients with contraindications to systemic dermatological therapies.

**Keywords:** acne vulgaris, atrophic scars, medium-depth chemical peels

# Tralokinumab in atopic dermatitis: 52-week retrospective single-center study.

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**Work's tutor: Prof. Aleksandra Lesiak MD, PhD; prof. Joanna Narbutt MD, PhD; Justyna Ceryn MD; Agata Ciosek MD**

**Background:** Atopic dermatitis (AD) is a chronic, relapsing inflammatory skin disease characterized by pruritus, xerosis and eczematous lesions. Without adequate treatment, AD may lead to infections, sleep disturbances and impaired quality of life. Advances in understanding type 2 inflammation have enabled the development of targeted biologic therapies. Among them, tralokinumab, a selective interleukin (IL)-13 inhibitor, represent key therapeutic option available within drug program B.124 for moderate-to-severe AD.

**The aim:** To retrospectively assess the long-term efficacy, safety, tolerability and adverse event profile of tralokinumab in patients with AD.

**Materials and methods:** A three-year retrospective analysis included patients with AD treated tralokinumab. Data included age, sex, diagnosis (ICD-10), comorbidities and disease severity assessed using the Eczema Area and Severity Index (EASI) and Dermatology Life Quality Index (DLQI) at baseline (W0) and at W16, W28, W40 and W52. Safety was evaluated based on laboratory abnormalities and adverse events. Statistical analysis included the Friedman test, with significance set at  $p < 0.05$ .

**Results:** Since early 2023, 41 patients received tralokinumab, (39% female, 61% male). The therapy showed high efficacy. At week 16, mean EASI decreased from 26.48 ( $\pm 9.13$ ) to 4.2 ( $\pm 5.42$ ). By week 52, EASI reduction reached 91% ( $\Delta$ EASI= 24.83  $\pm 9.22$ ), respectively. Quality of life improved markedly, with DLQI scores decreasing from 16.1 ( $\pm 4.53$ ) to 2.6 ( $\pm 2.84$ ). These improvements were statistically significant over time ( $p < 0.0001$ ). Adverse events were reported by 9 patients (22%), the most common were injection site pain, erythema and conjunctivitis.

**Conclusions:** Tralokinumab is an effective treatment option for patients with atopic dermatitis. The therapy is well tolerated, providing substantial and sustained clinical improvement, while ensuring a favorable safety profile and a low incidence of adverse events.

**Keywords:** atopic dermatitis, biologic therapy, retrospective study

# The issue of green nail syndrome among current and future healthcare workers

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**Background:** Green nail syndrome is a bacterial infection of the nail plate, most commonly caused by *Pseudomonas aeruginosa*, characterized by green discoloration of the nail. The infection is exacerbated by frequent hand soaking, nail trauma, and poor hygiene. Recently, the problem of green nail syndrome has been on the rise. This is due to the growing popularity of nail styling, which, if done improperly or worn for too long, increases the risk of infection. Treatment consists mainly of good hygiene and antibiotic therapy.

**The aim:** The aim of the study was to assess the risk factors for green nail syndrome among students and healthcare workers.

**Materials and methods:** The study included 52 women aged 19–59. They completed an original online questionnaire.

**Results:** Over 30% of participants experienced nail discoloration, mainly on the fingers (60%), most often associated with mechanical trauma or of unknown etiology. Almost all (80%) were familiar with the term "green nail syndrome." Among the risk factors for infection, exposure to moisture/water was the most common; 57% of people wash their hands >10 times a day, and 1/3 do not dry them thoroughly. Nearly ¾ of people get their nails done, with 2/3 doing so once a month or more often.

**Conclusions:** The respondents are familiar with green nail syndrome and its etiology. Despite numerous risk factors, nail discoloration is not common, and its cause is often unknown; therefore, it cannot be ruled out that some cases are due to bacterial discoloration. We should not underestimate discoloration on our nails, as it is often associated with systemic diseases or infections that can lead to serious consequences.

**Keywords:** *Pseudomonas*, survey study, nail styling

# Virtual trends & real protection: social media and photoprotective habits of high school youth.

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**Background:** Social media shapes youth health attitudes, including photoprotection. For skin cancer prevention, accessing educational content is insufficient; translating it into correct application practices and overcoming usage barriers is crucial.

**The aim:** To assess photoprotection awareness among youth (aged 15-20), focusing on social media's role as a knowledge source and practical determinants of sunscreen application/reapplication.

**Materials and methods:** A diagnostic survey evaluated 501 respondents (aged 15-20). Data were analyzed in Statistica 13.3 using the Pearson's chi-square test (significance at  $p < 0.05$ ).

**Results:** Most respondents (60.1%) do not actively seek photoprotection knowledge; those who do mostly use social media (23.6%). School education significantly reduced the abandonment of UV filters (27.0% vs 43.2%;  $p = 0.001$ ). SPF usage frequency correlated with knowing the "two-finger rule" ( $p < 0.001$ ), but only 35.9% of year-round users applied it. Main barriers included forgetting (36.5%), sticky consistency (27.1%), and price (20.8%). Frequent reapplication was strongly associated with convenient formulas like sprays and sticks.

**Conclusions:** Social media and the Internet play a vital role in building photoprotective awareness among youth; however, mere exposure to educational content does not automatically translate into correct health behaviors. Practical competencies regarding the proper application of products and the reduction of barriers hindering their regular use are of crucial importance. Therefore, effective preventive measures should integrate school education with modern digital communication, emphasizing the practical dimension of daily photoprotection.

**Keywords:** photoprotection, social media, youth, health behaviors, sunscreens, health education

# From Injury to Recovery: Current Strategies in Meniscus Care

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**Background:** Meniscal injuries are common orthopedic conditions that impair knee function and may lead to chronic pain, instability, and osteoarthritis. Accurate diagnosis and appropriate treatment are essential to preserve joint integrity. Advances in imaging and surgical techniques have significantly improved patient outcomes.

**The aim:** This study aims to evaluate current diagnostic methods and treatment strategies for meniscus injuries, with particular emphasis on magnetic resonance imaging (MRI) and arthroscopic repair techniques.

## **Materials and methods:**

**Results:** MRI remains the gold standard for diagnosing meniscal injuries due to its high sensitivity, specificity, and non-invasive nature. CT arthrography serves as an alternative in selected cases. Arthroscopic repair techniques demonstrate high effectiveness depending on tear type and location. The inside-out technique provides strong fixation in complex tears, the outside-in method is effective for anterior and radial tears, while the all-inside technique offers minimally invasive repair with faster recovery, particularly in posterior lesions.

**Conclusions:** Modern diagnostics and treatment of meniscal injuries prioritize accurate imaging and meniscus preservation. MRI plays a key role in treatment planning, while meniscus-preserving arthroscopic repair techniques improve clinical outcomes. Further large-scale studies are needed to establish standardized, evidence-based treatment guidelines.

**Keywords:** magnetic resonance imaging, arthroscopy, meniscus repair

# Optical Coherence Tomography Angiography: A New Era in Ophthalmic Diagnostics

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**Background:** Optical coherence tomography angiography (OCT-A, angio-OCT) is a non-invasive imaging modality for the ocular microcirculation. Introduced into widespread clinical practice over the last decade, this technology represents an absolute innovation that has revolutionized ophthalmology. It allows for the precise evaluation of vasculature without the need for intravenous contrast administration. Due to its high resolution and unique capability for the layer-by-layer analysis of vascular plexuses, OCT-A enables rapid and detailed assessment of posterior segment diseases.

**The aim:** The aim of this study is to present the current role of angio-OCT in modern ophthalmic diagnostics and to discuss the primary clinical indications, advantages over classical imaging modalities, and limitations of this technology based on the available literature.

## **Materials and methods:**

**Results:** A literature review indicates that OCT-A is widely utilized in the diagnosis and monitoring of age-related macular degeneration (AMD), diabetic retinopathy, retinal vein occlusion (RVO), central serous chorioretinopathy (CSCR), and glaucoma. The examination enables the detection of neovascular membranes, assessment of non-perfusion zones, and measurement of vessel density and optic disc perfusion. Compared to fluorescein angiography (FA), angio-OCT is characterized by a shorter examination time, an absence of risk for systemic complications, and the capacity for safe, frequent repetition.

**Conclusions:** OCT-A constitutes one of the key achievements in contemporary ophthalmic diagnostics. Although it is still a relatively young technology, its exceptionally high safety profile, imaging precision, and objective diagnostic value are rapidly making it the new standard for evaluating the ocular microcirculation.

**Keywords:** Optical Coherence Tomography Angiography, angio-OCT, OCT-A, ophthalmic diagnostics, new technologies

# Therapeutic potential of Upadacitinib in the treatment of vitiligo.

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**Background:** Vitiligo is a chronic autoimmune disease characterized by melanocyte destruction mediated by CD8+ T cells and interferon-gamma signaling via the JAK-STAT pathway. Activation of this pathway increases chemokines such as CXCL9 and CXCL10, sustaining immune-mediated melanocyte loss. It is considered a key therapeutic target in vitiligo.

**The aim:** To evaluate the role of JAK inhibitors, with particular emphasis on Upadacitinib, in the management of vitiligo focusing on JAK-STAT pathway mechanisms, clinical evidence, and established therapeutic approaches.

## **Materials and methods:**

**Results:** JAK inhibitors reduce interferon-gamma signaling and CXCL9/CXCL10 expression, limiting T-cell-mediated melanocyte destruction. Agents such as ruxolitinib and tofacitinib show efficacy in inducing repigmentation, especially when combined with phototherapy. Narrowband UVB phototherapy is one of the treatment options for vitiligo, promoting melanocyte proliferation and migration. Topical calcineurin inhibitors (tacrolimus, pimecrolimus) are widely used, particularly in sensitive areas, due to their immunomodulatory effects and safety profile. Upadacitinib, a selective JAK1 inhibitor, may provide targeted immunomodulation, though clinical evidence remains limited.

**Conclusions:** Targeting the JAK-STAT pathway represents a promising and mechanistically justified strategy in vitiligo treatment. Upadacitinib may constitute a novel therapeutic option, but further well-designed clinical trials are necessary to determine its long-term efficacy and safety profile.

**Keywords:** vitiligo, JAK-STAT pathway, JAK inhibitors, Upadacitinib

# Impact of biologic therapy for psoriasis on the course of inflammatory bowel diseases: a systematic review

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**Background:** Psoriasis and inflammatory bowel diseases (IBD) are chronic immune-mediated conditions with sharing overlapping immunopathogenic pathways. Biologic therapies including IL-17, IL-12/23, IL-23 and IL-17 are clinically proven to manage psoriasis symptoms, but their impact on coexisting IBD is not fully understood. This review synthesizes current evidence on the efficacy, safety, and clinical implications of biologic therapies in patients with psoriasis who have, or are predisposed to, IBD.

**The aim:** To evaluate the impact of biological therapies used in psoriasis on the course, activity and safety outcomes on inflammatory bowel diseases.

## Materials and methods:

**Results:** Observations from the reviewed literature suggest that the impact of biologic treatments on IBD varies among patients being managed for psoriasis. While TNF- $\alpha$  and IL-12/23 inhibitors typically yield either positive or stable outcomes regarding intestinal activity, IL-17 inhibitors have been flagged due to their potential to trigger new-onset IBD or exacerbate existing cases in vulnerable patients. Conversely, despite a current lack of extensive long-term evidence, IL-23 inhibitors show encouraging safety results concerning gut inflammation. The analysis focused on key clinical parameters, such as psoriasis severity (via PASI scores), rates of intestinal remission, and overall treatment tolerability. Additionally, the study monitored adverse events, specifically looking at the induction or flare-up of inflammatory bowel disease.

**Conclusions:** Managing the psoriatic-IBD comorbidity requires a precision-based, individualized therapeutic strategy rooted in a deep understanding of systemic inflammation. Elucidating the interplay between pathophysiology and biologic interventions remains fundamental to achieving sustained therapeutic remission. To ensure maximal efficacy and symptom mitigation, management must be tailored to the patient's specific phenotype and remain subject to iterative adjustment guided by rigorous longitudinal clinical monitoring.

**Keywords:** Psoriasis, Inflammatory Bowel Diseases (IBD), Biologic Therapies,

# Comparison of the Effectiveness of Different Enamel Remineralization Methods – A Review of Clinical and Labora

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**Background:** Although fluoride compounds have been the "gold standard" in prevention for decades, their action is mainly limited to surface layers. For this reason, alternative biomimetic solutions are being sought, such as: nano-hydroxyapatite, CPP-ACP systems, bioactive glasses and self-assembling peptides, which create three-dimensional scaffolds for the construction of a new mineral phase.

**The aim:** The aim of this paper was to compare the effectiveness of different enamel remineralization methods based on available laboratory and clinical studies. Both traditional fluoride-based preparations and newer approaches, such as CPP-ACP, nano-hydroxyapatite, bioactive glasses, and self-assembling peptides, were analyzed. Many modern methods, such as nano-hydroxyapatite and bioactive glasses, show effectiveness comparable to fluoride, but do not consistently outperform it. The best results are observed with combined therapies.

## Materials and methods:

**Results:** Findings indicate that fluoride compounds remain the gold standard in caries prevention, showing high efficacy particularly in the superficial layers of the enamel. Nano-hydroxyapatite and bioactive glasses demonstrate remineralization potential comparable to conventional fluoride toothpastes (approx. 1450 ppm), serving as a viable alternative. Notable effectiveness was observed with the P11-4 peptide, which, by forming a three-dimensional scaffold, enables deep biomimetic structural restoration of the lesion. However, the most favorable clinical and aesthetic outcomes are achieved through combined therapies that utilize the synergistic effect between fluoride and bioactive components.

**Conclusions:** Although modern remineralization systems show high efficacy, they do not fully replace fluoride therapy but rather complement it. Ultimate clinical success depends on treatment personalization, taking into account biological factors and patient behavioral factors.

**Keywords:** enamel remineralization, fluoride, nano-hydroxyapatite, CPP-ACP, self-assembling peptides

# Bonding as an Esthetic Tooth Restoration – A Review of the Literature.

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**Background:** With the rapid development of science and technologies applied in the production of dental materials, increasingly advanced products are being introduced into clinical practice. In recent years, composite materials have assumed a leading role in the restoration of hard dental tissues. Modern dentistry offers extensive possibilities to enhance both dental esthetics and function. One of the techniques gaining popularity is bonding, which involves correcting tooth shape using composite resin materials.

**The aim:** The aim of this study was to analyze the impact of bonding procedures on patients' oral health and to evaluate whether bonding can be considered a fully noninvasive method for correcting tooth anatomy, as well as to identify potential risks associated with this procedure.

**Materials and methods:**

**Results:** The analysis demonstrated that bonding is an effective and widely used technique for improving tooth shape, esthetics, and function. However, the reviewed studies indicate that, despite its minimally invasive nature, bonding is not entirely free of biological and clinical implications. Factors such as plaque accumulation, potential effects on periodontal tissues, material biocompatibility, and microbial interactions must be considered.

**Conclusions:** Bonding is a valuable and versatile method in contemporary dentistry, offering significant esthetic and functional benefits. Nevertheless, it should not be regarded as a completely noninvasive procedure. Clinicians must be aware of potential risks and carefully plan and execute bonding treatments to minimize adverse effects and ensure optimal oral health outcomes.

**Keywords:** bonding, oral health, esthetic dentistry, composite

# Contemporary diagnostic methods for fatigue fractures: a review of current techniques

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**Background:** Fatigue fractures are an important overuse injury seen especially in athletes, military recruits, and physically active individuals. Delayed diagnosis may prolong symptoms, increase the risk of progression, and delay return to activity. Recent advances in imaging have improved early detection and clinical assessment.

**The aim:** This review aimed to analyze contemporary diagnostic methods for fatigue fractures, compare their diagnostic value, advantages and limitations, and summarize current trends and future perspectives in this field.

## **Materials and methods:**

**Results:** The review was based on a literature search conducted in PubMed, Scopus, and Web of Science, with 40 scientific papers selected for detailed analysis. Clinical history and physical examination remain essential in identifying suspected fatigue fractures, especially in patients presenting with activity-related localized pain and risk factors associated with repetitive overload. However, imaging studies are necessary for diagnostic confirmation. Radiography remains the first-line modality because of its availability and low cost, although its sensitivity is limited in early stages. CT provides precise assessment of cortical bone and fracture extent. MRI offers high sensitivity and specificity, enabling detection of bone marrow edema, fracture lines, and early stress reactions. Bone scintigraphy remains highly sensitive for early lesions, whereas ultrasonography may be useful as an accessible adjunct in selected cases. Emerging techniques, including SPECT, PET-MRI, microwave tomography, and elastography, may further improve diagnostic accuracy and broaden future clinical applications.

**Conclusions:** The diagnosis of fatigue fractures should be based on a multimodal approach that integrates clinical evaluation with appropriately selected imaging modalities. Understanding the strengths and limitations of currently available techniques may improve early diagnosis, optimize treatment decisions, and reduce the risk of long-term complications.

**Keywords:** fatigue fractures, stress fractures, diagnostic imaging, MRI, scintigraphy, review

# Insulin Dilution in Pumps and AID Systems in Children with Type 1 Diabetes: A Systematic Review

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**Background:** Continuous subcutaneous insulin infusion (CSII), particularly when integrated with automated insulin delivery (AID) systems, is the preferred treatment for children with type 1 diabetes (T1D). However, accurate delivery of very small insulin doses remains challenging in patients with low total daily insulin requirements (TDI). Insulin dilution has emerged as a potential strategy to improve dosing precision and optimize glycaemic control in this population.

**The aim:** This systematic review evaluates the available evidence on the use of diluted insulin in pump-based therapy in children with T1D and low TDI.

## **Materials and methods:**

**Results:** The available evidence suggests that insulin dilution is associated with satisfactory glycaemic control, including increased time in range (TIR) and reduced glycaemic variability, particularly in younger children using AID systems. Reported outcomes indicate no consistent safety concerns, such as severe hypoglycaemia or diabetic ketoacidosis. However, findings remain heterogeneous, and the overall quality of evidence is limited due to small sample sizes and variability in study design.

**Conclusions:** Insulin dilution appears to be a feasible, safe, and potentially beneficial approach in children with low TDI treated with CSII and AID systems, with generally favorable glycaemic outcomes. Nevertheless, further high-quality, large-scale randomized studies are required to confirm its efficacy and establish clear clinical recommendations.

**Keywords:** insulin dilution, CSII, AID, T1D, low TDI, pediatric diabetes

# Contemporary Methods of Enamel Remineralization

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**Background:** Dental enamel, despite its high mineralization, lacks regenerative capacity and is therefore susceptible to demineralization and caries development. In the oral environment, a dynamic balance exists between demineralization and remineralization, influenced by pH, saliva, and biofilm. Fluoride remains the cornerstone of prevention, although its effect is mainly limited to superficial layers. Advances in biomaterials have enabled the development of biomimetic methods supporting deeper enamel regeneration.

**The aim:** To evaluate the mechanisms of enamel demineralization and remineralization and to compare the effectiveness of fluoride-based and biomimetic methods based on current literature.

**Materials and methods:**

**Results:** Fluoride effectively inhibits demineralization and promotes surface remineralization. Biomimetic methods (CPP-ACP, bioactive glass, self-assembling peptides, and nanohydroxyapatite) enable deeper enamel regeneration. The highest effectiveness is observed in combined therapies with fluoride.

**Conclusions:** Fluoride remains the foundation of caries prevention; however, biomimetic methods are an important adjunct, enabling deeper enamel regeneration. Combined therapies are the most effective, and treatment should be individualized.

**Keywords:** enamel remineralization, fluoride, biomimetics, dental caries, nanohydroxyapatite, CPP-ACP

# A comparative analysis of selected targeted therapies in the treatment of chronic and refractory migraine

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**Background:** Chronic migraine (CM) is a condition defined as a headache occurring for 15 days a month over a period of 3 months, of which at least 8 days meet the criteria for migraine. It is a significant health problem where pain attacks last from 4 up to even 72 hours. Furthermore, it is accompanied by somatic symptoms, e.g., nausea, vomiting, or photophobia. This condition is the second leading cause of disability worldwide.

The contemporary treatment of chronic migraine relies on targeted therapy, encompassing two main therapeutic pathways: botulinum toxin type A, which is the foundation of CM therapy for individuals non-responsive to oral pharmacotherapy, and monoclonal antibodies targeting CGRP (calcitonin gene-related peptide), which possess high specificity, effectively reduce the number of migraine days, and perform well in individuals for whom previous treatment regimens were unsuccessful. Gepants (orally administered CGRP receptor antagonists) also play a significant role in CM therapy. Their main advantages include the lack of a vasoconstrictive effect and the ability to reduce migraine days without increasing the risk of medication-overuse headaches.

**The aim:** The aim of this study was to compare the efficacy, safety, and costs of the three main methods of treating chronic migraine.

**Materials and methods:**

**Results:** The comparative analysis indicates that anti-CGRP antibodies are more effective in reducing pain days and improving the quality of life compared to botulinum toxin A, despite the higher costs of therapy. These drugs are characterized by better tolerability and a lower incidence of side effects.

**Conclusions:** To summarize, botulinum toxin type A remains a fundamental and effective treatment for chronic migraine. Anti-CGRP monoclonal antibodies represent a groundbreaking class of biologic drugs in CM prevention. Meanwhile, gepants offer a highly effective therapeutic alternative for patients unresponsive to other treatments.

**Keywords:** Anti-CGRP monoclonal antibodies, gepants, OnabotulinumtoxinA, chronic migraine

# Application of Artificial Intelligence in multiparametric magnetic resonance imaging of Prostate Cancer

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**Background:** Prostate cancer (PC) is one of the most common malignant neoplasms in men. Multiparametric magnetic resonance imaging (mpMRI) plays a key role in detecting clinically significant PC. However, its interpretation remains partly dependent on radiologist experience and is affected by interobserver variability, which justifies the development of tools based on artificial intelligence (AI) aimed at improving objectivity and reproducibility.

**The aim:** The aim of this study was to present the current state of knowledge on the use of AI in mpMRI based detection of PC, with particular emphasis on its role in lesion detection, image assessment, and diagnostic support.

## **Materials and methods:**

**Results:** AI-based tools may support radiologists in the interpretation of mpMRI examinations, increase the accuracy of detecting clinically significant PC, improve the reproducibility of assessment, and enhance selected aspects of diagnostic workflow. They may also facilitate automated prostate and lesion segmentation, classification of suspicious foci, and risk stratification. Models integrating imaging data with clinical parameters such as PSA level, PSA density, prostate volume, and patient characteristics appear to be particularly promising.

**Conclusions:** AI has considerable potential to improve PC imaging diagnostics. However, its clinical implementation remains limited by technical, clinical, legal, and ethical challenges including data heterogeneity, limited external validation, model interpretability, and responsibility for AI supported decisions. At present, AI should be regarded as a decision support tool rather than a replacement for radiologists.

**Keywords:** artificial intelligence, mpMRI, imaging diagnostics, prostate, prostate cancer

# Histamine H4 receptor as a future target for antiallergic drugs

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**Background:** Histamine acts through H1-H4 receptors. Drugs that are inverse agonists of the H1 receptor alleviate allergy symptoms, but poorly relieve chronic pruritus. The H4 receptor is present on immune system cells, regulating eosinophil chemotaxis and mast cell activation. These processes intensify inflammation and pruritus. Therefore, H4 blockade is a promising therapeutic direction.

**The aim:** Analysis of the role of the H4 receptor in allergic and inflammatory diseases and evaluation of the benefits of its blockade based on preclinical and clinical studies.

**Materials and methods:**

**Results:** The H4 receptor is a real target for new antiallergic drugs. It has a key influence on the sensation of pruritus. Its inverse agonists may complement classical therapies, and in reducing itching they may even exceed the effectiveness of that drugs.

**Conclusions:** New H4 ligands offer a chance for a significant improvement in the quality of life of allergy patients.

**Keywords:** autoimmune disorders; histamine H4 receptor; inflammatory diseases; histamine H4 immune response

# Artificial Intelligence for the Assessment of Pancreatic Cancer in Medical Imaging

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**Background:** Artificial intelligence (AI) is increasingly used in medical imaging, including the evaluation of pancreatic neoplasms. Pancreatic cancer, due to the late onset of initial symptoms and frequent diagnosis at an advanced stage, belongs to the group of malignancies with the highest mortality.

**The aim:** The aim of this study was to present current applications and the clinical potential of AI methods in the imaging-based diagnosis of pancreatic cancer.

## **Materials and methods:**

**Results:** The application of AI methods includes the analysis of computed tomography (CT), magnetic resonance imaging, endoscopic ultrasound, and positron emission tomography images using machine learning, deep learning (DL), and radiomics approaches. AI-based models may increase diagnostic performance in terms of lesion detection and differentiation, as well as assessment of resectability and prognosis. Radiomics and DL methods enable the identification of complex imaging features not visible in conventional radiological assessment. AI also supports the differentiation of pancreatic cancer from benign lesions and chronic pancreatitis. In the analyzed studies, high diagnostic performance was reported, including AUC values reaching up to 0.99 in CT analyses. AI may also support clinical decision-making, assessment of treatment response, and contribute to the development of personalized medicine in pancreatic cancer.

**Conclusions:** The use of AI may significantly improve the effectiveness of imaging-based diagnosis of pancreatic cancer. Despite promising results, its broader clinical application is currently limited by the lack of standardization, validation, and availability of high-quality data. Further research and development are necessary for the full utilization of AI potential in the diagnosis of pancreatic cancer.

**Keywords:** artificial intelligence, pancreatic cancer, machine learning, deep learning, radiomics

# Impact of Microgravity on Bone Homeostasis and Strategies for Mitigating Osteopenia in Astronauts

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**Background:** Microgravity leads to decreased osteoblastic activity and increased osteoclastic resorption due to reduced mechanical loading, resulting in accelerated osteopenia—a process similar to osteoporosis and prolonged bed rest.

**The aim:** This review aims to synthesize current data regarding the effects of microgravity on the human skeletal system and to evaluate the main strategies proposed for preventing bone mass loss during long-duration space missions.

## Materials and methods:

**Results:** Studies show a loss of bone mineral density under microgravity conditions of approximately 1–1.5% per month—10 to 15 times faster than in senile osteoporosis—predominantly affecting the lower skeleton. Resistive physical exercise using devices such as the Advanced Resistive Exercise Device (ARED) reduces this loss by approximately 50–70%, depending on the skeletal region. These measures are complemented by pharmacological interventions, particularly osteoclast inhibitors (bisphosphonates), along with adequate nutritional intake of calcium and vitamin D, contributing an additional estimated 20–30%—resulting in total bone loss of less than 1% in some missions. The combination of ARED and pharmacotherapy currently provides the best protection, although post-flight recovery remains variable.

## Conclusions:

Microgravity induces profound alterations in bone homeostasis, representing a major challenge for modern space medicine. Although current protocols mitigate bone mass loss, they do not provide complete protection. Their optimization remains essential for maintaining crew health in the context of long-duration space exploration and may have relevant implications for terrestrial bone pathology.

Conclusions

**Keywords:** microgravity, osteopenia, astronauts, resistive exercise, space medicine

# New Psychoactive Substances: Classification, Health Risks, and Why Prevention Matters

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**Background:** New psychoactive substances (NPS), commonly known as “designer drugs” or “legal highs,” are an expanding problem for global public health. These mostly synthetic compounds are designed to mimic the effects of well-known illicit drugs while initially bypassing legal regulations, making them particularly difficult to control.

**The aim:** This review aims to present the classification of NPS, explain their mechanisms of action, and summarize their health risks, while highlighting the need for effective prevention and educational strategies.

## **Materials and methods:**

**Results:** NPS can be divided into several main pharmacological groups, including synthetic cannabinoids, synthetic cathinones, phenethylamines, synthetic opioids, and novel benzodiazepines. Each group exhibits distinct psychoactive effects and varying degrees of toxicity. These substances primarily act on key neurotransmitter systems-dopamine, serotonin, and norepinephrine-similar to traditional drugs, but often with less predictable and more dangerous outcomes. Both acute and long-term consequences are observed, ranging from neuropsychiatric symptoms to severe physical complications. Adolescents and individuals purchasing substances online appear to be particularly at risk.

**Conclusions:** NPS represent a significant and evolving health threat that requires a multidisciplinary response. Strengthening health education, especially among young people, alongside targeted prevention programs and social campaigns, is essential to reduce the use, accessibility, and perceived attractiveness of these substances.

**Keywords:** Designer Drugs, Substance-Related Disorders, Street Drugs, Health Education, Drug Toxicity

# Fibromyalgia: Current Insights into Pathophysiology, Biomarkers, and Multidisciplinary Management

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**Background:** Fibromyalgia is a chronic syndrome marked by widespread pain, fatigue, sleep disturbance, cognitive dysfunction, and heightened pain sensitivity. It affects ~2–8% of the population, predominantly women, and is most common in working-age adults. Despite its prevalence, its pathophysiology remains unclear and diagnosis is still clinical, posing ongoing challenges in practice.

**The aim:** To synthesize recent evidence on FM pathophysiology, diagnostic biomarkers, genetic factors, multisystem involvement, and treatment strategies, a review was conducted using PubMed, Scopus, and Google Scholar. Data on mechanisms, biomarkers, genetics, comorbidities, and treatment outcomes were extracted.

## Materials and methods:

**Results:** Fibromyalgia is primarily driven by central sensitization, with additional roles of neuroinflammation, immune and autonomic dysregulation, and hormonal imbalance. It is associated with altered cytokine profiles, serotonergic dysfunction, and reduced heart rate variability. Genetic susceptibility has been linked to mu-opioid receptor (OPRM1) and catechol-O-methyltransferase (COMT) polymorphisms, contributing to variability in pain perception. No single diagnostic biomarker has been validated; however, combined inflammatory, neurophysiological, and oxidative stress markers show potential clinical relevance. Multisystem involvement is frequent, particularly depression, anxiety, and sleep disturbances. The most consistent improvements in symptoms are observed with multidisciplinary management combining pharmacological treatments and non-pharmacological interventions.

**Conclusions:** To conclude, fibromyalgia is a complex neuroimmune disorder with multisystem involvement and heterogeneous presentation. While biomarker research is promising, clinical diagnosis remains symptom-based. Multidisciplinary treatment approaches are currently most effective, but mechanism-based therapies are needed. Key gaps include lack of diagnostic biomarkers, limited global representation, and insufficient individualized treatment strategies.

**Keywords:** fibromyalgia, biomarkers, chronic pain, multidisciplinary treatment

# Intermediate-Grade Ductal Carcinoma in situ Arising Within a Fibroadenoma: Case Report

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**Background:** Fibroadenomas are the most common benign breast tumors in young women. While they are generally considered entirely benign, malignant transformation within a fibroadenoma – most commonly lobular or ductal carcinoma in situ (DCIS) – is a rare clinical entity. Such cases often present diagnostic challenges due to their predominantly benign radiological appearance.

**The aim:** The aim is to present a rare clinical case of intermediate-grade DCIS arising within a growing fibroadenoma in a 33-year-old female and to highlight the diagnostic importance of a core needle biopsy in managing atypical breast masses in young patients.

**Materials and methods:** This study presents a retrospective review of a single clinical case. Clinical presentation, radiological imaging (ultrasound and contrast-enhanced MRI), pre-operative histopathological evaluation (core needle biopsy and targeted lymph node biopsies), surgical management, and post-operative outcomes were analyzed.

**Results:** A 33-year-old female with no family history of oncological diseases presented with a palpable, self-discovered mass in her left breast. Pre-operative ultrasound and MRI identified a 2.8 x 1.7 cm vascularized, growing and heterogenous mass, along with a structurally altered left axillary lymph node. A core needle biopsy revealed a fibroadenoma with intermediate-grade DCIS component, while lymph node biopsy showed only reactive, inflammatory changes. Following surgical excision, final histopathology confirmed the fibroadenoma with intermediate-grade DCIS, local fibrosis and cystic changes. Recovery was uneventful, with a 6-month follow-up scheduled.

**Conclusions:** DCIS arising within a benign fibroadenoma is a rare but significant clinical entity. This case highlights the necessity of core needle biopsy and timely surgical excision for rapidly growing or atypical breast masses to ensure accurate diagnosis and treatment.

**Keywords:** Young Women, Fibroadenoma, Ductal Carcinoma In Situ, Malignant

# Imported Furuncular Myiasis Due to *Cordylobia anthropophaga* in a 24-Year-Old Traveller - A Case Report

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**Background:** Myiasis, a neglected tropical disease, is the most common form of human infestation by dipterous fly larvae. European cases of cutaneous myiasis due to *Cordylobia anthropophaga* (Tumbu fly) are observed in travellers returning from sub-Saharan Africa. Patients typically present with painful boil-like nodules, often accompanied by a sensation of movement within the lesion.

**The aim:** Here we present a case of Cutaneous Myiasis acquired after a short trip to Zanzibar, East Africa.

## **Materials and methods:**

**Results:** A 24-year-old previously healthy woman presented to the Emergency Department with intensely painful skin lesions on the left forearm and both buttocks. The symptoms appeared a week after returning to Poland from Zanzibar. Physical examination revealed multiple erythematous crater-like lesions: three on the right buttock, one on the left buttock, and one on the left forearm. Point-of-care ultrasonography demonstrated inflammatory changes in the subcutaneous tissue and distinct hypoechoic channels at the dermal-subcutaneous interface containing moving structures suggestive of parasitic larvae. Prior to presentation, the patient had manually extracted one larva herself. The remaining larvae were removed in the Emergency Department and outpatient clinic following surgical consultation. Morphological features and lesion distribution were consistent with cutaneous myiasis. A specimen was sent to a reference parasitology laboratory in Gdynia, which confirmed the organism as *Cordylobia anthropophaga*. Symptomatic treatment, including antihistamines, analgesics, and antibiotic therapy, was administered, and dermatological follow-up was recommended. The patient recovered without complications.

**Conclusions:** This case highlights travel-associated cutaneous myiasis as an important differential diagnosis in returning travelers presenting with furuncular skin lesions. Prompt recognition and larval extraction can lead to rapid symptom resolution and help prevent complications and misdiagnosis as other skin conditions.

**Keywords:** Myiasis, *Cordylobia anthropophaga*

# Susac Syndrome - Clinical Vigilance in the Face of Rarity

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**Background:** Susac syndrome is a rare autoimmune microangiopathy characterized by the classic clinical triad: encephalopathy, vision abnormalities, and sensorineural hearing loss. Due to its non-specific onset and rarity (approximately 500 cases reported to date), it remains a significant challenge in the differential diagnosis of demyelinating diseases and CNS vasculitis.

**The aim:** This study aims to present the clinical course of a 32-year-old female patient with full-blown Susac syndrome and to evaluate the effectiveness of rituximab treatment in stabilizing her clinical condition and halting disease progression.

## **Materials and methods:**

**Results:** The analyzed case involves a previously healthy woman who presented with worsening balance disorders, drowsiness, psychomotor slowing, and diplopia. Brain MRI revealed numerous (>20) hyperintense lesions, including pathognomonic "snowball" lesions in the corpus callosum. Pure-tone audiometry confirmed bilateral hearing loss, and fluorescein angiography revealed peripheral retinal artery occlusions, completing the clinical triad. Initial treatments provided only temporary effects, whereas a therapeutic breakthrough was achieved with rituximab, leading to significant clinical improvement.

**Conclusions:** Diagnosing Susac syndrome requires high clinical suspicion and multidisciplinary cooperation between neurologists, ophthalmologists, and otolaryngologists. Early initiation of intensive immunosuppressive therapy is crucial for the prognosis. In this case, rituximab treatment effectively halted disease progression, resolved most neurological symptoms, and allowed the patient to return to work despite persistent hearing loss.

**Keywords:** Susac syndrome, microangiopathy, rituximab, encephalopathy, sensorineural hearing loss, fluorescein

# Marked Neuropsychological Improvement After Severe Diffuse Axonal Injury in Two Adolescent Patients

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**Background:** Diffuse axonal injury (DAI) is defined as axonal damage at the white–gray matter junction caused by rapid acceleration–deceleration forces, leading to disruption of neural connectivity. It occurs in approximately 50% of severe traumatic brain injuries and is regarded as a major determinant of mortality and poor functional outcomes among young adults worldwide. Diagnosis is based on CT or MRI. DAI is classified into three grades; grades II and III are associated with unfavorable prognosis, including behavioral disturbances and persistent cognitive deficits. Management includes supportive care to prevent secondary injuries and neuropsychological rehabilitation.

We present two cases of severe DAI. The first patient, a 14-year-old male after a bicycle accident, was initially diagnosed with grade II DAI on MRI, with right-hemisphere lesions and hematomas. Clinically, right-sided paresis and central facial nerve palsy were observed. The second patient, a 17-year-old male after a scooter fall, presented with grade III DAI with left upper limb paresis.

During hospitalization, clinical courses of both patients diverged further. In the first case, follow-up MRI showed progression to grade III DAI. The patient regained consciousness after two weeks, with persistent aphonia. The second patient exhibited more complex deficits, including impaired working memory and language functions, and developed epileptic seizures. Their hospitalizations lasted, respectively, 25 and 45 days.

**The aim:** To emphasize the importance of long-term neuropsychological assessment and intensive multidisciplinary rehabilitation in DAI.

## **Materials and methods:**

**Results:** After one year of regular neuropsychological rehabilitation, both patients showed marked improvement in processing speed, learning, and prospective memory.

**Conclusions:** Significant neuropsychological improvement is possible in DAI despite severe initial findings, likely due to neural plasticity, systematic rehabilitation, and individual cognitive reserve.

**Keywords:** diffuse axonal injury, DAI, neuropsychological rehabilitation, MRI, traumatic brain injury

# Percutaneous Interventions in a Patient with Chronic Coronary Syndrome and Severe Tricuspid Regurgitation

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**Work's tutor: prof. dr hab. n. med. Mariusz Tomaniak**

**Background:** The prevalence of relevant tricuspid regurgitation (TR) in individuals aged over 75 has been established as 4%. Due to its conceivable progression to chronic heart failure (CHF), it needs optimal medical therapy (OMT), along with invasive procedures in selected cases. The pathology can coexist with chronic coronary syndrome (CCS), impairing patients' quality of life (QoL) and increasing perioperative risk. Implantation of coronary sinus reducer (CSR), which redistributes blood flow back towards the subendocardium, remains an option for individuals with refractory angina (RA) symptoms. Data on treatment of combined TR and CCS in the same subject remain limited.

**The aim:** This report illustrates a case requiring invasive procedures for the relief of RA manifestations due to failure of OMT.

## **Materials and methods:**

**Results:** A 77-year-old man with angina CCS class III and CHF with dyspnoea on minimal exertion (NYHA III) was admitted to Department of Cardiology. Heart Team concluded that no further revascularization option could be pursued and suggested device-based therapies for improvement of QoL of the patient. In the first step, CSR implantation was performed via the right internal jugular vein with a satisfying outcome. At 3 months a substantial angina relief was reported by the patient. Subsequently, according to initial Heart Team qualification, tricuspid transcatheter edge-to-edge repair (T-TEER) was performed 4 months later with implantation of 2 clips in anteroseptal position under transesophageal echocardiographic guidance. Its effectiveness was confirmed by post-procedural echocardiography with regurgitant orifice area of 15 mm<sup>2</sup> and TR volume of 13 mL. The patient was discharged in good general condition, with sustained reduction of cardiac symptoms at the 10-month follow-up (CCS 1, NYHA I/II).

**Conclusions:** While OMT remains the treatment of first choice, device-based therapies such as CSR for RA and T-TEER for severe TR remain an effective interventional option for selected patients with significantly impacted QoL.

**Keywords:** refractory angina, tricuspid regurgitation, percutaneous interventions

# When Fulminant Myocarditis Leads to Multiorgan Failure: A Highly Complicated Course

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**Background:** Fulminant myocarditis complicated by multiorgan failure is a rare but life-threatening condition requiring advanced mechanical circulatory support and prolonged intensive care management. Despite technological advances, the clinical course is often unpredictable and associated with numerous complications.

**The aim:** To describe the clinical course of a patient with fulminant myocarditis requiring prolonged mechanical circulatory support, with particular emphasis on complications encountered during treatment.

## **Materials and methods:**

**Results:** A 29-year-old male was admitted in critical condition following a recent viral infection, with severe lactic acidosis, combined cardiogenic and septic shock, and acute biventricular heart failure (EF 10%). He required veno-arterial extracorporeal membrane oxygenation (VA-ECMO) and intra-aortic balloon pump (IABP) support. The clinical course was complicated by multiorgan failure, including acute kidney and liver injury requiring renal replacement therapy. Recurrent, life-threatening hemorrhages from the femoral artery required multiple surgical interventions and massive transfusion, leading to transfusion-related lung injury (TRALI). Additionally, infections with multidrug-resistant organisms (Klebsiella NDM, VRE) and persistent wound complications significantly prolonged treatment. Imaging revealed an occipital ischemic stroke without permanent neurological deficits. Multiple hepatic lesions requiring drainage were observed, accompanied by persistent cholestasis. At discharge, cardiac function improved to EF 45–50%, with preserved neurological status and ongoing rehabilitation after a 135-day hospitalization.

**Conclusions:** This case highlights the extreme complexity of managing fulminant myocarditis with multiorgan failure, emphasizing the high burden of hemorrhagic and infectious complications. Despite a prolonged and complicated course, meaningful cardiac and neurological recovery is achievable with aggressive, multidisciplinary management.

**Keywords:** Fulminant myocarditis, Multiorgan failure, Hemorrhage, Multidrug-resistant infections

# Cor Triatriatum Dexter and Atrial Septal Defect: Leading to Ischemic Stroke in a Young Patient

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**Background:** Cor triatriatum dexter is a rare congenital anomaly where a membrane divides the right atrium. Coexisting with an atrial septal defect (ASD), it can direct superior vena cava flow toward the defect, facilitating a right-to-left shunt. This increases paradoxical embolism risk, potentially causing ischemic stroke.

**The aim:**

**Materials and methods:**

**Results:** A 22-year-old male, recently post-abdominal surgery, presented with severe left hemiparesis (2/5), rightward gaze deviation, and dysarthria (NIHSS 22). CT/Angio-CT showed acute right MCA (M1/M2) and internal carotid artery (C6/C7) thrombosis without evidence of arterial dissection. Because the exact time of stroke onset was unknown, thrombectomy was not performed. After 2 days, MRI confirmed acute right MCA territory infarction with right lateral ventricle compression. Transthoracic echocardiography demonstrated a left ventricular ejection fraction of 62% and identified an apparent mid-septal defect with a left-to-right shunt. Holter ECG showed no arrhythmias. The patient was treated with aspirin (150 mg/day), low-molecular-weight heparin, and intensive rehabilitation. He improved to NIHSS 6 and was referred to cardiology for further diagnostics. Contrast-enhanced Transcranial Doppler revealed a "curtain effect", indicating a massive right-to-left shunt. Transesophageal echocardiography diagnosed Cor triatriatum dexter; an intra-atrial membrane effectively funneled venous return from the superior vena cava through an ASD into a middle chamber, and subsequently across a patent foramen ovale (PFO) into the left atrium, explaining the paradoxical embolization of postoperative venous thrombi. The patient was referred for surgical correction.

**Conclusions:** Cor triatriatum dexter should be considered in the differential diagnosis of ischemic stroke in young patients, as its presence significantly increases embolic risk. Thus, accurate identification of this anomaly is critical, establishing a clear indication for surgical intervention for secondary stroke prevention.

**Keywords:** Cor Triatriatum, ischemic stroke

# Therapeutic Challenges in MDR Urosepsis After Kidney Transplant Recipient with ADPKD

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**Background:** Solid organ transplant recipients with ADPKD are at high risk for extra-renal surgical complications. Coexisting MDR infections like *K.pneumoniae* NDM/OXA-48 worsens prognosis, risking graft loss and death, requiring urgent diagnostics and targeted therapy.

**The aim:** To highlight challenges in managing MDR *K.pneumoniae* infection and gastrointestinal complications after kidney transplant in APKD.

## Materials and methods:

**Results:** A 53-year-old man with ADPKD, hepatic cysts, hypertension, and bilateral nephrectomy received living-donor kidney transplant from his wife. Graft function was immediate on tacrolimus, mycophenolate mofetil, glucocorticosteroids, and basiliximab, with an uncomplicated early course.

On POD4, urosepsis developed (*K.pneumoniae* NDM/OXA-48), treated with colistin-meropenem. After two days, rising creatinine and oliguria necessitated hemodialysis. On POD11, tigecycline and fosfomycin were added. Sudden dyspnea and free intraperitoneal gas prompted urgent laparotomy, revealing perforated sigmoid diverticulum and incarcerated internal hernia with small bowel. Hartmann's procedure with colostomy was performed. The patient was transferred to ICU for mechanical ventilation, vasopressors, and CRRT. Extended susceptibility testing enabled cefiderocol-tigecycline therapy, achieving stabilization. Week post-ICU discharge, recurrent urosepsis was diagnosed. Ceftazidime-avibactam and aztreonam were initiated. Total antibiotic therapy lasted 42 days. PET/CT identifies persistent inflammatory foci in the heart and diaphragmatic region. Two months later, GI continuity was restored with nephrology-guided antibiotics. Under follow-up in March 2026 showed normal graft function.

**Conclusions:** Patients with ADPKD after kidney transplantation require monitoring for surgical complications, including colonic perforation. In recurrent urosepsis, PET/CT help localize and identify persistent infectious foci. Cefiderocol, ceftazidime-avibactam, and aztreonam combination therapy is effective for MDR *K. pneumoniae* NDM/OXA-48 infections.

**Keywords:** ADPKD, kidney transplant, MDR *Klebsiella pneumoniae*, cefiderocol

# Serum electrophoresis and immunofixation results in patients treated with therapeutic monoclonal antibodies.

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**Background:** The development of therapeutic monoclonal antibodies (t-mAbs) offers advantages in treating various diseases like lymphomas, leukemias, transplant rejection, and autoimmune disorders. Among patients receiving biological therapy, a large group receives daratumumab (anti-CD38, IgG1 kappa). New types of therapeutic monoclonal antibodies are becoming increasingly common. These include isatuximab (anti-CD38, IgG1 kappa), rituximab (anti-CD20, IgG1 kappa), denosumab (targeting RANKL, IgG2 kappa), and teclistamab (BCMA, IgG4 lambda). Their presence interferes with serum immunofixation which hampers determination of treatment response in plasma cell dyscrasias.

**The aim:** This case report highlights the diagnostic challenges of patients treated with monoclonal therapeutic antibodies.

## **Materials and methods:**

**Results:** The results of serum electrophoresis and immunofixation of five patients receiving t-mAbs: denosumab, isatuximab, rituximab, teclistamab were compared to clinical data and electrophoresis mobility of t-mAbs reported in literature. The presence of t-mAbs was observed in all immunofixation results as a faint band, either in the IgG and kappa or the IgG and lambda paths. Electrophoresis results showed additional zones, indicating t-mAbs, only for isatuximab in the middle of gamma globulins.

**Conclusions:** Denosumab, isatuximab, rituximab and teclistamab caused visible interferences in immunofixation results and could be interpreted as the presence of monoclonal protein resulting in misdiagnosis. In serum electrophoresis, however, only isatuximab could be seen as an additional peak. To avoid mistakes in interpreting the serum immunofixation results of patients treated with t-mAbs, interdisciplinary cooperation between a clinician and laboratory professionals is needed, in the form of information about the ongoing biological therapy. Reducing the risk of misdiagnosis, minimizing the costs of unnecessary or repeated tests performed to confirm initial results, and improving patient safety remain key priorities.

**Keywords:** therapeutic monoclonal antibodies, serum electrophoresis, immunofixation

# Perifolliculitis Capitis Abscedens et Suffodiens Coexisting with Hidradenitis Suppurativa - A Case Report

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**Background:** Perifolliculitis capitis abscedens et suffodiens (PCAS) and Hidradenitis suppurativa (HS) are chronic, relapsing inflammatory conditions affecting the pilosebaceous unit. Along with acne conglobata and dissecting cellulitis, they are grouped under the follicular occlusion disease tetrad. Their simultaneous occurrence is rare and may point to a more severe disease phenotype, often associated with poor quality of life and resistance to standard treatments.

**The aim:** To present a rare case of coexistence of PCAS and HS and to highlight diagnostic and therapeutic challenges associated with this overlap.

## **Materials and methods:**

**Results:** The disease began in adolescence as acne-like lesions on his back. The disease kept progressing despite multiple treatment attempts, including topical and systemic antibiotics and oral isotretinoin, with only partial responses. Over the past five years, he developed painful, widespread inflammatory lesions on the scalp and in the axillary regions, with prior involvement of the groin. On examination, the scalp revealed diffuse inflammatory nodules with sinus tract formation and scarring alopecia, in keeping with PCAS. The axillae showed nodules, abscesses, and interconnected sinus tracts with fibrotic scarring, consistent with HS. The back displayed severe acneiform lesions with post-inflammatory and atrophic scars. A previous scalp biopsy revealed an epidermal cyst with signs of resorptive inflammation on histopathology.

**Conclusions:** This case demonstrates that PCAS and HS can coexist within the follicular occlusion disease spectrum. Recognizing this overlap early is important to avoid permanent tissue damage and scarring. For patients who fail conventional therapies, biologics such as TNF- $\alpha$  inhibitors may provide a valuable therapeutic option. This is also a plan for the presented patient.

**Keywords:** Hidradenitis suppurativa (HS), PCAS

# Iatrogenic Hyponatremia During Diagnostic Workup of Hyperandrogenism: From Clinical Suspicion to Real Threat

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**Background:** Desmopressin (DDAVP) is increasingly used in the diagnostic evaluation of Cushing's syndrome (CS), particularly as an adjunctive dynamic test to differentiate functional from neoplastic hypercortisolemia. Although useful, DDAVP may cause clinically significant water–electrolyte disturbances.

**The aim:**

**Materials and methods:**

**Results:** A 22-year-old woman was admitted for evaluation of suspected CS after inadequate cortisol suppression in an overnight 1 mg dexamethasone suppression test (DST). The workup was initiated due to hyperandrogenic features. Physical examination showed hirsutism and acne without typical Cushingoid features. Laboratory tests revealed elevated androgens: total testosterone 2.73 nmol/L [0.48–1.85] and DHEA-S 727.7 µg/dL [134.2–407.4]. Circadian cortisol rhythm, 24-hour urinary free cortisol, and ACTH levels were normal. Non-classical congenital adrenal hyperplasia was excluded. Pituitary MRI suggested a Rathke's cleft cyst. A combined overnight DST followed by 10 µg DDAVP stimulation was performed. Cortisol suppression remained incomplete (6.8 µg/dL), but the absence of a cortisol response to DDAVP argued against neoplastic hypercortisolemia. Several hours post-test, the patient developed severe headache and somnolence. Laboratory evaluation revealed acute hyponatremia (Na 122 mmol/L [137–145], plasma osmolality 262 mmol/kg). Further history disclosed ingestion of approximately 3000 mL of water despite instructions for strict fluid restriction, due to a misconception about "flushing" contrast after MRI. Treatment with 3% hypertonic saline led to rapid clinical and biochemical recovery.

**Conclusions:** DDAVP carries a significant risk of water intoxication, particularly without adequate fluid restriction. This case underscores the critical importance of thorough patient education to prevent potentially life-threatening complications during endocrine diagnostic testing.

**Keywords:** Desmopressin, Cushing's syndrome, Hyponatremia, Water intoxication, Dynamic endocrine testing

# Williams syndrome as cause of elderly chronic kidney disease in children — based on three clinical cases

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**Background:** Williams syndrome (WS) is a rare genetic disorder caused by elastin deficiency due to a microdeletion on chromosome 7. It is characterized by developmental delay, intellectual disability, a specific cognitive profile, cardiovascular abnormalities (supravalvular aortic stenosis, peripheral pulmonary artery stenosis, hypertension), vascular defects affecting renal development, connective tissue abnormalities, growth deficiency, and endocrine disturbances (precocious puberty, hypercalcemia, hypercalciuria, hypothyroidism), along with a characteristic facial appearance. These features predispose patients to chronic kidney disease (CKD), exacerbated by hemodynamic and calcium–phosphate metabolism disorders, including nephrocalcinosis. CKD in WS is typically mild (stages I–II), with progression reported rarely.

**The aim:**

**Materials and methods:**

**Results:** We present three boys with WS and CKD referred for multidisciplinary care. Two patients (aged 2 and 4) had stage IV CKD, while a 6-year-old presented with stage II CKD. The youngest patient had hypercalcemia, hypercalciuria, nephrocalcinosis, and renal dysplasia on ultrasound, without hypertension. The 4- and 6-year-old boys had cardiovascular abnormalities, including supravalvular aortic stenosis in both, and additional pulmonary artery branch hypoplasia and concentric ventricular hypertrophy in the 4-year-old. The 4-year-old was treated with amlodipine for hypertension, while no renal artery stenosis was identified. The 6-year-old received enalapril for microalbuminuria. All patients exhibited characteristic dysmorphic features, hypotonia, malnutrition, and significant dental problems. None required dialysis.

**Conclusions:** WS patients may present with multiple clinically significant complications requiring a multidisciplinary approach. Congenital renal and urinary tract abnormalities, hypercalciuria, vascular defects, and nutritional issues should be carefully monitored, as they may contribute to CKD development and progression.

**Keywords:** Williams syndrome, Chronic kidney disease, Hypercalciuria, Nephrocalcinosis

# Extensive Left Ventricular Pseudoaneurysm with Subacute Tamponade Requiring Urgent Heart Transplant

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**Background:** Left ventricular pseudoaneurysm (LVP) represents a rare, yet potentially fatal mechanical complication of myocardial infarction, serving as a distinct variant of free-wall rupture. These lesions carry a high risk of transmural perforation, which typically constitutes an urgent indication for surgical intervention. Nevertheless, the optimal criteria for repair in chronic cases remain a subject of ongoing debate.

**The aim:** To report a unique case of salvage heart transplantation (OHT) as the only viable life-saving option for an irreparable extensive pseudoaneurysm, demonstrating that OHT can be successfully performed even when standard criteria are not met, and conventional therapies are exhausted.

## Materials and methods:

**Results:** A 63-year-old male with prior anterior STEMI was admitted with progressive heart failure. TTE and CT revealed a giant (81x82mm) akinetic apical LV pseudoaneurysm with a markedly thinned wall (2 mm) and subacute tamponade (28mm effusion, RV compression) from a contained rupture. The Heart Team disqualified the patient from conventional surgery and LVAD due to tissue friability and LVEF 10%. Despite exceeding standard criteria, salvage OHT was pursued as the sole life-saving option. Following emergency authorization by Poltransplant, OHT was performed after a 5-day wait. Intraoperatively, 1.5L of hemolyzed blood was found, confirming prior rupture. Postoperative course was complicated by ACR 1R rejection, MDR infections, and sternal dehiscence. After 8 weeks of intensive care, the patient was discharged. At follow-up, he reached NYHA I status with an LVEF of 60%.

**Conclusions:** The advancement of non-standard therapeutic strategies, including the use of heart transplantation as a salvage procedure, coupled with a fully individualized decision-making process, offers the potential to modify the natural history of the disease and significantly improve the prognosis for patients presenting with free-wall rupture complicated by tamponade and subsequent pseudoaneurysm formation.

**Keywords:** Ventricular pseudoaneurysm, free-wall rupture, heart transplant, non-standard transplant allocation

# Severe Anemia as an Extraesophageal Manifestation of Gastroesophageal Reflux Disease in a Paediatric Patient

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**Background:** Gastroesophageal reflux (GER) is common in infancy and typically self-limiting, but in some children, it can persist and progress to gastroesophageal reflux disease (GERD). Extraesophageal manifestations may obscure diagnosis and complicate management, while standard therapies can be associated with rare but serious adverse effects.

**The aim:** To highlight the diagnostic and therapeutic challenges of pediatric GERD with extraesophageal manifestations, complicated by severe anemia.

## Materials and methods:

**Results:** We report a case of a 4-year-old child admitted for recurrent severe anemia and suspected extraesophageal manifestations of GERD. Symptoms included vomiting, abdominal pain, weight loss, cough, and left-sided head tilt, which began after a respiratory syncytial virus (RSV) infection. GERD with a sliding hiatal hernia was diagnosed by esophagogastroduodenoscopy (EGD), and proton pump inhibitor (PPI) therapy was introduced with reduction of esophageal inflammation. However, the patient developed profound anemia requiring repeated transfusions. Despite iron supplementation and subsequent Nissen fundoplication, GERD symptoms did not resolve completely. In addition, an intraoperative biopsy of an enlarged lymph node revealed Castleman-like changes, which prompted deeper immunological diagnostics. Neurological causes of the head tilt were excluded and Sandifer's syndrome was suspected but not definitively confirmed. Ongoing abdominal pain prompted further evaluation for functional gastrointestinal disorders

**Conclusions:** This case illustrates the diagnostic and therapeutic complexity of pediatric GERD, particularly when extraesophageal symptoms predominate. Management was complicated by severe, multifactorial anemia, creating an additional challenge. A multidisciplinary approach is essential for optimal care in complex presentations.

**Keywords:** Gastroesophageal reflux disease, iron-deficiency anemia, extraesophageal manifestations

# Combination of ECT and TMS in major depressive disorder with psychotic features – case study.

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**Background:** Major depressive disorder (MDD) is a severe, deteriorating mental disorder, a considerable and an increasingly common challenge in modern psychiatry. It is characterised by high recurrence and death rate. About 28% of patients develop psychotic features and a great group develops treatment resistant depression (TRD). In such cases, pharmacological approach may be ineffective and neuromodulation methods may be used such as electroconvulsive therapy (ECT) or transcranial magnetic stimulation (TMS).

**The aim:** The analysis of the efficacy of combining ECT and TMS methods in MDD treatment.

## **Materials and methods:**

**Results:** A 79-year old female patient with 14-year history of MDD was urgently admitted to psychiatry ward in result of acute suicidal tendencies, hospitalised 6 times so far. She presented with deeply depressed mood, severe anxiety, complete anhedony and apathy. She also expressed delusions of guilt, reference, theft, impoverishment and experienced simple auditory hallucinations. The patient received 36 points in Hamilton's depression scale. Pharmacotherapy was modified, since current was inefficient and she was cleared for ECT despite concomitant diseases. 12 procedures were executed with a maximum dose of 173 mC, etomidate and suxamethonium were used for anaesthesia. ECT was discontinued, because of adverse reaction of increased blood pressure up to 240/134 mmHg. The patient was then cleared for TMS in iTBS protocol. First procedure was executed 3 days after finishing ECT. 16 procedures were executed, she received 9600 pulses of 50hz, ITI 8s, 50%MT; 3min 9s, 600 pulses per procedure. A complete symptomatic and functional remission has been achieved with administered treatment.

**Conclusions:** After many years, ECT still stands as one of the most effective treatments for depression, acute onset suicidal tendencies and psychosis, while TMS is less potent. Currently there are no studies comparing efficacy of combining both methods in a short time frame versus standard of care or sham therapy.

**Keywords:** electroconvulsive therapy, transcranial magnetic stimulation, major depressive disorder, psychosis

# Brachioradial Pruritus as a Rare Manifestation of Cervical Spine Pathology: A Case Report

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**Background:** Itch is a common symptom associated with various physiological and pathological processes. Due to its nonspecific nature, its exact etiology is often challenging to determine.

**The aim:** To present a case of brachioradial pruritus as clinical evidence that the skin is closely interconnected with the nervous system and that seemingly local dermatological symptoms can mask deeper systemic pathologies.

## **Materials and methods:**

**Results:** A 56-year-old woman presented with a 3–4-year history of persistent itch with intermittent burning, symmetrically affecting both shoulders and upper arms, markedly exacerbated by sun exposure. She reported an inability to refrain from scratching. Her medical history included hypothyroidism treated with levothyroxine (75 µg daily). Previous oral antihistamines were ineffective. On admission, itch severity was 10/10 on the NRS. Physical examination revealed only xerosis, without primary or secondary skin lesions. The patient also reported chronic cervical spine complaints. MRI demonstrated straightening of cervical lordosis and multilevel degenerative changes, including osteophytes (most pronounced at C5–C6), reduced disc height and desiccation at C5/C6, mild anterior spondylolisthesis at C4/C5 (3 mm) and posterior disc protrusions at C4/C5 and C5/C6 (~3 mm). At C6/C7, a central disc protrusion (4 mm) indented the dural sac. Brachioradial pruritus was diagnosed. Treatment with oral gabapentin (300 mg twice daily) and topical 2% menthol led to significant improvement after one month (NRS 2). Increasing gabapentin to 400 mg twice daily resulted in complete symptom resolution after another month (NRS 0). The patient remains in remission, with ongoing emollient therapy recommended.

**Conclusions:** Skin manifestations may serve as markers for underlying systemic and neurological disorders. Recognizing the neurological pathomechanism of itch allows for targeted systemic pharmacotherapy, significantly increasing the likelihood of therapeutic success.

**Keywords:** Brachioradial pruritus, Neuropathic pruritus, Cutaneous manifestations, Cervical spine pathology

# Coronary Sinus Reducer in a Patient with Chronic Total Occlusion of the Left Anterior Descending Artery

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**Background:** Refractory angina (RFA) is a chronic condition marked by persistent ischemic symptoms despite optimal medical therapy and the absence of further revascularization options. Coronary sinus reducer (CSR) has emerged as treatment alternative for selected patients. Revascularization in individuals with chronic total occlusion (CTO) carries a higher risk of complications. Data on CSR implantation among patients with CTO, particularly in the presence of prior MI and mixed scar–hibernation patterns on advanced imaging, remain limited.

**The aim:** To present CSR therapy in RFA with LAD CTO, prior MI and a mixed scar–hibernation pattern.

## Materials and methods:

**Results:** A 47-year-old woman with prior anterior STEMI was referred for persistent, worsening refractory angina. Coronary angiography showed LAD CTO distal to the first diagonal branch. Transthoracic echocardiography (TTE) demonstrated an extensive akinetic apical aneurysm with LVEF ~38%. Stress perfusion imaging revealed a severe LAD-territory defect involving ~50% of LV myocardium while PET scan confirmed a mixed pattern with ~25% scar and ~25% hibernating myocardium, indicating residual viability predominantly outside the apical segments. Medical therapy was optimized, including the highest doses of trimetazidine. Nevertheless, angina persisted (CCS III). After repeat hospitalization and Heart Team Reassessment, the patient was considered unsuitable for PCI/CABG due to unfavorable LAD CTO anatomy and limited actionable revascularization targets. CSR was recommended and successfully deployed via the right internal jugular vein. At 3-month clinical follow-up, angina relief was observed with stable LV systolic function by TTE.

**Conclusions:** This case highlights the potential role of CSR therapy in a patient with RFA and LAD CTO where revascularization risk outweighs potential benefits of complex PCI. Such an inverse order favoring a safer intervention for angina symptoms mitigation with CS reduction among patients with CTO lesions is gaining interest nowadays.

**Keywords:** refractory angina, coronary sinus reducer, CTO

# Primary pulmonary cystic echinococcosis with extreme eosinophilia and *Pneumocystis jirovecii* coinfection.

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**Background:** Cystic echinococcosis caused by *Echinococcus granulosus* larvae is a rarely diagnosed parasitic disease in Poland, most commonly localizing in the liver. Isolated lung involvement as a primary focus poses a diagnostic challenge, often mimicking neoplastic lesions, abscesses, or severe pneumonia. *Pneumocystis jirovecii* is a pathogen commonly associated with HIV coinfection.

**The aim:** To present a case of a 32-year-old patient with giant hydatid cysts in both lungs, in whom the diagnostic process was hindered by an atypical radiological presentation and a coexisting opportunistic infection without HIV infection.

## **Materials and methods:**

**Results:** The patient presented with symptoms of chest discomfort and hemoptysis. HIV infection was excluded. A CT scan revealed numerous areas of consolidation, including a dominant focus in the right lung (11x8 cm) with signs of cavitation (abscess formation) and a fluid collection in the left lung (4x4.2 cm). Laboratory tests showed extreme eosinophilia (>8x over reference rate). The diagnosis of echinococcosis was confirmed by immunoserological tests (IgG ELISA, Western-blot positive for *E. granulosus*). During hospitalization, the cyst ruptured, and the hydatid fluid was evacuated via the bronchial tree. Additionally, microscopic examination of the respiratory tract material identified *Pneumocystis jirovecii*, which necessitated the initiation of targeted therapy with pentamidine. The course of albendazole treatment was complicated by transient hepatotoxicity (elevated aminotransferases).

**Conclusions:** 1. Pulmonary echinococcosis should be considered in the differential diagnosis of large cavitory lesions in the chest, especially with coexisting high eosinophilia. 2. The radiological presentation of pulmonary echinococcosis can be nonspecific in the event of cyst superinfection or rupture. 3. The presence of *Pneumocystis jirovecii* in this case suggests the need for a thorough assessment of the immune profile in patients with massive parasitic invasion and a history of autoimmune diseases.

**Keywords:** Cystic echinococcosis, *Pneumocystis jirovecii*, Pneumonia, *Echinococcus granulosus*