THE 71 ST S:MC

INTERNATIONAL MEDICAL CONGRESS OF SILESIA

Conference organized online and in Katowice

May 7th- 9th 2025

ABSTRACTS' BOOK

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OF

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OF
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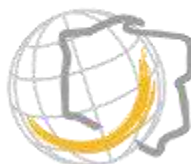Państwowy Instytut Badawczy
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Dear Students,

I have a great pleasure to invite you to the International Medical Congress of Silesia 2025 - "SIMC 2025" 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 2025 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 2025— 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:
- Prof. Tomasz Szczepański, MD, PhD – Rector of the Medical University of Silesia in Katowice,
- Prof. Katarzyna Mizia-Stec, MD, PhD – Vice-Rector for Science and International Relations,
- Prof. Jerzy Stojko, MD, PhD – Vice-Rector for Academic Affairs,
- Prof. Michał Holecki, MD, PhD – Curator of the Students' Scientific Society,
- Dr. Ireneusz Ryszkiel, PhD – Chancellor of the Medical University of Silesia,

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 2025 be a stepping stone to your future in science and medicine!

<p style="text-align:center">The Board of Students' Scientific Association
of the Medical University of Silesia</p>

Dear Participants and Colleagues,

On behalf of the Doctoral Students' Self-Government, we would like to express our thanks for the possibility of participation in the International Medical Congress of Silesia (SIMC) 2025, beside the Students' Scientific Association of the Medical University of Silesia. We believe profoundly that continuing agreement between students and PhD candidates paves the way for beneficial cooperation, based on exchanging views and experiences in order to develop friendship and, most important, mutual respect. We are convinced that the subjects and specific issues addressed during this Conference are found among issues currently facing us young researchers. Sessions that have been prepared for you will not only be an opportunity to present your research results but also to exchange opinions and provide an inspirational experience for every participant. We extend our sincere gratitude to the Rector of the Medical University of Silesia in Katowice Prof. Tomasz Szczepański, MD, PhD, the Director of the Doctoral School Prof. Agata Stanek, MD, PhD, the Chancellor of SUM, Ireneusz Ryszkiel, MD and all of the workshops' organizers and administrative staff for their help and support. We sincerely thank all of the members of the Scientific Committees for the time they devoted, valuable comments and exchange of experiences. In addition to the words of appreciation, we invite you to familiarize yourself with the subjects of papers presented at each session, in particular by the PhD candidates, who are always willing to share the knowledge they gained through continuous scientific research.

The Board of the Doctoral Students' Self Government
of the Medical University of Silesia in Katowice

International Medical Congress of Silesia SIMC 2025 programme

Wednesday, 07.05.2025

09:00 – 12:00 Scientific sessions
Session of systematic reviews and meta-analyses – Aula A3
Session of neurology and neurosurgery – Aula UCK B
Session of basic science, biotechnology and biomedical engineering – Aula 114 CDiSM
Session of public health and health care – Aula 114 CDiSM
13:00 – 14:30 Opening Ceremony & Discussion Panel "How do basic sciences shape the future of medicine?"
14:30 – 16:30 Scientific sessions
Session of public health and health care II – Aula A3
Session of oncology, nuclear medicine and radiotherapy – Aula UCK A
Session of pharmacy and clinical pharmacology – Aula 113 CDiSM
Session of systematic reviews and meta-analyses II – Aula 114 CDiSM

Thursday, 08.05.2025

09:00 – 12:00 Scientific sessions
Session of noninvasive cardiology – Aula A3
Session of experimental medicine – Aula UCK A
Session of anesthesiology, emergency medicine and intensive care – Aula 113 CDiSM
Session of surgery – Aula 114 CDiSM
12:00 – 14:30 Scientific Session
Session of dentistry- Aula UCK B
12:00 – 15:00 Workshops
14:00 – 16:30 Scientific sessions
Session of invasive cardiology and cardiac surgery – Aula A3
Session of clinical medicine – Aula UCK A
Session of physiotherapy and orthopedics- Aula UCK B
Session of psychiatry and sexology – Aula 113 CDiSM
Session of systematic reviews and meta-analyses II – Aula 114 CDiSM

Friday, 09.05.2025

09:00 – 12:00 Scientific sessions
Session of neonatology and pediatrics – Aula A3
Session of internal medicine – Aula UCK A
Session of basic science, biotechnology and biomedical engineering II – Aula 113 CDiSM
Session of dietetics and nutrition – Aula 114 CDiSM
12:00 – 15:00 Scientific Session
Session of gynecology and obstetrics – Aula UCK B
12:00 – 15:00 Workshops
18:00 – 20:00 Closing Ceremony - Aula A3
21:00 – 04:00 After SIMC "Karlus from SIMC" – Klub DSO Projekt

SPIS TREŚCI

SESSION OF SURGERY

SESSION OF INTERNAL MEDICINE

SESSION OF DIETETICS AND NUTRITION

SESSION OF PHARMACY AND CLINICAL PHARMACOLOGY

SESSION OF ONCOLOGY, NUCLEAR MEDICINE AND RADIOTHERAPY

SESSION OF GYNECOLOGY AND OBSTETRICS

SESSION OF NONINVASIVE CARDIOLOGY

SESSION OF INVASIVE CARDIOLOGY AND CARDIAC SURGERY

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SESSION OF NEONATOLOGY AND PEDIATRICS

SESSION OF NEUROLOGY AND NEUROSURGERY

SESSION OF PSYCHIATRY AND SEXOLOGY

SESSION OF DENTISTRY

SESSION OF PUBLIC HEALTH AND HEALTH CARE

SESSION OF SYSTEMATIC REVIEWS AND META-ANALYSES

SESSION OF EXPERIMENTAL MEDICINE

SESSION OF CLINICAL MEDICINE

SESSION OF PUBLIC HEALTH AND HEALTH CARE II

SESSION OF SYSTEMATIC REVIEWS AND META-ANALYSES II

SESSION OF PHYSIOTHERAPY AND ORTHOPEDICS

SESSION OF SYSTEMATIC REVIEWS AND META-ANALYSES III

SESSION OF BASIC SCIENCE, BIOTECHNOLOGY AND BIOMEDICAL ENGINEERING II

Metabolic disorders during CRRT (Continuous Renal Replacement Therapy)

Wiktor Wagner[1, 2], Adam Iwanicki[1, 2], Nikola Tomczak[1], Michał Kisiołek[1]

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2. Medical University of Silesia, Katowice

Work's tutor: prof. dr hab. n. med. Łukasz Krzych

Background: Continuous Renal Replacement Therapy (CRRT) is used to manage severe acute kidney injury (AKI). Despite its numerous advantages, CRRT may promote several metabolic disturbances, which arise due to patient- or procedure-related conditions.

The aim: To assess the occurrence of metabolic disorders during CRRT with Ci-Ca regional anticoagulation in critically-ill subjects.

Materials and methods: The study group covered 89 patients with AKI undergoing CRRT. Laboratory test results, details regarding CRRT and clinical data were retrieved from medical records.

Results: Sepsis-associated AKI was the most frequent indication for CRRT. 26 out of 89 patients developed metabolic alkalosis. The most prominent metabolic abnormalities occurred on day 5 of treatment. 25 out of 33 patients with any metabolic disorders had acute liver injury, and all patients received some type of hepatotoxic drugs, mainly antimicrobials.

Conclusions: Metabolic alkalosis is a frequent phenomenon during CRRT with citrate anticoagulation, hence hepatoprotective strategies should be considered among all in critically ill patients developing severe AKI.

Keywords: CRRT, intensive care unit, Metabolic alkalosis

Influence of vasopressors and intropes on patients during digoxin intake

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

Background: Cardiac glycosides are compounds of natural origin and are synthesized by some plants of the families Apocynaceae, Liliaceae, Ranuculaceae, and Scorphulariaceae. The most important mechanism of action of cardiac glycosides is the inhibition of Na, K-ATPase, which increases the concentration of sodium in cells.

The aim: The aim of this study is to compare influence of vasopressors and inotropes by patients with therapeutic drug monitoring of digoxin.

Materials and methods: This research is a retrospective study from ICU databes of the Silesia Center for Heart Diseases in Zabrze. From 980 patients admitted to ICU, 103 were analyzed - this patients received digoxin.

Results: Patients where received Norepinephrine had the same digoxin level and digoxin dose 1.17 +/- 0.5 (ng/ml) vs 1.10 +/- 0.81 (ng/ml); p=0.719 and 0.208 +/- 0.074 (mg) vs 0.195 +/- 0.106 (mg); p=0.637. Patients where received Dobutamine had the same digoxin level and digoxin dose 1.19 +/- 0.52 (ng/ml) vs 1.11 +/- 0.53 (ng/ml); p=0.445 and 0.213 +/- 0.075 (mg) vs 0.195 +/- 0.079 (mg); p=0.247. Patients where received Milrinone had the same digoxin level and digoxin dose 1.28 +/- 0.54 (ng/ml) vs 1.13 +/- 0.52 (ng/ml); p=0.225 and 0.200 +/- 0.092 (mg) vs 0.208 +/- 0.072 (mg); p=0.643. Patients where received Epinephrine had the same digoxin level and digoxin dose 1.19 +/- 0.52 (ng/ml) vs 1.11 +/- 0.53 (ng/ml); p=0.432 and 0.203 +/- 0.074 (mg) vs 0.213 +/- 0.081 (mg); p=0.531. Patients where received Vasopressin had the same digoxin level and digoxin dose 1.36 +/- 0.63 (ng/ml) vs 1.11 +/- 0.49 (ng/ml); p=0.065 and 0.207 +/- 0.073 (mg) vs 0.207 +/- 0.078 (mg); p=0.997. Patients where received Levosimendan had the same digoxin level and digoxin dose 1.31 +/- 0.55 (ng/ml) vs 1.15 +/- 0.52 (ng/ml); p=0.390 and 0.231 +/- 0.133 (mg) vs 0.204 +/- 0.071 (mg); p=0.344.

Conclusions: Patients in ICU treated with vasopressors and inotropes had the same digoxin level and digoxin dose.

Keywords: digoxin, vasopressors, inotropes

Assessment of Polish anesthesiologists' preferences for pharmacotherapy during RSI: a survey study.

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Medical University of Silesia, Katowice

Work's tutor: dr n. med. Michał Pluta

Background: Rapid Sequence Intubation (RSI) is a method of securing the airway in patients at high risk of aspiration. In hemodynamically unstable patients, the requirements for anesthetic agents vary. An ongoing debate exists regarding the selection of optimal drugs and dosages during RSI.

The aim: Assessment of anaesthesiologists' preferences regarding the choice of drugs used in the RSI procedure in hemodynamically unstable patients.

Materials and methods: We conducted a survey study in a group of Polish anesthesiologists in the period from January to March 2024. They were verified in the national register of doctors (specialists) and using their specialization card (doctors undergoing specialization). The questionnaire comprised 13 single-choice questions regarding the selection and dosage of anesthetic agents and neuromuscular blockers.

Results: The survey included 166 respondents: 106 (63%) doctors undergoing specialization and 60 (36%) specialists. Ketamine was the intravenous anesthetic of choice for 61% of respondents, most often administered at a dose of 1 mg/kg. Propofol, etomidate and midazolam were used less frequently: 20%, 18% and 1%, respectively. Additionally, 84% of respondents reported using neuromuscular blocking agents, with succinylcholine being preferred over rocuronium (57% vs. 43%). The most common dose for succinylcholine was 1.2 mg/kg, while for rocuronium it was 1 mg/kg.

Conclusions: In rapid sequence intubation, most anesthesiologists utilize pharmacotherapy in accordance with current medical standards. However, despite recommendations, the use of neuromuscular blocking agents is not universal among practitioners.

Keywords: hypnotics and sedatives, intubation, neuromuscular blocking agents, RSI

Impact of a new utilization improvement program on platelet concentrate transfusions: a pre-post study

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Work's tutor: dr hab. n. med. Piotr Czempik

Background: Annually millions of platelet concentrate (PC) are transfused worldwide. Decision regarding PC transfusion is often complex. Implementation of a procedure designed to facilitate the decision-making process is beneficial.

The aim: The aim of the study was to analyze the impact of a new hospital utilization improvement procedure on PC transfusions.

Materials and methods: We performed a retrospective analysis of all PC transfusions in adult patients hospitalized in the University Clinical Center in Katowice. The analyzed time included 12-month periods before and after introduction of the procedure. The procedure was based on the most recent clinical practice guidelines from the Association for the Advancement of Blood and Biotherapies (2015). Indications for PC transfusions were divided into prophylactic and therapeutic. Summary of the procedure was made available on the hospital e-learning platform. Additionally the modified order was implemented. The appropriateness of PC transfusions was decided based on platelet number, bleeding risk factors, and signs or symptoms of thrombocytopenia.

Results: In the analyzed time there were 168 PC recipients and 96 881 inpatients, resulting in transfusion rate (TR) of 0.17%. The TR increased from 0.17 to 0.18% and transfusion incidence from 14.5 to 16.4 transfusions per 10000 person-days. There was increase in the percentage therapeutic transfusions (from 34.7 to 54.6%). The overall appropriateness of transfusions increased from 48.4% to 63.0%. The increase in appropriateness of PC transfusions was higher for therapeutic (from 48.4 to 71.8%) compared to prophylactic transfusions (from 42.9 to 52.4%).

Conclusions: Simple strategy of introducing an utilization improvement procedure adjusted to the local population, backed by e-learning and modification of order form, may lead to shift from prophylactic to therapeutic uses and overall increase in appropriateness of PC transfusions in patients with thrombocytopenia.

Keywords: transfusion, platelet concentrate, intensive care

The Lactate-to-Albumin Ratio and CRP-to-Albumin Ratio as Predictive Elements in Critically Ill Patients

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Work's tutor: prof. dr hab. n med. Łukasz Krzych

Background: Lactate-to-Albumin Ratio (LAR) and C-reactive Protein-to-Albumin Ratio (CAR) are increasingly studied as potential prognostic tools in intensive care. LAR reflects metabolic disturbances and tissue perfusion, while CAR indicates the severity of inflammation. Their role in assessing the prognosis of critically ill patients remains insufficiently explored.

The aim: This study aimed to analyze the dynamics of LAR and CAR changes and their association with treatment outcomes.

Materials and methods: A retrospective analysis was conducted on patients hospitalized in the intensive care unit. Data were obtained from the AMMS medical records system and included daily LAR and CAR values. Their variability during hospitalization and correlation with treatment outcomes were analyzed. Statistical analysis assessed mean values, trends, and interrelationships between the two indices.

Results: Higher admission LAR and CAR values were significantly associated with in-hospital mortality (LAR: median 1.10 vs 0.81, $p < 0.001$; CAR: median 3.00 vs 1.45, $p < 0.001$). LAR demonstrated a stronger discriminative ability (AUC = 0.75) than CAR (AUC = 0.68) for predicting mortality. In deceased patients, LAR increased during hospitalization, while survivors showed a stable or declining trend (p for trend < 0.01). Persistent elevation of CAR was also observed in non-survivors ($p < 0.05$). Logistic regression confirmed both LAR (OR = 2.4, 95% CI: 1.6–3.7, $p < 0.001$) and CAR (OR = 1.8, 95% CI: 1.2–2.9, $p = 0.004$) as independent predictors of mortality.

Conclusions: LAR and CAR are significant predictors of mortality in critically ill ICU patients. Elevated LAR and CAR at admission, as well as their unfavorable trajectories during hospitalization, are associated with worse outcomes. LAR, showing higher predictive power, may serve as a particularly sensitive early indicator of deterioration. Monitoring both indices can improve risk stratification and inform clinical decision-making in intensive care settings.

Keywords: Lactate-to-Albumin Ratio (LAR), C-reactive Protein-to-Albumin Ratio (CAR), Critically ill patients,

Therapeutic plasma exchange in the intensive care unit: a single center experience

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Work's tutor: dr hab. n. med. i n. o zdr. Piotr Czempik

Background: Therapeutic plasma exchange (TPE) is a medical procedure during which a patient's plasma is removed and replaced with a replacement fluid, typically albumin or fresh frozen plasma (FFP). It is performed to eliminate harmful macromolecules or to replenish certain plasma components in the management of autoimmune, neurologic, hematologic, renal disorders.

The aim: The study aimed to analyze TPE procedures performed in the intensive care unit (ICU) of an academic medical center in Poland.

Materials and methods: We analyzed TPE procedures performed over 6 year period (01.2019–12.2024) in the Department of Anesthesiology and Intensive Care of Medical University of Silesia in Katowice. Data retrieved data included demographics, comorbidities, mechanical ventilation status, TPE indication, number of procedures per patient, replacement fluid, anticoagulant, complications, ICU and hospital length of stay.

Results: There were 42 patients undergoing TPE, with median age 52 (IQR 41–67) years, 27 (64.3%) patients were female. Indications for TPE were as follows: Guillain-Barre Syndrome (GBS) (n=13), myasthenia gravis (MG) (n=10), Stiff Person Syndrome (SPS) (n=6), hypertriglyceridemia (n=4), systemic lupus erythematosus (n=3), Neuromyelitis Optica (n=1), Miller Fisher Syndrome (n=1), Thrombotic Thrombocytopenic Purpura (n=1), sepsis (n=1), Multiple Sclerosis (n=1), colitis ulcerosa (n=1). There were 31 (73.8%) category I, 11 (26.2%) category III, and a single (2.4%) category II indication according to American Society for Apheresis (ASFA). There were 14 complications reported in 11 (26.2%) patients: infection (n=7), hypocalcemia (n=4), hypotension (n=3).

Conclusions: In large majority of patients in the local ICU TPE was performed as established first-line treatment. Most patients were diagnosed with GBS, MG, SPS. Only in a single patient FFP was used as a replacement fluid. Due to possible complications TPE should be primarily used in ASFA category I and II indications.

Keywords: TPE, ASFA, plasmapheresis, ICU, FFP

Echoes of the brain:predictive value ofoptic nerve and CRA ultrasound in patients with Intracranial Hemorrhage

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Work's tutor: dr hab. n. med. Piotr Czempik

Background: Promising alternative for invasive intracranial pressure (ICP) monitoring is measurement of optic nerve sheath diameter (ONSD) by ultrasonography. The instantaneous buildup of blood volume in patients with intracranial bleeding increases ICP and in turn decreases cerebral blood flow.

The aim: The aim of the study was to assess the utility of ONSD and central retinal artery (CRA) blood flow parameters in predicting outcomes in these patients.

Materials and methods: This prospective observational study was conducted in a mixed Intensive Care Unit (ICU) with expertise in management of patients with intracranial bleeding. Daily bilateral OUS assessments were performed, measuring ONSD and CRA blood flow parameters (PS, ED, TAMAX, TAMEAN, PI, RI, and S/D). There ultrasound parameters were correlated with standard neurological status outcome scores (GCS, GOS, GOSE,) and ICU mortality.

Results: There were 31 patients in the study: SAH group (n=5), non-SAH group (n=5), control group (n=21). Patients in the SAH group had significantly longer times of mechanical ventilation (p<0.01) and ICU hospitalization (p=0.02) than non-SAH patients and controls. Patients with SAH had lower scoring on GOS (p<0.01) and GOSE (p<0.01) compared to non-SAH patients and controls. There were no significant differences in day 1 and median 7-day ONSD or ONSD/ETD measurements between groups (lowest p=0.053). CRA Doppler analysis revealed no significant differences in 7-day medians of individual parameters between groups (lowest p=0.33). There were no meaningful association between ONSD and CRA parameters and GCS, GOS, GOSE scoring. Although some CRA parameters showed association with morality, accounting for possible confounding factors disproved it.

Conclusions: In patients with SAH, non-SAH intracranial bleeding, ONSD and CRA ultrasound parameters do not predict both neurologic status of patients at discharge form the ICU and ICU mortality. Further research is required to draw definitive and reliable conclusions.

Keywords: ONSD, CRA Doppler, Ocular Ultrasound, ICP monitoring, ICU mortality,

Utility of RDW in Predicting AKI following CABG

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Work's tutor: prof. dr hab. n. med.
Łukasz Krzych

Background: Acute kidney injury (AKI) is among the most common organ complications in patients undergoing cardiac surgery, including coronary artery bypass grafting (CABG). Red cell distribution width (RDW) is a valuable hematologic parameter with a documented predictive role in various clinical scenarios.

The aim: The main aim of this study was to evaluate the usefulness of RDW in predicting the occurrence of AKI following on-pump CABG.

Materials and methods: A retrospective analysis was conducted on data from a randomly selected cohort of 182 patients who underwent CABG in 2023. Patients who received blood product transfusions were excluded from the analysis. Risk factors for AKI were identified using logistic regression. The predictive value of RDW for AKI was assessed using receiver operating characteristic (ROC) analysis.

Results: In the studied cohort AKI occurred in 12 patients (6.6%). Patients who developed AKI had higher postoperative RDW-CV values (14.45% vs. 13.1%, $p = 0.04$). In contrast, preoperative RDW-CV levels did not significantly differ between patients with and without AKI ($p = 0.1$). The predictive value of preoperative RDW-CV for AKI was AUROC = 0.624 (95% CI: 0.426–0.822; $p > 0.05$), while the predictive value of postoperative RDW-CV was AUROC = 0.674 (95% CI: 0.472–0.875; $p > 0.05$).

Conclusions: RDW-CV does not appear to be a reliable predictor of AKI in patients undergoing coronary artery bypass grafting (CABG); however, drawing more definitive conclusions requires an increased sample size.

Keywords: Coronary artery bypass grafting, Acute kidney injury, Red blood cell distribution width

Evaluation of the accuracy of selected formulas for estimating body weight of children in emergency situations

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Work's tutor: dr n. med. Michał Pluta

Background: Estimating a child's weight in emergency situations, when the actual body weight is unknown, is essential for correct medication dosing and selection of medical equipment.

The aim: The aim of the study was to compare the patient's actual weight with the weight estimated from selected pediatric formulas.

Materials and methods: Data from 12,103 children, aged 1 to 10 years, hospitalized between 2014 and 2024 at the Silesian Center for Heart Diseases in Zabrze, were analyzed. Body weight was measured on admission to the hospital. Estimated body weight was calculated using the original and updated European Paediatric Advanced Life Support (EPALS), 'Best Guess', 'Luscombe and Owens', 'Rwanda Rule', and 'Shann' formulas. Estimated body weight was compared with actual body weight using Bland-Altman analysis and presented as the percentage difference between the values (±1.96 SD).

Results: Median age was 5 years (IQR: 1-10) and actual body weight was 18kg (IQR: 9-34). The highest accuracy in the age group of 1-5 years (n= 3151) was demonstrated by the updated EPALS formula, which estimated body weight on average -3.7% lower than the actual value (range ±1.96 SD: -8.7% to +1.4%). The lowest accuracy was reported for the 'Best Guess' formula, in children aged 1-4 years (n=6006), which estimated the weight on average 42.4% lower than the actual value (range ±1.96 SD: from -111.4% to +26.5%).

Conclusions: The formula recommended by the European Paediatric Advanced Life Support guidelines allows estimating the weight of a pediatric patient with the greatest accuracy. Using other formulas can lead to unacceptable errors.

Keywords: weight estimation, pediatric formulas, emergency situations

Social Awareness Regarding Basic Life Support (BLS) in the Opolskie Voivodeship

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Background: Basic Life Support (BLS) encompasses emergency procedures performed without specialized equipment to sustain vital functions. BLS knowledge is a critical skillset to deal with life-threatening emergencies. The Opolskie Voivodeship, characterized by a unique sociodemographic profile with mixed urban-rural population, presents challenges for BLS education due to fragmented healthcare infrastructure and aging community.

The aim: The aim of this study was to analyze the level of BLS knowledge among adult residents of the Opolskie Voivodeship and identify sociodemographic factors influencing this knowledge.

Materials and methods: The study was conducted using an anonymous written survey method in April 2025. A total of 150 residents of the Opolskie Voivodeship with no healthcare background were randomly selected. The survey included 20 questions about BLS principles based on Chapter 4 of Polish Resuscitation Council (PRC) 2021 Guidelines and respondents' sociodemographic data (gender, age, education level, marital status, and size of place of residence).

Results: A statistically significant difference ($p<0.05$) was demonstrated in BLS knowledge between respondents with high formal education level compared to those with lower education levels. The analysis revealed a weak positive correlation ($r=0.18$; $p<0.05$) between BLS knowledge and education level. Comparative analysis of age cohorts (18–55 vs >55) demonstrated statistically higher BLS assessment scores among younger participants. A moderate negative correlation ($r=-0.36$; $p<0.001$) was observed between age and assessment score.

Conclusions: The study underlines existing differences in BLS knowledge between respondents depending on their formal education level and age. It indicates better knowledge in groups with high education level and in the age group under 56 years. Based on these findings, an increased need for education in the field of BLS is indicated for all the groups, with particular emphasis on groups of respondents with lower scores.

Keywords: Basic Life Support, BLS knowledge, Emergency medical training, Opolskie Voivodeship

Sinking Under the Surface: Impact of Fluid Intake and Balance on Cardiovascular and Respiratory Status in ICU

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Background: Inadequate fluid administration can worsen an already critical situation in patients within intensive care units, increasing the risk of hemodynamic and respiratory dysfunctions. Fluid imbalance disturbs both pulmonary and cardiac parameters.

The aim: The aim of this study was to assess the correlation between daily fluid intake and daily balance, and selected hemodynamic and respiratory parameters in critically ill, mechanically ventilated patients.

Materials and methods: This retrospective study was conducted at a large academic tertiary cardiac center and included randomly selected ICU patients hospitalized between January 1 and December 31, 2024. Data was collected from medical records and covered clinical and demographic information from the first 8 days of ICU stay, including admission day. Only complete records meeting predefined criteria were analyzed. All data was anonymized. Statistical analysis was performed using Statistica software, and correlations were analysed using R Spearman test. Ethical approval was obtained from the local ethics committee.

Results: A total number of patients under investigation was 44, and 260 pairs of correlations were finally collected. Participants were divided into groups based on the reason of admission, i.e. acute cardiological (n=38) and acute non-cardiological (n=6). The median age of patients was 72 years (IQR 62–78). There were statistically significant ($p<0.01$) but weak positive correlations between fluid balance and lactate level (R = 0.3), as well as between fluid intake and lactate level (R = 0.2). Also a weak positive but insignificant ($p=0.5$) correlation was observed between both fluid intake and fluid balance and respiratory function.

Conclusions: Among critically ill patients with acute cardiac failure, increased fluid intake may be associated with worsening tissue perfusion. Further research is needed to verify the impact of fluid administration on respiratory function in mechanically ventilated subjects.

Keywords: Fluid balance, ICU patients, Mechanical ventilation, Cardiovascular function, Respiratory function

The incidence and risk factors for postoperative nausea and vomiting after elective caesarean section

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Background: Postoperative nausea and vomiting (PONV) is important during postoperative period. Guidelines recommend spinal anaesthesia to reduce risk but even then obstetric patients are more likely to experience PONV.

The aim: Calculate the incidence of PONV, determine if the Apfel score may be used in the assessment of obstetric patients and conclude if there is a difference in calculating risk assessment between opioid use in the first 12h and 24h.

Materials and methods: The study included 51 female patients who underwent elective caesarean section, 47 were under spinal anaesthesia and 4 under general. The Shapiro-Walk test and the Spearman test were used for data evaluation and correlations respectively.

Results: As many as 63,8% of patients under spinal anaesthesia were considered high risk. Only 21,3% developed nausea, while 4,3% experienced vomiting.

General anaesthesia was used on 4 patients. Even though they were considered high risk, none experienced PONV.

There was no significant statistical correlation (p>0,05) between the Apfel score and the incidence of PONV in both groups when opioid use was considered in the first 24h.

However, there was a significant statistical correlation (p<0,01) between the Apfel score and the incidence of PONV in patients who underwent spinal anaesthesia, when opioid use was considered in the first 12h.

Conclusions: Certain studies show that the Apfel score underperformed for obstetric patients. We concluded that the Apfel score can be used in obstetric patients undergoing spinal anaesthesia only if opioid use in the first 12h is calculated, not 24h as per Apfel.

Keywords: PONV, C section

Evaluation of Hydrocortisone Delivery Systems for Topical Therapy of Psoriasis

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Background: In spite of the progressive development of modern therapies for psoriasis, its complete cure remains impossible. The effectiveness of traditional topical therapies is limited by many side effects and application inconveniences. Therefore, studies were conducted on hydrogel biomaterials, characterized by biocompatibility as well as prolonged and controlled release of active substances, which should increase the therapeutic effect.

The aim: The aim of this study was to evaluate the properties of hydrogel delivery systems of hydrocortisone for topical therapy of psoriasis.

Materials and methods: In the research part, the average particle size of the obtained systems and the characteristics of the hydrogel formulations were studied to evaluate their physicochemical, structural and morphological properties. Furthermore, biological assessment of obtained formulations was carried out using advanced 3D models, recreating the 3D structure of the skin tissue affected by psoriasis (MTS assay, qRT-PCR).

Results: The average particle size of the analyzed systems was 131.3 nm, 124.8 nm and 137.0 nm, while the polydispersity index, 0.202, 0.178 and 0.186. The gel fraction of hydrogel biomaterials was 61%Ї0.6, 64%Ї0.3, 70%Ї0.4 and 63%Ї1.7. The swelling ratio of the hydrogel biomaterials was in the ranges of 209-261%, 212-253%, 190-220% and 184-222%. The chemical structure of biomaterials was confirmed by analysis of FT-IR spectra, which indicated that incorporation of the nanocarrier-hydrocortisone system into hydrogel biomaterials does not disrupt their chemical structure. The morphology of the samples varied by porosity. Cell viability in the Psoriasis 3D tissue model after 24h incubation in the presence of the M-TH40 sample reached 87%. PCR tests confirm the effectiveness of biomaterials in relieving the inflammation caused by disease.

Conclusions: The results confirm the high application potential of the hydrogel biomaterials and are a positive indicator for further in vivo studies.

Keywords: psoriasis, drug delivery, hydrocortisone, dermatitis, glucocorticosteroids

Molecular mechanism of hemophilia A at inversion of intron 22

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Background: Hemophilia A is a X-linked bleeding disease, which is characterized by deficiency of the blood coagulating factor VIII (FVIII), as a result from various mutations in FVIII gene. Gene inversion of intron 22 is typical for 40–50% of patients with severe form of hemophilia A. The mutant protein invFVIII disturbs the intrinsic pathway of the blood coagulation cascade.

The aim: We aim to reconstruct the three-dimensional (3D) structure (unknown up to now) of the activated mutant protein invFVIIIa using its amino acid sequence and to compare its structure, electric properties and thermodynamic stability with the normal activated FVIIIa. Additionally, we investigate the association of FVIIIa and invFVIIIa with their plasma blood carrier von Willebrand factor (vWF).

Materials and methods: A computer program for in-silico mutagenesis was employed in order to reconstruct the 3D structure of mutant invFVIII. We studied the electric properties of both proteins with a program for protein electrostatics. We use as a measure for the thermodynamic stability the electrostatic component ΔGel of their folding energy ΔGfold.

Results: As a result of inversion of intron 22, in the mutant invFVIII the C2 domain is absent, while the C1 domain is shortened and altered. This leads to the impossibility of invFVIII to form a complex with its carrier von Willebrand factor (vWF), which associates with the C1 and C2 domains of the normal FVIIIa, protecting FVIII from proteolytic enzymes in the blood plasma. The computation of the association constants confirms quantitatively this inference: to achieve equilibrium between the invFVIIIa-vWF complex and the free invFVIIIa and vWF proteins, it is necessary to reach about 7600 times higher concentration of the mutant factor invVIIIa compared to its normal analogue.

Conclusions: Inversion 22 of the FVIII gene results in the formation of an imperfect protein, which cannot associate with its carrier-protector vWF, resulting in a shortened circulatory half-life and strongly reduced plasma concentration.

Keywords: factor VIII; hemophilia A; inversion 22; von Willebrand factor

Influence of Sex and Breathing on Autonomic Nervous System During Controlled Breathing using Transfer Entropy

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Background: The autonomic nervous system (ANS) plays a key role in cardiovascular regulation and adapts dynamically to respiratory changes. Previous studies have investigated the causality between the beat-to-beat variability of heart period (HP) and systolic arterial pressure (SAP) to test the baroreflex in heart transplant recipients. Controlled breathing has been shown to modulate ANS activity, which can be quantified by interactions between cardiovascular and respiratory signals. Transfer Entropy (TE), a model-free measure of directed information flow, enables the assessment of causal relationships between physiological signals.

The aim: The study aimed to investigate how sex and resting breathing level influence the response of the ANS during controlled breathing using TE.

Materials and methods: A total of 24 healthy volunteers (15 females and 9 males, aged 23 Ȋ 3 years) participated in the study (KB-179/2023/N). Noninvasive arterial blood pressure (ABP) were recorded using a photoplethysmograph and respiratory rate (RR) using capnography during rest and controlled breathing at 6, 10, and 15 breaths per minute, guided by a metronome. From ABP signal, the SAP and HP were derived. Subsequently, these signals were used for the computation of TE. This study was supported by the National Science Center (UMO-2022/47/D/ST7/00229).

Results: Repeated measurements ANOVA showed that the TE from SAP to HP was more pronounced (F=26.8;p<0.001; η2=0.94) than from HP to SAP (F=3.26; p=0.027; partial η2=0.93). Mixed-design ANOVA showed that sex had only a significant influence (p=0.011; partial η2=0.15) on the results for TE from SAP to HP. Effect of rest breathing level did not interact significantly with the controlled breathing (p=0.95).

Conclusions: Sex significantly impacted the modulation of ANS by breathing maneuvers, while the influence of resting respiration level may be neglected. Further research on individuals with pathologies is needed to validate those observations in clinical settings.

Keywords: autonomic nervous system, cardiorespiratory system, sex, breathing, entropy

Bioinformatic screening of deleterious non-synonymous SNVs in human GATA1 gene

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Background: The GATA1 gene plays a crucial role in the differentiation of red blood cells and platelets. Mutations in this gene are associated with Diamond-Blackfan anaemia, combined anaemia-thrombocytopenia syndromes, and acute megakaryoblastic leukaemia of Down syndrome. Additionally, it has been linked to relapses of various types of leukaemia following chemotherapy. Although single nucleotide variants (SNVs) account for 90% of the genetic variation, and more than 20% of SNVs are pathogenic, few researches have been devoted to the associations of SNVs in human GATA1 gene with disorders.

The aim: This study evaluates the non-synonymous SNVs in the GATA1 gene, focusing on their structural, functional, and clinical importance.

Materials and methods: The analysed dataset comprise 494 missense SNVs in the GATA1 gene retrieved from the UniProt database. Structural and functional effects of SNVs were evaluated by six bioinformatic predictors (fathmm, PANTHER, PhD-SNP, PolyPhen-2, SNPs&GO, and SIFT). The impact of SNVs on protein stability was assessed by three in silico tools (i-Mutant, MuPro, iStable). Variants were classified as pathogenic if all tools employed in the study predicted them to be deleterious and decreasing protein stability. The evolutionary conservation of amino acids in the GATA1 transcription factor was analysed by the ConSurf server.

Results: All used bioinformatic predictors indicated 71 SNVs in the GATA1 gene as disturbing protein functions. All applied in silico tools marked 266 SNVs as decreasing stability. In total, 55 SNVs in 44 sites were estimated as pathogenic, and the majority of them encoded highly conserved structural and functional amino acid residues located in the zinc finger domains. However, only 16 SNVs were annotated as pathogenic in bioinformatic and clinical databases.

Conclusions: There were revealed 39 novel deleterious SNVs in the GATA1 gene, which could be helpful for diagnosis of inherited blood disorders and cancer.

Keywords: GATA1, non-synonymous SNV, pathogenicity

Association of Entropy Measure with Brain-Specific Biomarkers in Traumatic Brain Injury

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Background: Traumatic brain injury (TBI) may lead to excessive stimulation of autonomic nervous system, reflecting in heart rate variability (HRV) changes with concomitant neuroinflammation and disruption of the blood-brain barrier (BBB). Previous studies have shown that lower HRV entropy values are linked to increased mortality in TBI; however, the relationship between HRV complexity and BBB integrity remains unclear.

The aim: This study aimed to investigate the association between serum brain-specific biomarkers and HRV entropy in the early phase following TBI.

Materials and methods: Invasive arterial blood pressure (ABP) recordings from 20 TBI patients from the CENTER-TBI high-resolution sub-study were analysed retrospectively. Multiscale entropy (MSEn) was estimated from R-R intervals obtained from 20-minute ABP-derived segments <24 hours post-injury. Serum concentrations of six biomarkers (S100B, NSE, GFAP, UCH-L1, NFL, and t-tau), collected within 24 hours post-injury, were measured. Functional outcome at 6 months was assessed using the Glasgow Outcome Scale Extended (GOSE), with scores 1–4 indicating unfavorable outcome. This study was supported by the National Science Center (UMO-2022/47/D/ST7/00229).

Results: Serum S100B and UCH-L1 levels were significantly elevated in patients with unfavorable outcome (p=0.003 and p=0.012, respectively), showing strong discriminative power (AUC=0.90 and AUC=0.84). MSEn was lower in patients with unfavorable outcome (0.79±0.25) compared to those with favorable outcome (0.92±0.30), though not statistically significant (p=0.094). A negative correlation was observed between MSEn and GFAP levels (rS= –0.45).

Conclusions: Increased GFAP levels, a marker of neuroinflammation and central nervous system injury, were inversely associated with HRV entropy. These findings suggest a potential link between brain-specific pathology and autonomic dysregulation in TBI. Further studies on larger cohorts are needed to validate these observations.

Keywords: Complexity, Autonomic Nervous System, Biomarkers

Differences in C. difficile and C. perfringens antibiotic sensitivity depending on the medium used

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Background: EUCAST (The European Committee on Antimicrobial Susceptibility Testing) guidelines (v2024) provide the framework for determining and interpreting microbial susceptibility. This study utilized these recommendations to evaluate the MIC (Minimum Inhibitory Concentration) values for two antibiotics using different culture media.

The aim: The study aimed to compare the MIC values of penicillin (PG) and metronidazole (MTZ) for Clostridium perfringens strains, as well as MTZ for Clostridioides difficile strains, determined on two different media - Brucella Blood Agar (BBA) and Fastidious Anaerobe Agar with defibrinated horse blood (FAA-HB); with FAA-HB being the media recommended by EUCAST.

Materials and methods: A total of 12 C. perfringens strains from environmental swabs and 73 C. difficile strains isolated from patients with antibiotic-associated diarrhea were included in the study. The MIC of MTZ was determined for all strains. The MIC of PG was determined for C. perfringens. Each determination was performed twice using BBA(bioMérieux) and FAA-HB (Neogen). The cultures were incubated in anaerobic conditions (Whitley A35 Anaerobic Workstation) for 48 hours. The interpretation was made according to the current EUCAST recommendations. The statistical analysis of the obtained results was performed using the STATISTICA program.

Results: For C. difficile, MTZ resistance was detected in 3 out of 73 strains on BBA and in 1 out of 73 on FAA-HB, with MIC values on BBA significantly higher than those on FAA-HB (p = 0.000927). In contrast, no MTZ resistance was observed in C. perfringens, and PG MIC values were comparable between the two media, with no statistically significant differences.

Conclusions: The study highlights that the choice of culture medium can influence MIC results, with BBA potentially overestimating values. This finding underscores the importance of standardizing testing methodologies and carefully selecting media to ensure reliable antibiotic susceptibility testing in clinical practice.

Keywords: antibiotic susceptibility,Clostridioides difficile,Clostridium perfringens, Fastidious Anaerobe Agar

Patient Awareness of Radiation Exposure and Protection in Computed Tomography (CT) Examinations

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Background: In recent years, the use of computed tomography (CT) scans has grown rapidly worldwide, leading to a significant increase in medical exposure to ionizing radiation. While CT imaging is an invaluable diagnostic tool, many patients remain unaware of the potential health risks associated with radiation, including both long-term (stochastic) and short-term (deterministic) effects. As awareness of radiation safety grows among healthcare professionals, patient understanding remains a key area for improvement.

The aim: This study aimed to evaluate patients knowledge about radiation exposure related to CT scans and their awareness of radiation protection methods. The goal was to identify gaps in understanding and highlight the need for better communication between healthcare providers and patients.

Materials and methods: A total of 100 patients were surveyed using a self-designed questionnaire. Participants were grouped based on demographic factors such as age, gender, place of residence, education level, and employment status. The survey assessed both general awareness of ionizing radiation and specific knowledge of radiation protection practices.

Results: While 76% of participants correctly recognized that ionizing radiation poses a health risk, only 50% were familiar with the concept of patient radiation protection. Most respondents identified only one form of protection—typically the use of shielding equipment such as lead aprons. Alarmingly, 95% of patients reported never requesting any protective measures during their CT scans.

Conclusions: The findings indicate a important lack of awareness among patients regarding radiation risks and available protective strategies during CT imaging. These results emphasize the need for improved patient education and stronger communication between medical staff and patients to ensure informed decision-making and safer diagnostic procedures.

Keywords: Computed Tomography(CT),Ionizing Radiation,Radiation Protection,Patient Awareness,Medical Imaging

Podophyllotoxin and its derivatives – A promising approach in melanoma therapy?

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Background: Podophyllotoxin (PPT) is an active substance in therapy of genital warts caused by human papillomavirus infection. High toxicity of PPT limits its application to topical treatment, though it is a promising structural scaffold for new anticancer agents. PPT derivatives etoposide and teniposide are used intravenously as anticancer agents. Some PTT derivatives have been evaluated in kidney and breast cancers and malignant melanoma (SK-MEL-2 cells). Deoxypodophyllotoxin exhibits oncostatic properties in tests including various cancers and malignant melanoma. The B16F10 cells originate from melanoma developed in C57BL/6J mice. This model is used in studies of cancer progression, metastasis and tumor growth. Activity of PPT and its derivatives against B16F10 cells is largely unexplored.

The aim: In search of agents applicable in melanoma treatment our group researched PPT and its derivatives. We hoped to determine their therapeutic value in melanoma by accessing their cytotoxicity and induced morphological aberrations. By determining working concentration of fluorescein-coupled compound we aimed to gather data for further studies with other techniques (e.g., confocal microscopy).

Materials and methods: We performed cytotoxicity assay on B16F10 cells. In particular, we studied unmodified PPT and its fluorescein-attached derivative. Using viability assays, we established working concentrations of agents. We then analyzed morphological changes under light microscope in HE-stained samples.

Results: Both the parental compound and the fluorescein-attached derivative differ significantly in reduction of viability. The fluorescein-attached molecule exhibited poor cellular uptake. We determined morphological changes induced by compounds.

Conclusions: Our study has shown important differences in activity of PPT and its derivatives and provided results on their impact on B16F10 cells morphology. More research is required, including confocal microscopy techniques to further examine compounds' effectiveness in potential melanoma therapy.

Keywords: podophyllotoxin, melanoma, B16F10, viability assay, derivatives

Effects of partial VEGFR2 gene silencing on the expression of metastasis-related genes in NSCLC cells

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Background: Non-small cell lung cancer (NSCLC) is the most common cancer and the leading cause of cancer deaths worldwide. Despite the enormous progress in the diagnosis and treatment of NSCLC, the 5-year survival rate of patients is still highly unsatisfactory and mortality is high. Therefore, it is necessary to search for new methods of therapy that will be more effective and will significantly increase the chances of survival of patients.

The aim: The aim of this study was to determine the effect of partial silencing of the VEGFR2 (KDR) gene expression on the expression of genes associated with the metastasis process in NSCLC cells of the A549 line.

Materials and methods: The study used a human NSCLC cell line - A549 (The American Type Culture Collection). The cells were cultured in F-12K medium with the addition of 10% FBS and gentamicin, at 37°C and in an atmosphere of 5% CO_2. In order to silence the VEGFR2 gene, cells were transfected using FlexiTube siRNA Premix Hs_VEFGR2_2 (1nM/48 h). The effect of partial silencing of the VEGFR2 gene on the invasiveness of NSCLC cells was examined by assessing the expression of selected genes (VEGFR2, VEGFA, FLT1, EZH2, ANGPT1, CTSD, HIF1A, HMOX1, TUBB3, GDF15, PTBP3, CXCR4, EGF, STAT3, MCL1, MMP14, NRP1, CHI3L1, TNC, MMP1, MMP2, MMP7, MMP9, MMP13, MMP20, TIMP1, TIMP2 and TIMP4) using RT-qPCR. Statistical analysis was performed using the GraphPad Prism program. RT-qPCR results were presented using the fold change of expression ($2^{-\Delta\Delta CT}$), which was calculated using the comparative method.

Results: The study showed significant decrease in VEGFR2, TNC and TIMP1 expression. The rest of studied genes didn't exhibit any significant changes.

Conclusions: There is correlation between partial VEGFR2 gene silencing and expression of two metastasis-related genes: TNC and TIMP1 in NSCLC cells.

Keywords: Lung cancer, metastasis, VEGFR2 silencing

Morphometric Analysis of the Left Ventricular Outflow Tract and Its Surroundings in Human Cadaveric Hearts

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Background: The left ventricular outflow tract (LVOT) is a spatial structure located within the left ventricle, just below the aortic root. Despite its anatomical complexity, the LVOT is often oversimplified in studies, where it is frequently treated as a flat surface during measurement and analysis.

The aim: The aim of this study was to define the complete anatomical borders of the LVOT, assess the surrounding structures, and evaluate its dimensional parameters, such as perimeter and height across different LVOT sectors.

Materials and methods: We examined 187 hearts from healthy donors obtained during routine forensic autopsies (16% females). The age of donors ranged from 15 to 94 years (mean age: 47.3 ± 17.1 years). The LVOT was divided into three sectors, each adjacent to a specific aortic leaflet.

Results: The mean perimeter of the virtual basal ring was 62.8 ± 7.2mm, while the mean perimeter of the LVOT base was 94.1 ± 12.4mm. The average distance from the tip of the anterior mitral leaflet to the basal ring was 25.6 ± 3.8mm. All these measurements showed statistically significant sex differences (males>females, $p < 0.05$). The sub-left coronary leaflet sector were adjacent to the left ventricular free wall in 85.6% of hearts, while in 14.4% it bordered the left atrium. The mean LVOT height in this sector was 13.9 ± 3.6mm. The sub-noncoronary leaflet sector were adjacent to the left atrium in 79.7% of hearts, while in 20.3% it bordered the right atrium. The mean LVOT height in this sector was 21.8 ± 5.2mm. In the sub-right coronary leaflet sector were adjacent to the right ventricle in 93.5% of hearts, while in 6.5% it bordered the right ventricular outflow tract. The mean LVOT height in this sector was 18.9 ± 4.3mm.

Conclusions: This study provides detailed anatomical insights into the LVOT and its spatial relationships with adjacent cardiac structures. The findings underscore the need for further research on LVOT morphometric characteristics and their variations throughout the cardiac cycle.

Keywords: Left Ventricular Outflow Tract, surroundings, morphometry

Experimental 3D cell culture model for analysis of ECM produced by fibroblasts from Osteogenesis imperfecta

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Background: 3D cell cultures provide an advanced in vitro model, offering more accurate representation of tissue architecture and the extracellular matrix (ECM) function than routinely used 2D cultures. The ECM is a key component of connective tissue, and its structural defects contribute to various disorders, including Osteogenesis imperfecta (OI). OI is a genetic disease characterized by bone fragility, mainly caused by mutations in genes encoding type I collagen. OI type II is perinatally lethal and considered the most severe form of OI. So far, abnormalities of ECM structure and function in OI type II remain not fully understood.

The aim: This study aimed to analyze the ECM produced by skin fibroblasts from OI type II using experimental 3D cell culture model.

Materials and methods: We used primary skin fibroblasts isolated from 3-day-old OI type II patient and control fibroblasts from 7-day-old healthy donor. Both cell lines were cultured on agarose as 3D spheroids. After 7 and 14 days, cell viability was assessed via FDA/EtBr staining. Histological evaluation was performed using HE, Sirius red, and AB-PAS staining methods. Qualitative analysis of selected ECM components was conducted using immunofluorescent and immunohistochemical methods.

Results: The FDA/EtBr staining confirmed high cell viability in OI and control spheroids, thereby validating both 3D models for further studies. Histological analysis revealed structural differences in ECM organization between OI-derived and control models, emphasizing altered morphology of cells, reduced collagen fiber content, and increased glycosaminoglycan deposition in OI. Furthermore, immunofluorescent and immunohistochemical analyses showed a substantial decrease of COL1A1 and increase of COL3A1 levels in OI spheroids compared to control donor.

Conclusions: This study established a reliable 3D model for ECM analysis in OI and demonstrated significant ECM abnormalities in OI type II in comparison to ECM from healthy donor, providing prospects for further research on this clinical problem.

Keywords: 3D cell culture, Osteogenesis imperfecta, skin fibroblasts, extracellular matrix

Działanie przeciwnowotworowe kurkuminy

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Background: Curcumin is a polyphenolic compound naturally found in the Curcuma longa, which has chemopreventive and anticancer properties. Numerous studies confirm the broad spectrum of biological activity of curcumin, related to the ability to modulate key molecular pathways responsible for, among others, inhibiting proliferation and inducing apoptosis of cancer cells, inhibiting tumor angiogenesis or creating metastases.

The aim: Our study aims to evaluate the anticancer effect of curcumin in vitro.

Materials and methods: The therapeutic potential of curcumin was demonstrated in vitro on HT-29 and Caco-2 colon cancer cells. The cytotoxicity of selected concentrations of curcumin was tested using the WST-1 assay and crystal violet staining. The effect of curcumin on cell proliferation and migration was assessed by wound-healing assay. The ability to induce apoptosis was analyzed by DAPI staining.

Results: The assessment of cell viability in HT-29 and Caco-2 cell lines exposed to selected concentrations of curcumin, based on the WST-1 assay and crystal violet staining, demonstrated a decrease in cell viability with increasing curcumin concentration. Analysis of the obtained images of DAPI-stained cell cultures confirmed the formation of apoptotic bodies, characteristic of apoptosis. Results from the wound-healing assay indicate that curcumin inhibits the proliferation and migration of the examined cells, as evidenced by a significantly wider wound area in cultures exposed to curcumin compared to the control group. The higher the concentration of curcumin, the lower the viability and migratory capacity of the cells.

Conclusions: Curcumin has been shown to exhibit anticancer potential against HT-29 and Caco-2 cancer cell lines-under the applied experimental conditions, it reduces cell viability and exerts an inhibitory effect on both cell proliferation and migratory capacity.

Keywords: curcumin, colon cancer

Signal Processing for a 3D-Printed Myoelectric Hand Prosthesis

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Background: Modern upper limb prostheses aim to replicate natural hand movements, yet their functionality remains limited. A major challenge is developing an intuitive and responsive control system. One of the most promising solutions is surface electromyography (EMG), which enables precise control of the prosthesis by analyzing the user's muscle bioelectric signals.

The aim: The project aimed to design an active prosthetic hand controlled by EMG signals and 3D printed. It explored the algorithms used, technical limitations, and analyzed the optimal setup configurations and their associated challenges.

Materials and methods: The prosthetic hand was 3D printed using an Ultimaker 2+ with durable, easy-to-print PLA (polylactic acid) material. Different electrode and servo configurations were tested for optimal responsiveness. EMG signals from muscle contractions were captured using the MyoWare 2.0 EMG control and processed with Arduino IDE algorithms, which convert the signals into servo movements to control finger motion. This system enables precise control and functionality of the robotic hand.

Results: A functional 3D-printed left hand prototype was created, replicating natural movements with independent finger control. The intentionally enlarged model maintains proportions while facilitating kinematic observation. EMG control uses muscle signals (rest: 40-150, contraction: >700), with an activation threshold 100 units below maximum to reduce fatigue. Standard servos precisely position fingers, while continuous rotation servos control speed (values: <90-forward, >90-backward, 90-stop). The system ensures smooth operation with minimal user effort.

Conclusions: Our design can serve as a basis for further prosthetics research and as a teaching tool for medical students. It can also be modified to study the impact of rheumatoid diseases on prosthesis functionality. While the algorithms worked well, some setups had technical limitations. Analyzing these strengths and weaknesses can help optimize the system for future use.

Keywords: prosthetics, additive technology, EMG, signal analysis, algorithms

Analysis of UV-VIS spectra of energy drinks and consumers' perspectives

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Background: The rising popularity of energy drinks, especially among young people, highlights the need to understand consumer motivations and subjective experiences associated with their use. In addition to chemical analysis, it is important to examine the factors influencing brand choice, expected effects, and user concerns.

The aim: This study aimed to analyze the composition of selected energy drinks using UV-Vis spectrophotometry and to explore consumer behavior through a survey focused on motivations, product choice, and experienced effects.

Materials and methods: Several popular energy drink brands were analyzed using UV-Vis spectroscopy to identify characteristic absorption bands. A survey was conducted among individuals of varying age and professional backgrounds, addressing consumption frequency, fatigue, ingredient preferences (e.g. caffeine, vitamins), and subjective responses, including the onset and duration of the drink's effects.

Results: Spectral analysis showed differences in chemical composition among tested products. Survey results indicated that combating fatigue is the main reason for consumption, especially among students and working individuals. Taste, caffeine content were key selection factors. Respondents reported mixed feelings about the effects.

Conclusions: The applied research method, UV-Vis spectroscopy, allows for the identification and verification of the composition of tested energy drinks. Combined with survey data, the study reveals that consumers make choices based on flavor, functionality. The findings may be a foundation for developing health recommendations and regulations regarding the composition of energy drinks.

Keywords: energy drinks, UV-VIS spectroscopy, caffeine

Laparoscopic sleeve gastrectomy - fewer trocars, better outcomes

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Background: Laparoscopic sleeve gastrectomy, the most common bariatric procedure in Poland, is the optimum method of treatment for obesity, regarding long term results measured by % excess weight loss and remission of co-morbidities. The conventional surgical procedure demands five trocars to insert surgical tools. The novel technique includes use of only three trocars.

The aim: The study aimed to compare outcomes between patients treated with conventional five-trocar laparoscopic sleeve gastrectomy and three-trocar laparoscopic sleeve gastrectomy.

Materials and methods: We analyzed the course of treatment in a group of 50 patients who had undergone a five-trocar sleeve gastrectomy and 50 patients who had undergone a three-trocar procedure within the time frame of twelve months (between 2022 and 2023), with 1-year follow-up. The main endpoints included surgery duration, early postoperative complications and length of hospital stay. The additional endpoints were % excess weight loss, postoperative incidence of gastroesophageal reflux disease and other late complications.

Results: No significant differences were observed between the two groups regarding age, weight, BMI, and sex distribution. Related health conditions were comparable between the two groups. The patients treated with the three-trocar technique had a shorter surgery duration and comparable length of hospital stay, lower rate of early postoperative complications. Additionally, the % excess weight loss was higher in the three-trocar group and the incidence of postoperative late complications was comparable between the two groups

Conclusions: The three-trocar sleeve gastrectomy is a feasible, safe, and effective alternative to conventional five-trocar procedure, with shorter surgery duration, lower rate of early postoperative complications and higher % excess weight loss.

Keywords: laparoscopic sleeve gastrectomy, bariatric procedure, trocars

Second-Generation Carotid Stents Show Similar Outcomes Compared to First-Generation Stents: A Retrospective An

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Background: Carotid artery stenting has emerged as a critical intervention for patients with carotid artery stenosis (CS), offering a less invasive alternative to surgical endarterectomy. Advances in stent technology have led to the development of second-generation stents (SGS) with distinct design features compared to the first-generation stents (FGS). However, the comparison between FGS and SGS in terms of efficacy and safety remains a topic of ongoing investigation.

The aim: The aim of this study is comparison of indications, quantities and outcomes between FGS and SGS.

Materials and methods: A single-center retrospective study included 1129 (743 men, 386 women) patients treated for CS with FGS and SGS between February 2018 and June 2024. Data on general, surgical, clinical characteristics, along with long-term outcomes, were collected

Results: FGS was used in 481 (42.06%), while SGS in 648 (57.39%) patients. Preoperative internal carotid artery (ICA) stenosis was similar between the FGS group and the SGS group (70% vs 70%; p=0.06). Postoperative change in ICA diameter was smaller in FGS than in SGS (3.60 vs 3.90, p=0.002). Thirty-day neurological complications occurred in 13 (2.70%) patients with FGS and in 18 (2.78%) patients with SGS (p=0.55). Thirty day mortality was 1.04% in the FGS and 0.46% in the SGS (p=0.29). Long-term neurological complications occurred in 13 (2.7%) patients with FGS and in 14 (2.16%) patients with SGS (p=0.55). Long-term mortality was 1.88% in the FGS and 1.39% in the SGS (p=0.52).

Conclusions: FGS and SGS demonstrate comparable thirty-day neurological complication rates. However, FGS has a smaller postoperative change in ICA diameter. Notably, SGS has similar thirty-day and long-term neurological complications compared to FGS, as well as similar long-term mortality rates. These findings highlight the similarity of SGS compared to FGS in terms of overall outcomes.

Keywords: Carotid artery stenosis, Carotid artery stenting, Carotid stents

Predictive Factors for Complications After Carotid Artery Stenting: A Retrospective Analysis of 1132 Cases

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Background: Carotid artery stenting (CAS) is a key therapeutic approach for patients with carotid artery stenosis (CS), offering a less invasive alternative to carotid endarterectomy. However, CAS carries a risk of complications, including stroke, transient ischemic attack (TIA), in-stent restenosis, and, in some cases, mortality. Identifying predictive factors for these complications is crucial to improving patient outcomes.

The aim: This study aimed to identify predictive factors for complications following CAS.

Materials and methods: A retrospective analysis was conducted on 1132 patients who underwent CAS for CS at the Medical University of Silesia, Poland, between 2018 and 2024. Predictive factors for postoperative complications (stroke, TIA, in-stent restenosis) and overall survival (OS) were assessed using logistic regression and Cox proportional hazards regression models.

Results: Among the treated patients, 743 (65.64%) were men and 389 (34.36%) were women, with a mean age of 70.02 years (range: 42–93; SD: 7.28). The median carotid artery stenosis was 70% (IQR: 19%). The median follow-up duration was 16.56 months (IQR: 28.13). One-year survival rates were: stroke-free 97.61%, TIA-free 97.94%, in-stent restenosis-free 99.29%, and overall survival 99.42%. Independent predictive factors for stroke-free survival included age (p=0.046) and NIHSS at discharge (p=0.02). For TIA-free survival, only distal ICA diameter (p=0.02) was identified as an independent predictor. In-stent restenosis was independently associated with age (p=0.04), predilatation (p=0.03), and postoperative ECA diameter (p=0.006). No significant predictors for OS were identified.

Conclusions: Age, NIHSS at discharge, distal ICA diameter, predilatation, and postoperative ECA diameter were identified as independent predictors of specific complications following CAS. These findings may aid in risk stratification and personalized patient management after the procedure.

Keywords: Carotid artery stenting, Carotid artery stenosis, Predictive factors

Impact of pathologic complete response on survival in patients with primary breast CA and BRCA1 gene mutation

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Background: Breast cancer is the most common malignancy and leading cause of oncological mortality among women worldwide. BRCA1/2 gene mutations significantly contribute to breast cancer development, raising risk by 55–72%, with resulting tumors often showing aggressive behavior and poor prognosis. Neoadjuvant systemic therapy (NST) in breast cancer management allows for tumor and lymph node downstaging, increases the possibility of breast conserving surgery, reduces the extent of axillary surgery and provides an opportunity to assess treatment efficacy through evaluation of pathologic complete response (PCR). PCR is a well-established prognostic factor and is used as surrogate endpoint for predicting long term clinical benefit, including recurrence free and overall survival.

The aim: To analyze potential impact of a pathologic complete response on overall survival in patients with primary breast cancer and BRCA1 gene pathogenic variant who have received NST.

Materials and methods: Research included 134 patients with stage I-III primary breast cancer, confirmed to have BRCA1 gene pathogenic variant and treated with NST. Overall survival was defined as the time from diagnosis to breast cancer related death. Data was collected from 2008 to 2024 and analyzed using IBM SPSS Statistics v29.0. For the sample characterization descriptive statistics were used, categorical variables were analyzed via Pearson Chi-Square and Fishers exact test. Mann-Whitney U test for continuous variable analysis and Kaplan-Meier survival analysis with Log-rank test were applied to access the prognostic significance of pathologic complete response on overall survival.

Results: Achieving PCR significantly impacted overall survival (p=0,044). Among all patients who achieved PCR none experienced breast cancer related death during study period. Survival rate for patients who achieved PCR was 100%, compared to 90,6% for those who did not.

Conclusions: Pathologic complete response is significantly associated with improved overall survival in breast cancer patients.

Eagle syndrome as a possible risk factor for carotid artery dissection

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Background: Eagle syndrome is a rare condition caused by an elongated or calcified styloid process of the temporal bone or the stylohyoid ligament. Typically, this condition presents as orofacial pain, ear-related symptoms, and throat discomfort. In rare cases, mechanical irritation of the internal carotid artery can cause carotid artery dissection.

The aim: This study aimed to assess the potential risk of severe vascular complications associated with Eagle syndrome, including carotid artery dissection.

Materials and methods: The medical records of 150 patients with Eagle Syndrome treated at the Department of Maxillofacial Surgery at the University Hospital in Kraków between 2020 and 2024 were retrospectively analyzed. Data were collected regarding risk factors, comorbidities, vascular complications, the time interval between symptom onset and the development of these complications, and the treatment methods applied.

Results: Out of 150 analyzed patients, 10 (6.7%; 95% CI: 3.3–11.9%) were diagnosed with carotid artery dissection. Among these, 7 patients (4.7% of the total cohort) experienced a unilateral ischemic stroke, predominantly localized to the left cerebral hemisphere (71.4% of stroke cases). Additionally, 3 patients (2.0% of the total cohort) presented with isolated carotid artery dissection without evidence of ischemic stroke. Among all patients with carotid artery dissection induced by the elongated styloid process, 40% (n=4/10) underwent surgical removal of the styloid process. Conservative treatment was implemented in 60% (n=6/10) of patients.

Conclusions: Eagle syndrome should be considered in the differential diagnosis of carotid artery dissection. Early surgical intervention can significantly reduce morbidity and mortality associated with this condition by preventing further complications and improving long-term outcomes.

Keywords: eagle syndrome, ES, carotid artery dissection, CAD, ischemic stroke, stylohyoid chain syndrome

The applicability of inflammation markers in the diagnosis of acute appendicitis (AA)

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Background: Acute appendicitis (AA) is one of the most common causes of acute abdomen, demanding operative care. Despite the diagnostic use of inflammation markers such as CRP, PCT and WBC, their value, especially in early stages of illness stays ambiguous.

The aim: The purpose of the study was to evaluate the applicability of CRP, PCT and WBC in diagnosing acute appendicitis and assessment of cases in which inflammation markers remained within normal range upon admission despite the presence of illness.

Materials and methods: A retrospective analysis was conducted on 192 patients with acute appendicitis between 2023 and 2024 in USK Opole. The values of CRP, PCT and WBC at admission were evaluated and compared with symptom duration and intraoperative findings (phlegmonous appendicitis).

Results: 33 patients (17,2%) patients had CRP <10mg/L of which 66,7% had simultaneously elevated WBC. It indicates higher sensitivity of WBC in early stages of acute appendicitis. Low values of all evaluated markers were rarely observed, mostly when symptom duration was <24 hours. There was positive correlation between symptom duration and rise of CRP and WBC levels.

Conclusions: Inflammation markers can stay within normal ranges in patients with acute appendicitis, especially in the beginning of the illness. WBC appears to be more useful than CRP or PCT in that group of patients. The findings highlight the importance of careful interpretation of laboratory tests in context of symptom duration.

Keywords: acute appendicitis, acute abdomen, inflammation markers, CRP, WBC

Gastrointestinal stromal tumors of the duodenum: clinicopathological characteristics and surgical outcomes

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Background: Gastrointestinal stromal tumors (GISTs) located in the duodenum are exceptionally rare yet clinically significant entities. Due to their nonspecific clinical manifestations, the diagnostic process is often delayed, increasing the risk of complications and hindering therapeutic intervention. The complex anatomy of the duodenum, coupled with the diverse clinical presentations, necessitates an individualized diagnostic and therapeutic approach.

The aim: The aim of this single-center study was to assess the clinical presentation, diagnostic methods, and treatment strategies in patients diagnosed with duodenal GIST.

Materials and methods: This retrospective study included 11 patients (2 males, 9 females) with a median age of 69 years (range: 35–82) who underwent either pancreatoduodenectomy (PD) or limited duodenal resection (LR) between October 2018 and February 2025. 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 (55%) patients, with abdominal pain being the most common, reported in 4 (36%) cases. The most frequent tumor location was the descending part of the duodenum, found in 4 (64%) patients. LR was more commonly performed (7 patients, 64%) compared to PD (4 patients, 36%). Early postoperative complications occurred in 5 (45%) patients, while late complications were observed in 3 (27%) patients—2 of whom required reoperation, and 1 patient died as a result of postoperative complications.

Conclusions: The study indicates that duodenal GISTs often present with minimal or nonspecific symptoms, significantly delaying diagnosis and increasing the risk of severe complications. Despite this, overall morbidity and mortality rates remain low. Close postoperative monitoring is essential to enable early detection and management of complications.

Keywords: GIST, surgery, pancreatoduodenectomy, limited resection

Open versus Laparoscopic Appendectomy in Acute Appendicitis

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Background: Appendectomy remains one of the most commonly performed emergency surgical procedures worldwide. With advancements in minimally invasive techniques, laparoscopic appendectomy (LA) has emerged as an alternative to the traditional open approach.

The aim: This study aims to compare the clinical outcomes between open appendectomy (OA) and LA.

Materials and methods: A retrospective analysis including 76 patients (44 men, 32 women) undergoing surgery for acute appendicitis (AA) in Department of Digestive Tract Surgery, was performed. Parameters such as age, gender, BMI, duration of symptoms, laboratory tests, duration of operation and hospitalization, ASA score and postoperative complications were analyzed.

Results: LA was performed in 56 % (n=44) patients and OA in 44% (n=35). There were 43 men and 36 women, aged 42.,29 (Ī15,63) in the analyzed group..The mean BMI of patients was 27.,49(Ī4,5). The median duration of hospitalization was 4 (IQR = 3) days. The mean of ASA score was 2.07 (Ī0,71). There was non significant difference between ASA score between OA and LA (p=0.301). Significant differences were observed between OA and LA regarding patients' age (18-92) and length of hospital stay. Patients undergoing LA were younger (37 vs. 48) (p= 0.,00014) and experienced a notably shorter hospital stay (p=0.0062) compared to those receiving OA.In multiple regression analysis, the prolonged hospital stay may be explained by the patient's age. The duration of symptoms prior to surgery showed a trend toward significance (p = 0.098), suggesting possible relevance in a larger population.

Conclusions: (LA) appears to be favoured for younger patients, leading to shorter recovery times and potentially fewer complications associated with longer hospital stays. Older patients are more likely to undergo OA which may explain the longer hospital stays in the group.

Keywords: acute appendicitis, laparoscopic appendectomy, open appendectomy

Pancreatic enucleation: indications and surgical outcomes

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Background: Pancreatic enucleation (PE) is an uncommon surgical procedure that preserves both endocrine and exocrine pancreatic functions, primarily indicated for benign and low-grade malignant pancreatic tumors.

The aim: The study aimed to evaluate indications and postoperative clinical outcomes after PE.

Materials and methods: We retrospectively included patients who underwent PE between November 2017 and May 2022, in the Department of Digestive Tract Surgery. The analysis was based on collected data from the medical records concerning indications, symptoms, imaging examinations, complications, duration of surgery and hospital stay.

Results: A total of 12 patients were included (mean age 53.08 ± 14.91 years), of whom 91.67% were women. The mean BMI was 26.98 ± 5.08. Tumors were located in the pancreatic head (n=5, 41.67%), followed by body and tail (n=3, 25.0%), tail (n=2, 16.67%), head and body (n=1, 8.33%), and body (n=1, 8.33%). The median tumor size was 18.0 mm (IQR 12.5–30.0). Histopathological diagnoses included neuroendocrine tumor (n=8; 66.67%), cystic lymphangioma (n=2; 16.67%), intraductal papillary mucinous neoplasm (n=1; 8.33%), solid pseudopapillary tumor (n=1; 8.33%). The median operative time was 202.5 minutes and the mean postoperative hospitalization was 6.33 days. Seven patients (58.33%) experienced postoperative complications, and no deaths were reported. Postoperative pancreatic fistula (Grade B) occurred in 3 (25.0%) and intraabdominal fluid collections were reported in 2 (16.67%) patients. Among the two individuals with fistula, one had an abscess, and the other acute pancreatitis. Incisional hernias were diagnosed in 4 patients (33.33%), all of whom were overweight or obese, following 478.25 ± 419.96 days postoperatively.

Conclusions: PE is used for benign and low-grade malignant tumors that do not require extensive pancreatic resection. The procedure is associated with acceptable postoperative morbidity, low mortality, and favorable long-term prognosis.

Keywords: pancreatic enucleation, pancreatic tumor, postoperative complications, pancreatic fistula

Thrombolysis in Kidney Infarction (TIKI) scale

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Background: Renal artery (RA) occlusion, a rare but clinically significant condition, can lead to severe complications, including acute kidney injury or dialysis. It is a prevalent complication following fenestrated or branched endovascular aortic repair (B/FEVAR) for thoracoabdominal aortic pathologies. Occluded bridging stentgrafts can be effectively managed via endovascular revascularisation, even after prolonged ischaemia.

The aim: The study aims to introduce the Thrombolysis in Kidney Infarction (TIKI) angiographic scale to assess the efficacy of these procedures.

Materials and methods: We analysed 82 patients who underwent revascularisation of one or both RA branches following B/FEVAR at the 2nd Department of Clinical Radiology WUM between 2016-2025. A total of 131 RA branches were revascularised, with a success rate of 95%. Two independent radiologists and a PhD candidate evaluated all angiographic studies to assign TIKI scores.

Results: The TIKI scale was developed based on 131 angiographic images of the treated occluded vessels, drawing inspiration from existing scales such as TIMI/TICI. Prior to the evaluation, pre-operative CT angiography was examined in all patients to assess the RAs and identify any pre-existing parenchymal abnormalities. To define the degree of restored renal perfusion six gradations scale (0, 1, 2a, 2b, 2c, 3) was created. Criteria included the percentage of preserved renal parenchyma, vascular stasis, parenchymal perfusion velocity, venous outflow, the presence of extensive emboli, and vascular resistance.

Conclusions: The proposed TIKI scale can provide physicians with a tool to evaluate the outcomes of RA revascularisation, enabling better comparison of results between centres worldwide and facilitating future research.

Keywords: interventional radiology, endovascular revascularisation, renal artery,

State-of-the-art in situ laser fenestration in one-stage total endovascular percutaneous aortic arch repair

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Background: The management of abdominal, thoracic, and thoracoabdominal aneurysms has shifted over time to endovascular repair; nonetheless, the aortic arch(AA) continues to present a technical difficulty.

The aim: The purpose of this study is to present the results of endovascular AA repair with retrograde endoluminal laser in situ fenestration(LISF) of the Nexus AA device for preservation of AA branches.

Materials and methods: This was a single-center, retrospective analysis of prospectively collected data from patients treated percutaneously with the Nexus device and LISF for aortic arch diseases. All patients were unfit for open surgery and required urgent intervention. Primary endpoints included technical success, early mortality, cerebral and spinal cord ischemia and clinical success on 12 months follow-up. Clinically adequate intracranial vascular cross filling was confirmed angiographically and with constant periprocedural cerebral oximetry. Vascular accesses were selected appropriately to the anatomical conditions of the patients.

Results: From 2020 to 2022, 5 patients(62.8Ī10.1years; 3 men) underwent percutaneous AA repair with LISF of the Nexus device. Indications included post-dissection aneurysms(n=3), atherosclerotic aneurysms(n=1) and type Ia entry flow after failed type B aortic dissection treatment (n=1). A total of 8 fenestrations were performed(LCCA n=5, LSA n=3), with 1(n=2) or 2(n=3) fenestrations per patient. Technical success was achieved in all the patients. No patient developed major complications, such as death or CNS ischemia. During the 1-12 months follow-up 1 case of endoleak was detected that later subsided. Follow-up CTA at 24 months demonstrated false-lumen thrombosis, subsequent aortic wall remodelling, and patency of all fenestrations.

Conclusions: While LISF of Nexus AA stent graft remains an off-label technique, it was shown to be an effective and promising therapeutic option for urgent patients unfit for open surgery. Preoperative assessment of the intracranial arteries is essential for success.

Keywords: interventional radiology, endovascular, aortic arch

Nutcracker syndrome – should we believe in axial imaging study results?

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Background: Nutcracker syndrome, associated with the compression of the left renal vein between the superior mesenteric artery and the aorta, is often considered to be "overdiagnosed" due to the anatomy in this region and it is frequently influenced by the conditions under which diagnostic imaging studies are performed.

The aim: This study aimed to evaluate the actual occurrence of left renal vein compression depending on the patient's body position, with the goal of developing a reliable diagnostic algorithm for patients suspected of having this syndrome.

Materials and methods: The study was conducted on a group of 30 young individuals who underwent duplex Doppler USG examination of the left renal vein in the supine, seated, and lateral positions. The diameter of the renal vein was assessed in each body position, as well as flow parameters within the vein. Changes in the angle between the aorta and the superior mesenteric artery were also analyzed. The preliminary results presented in the abstract are based on data from a group of 15 participants.

Results: The diameter of the renal vein in the participants ranged from 4 to 10 mm. At the level between the aorta and the superior mesenteric artery, it measured between 1 and 5 mm in the supine position. In the seated position, an increase of 20 to 35% (absolute values ranging from 3 to 7 mm) was observed. The maximum flow velocity in the supine position was 20 to 45% higher compared to the seated position. Significant differences were observed in the mean flow volume per minute across the different body positions. Changes in the renal vein diameter were also noted performing the Valsalva maneuver.

Conclusions: Assessment of potential compression of the left renal vein at the level of its crossing with the aorta and the superior mesenteric artery performed only in the supine position carries a risk of misdiagnosed nutcracker syndrome. In the diagnostic evaluation of this syndrome, it is crucial to include flow assessment in a position that reduces the likelihood of renal vein compression.

Awareness of Risk Factors and Prevention of Economy Class Syndrome Among Medical Students

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Background: The term "economy class syndrome" refers to the occurrence of thrombotic incidents during long-haul flights, primarily among economy class passengers. It results from flight-related factors like immobility, combined with individual risk factors (e.g., obesity, oral contraceptives, cancer), which together raise the risk of excessive clotting and potential VTE (venous thromboembolism).

The aim: The study assesses VTE risk awareness and prevention knowledge among final-year students, especially in relation to long-distance travel.

Materials and methods: An anonymous online survey was conducted among 5th and 6th year medical students. The questionnaire included questions regarding awareness of the risk of thrombosis, risk-increasing factors, and principles of thromboprophylaxis, particularly in the context of prolonged travel. Initial findings are included in the abstract, with additional results currently under analysis.

Results: The term "economy class syndrome" was known to 56.3% of the students, while all were aware of the increased risk of thrombosis during prolonged travel, particularly by airplane. The most commonly cited moment of increased risk was 6 hours of travel, and 96.9% of respondents considered thromboprophylaxis to be justified. The most recommended measures were low molecular weight heparin (93.8%) and compression stockings (90.6%). Immobility and lower limb venous disease (100%) were the top risk factors, while less common ones like coffee (9.4%) and lung disease (53.1%) were less often noted.

Conclusions: Although the results indicate a high overall awareness of thrombosis risk among medical students - particularly in the context of prolonged travel and the need for prophylaxis - a significant proportion of students were unfamiliar with the concept of "economy class syndrome." Notable gaps in knowledge of specific risk factors and less obvious preventive measures highlight the need for improved education on this topic during medical training.

Keywords: venous thromboembolism, economy class syndrome, thromboprophylaxis

Attractive appearance or health – can they be combined?

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Background: Walking in high heels is a commonly recognized factor that increases venous stasis resulting from impaired function of calf muscle pump. However, general observations still have not found reference in a detailed characteristics of footwear that should not be worn by patients with chronic venous disease.

The aim: This study attempted to objectively assess the influence of footwear type on the calf muscle pump and the flow in the popliteal vein.

Materials and methods: The parameters of flow in the popliteal vein were analysed depending on the height of the worn shoes. The study was conducted on 20 healthy volunteers. In a duplex Doppler ultrasound examination were measured: width of the popliteal vein, values of maximum and average velocities and volume of flow in the popliteal vein. The results were compared with the results obtained during resting standing position with the ankle joint in 90 degrees of flexion and also depending on the heel height.

Results: The diameter of the popliteal vein in the resting standing position with the ankle joint in 90 degrees of flexion ranged from 7 to 10 mm and the values of the maximum velocity ranged from 10 to 20 cm/s. In the position of maximum plantar flexion forced by a high heel, we noted an increase of popliteal vein diameter by 10-25% and in the values of the maximum velocities from 15 to 35%. In intermediate positions, with a heel height of 6-8 cm, a decrease in the values of the maximum velocity and minute flow volume was observed.

Conclusions: The diameter of the popliteal vein in the resting standing position with the ankle joint in 90 degrees of flexion ranged from 7 to 10 mm and the values of the maximum velocity ranged 10-20 cm/s. In the position of maximum plantar flexion forced by a high heel, we noted an increase of the popliteal vein diameter by 10-25% and in the values of the maximum velocities from 15 to 35%. In intermediate positions, with a heel height of 6-8 cm, a decrease in the values of the maximum velocity and minute flow volume was observed.

Keywords: chronic venous disease, high heels, venous flow

Bariatric Surgery as a Method of Treatment for Childhood Obesity – A Clinical Evaluation

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Background: Childhood obesity has become one of the most serious public health challenges of the 21st century, with its prevalence rising at an alarming rate worldwide. In response to this growing health crisis, bariatric surgery, once reserved exclusively for adults, is now being considered as a therapeutic option for selected pediatric patients.

The aim: Our study aimed to collect indications for bariatric surgery in pediatric patients and to evaluate efficacy of most commonly performed procedures (Sleeve Gastrectomy and (Roux-en-Y Gastric Bypass). In addition, we wanted to assess the most often occuring long-term complications.

Materials and methods: In our study we analyzed indications from the American Society for Metabolic and Bariatric Surgery and American Academy of Pediatrics from the year 2023. We also used information from the Teen-LABS study and collected data from the database of Upper Silesian Children's Health Center in Katowice, which contained details on adolescents who underwent bariatric surgery in years from 2016 to 2024. Additional sources include recent literature reviews and meta-analyses.

Results: Sleeve gastrectomy was the most frequently performed procedure, with a BMI reduction of 26–28% sustained for ≥5 years. Remission of type 2 diabetes (up to 95%), hypertension (68–74%), and dyslipidemia was observed in most patients. Significant improvement in health-related quality of life (PedsQL, SF-36) was reported. Common complications included iron deficiency (60%), vitamin B12 deficiency (38%), and the need for reoperation (13–20%).

Conclusions: Bariatric surgery is an effective and safe treatment for severe obesity in carefully selected pediatric patients. Data from the Upper Silesian Children's Health Center supports international findings. Successful outcomes require multidisciplinary qualification and comprehensive long-term follow-up, including nutritional and psychological support.

Keywords: bariatric surgery, treatment of obesity, pediatric

Ultrasound examination – is it really a non-invasive diagnostic test?

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Background: The prevalence of hospital-acquired infections (HAIs) has been increasing for the last ten years. According to epidemiological data in Poland between 100 000 to 800 000 HAIs occur yearly and about 3% of them lead to death. Nosocomial infections can be acquired not only during invasive procedures but also when the proper hygiene is not used during non-invasive forms of treatment, one of which can be ultrasound imaging. Ultrasonography is the most common imaging test performed for hospital patients.

The aim: The aim of the study is to investigate the prevalence of the positive bacterial cultures from the hospital ultrasound machine probes, as well as to assess the approach of the physicians to the US probe cleaning and sterilization.

Materials and methods: 10 samples were taken from 8 hospital US probes, 2 of the samples were taken after cleaning the probes and the bacteriological investigation was performed according to the same protocol. In addition the survey, concerning disinfection and hygienic use of US probes, was performed among the physicians performing the US examination.

Results: In 8 out of 10 probes samples the bacterial cultures turned out positive, moreover in one of the samples hospital strain S. aureus was identified. In 3 out 10 samples multiple bacteria strains were found. Results of the surveys regarding approach to the care of probes revealed that 85% of the physicians declared the proper daily care and use of the antibacterial solution disinfection, however 50% of the respondents could not specify the name of the disinfectant liquid used in the daily probe care. When examining the surgical patients, most of the respondents use simple probe disinfection, whereas 60% of them were familiar with the use of the special probe covers.

Conclusions: The risk of the bacterial contamination of the ultrasound probes in the hospital settings is high and suggests taking actions towards better and proper care before, during and after US examination to decrease the risk of contracting the hospital-acquired infections.

Keywords: hospital-acquired infections, ultrasound

Predictive value of drain amylase for clinically relevant pancreatic fistula after distal pancreatectomy

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Background: Postoperative pancreatic fistula (POPF) remains one of the most frequent and clinically significant complications following distal pancreatectomy (DP). Its occurrence is associated with increased morbidity, prolonged hospitalization, and the need for additional interventions.

The aim: The aim of this study was assess the predictive value of drain amylase levels for the development of clinically relevant (CR) POPF following DP.

Materials and methods: This retrospective study included 88 patients who underwent DP between January 2021 and October 2024. The analysis was based on collected data from the medical records.

Results: There were 40 males (45.5%) and 48 females (54.5%), aged ±15.3 (18-83) years with BMI 27±4.4 (17-39). The most common histopathological diagnoses were: neuroendocrine tumor (NET) in 30 patients (34.1%), adenocarcinoma in 17 (19.3%), and mucinous cystic neoplasm (MCN) in 14 (15.9%).
The duration of surgery was 284±57.6 (160—470) minutes, and postoperative hospitalization was 9 days (IQR=3), respectively.
Postoperative complications occurred in 40 (45.5%) patients, including peripancreatic fluid collection (38, 43.2%), CR-POPF (6, 6.82%), postoperative acute pancreatitis (13, 14.8%), wound infection (5, 5.7%). Reoperations were reported in 5 (5.7%), and rehospitalizations in 12 (13.6%) patients, respectively. There was one postoperative death (1.1%).

Median drain fluid amylase level on postoperative day 1 (POD 1) was 4422 IU/L (IQR = 16,224.3). Significantly longer postoperative hospitalization (p < 0.001), higher postoperative serum amylase (p = 0.009), serum lipase (p = 0.014), and POD1 drain amylase level (p = 0.003) were reported in patients with POPF compared to those without fistula. In multivariate analysis, an increase of 1000 IU/L in POD1 drain amylase level was associated with a 5.7% higher risk of developing CR-POPF.

Conclusions: Elevated drain amylase level on POD 1 is a significant and independent predictor of CR-POPF following DP.

Keywords: postoperative pancreatic fistula, distal pancreatectomy, amylase, postoperative complications

Hypoxia and Metabolic Dysregulation in OSA: HIF-1 Signaling and Insulin Resistance.

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Background: Obstructive sleep apnea (OSA) is a common disorder linked to intermittent hypoxia, sleep disturbances, and metabolic dysfunction, increasing cardiovascular risk. Hypoxia-inducible factor 1 (HIF-1) regulates glucose metabolism through glucose transporter 1 (GLUT1) and the insulin receptor (INSR).

The aim: This study examined HIF-1, GLUT1, and INSR expression at genetic and protein levels in OSA patients and their links to insulin resistance markers like HOMA-IR.

Materials and methods: Eighty-nine participants underwent polysomnography and were categorized based on their apnea- hypopnea index (AHI): OSA (AHI≥5, n=47) and control (AHI<5, n=42). Morning blood samples were analyzed for gene and protein expression of alpha (HIF-1α) and beta (HIF-1β) subunits of HIF-1, GLUT1, and INSR, as well as insulin and glucose levels. HOMA-IR was calculated. Funding was provided by the Ministry of Science and Higher Education (Grant no. 0067/DIA/2018/47).

Results: OSA patients had lower HIF-1α and GLUT1 expression (p=0.046, p=0.007) and reduced INSR protein levels (p<0.001). No significant correlation was found between gene and protein expression. OSA patients showed higher insulin, glucose, and HOMA-IR levels (p<0.001). Among OSA patients, AHI positively correlated with insulin (R=0.303, p=0.041), glucose (R=0.327, p=0.026), and HOMA-IR (R=0.378, p=0.01). Significant associations were observed between HIF-1α, HIF-1β, GLUT1, and INSR in both groups, except for HIF-1α and INSR in OSA (p=0.089).

Conclusions: OSA is linked to lower HIF-1α and GLUT1 expression, decreased INSR protein, and increased insulin resistance. These findings suggest HIF-1's role in OSA-related metabolic dysfunction and the need for targeted therapies.

Keywords: OSA, HIF-1, GLUT, INSR, insulin resistance

Tailoring Treatment: Impact of Comorbidities on Dupilumab Efficacy in Severe Asthma

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Background: Dupilumab is a human IgG4 monoclonal antibody that inhibits IL-4 and IL-13 signaling, modulating Th2 inflammation. Approved for moderate to severe asthma, atopic dermatitis, and chronic rhinosinusitis with nasal polyps, it reduces exacerbations and glucocorticoid use, improving FEV1 and asthma control. Other biologics for severe asthma include omalizumab, mepolizumab, benralizumab, and tezepelumab, offering options for patients with comorbidities.

The aim: Evaluate efficacy and safety of dupilumab for severe bronchial asthma in a real-world, single-centre setting, comparing outcomes in patients with and without comorbidities.

Materials and methods: Patients with severe bronchial asthma received dupilumab at 300 mg (with comorbidities) or 200 mg (without comorbidities) at the Department of Pneumonology of SUM. Efficacy was evaluated by improvements ≥0.5 in Asthma Quality of Life (AQLQ) and Asthma Control (ACQ) scores, exacerbation reduction, and a "good" GETE response. Spirometry, eosinophil levels, hypereosinophilic syndrome (HES) symptoms, and adverse events were assessed. Outcomes were compared between dosage groups.

Results: 24 patients (8 men, 16 women), aged 31 to 80 years (mean 54.33 ± 17.39), were analysed. 14 received 200 mg, and 10 received 300 mg. Baseline AQLQ and ACQ scores were 2.54 and 3.68, respectively, with the 300 mg group having scores of 2.73 and 3.60. The mean eosinophil count was 560 cells/µL. Many patients had multi-organ symptoms like nasal polyps (n=13) and allergies (n=10). After 6 months, the 300 mg group showed greater improvements in AQLQ (+2.60) and ACQ (-2.32) compared to the 200 mg group (+2.02,-1.79). All patients had a positive GETE response. No HES or adverse symptoms were reported.

Conclusions: Dupilumab demonstrated significant efficacy, particularly in patients with comorbidities. These results emphasize the importance of considering comorbidities when selecting biologic therapies for asthma. Treatment should be tailored to asthma severity and comorbidity profile to optimise outcomes.

Keywords: severe asthma, dupilumab, comorbidities, biological therapy

Correlation of TSH levels with inflammatory markers in COVID-19 patients: a retrospective study

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Background: COVID-19 caused by SARS-CoV-2 is an acute disease which may lead to a severe systemic inflammation, causing multi-organ dysfunction and death. Studies indicated that TSH levels were lower when the infection was more severe.

The aim: The aim of the study was to determine whether TSH level correlates with inflammatory markers in COVID-19 patients.

Materials and methods: We conducted a retrospective study of 105 patients admitted from 2020 to 2023 to the University Clinical Centre in Katowice with a positive COVID-19 test. Parameters such as TSH levels, White Blood Cell count (WBC), Platelet count (PLT), C-reactive Protein (CRP), D-dimers, procalcitonin levels, Lymphocyte count and percentage and neutrophil-to-lymphocyte rate (NLR) were evaluated.

Results: Average age was 69.49 (SD 14.14) and the range was 36-95 years. 53.2% of the population were male. Out of 9 parameters, after statistical analysis, Lymphocyte count (p=0.0038) correlated positively and NLR (p=0.04682) negatively with TSH level in COVID-19 patients and PLT correlated positively with TSH level in female population (p = 0.0384), while CRP (p= 0.81320), D-dimers (p=0.974), WBC (p=0.6862), Lymphocyte percentage (p=0.1838) and procalcitonin (p=0.906) did not show statistical significance.

Conclusions: Our study suggests that TSH levels may be associated with lymphocyte count and NLR in COVID-19 patients and PLT in the female population. Other acclaimed inflammatory markers (CRP, D-dimers, WBC, Lymphocyte percentage and Procalcitonin) were nonsignificant. These findings indicate that TSH may have a potential as a biomarker in disease severity but further studies need to investigate this claim and other indicators of inflammation should be considered. Main limitation of our study was its small sample size.

Keywords: COVID-19, TSH, PLT, Neutrophil-to-lymphocyte ratio, Lymphocyte count

The impact of heated tobacco products on mental health

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Background: According to the World Health Organization (WHO) in 2021, the use of new-generation tobacco products, such as tobacco heating systems, has significantly increased, even though traditional cigarette consumption has decreased in many countries. It is used to consider them to be a less harmful alternative to traditional smoking, but their impact on mental health remains unexplored.

The aim: To investigate the impact of tobacco heating systems on the mental state of a person and identify possible risks associated with their use in comparison with people without tobacco dependence.

Materials and methods: To achieve this goal, a sample of 142 people was formed, of whom 66.9% (n=95) were women and 33.1% (n=47) were men with an average age of 24.92 Ỉ 9.69 years. Participants were asked to complete an anonymous online survey using the Google Forms platform. The questionnaire consisted of 27 questions, including open-ended questions, alternative questions, questions with the possibility of providing a rating (from 1 to 10), and the DASS-21 psychological self-report instrument designed to assess the level of depression, anxiety, and stress. For statistical evaluation, processing, and analysis of the data, we used parametric and descriptive statistical methods and Microsoft Excel program.

Results: According to the obtained results, the proportion of smokers who used tobacco heating systems (IQOS, Glo, Lil, JOUZ, etc.) was 14.1% (n=20). According to the DASS-21 scale, the level of depression among the respondents was 8, which corresponds to "severe". Anxiety was 5 points (mild), and stress was 10 points (moderate). Comparatively, in non-smokers, the level of each of the three indicators did not exceed 3 points (normal).

Conclusions: The study showed the presence of a harmful effect on the mental state of respondents, such as significantly higher rates of depression, anxiety, and stress among users of heated tobacco products compared to non-smokers. This opens up the need for a deeper study of the problem.

Keywords: Smoking, depression, anxiety, stress

The Association between Antidepressants Intake and Liver Function in Geriatric Population

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Background: Antidepressants are widely used in older adults due to the high prevalence of depression and anxiety. They modulate neurotransmitters to enhance mood and cognition. However, antidepressants undergo hepatic metabolism via the cytochrome P450 system, raising concerns about liver toxicity, particularly in aging patients with reduced liver function. This study explores the safety in older adults to guide clinical decisions.

The aim: This study aims to evaluate the effect of antidepressant use on liver function in the geriatric population by analyzing differences in liver enzyme levels Aspartate Aminotransferase (AST) and Alanine Aminotransferase (ALT) between individuals prescribed antidepressants and those not receiving such treatment.

Materials and methods: A retrospective analysis was conducted on 2,432 geriatric patients, categorized into two groups: those not taking antidepressants (N=1,923) and those prescribed antidepressants (N=509). Key parameters analyzed included age, body mass index (BMI), sex, and liver enzyme levels. Comparisons were performed using statistical tests, with a significance level set at $p<0.05$.

Results: The mean age and BMI were similar between groups, with no significant differences (p=0.6, p=0.81). Sex distribution was also comparable (p=0.8). However, liver enzyme levels were significantly lower in the antidepressant group. AST in the group taking antidepressants was lower (31.75Ī32.90 to 28.55Ī24.72 U/L (p=0.0001) and ALT from 24.00Ī37.69 to 21.54Ī30.92 U/L (p=0.0001)) compared to the group without.

Conclusions: Despite concerns about hepatotoxicity, antidepressant use in the older adults was linked to lower AST and ALT levels. Further research is needed to assess whether this reflects a protective effect, prescribing patterns, or confounders. Longitudinal studies should explore causal links and clinical significance.

Keywords: antidepressants, liver function, geriatric population

There may be something more behind every forgotten word...let's focus on comorbidities

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Background: Mild cognitive impairment (MCI) is a clinical condition that must be distinguished from normal age-related cognitive changes. It primarily affects individuals over the age of 65 and is characterized by cognitive alterations that do not fully meet the criteria for dementia. Some cases are linked to Alzheimer's disease (AD). Patients mainly experience memory deficits that do not significantly interfere with daily activities. Chronic illnesses play a crucial role in cognitive decline and may contribute to the onset of MCI.

The aim: The aim of the study was to confirm the hypothesis that the coexistence of chronic diseases influences the deterioration of cognitive functions and an increased incidence of MCI.

Materials and methods: The study was multicenter, conducted between 2023 and 2024. It included 92 patients with a final diagnosis of MCI without dementia and 118 patients with the exclusion of these diseases. Diagnosis was based on criteria according to the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) and with the use MoCA and Mini-Mental test score. Descriptive statistics were calculated using Statistica version 8.4 software (StatSoft, Krakow, Poland).

Results: MCI correlated with age in the study interval r= 0.8, ($p<0.05$), with overweight r= 0.74, ($p<0.05$), with multimorbidity r=0.81 ($p<0.05$) with presence of allergic disease (asthma and/or allergic eczema) r=0.69 ($p<0.05$) and with presence of depression r=0.71 ($p<0.05$). Spearman correlation test confirmed this relationship with MCI diagnosis: use of sleep medications r=0.72, tramadol derivatives r=0.68 for $p<0.05$.

Conclusions: The phenomenon of multimorbidity, the use of sleep medications, and tramadol may influence the incidence of MCI in the population, especially among older adults. Further research is necessary to assess this correlation and its pathophysiological basis.

Keywords: MCI, asthma, depression, multimorbidity, age-related cognitive changes

Development of a refined blister formation model aimed at elucidating IL-17B functions in Bullous Pemphigoid

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Background: Bullous Pemphigoid (BP) is a skin autoimmune bullous disease that mainly occurs in the elderly, severely affecting their health and quality of life.

The aim: This study aimed to decipher the cellular and molecular components and the functions of the IL-17B/IL-17 receptor B (IL-17RB) axis at the time of diagnosis in BP. Interleukin-17 cytokines, particularly IL-17A, have been implicated in the development of BP. Recently, our lab identified IL-17B in the serum and blister fluid (BF) of BP patients, with evidence of a negative correlation between IL-17B BF levels and the score associated with blisters and erosions, suggesting a potential protective role of IL-17B in blister formation in BP disease.

Materials and methods: To explore IL-17RB and IL-17RA expression in BP, a pilot study including 3 BP patients, two of whom relapsed and 3 sex- and age-matched controls was conducted. Peripheral blood mononuclear cells from all 6 individuals were collected at baseline and additionally at 60 and 90 days after the beginning of treatment from patients who relapsed. The ex vivo model of blister formation was optimised by adjusting the quality and thickness of the cryosections, concentrations of antibodies in BP patients sera, number of granulocytes applied to the cryosection, and cell activation methods.

Results: Flow cytometry analysis revealed a ubiquitous presence of IL-17RA expression on ILCs, NK cells and lymphocytes/monocytes at baseline. In contrast, no IL-17RB expression was observed in any of these cells neither at baseline nor at the time of relapse. Additionally, a tool is presented for future studies on the functions of various interleukins in the blister formation in bullous pemphigoid.

Conclusions: The developed model, combined with stimulation of granulocytes, by supernatants originating from IL-17B induced IL-17RB+ cells should allow us to better define the function of IL-17B in blister formation, leading to new therapeutic alternatives to local corticotherapy in the treatment of BP disease.

Keywords: Bullous pemphigoid, IL-17B, Blister formation, Immunofluorescence

Application of targeted metabolomics in predicting graft rejection

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Background: In 2013-2023, around 60% of transplanted organs in Poland were kidneys. Among kidney recipients, up to 17% experience graft rejection within 3 years. The gold standard of diagnosing the process of kidney rejection is a biopsy, however it is invasive and can cause side effects, while markers such as serum creatinine rise only after the injury is present. Metabolomics is a non-invasive tool which could be used to predict deterioration of kidney function.

The aim: The aim of this study is to compare metabolic profiles of plasma of kidney transplant recipients with deterioration of graft function (DoGF) to those without DoGF.

Materials and methods: Plasma of 44 patients of the Nephrology Outpatient Clinic, Department of Immunology, Transplantology and Internal Diseases of the Infant Jesus Clinical Hospital in Warsaw were analysed using LC-MS with Orbitrap Focus. 22 patients have experienced DoGF , while 22 did not. Plasma was collected within 1-5 years after transplantation, at least 3 months before DoGF occurred.

Results: By using PLS-DA analysis, one of the bile acids was selected as the compound with the biggest impact on kidney graft function in this group of patients. It was found to be 4 times lower in patients with DoGF than those without DoGF (p=0.002), with ROC analysis with AUC = 0.724. There was no statistically significant difference in eGFR between groups.

Conclusions: The level of said bile acid may be a potential indicator of DoGF in kidney recipients. Further studies are required to confirm the accuracy of this compound as a biomarker.

Keywords: graft failure, kidney transplantation, rejection biomarker, metabolomics, bile acids

Association Between Total Cholesterol and Depression in Hospitalized Older Adults

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Background: Depression is a complex mood disorder marked by persistent sadness, loss of interest, and cognitive impairment, often with physical symptoms that affect overall well-being and daily functioning, especially in the older population. Elevated total cholesterol (TC) has been noted in individuals with depression, possibly due to shared vascular or inflammatory pathways. However, limited research has examined this link in older adults, particularly across sexes.

The aim: This study explores the association between depression using the Geriatric Depression Scale (GDS) and TC levels in older patients, stratified by sex.

Materials and methods: This cross-sectional study included 230 patients admitted to the Geriatric Department in Lodz, Poland. Depression was defined as a GDS score of ≥5 points. TC levels at admission were obtained from medical records. Participants were stratified by sex and depression status. Non-parametric tests and multiple regression analyses were used to assess associations, adjusting for confounders.

Results: 161 women and 69 men with a mean age of 81.50±8.40 were enrolled in the research. Median TC was significantly higher in depressed patients (3.90 (2.92-4.80) mmol/l) compared to non-depressed ones (3.42 (2.78-4.10) mmol/L; p=0.02). The age-adjusted model showed a significant association between TC levels and the presence of depression. Among women, depressed individuals had higher median TC levels (4.06 (3.29–5.06) mmol/L) compared to those without depression (3.53 (2.92–4.44) mmol/L; p=0.016). No significant difference in TC levels was found in men according to depression status (p=0.740).

Conclusions: In conclusion, these findings underscore the need for careful monitoring of women with lipid disorders, as they may be at heightened risk for developing mood disorders.

Keywords: Geriatric Depression Scale, Total Cholesterol, Depression

Assessment of Blue LED Light in Combination with Photoconverter in the Reduction of Acne Vulgaris Symptoms

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The aim: The aim of this study was to objectively assess the reduction of acne lesions with erythematous background through the use of Fluorescent Light Energy (FLE) technology.

Materials and methods: The study involved 15 volunteers aged 20–24 years suffering from acne vulgaris accompanied by erythema. Prior to the treatment, exclusion criteria were evaluated. Inclusion was based on visual assessment using Fotomedicus clinical photography, Antera 3D imaging, and biochemical skin parameter measurements such as sebumetry and cutometry. The treatments were conducted according to a standardized protocol once weekly for six consecutive weeks. Skin biomechanical parameters were assessed before and after the full treatment course.

Results: Sebumetric and cutometric evaluations demonstrated an approximate 18% reduction in seborrhea, accompanied by a 9.5% increase in skin hydration. Clinical observations indicated a noticeable reduction in erythema, active inflammatory lesions, and comedones. Additionally, a significant softening and flattening of post-acne scarring was observed.

Conclusions: Blue LED light therapy, when combined with formulations containing photoconverter agents, may serve as an effective intervention for the treatment of acne vulgaris and erythema. The procedures may be used as an adjunctive therapy alongside conventional pharmacological treatments, or as a primary option for individuals contraindicated for oral medications or those with sensitive and highly reactive skin types. The skin parameter evaluation techniques applied in this study may contribute to optimizing therapeutic protocols and enhancing the efficacy of active ingredients aimed at the reduction of acne-related lesions.

Keywords: Acne Vulgaris, Erythema, FLE, Photoconverter, Blue LED light

Blood pressure control in end stage kidney patients treated with hemodialysis or peritoneal dialysis.

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Work's tutor: dr n. med. Beata Czerwieńska

Background: Hypertension is frequently found in patients with end-stage kidney disease (ESKD) treated with hemodialysis (HD) or peritoneal dialysis (PD).

The aim: The aim of this study was to compare the blood pressure control in ESKD patients treated with HD or PD.

Materials and methods: In this case-control study 60 patients treated with HD and 60 patients treated with PD were enrolled and matched by age and gender (aged 49 Ī 16 years, 36M 24F in each group). In all patients, three office blood pressure measurements in consecutive, separate visits in the outpatient clinic and plasma sodium and potassium concentration measurements were performed. Blood pressure measurements in HD patients were completed before three subsequent dialysis sessions within one week. Mean systolic and diastolic blood pressure was calculated from three measurements. Statistical analysis was performed using the Shapiro-Wilk, chi-square, t-student and U Mann Whitney tests, as well as Pearson and Spearman correlations.

Results: The prevalence of hypertension was 90% in HD patients and 87% in PD patients. It has been shown that mean systolic blood pressure was higher in patients treated with HD than treated with PD($140.0Ī17.1$ vs $134.1Ī11.7$ mmHg, $p=0.02$). There was no significant difference between studied groups in mean diastolic blood pressure ($83.2Ī11.3$ vs $83.2Ī8.4$ mmHg) and number of using antihypertensive drugs ($2.8Ī1.4$ vs $2.8Ī1.1$). The use of diuretics in PD patients was more common than in HD patients (75% vs 55%, $p<0.05$).There was no difference in plasma sodium concentration($139.1 Ī 3.7$ vs. $139.2 Ī 3.3$ mmol/L), respectively. Potassium plasma concentration was higher in HD patients than in PD patients ($5.04 Ī 0.80$ vs $4.52 Ī 0.62$ mmol/L, $p<0.001$). Residual diuresis in PD patients was higher than in HD patients (1298 mL vs. 437 mL, $p<0.001$).

Conclusions: Results of this study may suggest that in ESKD patients treated with hemodialysis blood pressure was less adequately controlled than in patients treated with peritoneal dialysis.

Keywords: Blood pressure, hemodialysis, peritoneal dialysis

Underdiagnosed and Overlooked: Cardiovascular Autonomic Neuropathy in Patients with Diabetes in Silesia

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Background: Cardiovascular autonomic neuropathy (CAN) is a frequent yet underdiagnosed microvascular complication of Diabetes Mellitus (DM), increasing the risk of heart problems and mortality. As it often develops asymptomatically, early detection is crucial. Limited data exist on CAN prevalence in Poland. While the EURODIAB study reported a 37% prevalence across Europe, local research is needed to better understand its impact.

The aim: This study aimed to assess the prevalence of CAN in individuals with diabetes in the Silesian region.

Materials and methods: A total of 729 patients with diabetes were examined between the years 2021 and 2024. CAN was assessed using the DiCAN (Diabetic Cardiovascular Autonomic Neuropathy) device, which performs a series of standardized autonomic function tests based on the Ewing battery. Diagnosis and staging of CAN followed the guidelines outlined by the Toronto Consensus (The CAN Subcommittee of the Toronto Consensus Panel on Diabetic Neuropathy).Demographic, laboratory, and clinical data were collected.

Results: Among the 729 individuals studied, 222 (30%) had type 1 DM, and 507 (70%) had type 2 DM. CAN was diagnosed in 420 (47%) of participants, with 197 (47%) classified as early-stage CAN and 223 (53%) as advanced-stage CAN.

Conclusions: The high prevalence of CAN, affecting nearly half of the participants, suggests it may be more widespread than previously estimated. The significant proportion of advanced cases highlights the need for increased awareness, earlier screening, and further research to improve prevention and management strategies.

Keywords: diabetology, diabetes, neuropathy, complications

Is AI as Accurate as Ophthalmologists in Detecting Diabetic Retinopathy? Insights of the study in Silesia

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Background: Diabetic retinopathy (DR) is the leading ocular complication of diabetes mellitus (DM). Regular eye screenings help detect it at an early stage, but not everyone has access to an ophthalmologist. Artificial intelligence (AI) could help by making screening more available.

The aim: This study aimed to evaluate the effectiveness of AI in detecting DR compared to ophthalmologists in a cohort of patients with DM.

Materials and methods: We examined patients with DM from the Silesia Diabetes-Heart Project.
 DR severity was categorized using two classification methods: (A) no DR/mild/moderate DR vs. severe/proliferative DR and (B) no DR/mild DR vs. moderate/severe/proliferative/PDR.
 Participants had eye images taken with a fundus camera (DRSplus). The AI software (RetCAD™) analyzed the fundus images, while two ophthalmologists independently graded them as the reference standard.AI performance was evaluated based on sensitivity (ability to detect disease), specificity (ability to avoid false positives), and overall accuracy.

Results: We analyzed images from 537 individuals (1,074 eyes). The AI system was good at identifying severe cases, with high specificity (98.3%) but moderate sensitivity (69.2%) for severe/proliferative DR. However, when identifying moderate to severe cases, its sensitivity improved to 85.3%, while maintaining a high specificity of 97.2%. The agreement between the two ophthalmologists was strong, with Cohen's kappa values of 0.924 for Group A and 0.917 for Group B.

Conclusions: The AI-based screening tool demonstrated high specificity and moderate sensitivity, particularly for detecting severe or proliferative DR. While sensitivity improvements are needed, its strong performance suggests AI could enhance DR screening in regions with limited ophthalmologic access. Further refinements and clinical validation could improve early detection, potentially preventing vision loss in individuals with DM.

Keywords: diabetology, ophthalmology, diabetes, retinopathy, artificial intelligence

Correlation Between Oral Microbiota and Psoriasis Severity: A Retrospective Analysis

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Background: Psoriasis is a chronic, immune-mediated, multifactorial disease with cutaneous and articular manifestations. Its pathogenesis is influenced by both genetic susceptibility and environmental factors, including infections caused by microorganisms. Pathogens such as Candida albicans, Staphylococcus aureus, and Streptococcus viridans may trigger or exacerbate clinical symptoms.

The aim: To evaluate the impact of selected pathogenic microorganisms from the upper respiratory tract on the severity of psoriasis symptoms, and to assess whether their presence correlates with disease exacerbation.

Materials and methods: This retrospective study analyzed oral swab cultures from 468 patients diagnosed with psoriasis and psoriatic arthritis (PsA) at the Dermatology, Sexually Transmitted Diseases and Clinical Immunology Clinic of the Municipal Polyclinical Hospital in Olsztyn. The group included 191 women (41%) and 277 men (59%). Pharyngitis symptoms were observed in 198 patients (42%). Among them, 125 had PASI>10, 40 had PASI<10, and 33 were diagnosed with PsA. Bacterial species were identified and compared against symptom severity based on the Psoriasis Area and Severity Index (PASI).

Results: The most frequently identified microorganism was Streptococcus viridans, whose presence was positively correlated with higher PASI scores. Patients with upper respiratory infections exhibited significantly more severe clinical manifestations.

Conclusions: Microbial infections of the upper respiratory tract, particularly involving S. viridans, appear to contribute to psoriasis exacerbation. These findings suggest that performing oral swabs and treating infections may be an important adjunct in managing disease severity among psoriasis patients.

Keywords: psoriasis, PASI, pharyngitis, infection, Streptococcus, swab

Microbiota, anxiety, and food - a mental and nutritional profile of people with gastrointestinal symptoms

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Background: The human gut microbiota is a complex ecosystem crucial for maintaining homeostasis. Its composition is influenced by factors such as environment, lifestyle, medications, and diet. Recent literature highlights its role in the gut-brain axis, whose disruption may contribute to psychiatric conditions like anxiety and depression. A Western diet may lead to intestinal dysbiosis, which often co-occurs with gastrointestinal complaints and can negatively impact psychological wellbeing.

The aim: This study aimed to assess anxiety symptoms and eating habits in adults reporting gastrointestinal issues potentially indicative of dysbiosis.

Materials and methods: The study was conducted as an anonymous online survey from October 2023 to February 2024. 220 adults aged 18-60 years participated. Three standardised tools were used: the GAD-7 (assessment of anxiety symptoms), the FFQ-6 (assessment of eating habits) and the GSRS (assessment of gastrointestinal symptoms). Statistical analysis was performed using the chi-square test and a multiple regression model in Statistica StatSoft ($p<0.05$).

Results: The largest proportion of respondents (34.5%) rated their eating habits as moderately adequate, and 36.4% declared moderate mental health. Anxiety symptoms occurring almost daily were reported by 17.7% of respondents. No significant group differences were found in the distribution of anxiety symptoms ($\chi^2=1.27$; $p=0.74$). However, regression analysis revealed a significant link between more severe gastrointestinal symptoms and higher anxiety levels ($p=0.012$), as well as an inverse relationship between better self-assessed eating habits and anxiety ($p=0.039$). Age, gender, and BMI had no significant impact on anxiety symptoms ($p>0.2$).

Conclusions: Anxiety symptoms are evenly distributed in the study population, with no significant statistical differences.
 The presence of symptoms suggestive of intestinal dysbiosis correlates with higher levels of anxiety.
 Better quality of eating habits is associated with lower levels of anxiety symptoms.

Keywords: gut microbiota, mental health, nutrition, gastrointestinal complaints

The impact of social media in shaping nutrition knowledge

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Background: Social media is used by influencers, nutritionists, experts and individuals to share nutrition tips, recipes or lifestyles. However, due to a lack of clear regulations and a variety of sources, messages in these media are not always reliable and can influence dietary choices. In an era of widespread access to online platforms, users often draw information about diet and health, which carries the risk of misinformation and the promotion of unbalanced diets that can negatively affect health.

The aim: The aim of the study was to assess the impact of social media content on the formation of nutritional knowledge and to determine how different age and social groups respond to nutrition messages.

Materials and methods: The study included 100 participants, including 30 men and 70 women. The largest group consisted of respondents aged 25-34. A proprietary survey questionnaire was used, which included video footage, based on which the respondents assessed the credibility of the content presented. The questionnaire consisted of 15 questions.

Results: The most frequently indicated social media platforms were Facebook, Instagram and YouTube. More than half of the respondents felt that social media influenced their approach to nutrition, while 66% said they made changes to their diet based on content found online. Respondents with a college education showed the least susceptibility to manipulation. Middle-aged people were more likely to declare a belief in celebrity influence on diet and lifestyle decisions. The group aged 25-34 gave the best assessment of the credibility of the videos presented.

Conclusions: Analysis of the survey results showed that social media plays an important role in shaping respondents' nutritional knowledge. Those with a university education were characterized by greater resistance to misinformation. The results underscore the need to increase nutrition education and promote reliable sources of information in the online space.

Keywords: Social media, Nutrition education, Online platforms, Nutrition education

Risk of Orthorexia Nervosa Among Young Football Players from Poland and Türkiye: A Comparative Analysis Consid

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Background: The pursuit of athletic perfection often drives athletes to adhere to strict dietary and training guidelines, which in some cases may lead to the development of unhealthy eating behaviors, such as Orthorexia Nervosa.

The aim: This study aimed to assess the risk of Orthorexia Nervosa among young football players from Poland and Türkiye and to identify potential differences between these national groups.

Materials and methods: The study included 98 football players aged 15–18 years, recruited from two football academies in both countries. The risk of Orthorexia Nervosa was assessed using the Düsseldorfer Orthorexia Scale, a tool specifically designed to evaluate orthorexic eating behaviors. The nutritional status of the participants was assessed based on the Body Mass Index (BMI), which was then compared to appropriate centile charts characteristic of each country's population.

Results: The study found statistically significant differences between groups in body mass ($p = 0.003$) and height ($p < 0.001$). However, no differences were observed in BMI values ($p = 0.982$) or BMI centiles ($p = 0.051$). An increased risk of Orthorexia Nervosa was identified in 31% of all players, with its presence confirmed in 11%. Additionally, no significant differences were found in the prevalence of Orthorexia Nervosa between Polish and Turkish players ($p = 0.899$). Moreover, no differences were observed in the risk of Orthorexia Nervosa according to BMI classification ($p = 0.755$).

Conclusions: Despite significant differences in body weight and height between Polish and Turkish football players, no differences were found in the risk of Orthorexia Nervosa between these groups or according to BMI classification.

Keywords: Orthorexia Nervosa, Football players, Body Mass Index, Adolescents, Mental Health

Body Composition and Orthorexia Risk in Football Players of Varying Levels

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Background: Orthorexia Nervosa is a relatively newly identified eating disorder characterized by an obsessive pursuit of consuming only healthy foods. The risk of developing Orthorexia Nervosa is particularly high among athletes due to strong pressure to achieve physical perfection, optimize sports performance, and meet cultural standards of body aesthetics.

The aim: The study aimed to analyze the relationship between body composition and the risk of Orthorexia Nervosa in two groups of football players of different athletic levels.

Materials and methods: The study involved 53 players (26 professionals and 27 amateurs). The risk of Orthorexia Nervosa was assessed using the Düsseldorfer Orthorexia Scale, while body composition was measured using the InBody 570 analyzer, which provides measurements including: lean body mass, total body water content, fat mass, and percentage of body fat.

Results: A comparative analysis of body composition between players revealed significant differences in fat mass ($p < 0.001$) and percentage of body fat ($p < 0.001$). The average fat mass and its percentage content were higher among amateur football players compared to professional players. However, no significant differences were found in the prevalence of Orthorexia Nervosa between players from different levels ($p = 0.817$). Significant differences were observed in the number of points obtained in the DOS questionnaire between the groups ($p = 0.022$), with a higher average score among professional players. The analysis of the results did not show significant relationships between body composition and the risk of Orthorexia Nervosa ($p > 0.05$).

Conclusions: Despite significant differences in body composition between professional and amateur players, the risk of Orthorexia Nervosa was comparable in both groups, suggesting that sporting level does not have a significant impact on the occurrence of this disorder.

Keywords: Body Composition; Football Players; Sports Performance

THE RELATIONSHIP BETWEEN ORTHOREXIC TENDENCIES AND BODY IMAGE PERCEPTION AMONG DIETITIANS

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Background: An obsessive focus on healthy eating can lead to dietary restrictions and negatively im-pact quality of life. Dietitians, due to their expertise and daily involvement in nutrition-related topics, are particularly susceptible to developing orthorexic tendencies. Additionally, professional pressure may contribute to distorted perceptions of body image. Dietitians' in-depth understanding of healthy eating principles and their commitment to strict adherence may promote excessive control over food intake and intensify the pursuit of an ideal physique.

The aim: The aim of the study was to analyze the relationship between eating behaviors and body perception.

Materials and methods: The study included 153 dietitians (130 women and 23 men) aged between 21 and 56 years, and a control group of 30 individuals. The study was conducted between December 2024 and March 2025. Orthorexia tendencies were assessed using the Düsseldorf Orthorexia Scale (DOS-PL), while body perception was assessed using the Body-Esteem Scale for Adolescents and Adults (BESAA). Data were collected through a computer-assisted online survey

Results: The group of dietitians showed a significantly higher risk of orthorexic behavior compared to the control group ($p < .05$), particularly in the domain of the perceived importance of nutrition for health ($p < .001$). No significant differences were found in the domains of negative emotions or social exclusion. Dietitians evaluated their bodies more critically ($p = .002$) and were more aware of social evaluations of appearance ($p = .02$).

Conclusions: The study highlights a significant association between the pressures of the dietetics pro-fession and an increased risk of orthorexia. Both low body self-esteem and dissatisfaction with body weight were clearly associated with a higher risk of orthorexia in the study group. Raising awareness among dietitians and promoting body acceptance may be beneficial; however, further research is nee-ded.

Keywords: orthorexia nervosa, body image perception, dietitians, eating disorders

Assessment of oncology patients' knowledge of malnutrition prevention

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Background: Malnutrition is one of the most common and most underestimated problem among oncology patients. Secondary prevention of malnutrition plays a key role in comprehensive oncological care.

The aim: The aim of this study is to assess the knowledge of female oncology patients regarding the role of nutrition in cancer treatment

Materials and methods: The study was conducted using a proprietary survey questionnaire and the Simplified Nutritional Appetite Questionnaire (SNAQ). The research was conducted among adult female patients diagnosed with cancer. Statistical analyses were performed using the Statistica for Windows software.

Results: Based on the SNAQ questionnaire, 51 respondents were identified as being at high risk of malnutrition, and 26 respondents were classified as having a low risk of malnutrition.
 Based on BMI, n=5 (6,49%) individuals were identified as malnourished, n=34 (44,15%) had a normal BMI, n=25 (32,47%) were overweight, and n=13 (16,88%) were classified as obese.
 n=70 (90,91%) respondents stated that nutrition has an impact on the treatment process. n=35 (45,45%) respondents reported not receiving information from their physician regarding the importance of nutrition.
 n=33 (42,86%) respondents were not aware of their nutritional requirements, of whom n=23 (69,70%) belonged to the group at high risk of developing malnutrition.
 n=62 (80,52%) respondent believe that income has an impact on the quality of treatment, and n=70 (90,91%) stated that income affects the quality of food they are able to purchase.
 n=52 (67,53%) had not used the services of a dietitian. Additionally, n=36 (70,59%) individuals from the high risk group reported not consulting a dietitian.

Conclusions: Despite the growing awareness of the importance of nutrition in the treatment process, many patients still do not seek dietary consultations, and their knowledge in this area remains limited

Keywords: malnutrition, oncology, malnutrition prevention

From forest to pharmacy: antioxidant compounds in aqueous extracts from selected mushrooms.

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Background: Nowadays, the kingdom of mushrooms is gaining more and more popularity. Scientists have already discovered a few of their valuable properties. However, many features are still hidden. Mushrooms can be a great source of proteins, fiber, vitamins B, amino acids and minerals so we use them as a functional food. They are believed to have health-promoting properties such as being immunostimulants, anticancer, hypoglycemic and antioxidant agent. However, the majority of studies focus on alcoholic preparations of mushrooms.

The aim: The aim of the study was to analyze the antioxidant capacity and phytochemical content in aqueous preparation from selected mushrooms.

Materials and methods: Seven mushroom species were selected: Agaricus bisporus, Auricularia polytricha, Boletus edulis, Cantharellus cibarius, Imleria badia, Lentinula edodes, Suillus variegatus, and decoctions (from 1 part of mushroom, 10 parts of decoction were obtained) were prepared from them. All samples were filtered twice.
The total content of phenols, phenolic acids and total thiols, as well as antioxidant properties using ABTS, DPPH and FRAP methods, were analyzed.

Results: The highest total phenol and phenolic acid content was measured in Suillus variegatus. Significant amounts of thiols were determined in Agaricus bisporus, Boletus edulis, Suillus variegatus, and Imleria badia. The lowest content of the tested phytochemicals was measured in Lentinula edodes, Auricularia polyuria and Cantharellus cibarius. Water extracts from mushroom species containing higher amounts of phenolic compounds and thiols were characterized by higher antioxidant capacity than from the other species.

Conclusions: The demonstrated results indicate that the best antioxidant properties has Suillus variegatus. On the contrary of that, popular mushroom species such as Lentinula edodes, Auricularia polytricha and Cantharellus cibarius have much worse antioxidant properties.

Keywords: mushroom, antioxidant, phenols, phenolic acids, thiols

Cancer risk and dietary habits of adults - a pilot study

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Background: Cancer is among the leading causes of death worldwide every year and the number of diagnosed cases is steadily increasing. Many people are also at risk of developing cancer due to the presence of the disease in the family. Treatment is often lengthy and debilitating for the patient. Prevention is important, including diet based on healthy eating principles.

The aim: The aim of this study was to find out the dietary habits of adults with a family history of cancer, as well as other preventive behaviour, and to compare it to a representative group of people without a family history of cancer.

Materials and methods: The study group consisted of 95 adults, some of whom had a positive family history of cancer (n=59) and some of whom had a negative family history (n=36). In addition, 11 respondents had been diagnosed with cancer in the past. The research tool was a survey questionnaire consisting of a section of original questions and a section based on the KomPAN questionnaire.

Results: Cancer in the family was most often diagnosed in the grandmother or grandfather of the respondents. There were no statistically significant differences in the diets of the two representative groups of respondents for most products. However, at-risk patients are more likely to use skim dairy (p=0.01) and consume wholemeal bread (p=0.02). In addition, those with a family history of cancer are more likely to be convinced that they are at risk of developing the disease themselves (p=0.02), and more likely to experience ongoing anxiety about the disease (p=0.02). The presence of cancer in the family also does not affect the frequency of health-promoting and preventive behaviours among the respondents.

Conclusions: Based on the results, conclusions were drawn regarding the lack of specific differences in nutrition and suggesting the need for nutrition education among those at risk of cancer in terms of cancer prevention, yet further research is warranted.

Keywords: cancer, eating habits, preventive behaviours

Problematic eating styles at different stages of a woman's life

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Background: The scientific literature distinguishes three problematic eating styles: restrained eating (chronic restriction of food intake in order to control body weight), uncontrolled eating (loss of control over food consumption), and emotional eating (using food to regulate emotions). Despite numerous studies on eating styles, there is a limited amount of research specifically focusing on the prevalence of problematic eating styles among women of different age groups.

The aim: The aim of the study was to assess the prevalence of problematic eating styles among women across different age groups.

Materials and methods: A cross-sectional study was conducted using an online survey utilizing the TFEQ-18 (The Three-Factor Eating Questionnaire), consisting of three subscales: restrained, uncontrolled and emotional eating. The study involved 1016 women, who were classified into the following age groups: 18–24 (N=255), 25–35 (N=142), 36–45 (N=215), 46–54 (N=232), and 55+ (N=172). The results were subjected to statistical analysis using the Statistica 13.0.

Results: The average scores on the emotional eating subscale varied across age groups (18–24, 25–35, 36–45, 46–54, 55+) as follows: 43.14±28.82; 42.96±30.73; 38.29±28.81; 33.57±28.08; 35.34±27.45. The uncontrolled eating subscale showed the following age-specific means: 36.96±20.71; 34.38±20.98; 32.82±19.63; 30.06±19.24; 30.47±17.95, whereas the restrained eating subscale demonstrated: 39.52±21.08; 40.18±19.88; 47.75±19.36; 49.23±17.79; 50.03±18.00. With increasing age, the scores on the emotional eating subscale decreased (r= -0.124, p<0.0001). A similar trend was observed for the uncontrolled eating subscale (r= -0.140, p<0.0001). In contrast, scores on the restrained eating subscale increased with age (r=0.217, p<0.0001).

Conclusions: The findings indicated an age-related trend: as age increased, emotional and uncontrolled eating styles became less prevalent, whereas the prevalence of the restrained eating style increased.

Keywords: emotional eating, uncontrolled eating, restrained eating, TFEQ-18, women

The Risk of Eating Disorders in Adolescent Athletes in Comparison to Non-Athletic Peers

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Background: Eating disorders (ED) are mental disorders that considerably impair physical health and disrupt psychosocial functioning. The consequences of ED are particularly dangerous for adolescent athletes, who are at increased risk due to both their developmental stage and the specific characteristics of the sports environment. Despite numerous studies on the risk of ED among athletes, there is a limited amount of research specifically focusing on Polish athletes.

The aim: The aim of the study was to assess the risk of developing ED among adolescent athletes in comparison to their non-athlete peers.

Materials and methods: A cross-sectional study, utilizing the EAT-26 (Eating Attitudes Test), was conducted through an online questionnaire distributed during on-site school classes. The study involved 1517 students (912 females, 605 males) aged 14 to 19 years. Participants were divided into three groups: athletes (N=315; individuals actively competing in sports events), physically active individuals (N=669; those engaging in intense physical activity for at least 3–4 hours per week but not participating in competitions), and non-athletes (N=533). The results were subjected to statistical analysis using the Statistica 13.0. A significance value of $p<0.05$ was considered statistically significant.

Results: Women represented 85.25% (N=237) of individuals at risk for ED ($p<0.0001$). Among athletes, 17.78% (N=56) were at risk for ED, 19.73% (N=132) of physically active individuals, and 16.89% (N=90) of non-athletes, but these differences did not reach statistical significance ($p>0.05$). No statistically significant difference was observed between the mean EAT-26 scores of athletes (11.32Ī12.50) compared to non-athletes (11.09Ī12.28), $p>0.05$. In the subscales "dieting," "bulimia," and "oral control," athletes scored lower on average than the other groups.

Conclusions: No statistically significant differences were observed in the risk of developing ED between athletes, non-athletes, and physically active individuals.

Keywords: adolescents, athletes, eating disorders, EAT-26

The Relationship Between Self-Esteem and the Risk of Eating Disorders in School-Aged Youth

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Background: Adolescence is a period of dynamic physical and psychological change, which significantly shapes young people's self-esteem. External factors, such as social media, often hinder self-acceptance and the development of a positive self-image. In this developmental stage, individual personality traits may be overshadowed by social pressure and comparison with peers. Dissatisfaction with appearance can lower one's sense of control, increasing the risk of emotional difficulties and disordered eating.

The aim: The study aimed to assess the relationship between self-esteem and the risk of eating disorders among schoolchildren, with a focus on whether low self-esteem increases the likelihood of disordered eating behaviours.

Materials and methods: The study was conducted among 156 pupils (90 girls and 66 boys).Data were collected using an original self-esteem questionnaire and EAT-26 tool. Body composition (fat, muscle mass, hydration) was also measured.

Results: A total of 97 students (59%) felt they were valuable people, 36 (23%) disagreed, and 23 (15%) had no opinion. Self-acceptance was declared by 87 students (53%). Most respondents assessed their self-esteem as average (58%). Girls more often declared low self-esteem (17%) than boys (11%). The absence of eating disorder risk was most frequent among students with high self-esteem (97.9%), followed by those with low (83.3%), and least frequent among those with average self-esteem (20.7%). In contrast, the highest risk was found in students with average self-esteem (79.3%), compared to 16.7% with low and 2.1% with high self-esteem. Among girls, 42% were at risk of eating disorders, compared to 12% of boys.

Conclusions: High self-esteem appears to protect against the risk of eating disorders. Moderate self-esteem may be linked to greater vulnerability to external influences. Girls are more at risk, likely due to stronger socio-cultural pressure.

Keywords: self-esteem, eating disorders, youth

Assessment of consumer exposure to histamine in fermented non-alcoholic and low-alcohol beverages

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Background: Fermented beverages, including kombucha, wine, beer and ciders, feature high accumulation of biogenic amines (BA), specifically histamine. Histamine is an organic chemical compound that naturally occurs in many food products and also is produced by various yeasts and lactic acid bacteria during the fermentation process. The analysis of histamine concentration level in foodstuffs one of the most relevant aspect for food safety, because this compound is considered as one of the most toxic BA at high intakes.

The aim: The aim of the study was the quantitative analysis of histamine in selected low-alcohol and non-alcoholic fermented beverages and an assessment of the potential consumer exposure to its intake.

Materials and methods: The ELISA method was used to determine the content of histamine in selected beverages.
A total of 76 beverages were tested, including 22 non-alcoholic beers, 24 alcoholic beers, and 30 kombucha beverages purchased at supermarkets in the Silesian Voivodeship. The obtained results were compared with the recommended maximum content of histamine in alcohols.

Results: Histamine was detected in all analyzed samples, but in the case of 11 beverages, the concentration did not exceed the detection limit (LOD = 0.05 mg/L). For the remaining samples, the histamine content ranged from 0.055 to 0.975 mg/L. The highest average histamine concentration was reported in alcoholic beers (0.364 mg/L), with particular increase in products containing more than 5.1% alcohol by volume (0.423 mg/L). The highest exposure was observed in individuals with histamine intolerance; however, it remained at a low level.

Conclusions: The average histamine concentration was significantly higher in alcoholic products and increased proportionally with its alcohol content. The exposure assessment indicated that histamine levels in fermented non-alcoholic and low-alcohol beverages remained below toxicologically significant thresholds.

Keywords: Histamine, fermented beverages, kombucha, beer, exposure assessment

Medical students' awareness of nutritional problems affecting elderly people - preliminary results.

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Background: According to the Central Statistical Office (GUS), the percentage of people aged 60 and over in Poland in 2023 was 26.3 %. Adequate care for the elderly is key to sustaining a good quality of life, including the treatment of diseases affecting people of this age. Nutrition for the elderly is a key role of care, and awareness among future healthcare professionals is an important aspect in the face of a steadily increasing number of seniors.

The aim: The aim of this study was to test medical students' knowledge of nutrition for seniors.

Materials and methods: The study was conducted using an original questionnaire survey distributed to medical students. Only respondents declaring to be studying in a medical field were included in the study - n=39 out of n=46 who completed the questionnaire. A point was awarded for each correctly completed question (maximum 17 points). An author's method of assessing knowledge by adopting point ranges was defined.

Results: Most respondents were SUM students n=37 (94.9%). The largest group was dietetics students (n=20, 51.3%) followed by physiotherapy (n=8, 20.5%) and medical students (n=5, 12.8%). The average score was 8.9, with the highest number of people in the 9-11 score range 'satisfactory knowledge' (n=24, 61.5%). The worst performing question was on methods of assessing nutritional status, only 1 person (2.6%) studying public health answered correctly. Another question with a low performance was the one on medicines that cannot be used with grapefruit. Six people (15,4%) answered correctly. The wrong choices were NSAIDs (n=21, 53.8%) and metformin (n=17, 43.6%). Thirty-four people (87.2%) expressed an opinion on the level of education of health professionals about nutrition for the elderly - every opinion was negative.

Conclusions: The study group shows insufficient knowledge regarding nutrition in the elderly. Due to the study profile and the increasing number of elders, more attention should be focused on the nutritional aspect in geriatrics during the study programs.

Keywords: nutrition, elderly nutrition, nutritional knowledge, medical students

In silico and in vitro study on the effect of diclofenac alone and in combination with pterostilbene on breast

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Work's tutor: dr n. farm. Joanna Wawszczyk

Background: Breast cancer and colorectal cancer represent significant global health challenges, being among the most common cancers diagnosed worldwide and the leading causes of cancer-related deaths. Some compounds of natural origin, such as pterostilbene (PTB), have anticancer properties that may have potential therapeutic applications. They may also show synergism with already well-known drugs such as diclofenac (DC). DC is a non-steroidal anti-inflammatory drug which has been shown to be effective in the treatment of a variety of acute and chronic pain and inflammation. Moreover, inflammation is often a factor associated with cancer development and progression.

The aim: To evaluate the impact of DC alone and in combination with PTB on breast and colon cancer cells in silico and in vitro studies.

Materials and methods: In silico analysis was performed to evaluate the potential molecular interactions between DC and PTB by the ChemDIS Mixture System. In the in vitro study colorectal adenocarcinoma (HT-29) and breast cancer (MCF-7) cells were exposed to DC and also DC in combination with PTB was determined by SRB assay. Cancer cells were incubated with DC at concentrations from 0.01 mM to 1.6 mM and in combination with 20 μM or 40 μM PTB for 72 hours.

Results: The study evaluated the combined effects of DC and PTB on cancer cells, which was conducted using the ChemDIS Mixture System. The results showed a high probability of interaction between these two compounds against cancer cells. The study revealed the growth inhibitory effect of DC on studied cells at concentrations ≥ 0,01 mM. Cell mortality was significantly higher in cultures incubated with DC in combination with PTB.

Conclusions: The promising results of the in silico analysis suggest that it is reasonable to continue the simultaneous study of DC and PTB. This is also indicated by the significant reduction in cancer cell survival, evidenced by the effect of DC alone and in combination with PTB in the in vitro study.

Keywords: diclofenac, pterostilbene, breast cancer, colorectal cancer, in vitro, in silico

The use of sulfoximines in the Mannich reaction

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Background: Our research focuses on the technologies that give access to new, more sophisticated chemical space and to the intensive research on novel functional groups that can improve the characteristics of the investigative agents. Within the project we are expanding yet largely unexplored chemical space of drug-like sulfoximine class and by widening scope of multicomponent reactions which are important tools in modern drug discovery, as they proceed with high atom economy and use simple, one-pot procedures, which makes them suitable for time- and cost-efficient tools for generating investigative new compounds for drug discovery. We present current results of optimization as well as scope and limitation of one of important types of multicomponent reactions - Mannich MCR.

The aim: The goal of this project was to find an optimal conditions for the Mannich reaction and to obtain the sulfoximine derivatives, which can be used for the synthesis of new types of drugs.

Materials and methods: We used a large set of commercially available substrates sulfoximines and a.o. carbony compounds, (hetero)arenes and acids as efficient catalyst. The products were isolated using standard chromatography (normal and reverse-phase) methods, identified and characterized using LC-MS and NMR techniques.

Results: We completed the optimization of model Mannich reaction. We implemented the developed protocols to the synthesis of diversity-oriented set of novel sulfoximine-based class of compounds. Broadening of the scope of reactions is still in progress.

Conclusions: Mannich reaction is a robust and versatile tool for obtaining new sulfoximine scaffold of potential use in medicinal chemistry and chemical biology.

Keywords: MCR, mannich reaction, sulfoximines, drug discovery

Beyond Human Sight: AI Uncovers Hidden Drug Risks in Elderly Patients

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Work's tutor: dr n.med. Małgorzata Stompór

Background: Polypharmacy is an increasing concern in geriatrics. Traditional methods for screening drug interactions are labor-intensive and prone to error. The aim: This study evaluates the use of artificial intelligence (AI), for detecting hazardous drug interactions in geriatric long-term care settings.

The aim: This study evaluates the use of artificial intelligence (AI), for detecting hazardous drug interactions in geriatric long-term care settings.

Materials and methods: A comprehensive medication review was performed on 187 elderly patients, encompassing both geriatric and psychogeriatric departments, and analyzed using the DeepSeek-V3 AI model.

Results: The AI system identified 13 clinically significant drug interactions among the 187 elderly patients. Specifically, it flagged tramadol-SSRI combinations (n = 2), which pose a risk for serotonin syndrome, and opioid-benzodiazepine pairings (n = 3), increasing the risk of central nervous system depression and respiratory compromise. The AI also detected SSRI-NSAID interactions (n = 2), raising concerns about gastrointestinal bleeding, as well as valproic acid-SSRI combinations (n = 2), which can affect coagulation and seizure thresholds. Additionally, the system identified benzodiazepine-hydroxyzine co-prescriptions (n = 2), which may amplify sedation and fall risk. The AI tool also flagged moderate-risk pharmacokinetic interactions related to cytochrome P450 metabolism, requiring clinical monitoring. All identified interactions were manually verified, with no false positives found, demonstrating high sensitivity and specificity.

Conclusions: AI serves as a valuable decision-support tool, helping clinicians identify high-risk interactions that may be overlooked. While the system performed well in this cohort, larger studies are needed to confirm its clinical reliability. These findings demonstrate AI's potential to enhance medication safety in elderly populations, supporting its integration as an adjunctive tool in polypharmacy management.

Keywords: geriatrics, polypharmacy, drug interaction, AI

Two Wards, Two Approaches: Analyzing Medication Strategies in Elderly Care

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Background: Polypharmacy is a major concern among older adults, with Polish seniors prescribed an average of 7 medications daily. Adverse drug events (ADEs) cause 5-7% of hospitalizations, most of which are preventable through better medication management. Drug-related harms, such as falls and hypoglycemia, remain leading causes of hospitalization, underscoring the need for improved prescribing practices.

The aim: The aim of this study was to analyze and compare prescribing patterns among hospitalized older adults in geriatric and psychogeriatric wards, with a focus on polypharmacy, sedative use, and pain management strategies.

Materials and methods: This cross-sectional study included 88 hospitalized geriatric patients. Data were collected on all prescribed medications and supplements. The analysis focused on evaluating the extent of polypharmacy, the use of sedative medications, and approaches to pain management across the two types of wards.

Results: Patients took an average of 6.9 medications, with women prescribed more than men. Medication use increased with age by 0.14 drugs per year. Psychogeriatric patients received opioids half as often as general geriatric patients. Pain management was implemented in 63.6% of cases, primarily with paracetamol (78.4%), Over one-third used multiple analgesics, with women more likely to receive as-needed pain relief, while men were prescribed opioids more frequently despite fewer pain diagnoses. Only 11.3% of dementia patients were prescribed pain medication. Additionally, 28% were on co-analgesics like SSRIs, and 41% were prescribed at least two sedating medications - 18% took three or more, raising serious safety concerns.

Conclusions: These findings highlight the urgent need for (1) deprescribing high-risk medications, particularly sedatives and duplicate analgesics; (2) standardized, gender-neutral prescribing protocols; and (3) mandatory medication reviews using STOPP/Beers criteria to improve patient safety.

Keywords: Geriatrics, pain management, polypharmacy, LTCF

"Synthesis and characterization of novel calcium silico-phosphates as potential drug delivery systems"

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Work's tutor: dr Łukasz Pajchel

Background: Silicocarnotite (CPS) is a type of silicate bioceramic with the chemical formula $Ca_5(PO_4)_2SiO_4$. Its specific crystalline structure contributes to high mechanical strength and significant resistance to abrasion, bending, and compression. At the same time, it exhibits excellent biocompatibility, making it a promising material for tissue engineering and bone defect repair. The incorporation of additional ions into its structure can modify the material's properties by altering its biocompatibility, durability, crystal structures and also enhance its potential to improve bone tissue regeneration. This approach remains innovative, as only a limited number of studies have described the synthesis of ion-doped silicocarnotite, and none of them have confirmed the successful substitution of the native ions in its structure.

The aim: The aim of this project is to synthesise ion-doped silicocarnotite enriched with zinc (Zn^{2+}) and cobalt (Co^{2+}) ions, intended for potential biomedical applications. Doped CPS can serve as an effective drug delivery system due to their high porosity. It also has therapeutic properties of its own, including the promotion of osteogenesis and angiogenesis.

Materials and methods: In this study, the successful synthesis of the material was achieved, and its identity was confirmed using spectroscopic techniques (FT-IR and Raman spectroscopy) and powder X-ray diffraction (PXRD).

Results: The results indicate the preservation of the silicocarnotite crystal structure in the obtained materials, confirming the effectiveness of the synthesis method.

Conclusions: Further investigations will focus on evaluating the bioactivity of the materials, their ion release capacity, and their potential applications in medicine. This work may significantly contribute to the development of novel functional materials for targeted therapy and tissue engineering.

Keywords: biomaterials, bone substitutes, silicocarnotite, ion-doped bioceramics

Targeting BCL-2 proteins with novel synthetic derivatives of genistein to resist apoptosis in lymphoma

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Work's tutor: Dr okeke Medical laboratory science

Background: Lymphoma comprises heterogeneous malignancies, representing approximately 5% of malignancies. Resistance to apoptosis, a hallmark of cancer, is centrally regulated by members of the BCL2 family of proteins. Computational or In Silico methods aid in simulating virtually every facet of drug discovery. This research focuses on examining the anticancer prospects of novel synthetic derivatives of genistein against apoptosis target, BCL-2 proteins, in lymphoma

The aim: To target bcl-2 proteins using synthetic derivatives of genistein

Materials and methods: The coordinates of the BCL2 protein was retrieved from the protein data bank (6O0K) and prepared for docking with the MGL Tools and PyMol softwares. The 3D model of two novel synthetic derivatives of genistein, being adducts of ninhydrin (compound 1) in which one of the compounds has barbituric acid incorporated into the adduct (compound 2). The molecular docking was done taking the native ligand of the downloaded protein (venetoclax) as the reference compound

Results: The binding affinity of venetoclax was -12.2 kcal/mol while that of compound 1 and compound 2 are respectively, -9.7 kcal/mol and -9.5 kcal/mol. The two new compounds though having lower binding affinity relative to the reference drug, have more polar contacts with the target protein (3 each) unlike that of ventoclax that has 2 polar contacts. Compound 1 has a better score for the quantitative estimate of druglikeness (QED, 0.361) which is much better than that of venetoclax which is 0.076 and suggests that compound 2 will be more druggable than ventoclax. Furthermore, Using the Lipinski rule as a second model for assessing druglikeness, compound 2 still turned out to have a better profile (only compound accepted by Lipinski's rule).

Conclusions: Compound 2 looks like a promising compound for targeting Lymphoma in a bid to get optimum binding affinity for the BCL2 protein in the cancer cells which will ultimately lead to cancer cell death without the toxicity that is associated with venetoclax.

Keywords: genistein, lymphoma, apoptosis, BCL-2 proteins, In Silico

Distinctive Features of Malignant Versus Benign Parathyroid Lesions: Insights from a Retrospective Study

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Background: Parathyroid carcinoma is an exceptionally rare malignancy, accounting for fewer than 1% of primary hyperparathyroidism cases. Symptoms from excessive parathyroid hormone (PTH) secretion and hypercalcemia often precede tumor invasion of adjacent tissues. Differentiating carcinoma from benign adenoma intraoperatively remains a major challenge due to their similar appearance. Timely radical surgery is crucial to reduce recurrence risk.

The aim: To identify clinical and biochemical features that could support early recognition of patients at increased risk of parathyroid cancer.

Materials and methods: This retrospective analysis included 344 patients treated surgically for primary hyperparathyroidism at the National Institute of Oncology (NIO PIB) between 2017 and 2024. Both clinical characteristics and biochemical parameters were evaluated to distinguish carcinoma from benign lesions.

Results: Among the 344 patients (288 women, 56 men; mean age 56.15 years, range 18–88), parathyroid carcinoma was diagnosed in 8 individuals (2.3%). These patients were slightly younger than those with benign lesions (mean 50.75 vs. 56.28 years; $p > 0.1$). Median serum calcium was higher in the carcinoma group (2.96 mg/dL vs. 2.85 mg/dL), though not significantly ($p = 0.23$). However, tumor volume and PTH levels were markedly elevated in cancer cases (10.8 ml vs. 1.06 ml, $p < 0.001$; 1290.6 pg/ml vs. 224.4 pg/ml, $p < 0.025$). Additionally, a notably lower PTH-to-tumor volume ratio was observed in malignant cases, indicating a unique biochemical profile.

Conclusions: Parathyroid carcinoma is associated with significantly larger tumors, higher PTH levels, and elevated calcium compared to benign lesions. These parameters—especially PTH concentration and tumor size—may serve as useful markers in differentiating malignancy. Furthermore, a reduced PTH-to-volume ratio could provide an additional diagnostic clue. Recognizing these predictors early may support timely diagnosis, guide surgical decision-making, and improve clinical outcomes.

Keywords: Parathyroid carcinoma, Parathyroid adenoma

Remodeling of glioma microenvironment through hiperbaric oxygen modulates micro-RNAs expression.

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Work's tutor: dr hab n med. Anna Bielecka Wajdman

Background: Remodeling of strong hipoxic glioma microenvironment seems to be an atractive strategy in glioma therapy therefore application the appropriate complementary treatment such a hiperbaric oxygen (HO) may have significant inluence on weakening malignant phenotype this tumor. Due to constant impass in a standard treatment with Temzolomide (TMZ) and radiotherapy and high mortality among patients with glioma, microRNAs are recently considered as a potential prognostic biomarkers of treatment or relapse free survival. However up to now there is no information about correlation between HO and microRNA expression changes.

The aim: The aim of our study was to investigation the influence of HO on microRNAs expression changes (microRNA0138, 128, 210,21), HIF1-alfa level, TMZ sensitivity and selected malignant features of glioma such a proliferation and viability).

Materials and methods: Influence of hiperbaric oxygen alone or its combination with TMZ on: relative expression of microRNA-138,128,21,210 (QRT-PCR), HIF-1 alfa level (ELISA assay), viability (EVE cell counter) and proliferation (BrdU) in a commercial U87 and primary reccurent glioma HROG17 cell lines have been studied (qRT-PCR). Exposition glioma cells on hiperbaric oxygen (HO) was conducted in hiperbaric chamber (Nowe Technologie, model NT2200, Nowe Technologie, Łódz, Poland).

Results: The findings of our study for the first time shown that HO can modulate expression of microRNAs, HIF-1alfa level , TMZ sensitivity and malignant features of glioma but this effect can be specific to a particular glioma cell line.

Conclusions: Study scheds a new lighy on a HO using as a potential complementary therapy in glioma however the meaning observed of microRNA expression changes needs multiomic analysis.

Keywords: glioma, miRNA, HBOT, temolozomide

The Impact of Glutathione Metabolism in CRISPR-Cas9 Modified Cells

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Background: Glutathione (GSH) is a key antioxidant tripeptide that neutralizes ROS and maintains redox balance via the GSH/GSSG cycle, regulated by GPX, GR, and GST enzymes. Its dysfunction contributes to oxidative stress-linked diseases like cancer and neurodegeneration, with therapeutic potential.

The aim: This study aims to investigate the function of glutathione and assess the importance of the GPX4 enzyme in antioxidant defense by selectively deleting the GPX4 gene from HCT-116 cells using CRISPR-Cas9 technology.

Materials and methods: To better understand cellular defense mechanisms against ROS, we employ confocal microscopy and fluorescence signal analysis. These methods enable precise monitoring of intracellular processes, including changes in redox balance and oxidative stress levels.

Results: Erastin treatment induced oxidative stress in all cell lines, reducing the GSH/GSSG ratio most severely in GPX4-KO cells ($37.47 \rightarrow 14.4$). WT cells showed compensatory GSR upregulation ($p<0.05$) and thioredoxin pathway activation, while KO cells failed to mount this defense. GPX4 expression was abolished in KO cells and significantly decreased in erastin-treated WT cells. The thioredoxin system was disrupted in PC cells ($\downarrow$TRX, $\downarrow$TRXRD), revealing GPX4's essential role in maintaining both glutathione and thioredoxin antioxidant systems. These findings demonstrate that GPX4 knockout synergizes with erastin to deplete GSH pools and disable backup defense mechanisms, creating a ferroptosis-permissive state.

Conclusions: Using CRISPR/Cas9 to silence GPX4 in HCT116 cells, we demonstrated that GPX4 depletion disrupts glutathione homeostasis, increasing susceptibility to oxidative stress and ferroptosis. Notably, erastin-induced cell death led to glutathione depletion and GPX4 inhibition, while normal cells showed compensatory activation of the thioredoxin system. Modified cells, however, failed to activate these antioxidant defenses, confirming GPX4's essential role.

Keywords: HCT116, glutathione, ROS, GPX4, CRISPR-Cas9

Medication-related osteonecrosis of the jaw (MRONJ) - prevention and treatment

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Background: Medication-related osteonecrosis of the jaw (MRONJ), associated with the use of medications such as bisphosphonates, denosumab, and some other antineoplastic drugs is a serious adverse effect, being increasingly reported in oncology. MRONJ complicates cancer therapy and significantly impacts patient quality of life.

The aim: Evaluation of MRONJ risk factors in oncological patients and facilitation of early identification.

Materials and methods: This paper presents a retrospective clinical observation of 38 patients admitted at the Department of Cranio-Maxillofacial Surgery at the Medical University of Silesia in Katowice, who were diagnosed with MRONJ. The patients were between 1st January 2024 and 1st March 2025. After application of inclusion criteria (which were: cancer as a primary disease, treatment with zoledronic acid, no radiation therapy to the head and neck region), 19 patients were included in the final study. The etiopathogenesis, risk factors, clinical symptoms, as well as diagnostic and therapeutic methods have been taken into account.

Results: The study highlights early symptoms associated with diagnosis of MRONJ and compares size, severity and localisation of the lesions, depending on risk factors (such as: tooth extractions, possible odontogenic foci, use of dentures). Moreover, patients' general medical conditions, other medications and applied prophylaxis are displayed as crucial factors.

Conclusions: The greatest risk factors for MRONJ are the lack of prophylaxis, and dental procedures during and after treatment with antiresorptive drugs. The presented findings indicate the need for increased medical attention from oncologists prescribing these therapies. Early diagnosis and appropriate therapeutic management increase the chances of limiting complications.

Keywords: MRONJ, osteonecrosis, bisphosphonates, dental procedures, retrospective clinical study

Clinical Characteristics of Patients with Systemic Mastocytosis: A Retrospective Single Center Analysis

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Background: Systemic mastocytosis (SM) is a rare clonal disorder characterised by abnormal proliferation and accumulation of mast cells in various
organs. Mutations in the KIT gene, particularly in codon D816V, serve as therapeutic targets. Midostaurine, a multikinase inhibitor, has
emerged as an effective treatment option for patients with advanced MS.

The aim: The aim of this study was to evaluate the clinical characteristics and outcomes of MS treatment, with a particular focus on the efficacy and tolerability of midostaurin.

Materials and methods: A retrospective analysis of 20 patients diagnosed with systemic mastocytosis with a median age of 62 years (range 32-79), 6 women (30%)
was performed. Clinical and laboratory data was collected and analysed.

Results: The KIT D816V mutation was found in 14 patients. MS subtypes included 15 ASM (aggressive systemic mastocytosis), 1 SM-AHN (ASM
with associated haematological malignancy), 2 SSM (smoldering systemic mastocytosis) and 2 ISM (indolent systemic mastocytosis). B
symptoms were present at diagnosis in 15 patients, skin involvement in 11, bone involvement in 10 and lymphadenopathy in 4. The median
tryptase level was 136.5 ng/ml (range: 19.6-841). 4 patients did not require systemic treatment (ISM, SSM), 1 patient died before treatment.
11 patients received midostaurin (3 after prior cladribine) and 4 received cladribine alone. The median duration of treatment with midostaurin
was 7 months (range 1-60). All patients treated for more than 6 months achieved a partial remission (PR); in others, poor tolerability led to
early discontinuation. Common adverse events included cytopenias (N=3) and gastrointestinal symptoms (N=4). 8 patients died (7 with ASM
and 1 with SM-AHN).

Conclusions: Tolerance to midostaurin is variable. However, patients with good tolerance have favourable clinical outcomes.

Keywords: systemic mastocytosis, midostaurin

Haemophagocytic lymphohistiocytosis in adults - a single centre experience

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Background: Haemophagocytic lymphohistiocytosis (HLH) is a rare, severe hyperinflammatory reaction caused by excessive cytokine release. The mortality rate for untreated patients is 100%, while the prognosis for treated patients is uncertain.

The aim: To characterize HLH patients and to evaluate prognostic parameters.

Materials and methods: All 11 patients (7 males) diagnosed with HLH between 2010 and 2025 were included in this retrospective study (median age: 42 years, range 24-77). Statistical analysis was performed using Statistica software.

Results: The median time from onset of symptoms to diagnosis was 6 weeks (range 1-9). The most common presenting symptom was fever (91%); the leading physical finding was hepatosplenomegaly (100%). Laboratory investigations revealed anaemia (100%; median haemoglobin [Hb] 9.7 g/dL, range 5.5-11.3), thrombocytopenia (100%; median platelet count [PLT] 59 G/L, range 18-122), leukopenia (100%, median white blood cell [WBC] 1,4 G/L, range 0,57-2,26), hypertriglyceridemia (91%; median 4.4 mmol/L, range 1.02-8.38), hypofibrinogenemia (73%; median 0.86 g/L, range 0.41-2.96), hyperferritinemia (100%; median 40000 ng/mL, range 12470-40000). All patients had bone marrow haemophagocytosis. One patient had haemophagocytes in the cerebrospinal fluid. The median HScore was 283 (range 245-337). HLH was due to cancer in 2 patients, infection in 4, and autoimmune disease in 2. 10 patients were treated according to the HLH-2004 protocol. One patient died before starting targeted treatment. Median follow-up was 18 days (1-480 days). Seven patients died. WBC and PLT at diagnosis and lung involvement were found to be statistically significant for patient survival. There was no statistically significant correlation between HScore and patient survival.

Conclusions: HLH is an aggressive and often fatal disease. WBC, PLT, and lung involvement may be significant prognostic factors in HLH patients.

Keywords: hemophagocytic lymphohistiocytosis, HScore, HLH

The study on the drug repositioning and treatment efficacy in glioblastoma 3D culture models and in vitro co-c

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Background: Strong heterogeneity, hypoxia, resistance to therapy and a high risk of local recurrence imply that the treatment of glioblastoma remains a big challenge for medical oncologists. Because of the lack of significant therapeutic progress resulting in the life extension among patients, the ideas of new therapeutic targets, other drugs supporting primary therapy, and the strategy for modulating the hypoxic tumour microenvironment are currently being examined. Due to their immunomodulatory and regulatory properties, the antidepressants were proposed for repositioning, which led to using them also in other medical indications, including oncology. It is not known how modulating the tumour microenvironment may affect the drug sensitivity and carcinogenesis.

The aim: The study aimed to assess the influence of Amitriptyline and Temozolomide on glioblastoma cell lines HROG17 (recurrence) and HROG02 (primary lesion) cultured in hypoxia and hyperbaric oxygen conditions.

Materials and methods: The in vitro experiments were conducted on the spheroidal model and in the co-culture system, which enabled the cross-talk between glioblastoma cells and astrocytes. The assessments were performed independently in hypoxia (an incubator providing conditions of 2% oxygen concentration) and hyperbaric oxygen conditions (a commercial hyperbaric chamber).

Results: Microenvironment conditions (both hypoxia and hyperbaria) significantly modulated both the sensitivity of glioblastoma cells to Temozolomide, as well as spheroid formation and size. On the other hand, Amitriptyline silenced selected features of glioblastoma malignancy when administered alone in cell cultures.

Conclusions: Hyperbaria may be of potential importance in sensitising glioblastoma cells (both the primary lesion and recurrence) to Temozolomide and Amitriptyline. However, this response is specific to glioblastoma cell lines, so enriching the experimental models with 3D systems is important for a more complete imaging of drug-induced changes in the in vitro models.

Keywords: Glioblastoma; 3D culture; co-culture system; drug repositioning; Amitriptyline; Temozolomide

Knowledge about HPV vaccination among individuals aged 18-58

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Background: Cervical cancer primarily stems from HPV (Human Papillomavirus) infection, emphasizing the importance of both early detection and preventive vaccination efforts. By evaluating public knowledge, we can identify areas lacking awareness.

The aim: The study evaluated knowledge and opinion about vaccination against the Human Papillomavirus (HPV).

Materials and methods: The retrospective study surveyed 286 women and 65 men aged 18-58 about their knowledge about vaccination against Human Papillomavirus (HPV). The questionnaire was distributed from February 2025 to March 2025 via Internet forums. The survey included a self-report questionnaire based on the guidelines of the Polish Society of Gynecology and Obstetrics.

Results: The study included 351 participants (286 women and 65 men) aged 18-58. A total of 38 respondents were unaware of the existence of HPV vaccination. Only 31,1% (89/286) of women reported being informed about vaccination during a gynecological visit, and 34.9% (100/286) had undergone HPV screening at least once in their lifetime. Among all participants, 87 individuals had received the HPV vaccine. Regarding parental vaccination decisions, 31.5% (28/89) of parents vaccinated their children against HPV. A significant majority (73.2%) believed that HPV vaccination should be mandatory and 82% (288/351) would get vaccinated if the vaccine were fully reimbursed. Furthermore, 91.4% (321/351) of respondents recognized the social importance of HPV vaccination.

Conclusions: This research highlights that despite growing awareness, there are significant gaps in HPV vaccination knowledge. Despite this, a strong societal belief in the importance of HPV vaccination exists. Increasing education and accessibility could further improve vaccination rates, contributing to more effective HPV-related cancer prevention.

Keywords: HPV, vaccination, prevention, public awareness, health education, cervical cancer

Aberrant right subclavian artery (ARSA) – an important additional marker in prenatal fetal examination

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Work's tutor: dr n. med. Tomasz Lepich

Background: In approximately 1% of cases, the right subclavian artery arises directly from the aortic arch and is referred to as an aberrant right subclavian artery (ARSA). ARSA can be detected during prenatal fetal screening, and its occurrence is considered a potential marker for congenital anomalies. In children, ARSA can lead to dysphagia, dyspnea, respiratory failure with stridor and coughing.

The aim: The aim of this study was to conduct a detailed analysis of fetal cases with ARSA detected during prenatal ultrasound, focusing on its association with congenital anomalies and chromosomal aberrations.

Materials and methods: A retrospective analysis was conducted on 16 cases of fetuses diagnosed with ARSA using prenatal ultrasonography.

Results: The mean age of the studied patients was 32.8 Ī 5.65 years. Isolated ARSA was observed in 10 out of 16 cases, accounting for 62.5%. A normal karyotype was found in 13 cases (81.25%). Among the three cases with abnormal karyotypes (18.75%), one case of trisomy 21, one case of chromosome 18 deletion, and one case of tetrasomy 9p were identified. Cardiac abnormalities were observed in 5 cases (31.25%). Two-vessel umbilical cord was present in 2 out of 16 fetuses with ARSA (12.5%). In the case of non-isolated ARSA, the risk of an abnormal karyotype is significantly higher (p=0.036). The mother's age does not affect whether ARSA is isolated or non-isolated (p=0.175).

Conclusions: ARSA may serve as a useful additional marker for fetal congenital anomalies. The detection of ARSA during fetal life can positively influence neonatal care and treatment in cases where symptoms related to ARSA occur.

Keywords: aberrant right subclavian artery, fetal echocardiography, prenatal diagnosis, fetal ultrasound

Are Poles ready for reimbursement policy? Knowledge and emotions of in vitro fertilization among Polish people

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Work's tutor: Katarzyna Kwas MD, Grzegorz Guzowski1 MD, PhD; Piotr Sieroszewski Prof

Background: When natural conception is difficult or impossible, individuals and couples might utilize the medical treatment known as in vitro fertilization (IVF) to help conceive a child. In this procedure, the egg is fertilized with sperm outside the body in a lab, and the resultant embryo is subsequently implanted into the uterus. Recent changes to Poland's reimbursement laws have made public awareness and understanding of in vitro fertilization (IVF) even more important.

The aim: This study aims to assess the level of knowledge and awareness of in vitro fertilization (IVF) among Polish people.

Materials and methods: The study was conducted using a structured survey to assess the knowledge and perceptions of in vitro fertilization (IVF) among the general Polish population. The questionnaire consisted of 48 multiple-choice and open-ended questions divided into three main sections: sociodemographic characteristics, factual knowledge about IVF, and ethical considerations. Statistica 13.3 was used for all statistical analyses.

Results: The study involved 276 respondents; 77,9% (n=215) of respondents were women and 22,1% (n=61) were men. The average age of the respondents was approximately 34 years (SD = 13,22). The average length of time spent trying to get pregnant was 11 months (SD = 21,22). 40% of respondents confirmed that they know people who have used IVF, and one in ten women who have already given birth have used IVF. 67% of people consider the topic of IVF to be controversial, and as many as 21% believe that the disposal of unused embryos is a violation of the right to life. 72% of respondents support the reimbursement of in vitro treatments with public funds. Only 29% of people believe they have either good or excellent knowledge about in vitro.

Conclusions: The knowledge about in vitro fertilization in Poland is not widely spread, and the topic still raises many controversies and misunderstandings.

Keywords: in vitro, knowledge

Genital tract infections, genetics and breast milk - do they have anything in common?

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Background: Genital tract infections during pregnancy may increase the risk of complications such as preterm birth, low birth weight, or infections in the newborn. Early diagnosis and appropriate treatment are essential to reduce potential risks for both the mother and the baby. miRNAs play a crucial role in regulating gene expression and immune responses.

The aim: The aim of this study was to investigate whether genital tract infections during pregnancy influence breast milk composition, specifically miRNA expression.

Materials and methods: A case-control study was conducted on 31 patients in 38–40 hbd admitted for childbirth to the Department of Obstetrics and Pathology of Pregnancy. Breast milk samples (5 ml) were collected between the 3rd and 4th day postpartum. miRNA expression was assessed using qPCR analysis. The study participants were categorized into two subgroups based on the presence or absence of genital tract infections during pregnancy. Among them, eight patients had experienced such infections, while the remaining 23 had not.

Results: qPCR confirmed the presence of miR-21-5p, miR-26b-5p, miR-29a-3p, and miR-126-5p in the cell fraction of breast milk. Patients with genital tract infections (N=8) showed significantly lower expression of all four miRNAs compared to uninfected women (N=23). Specifically, miR-126-5p expression decreased nearly fourfold (p=0.005), miR-21-5p more than threefold (p=0.02), miR-26b-5p more than fivefold (p=0.029), and miR-29a-5p over tenfold (p=0.019). No other significant associations were found with clinical or demographic factors.

Conclusions: In conclusion, the qPCR tests conducted indicated that the expression of miR-21-5p, miR-26a-5p, miR- 29b-5p, and miR-126-5p was statistically significantly lower in cell fractions of milk from patients with genital tract infections during pregnancy compared to those without.

Keywords: pregnancy; PCR; microRNA; genital tract infections

Knowledge about the HPV and its prevention among women of different age groups

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Work's tutor: Dr n. med. Tomasz Wikarek

Background: Human papillomavirus (HPV) is a common viral infection that affects both men and women, but it is particularly concerning women due to its association with cervical cancer and other reproductive health issues. Despite its prevalence, awareness and knowledge about HPV and its prevention methods, such as vaccination and regular screenings, vary significantly among different age groups.

The aim: To assess the level of knowledge about HPV among women of various ages and level of education, identifying gaps in awareness and understanding of prevention strategies.

Materials and methods: The data were collected through an anonymous online survey containing questions about HPV prevention. A total of 60 women over the age of 18 participated in the study.

Results: The majority of respondents were women aged 18–34 with higher or secondary education. Most (75%, n=45) had 0–3 sexual partners, while 3.3% (n=2) had more than 10. A total of 90% (n=54) identified as heterosexual. Mechanical contraception(condoms) was reported by 51.7% (n=31) of participants, and 26.7% (n=16) had undergone HPV DNA testing. While all respondents had heard of HPV and the HPV vaccine, 33.3% (n=20) were vaccinated, and 43.3% (n=26) regularly underwent Pap smears. Only 1.7% (n=1) of women reported having no knowledge of HPV, while 3.3% (n=2) were unaware of the potential consequences of infection. The primary sources of HPV-related information were the internet and gynecologists. Additionally, 78.3% (n=47) considered the HPV vaccine an effective preventive measure. However, 91.7% (n=55) believed that awareness of the virus remains insufficiently widespread.

Conclusions: While awareness of HPV and the HPV vaccine are high, vaccination rates (33.3%), regular Pap smears (43.3%), and HPV DNA testing (26.7%) remain low. Mechanical contraception (condoms) during intercourse was reported by 51.7% of participants. These findings suggest a need for increased efforts in promoting HPV prevention and screening practices.

Keywords: HPV, HPV prevention, vaccination, cervical cancer, HPV awareness, pap smear

The influence of vitamin D levels on the development of autoimmune thyroiditis in patients with PCOS

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Background: Polycystic ovary syndrome (PCOS) affects 8–13% of women of reproductive age and is associated with reproductive and metabolic disturbances, including insulin resistance and obesity. Autoimmune thyroid disease (AITD), particularly Hashimoto's thyroiditis, is the most common autoimmune condition in this group and may worsen PCOS symptoms. Emerging evidence suggests a potential link between vitamin D deficiency and autoimmune disorders.

The aim: This study aimed to assess the association between serum 25(OH) vitamin D levels and the presence of AITD in women with PCOS.

Materials and methods: The study included 83 women: 29 with both PCOS and AITD, and 54 with PCOS only. Hormonal and metabolic parameters were analyzed, including serum levels of 25(OH) vitamin D, thyroid hormones, and PCOS phenotypes. Results: Women with both PCOS and AITD had significantly lower vitamin D levels (26.38 Ī 7.55 ng/mL) compared to those with PCOS alone (35.64 Ī 10.54 ng/mL; p < 0.0001). No significant correlations were found between PCOS phenotypes and thyroid hormone levels in either group.

Results: Women with both PCOS and AITD had significantly lower levels of 25(OH) vitamin D compared to those with PCOS alone, based on clinical and biochemical data. There was no significant difference regarding other parameters. No correlation between phenotype of PCOS, TSH and fT4 levels within those two groups of patients was found.

Conclusions: The findings suggest that vitamin D deficiency may act as an environmental trigger for the development of AITD in women with PCOS. Further studies are needed to evaluate vitamin D supplementation as a potential preventive strategy. Maintaining adequate vitamin D levels could be crucial in reducing autoimmune risk in this population.

Keywords: PCOS, autoimmune thyroiditis, vitamin D levels

Analysis of Risk Factors, Quality of Life and POP-Q Stage (Pelvic Organ Prolapse) in Women after TLH

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Background: Total laparoscopic hysterectomy (TLH) is one of the most commonly performed gynecological procedures, primarily indicated for abnormal uterine bleeding, uterine fibroids and endometrial hyperplasia. However, data evaluating the impact of hysterectomy on the risk of vaginal cuff or vaginal wall prolapse remain inconclusive.

The aim: The aim of this study was to assess the risk factors, quality of life and prevalence of pelvic organ prolapse stage III according to the POP-Q scale in patients who underwent TLH with vaginal cuff suspension to the uterosacral ligaments.

Materials and methods: The study included 226 women aged 31–79 years old, hospitalized between 2021 and 2024 at the Department of Gynecology, Obstetrics and Gynecologic Oncology at Prof. K. Gibiński University Clinical Center of the Medical University of Silesia in Katowice, who underwent TLH procedure. Subjective assessment was conducted using questionnaires including P-QoL, POPDI-6 and PFIQ-7, which evaluate quality of life and prolapse symptoms. Objective evaluation using the POP-Q scale was performed during clinical examination at the hospital's gynecological clinic.

Results: Prior to surgery, pelvic organ prolapse of stage ≥ III was observed in 2.2% of women - excluding those patients from further analysis. The mean follow-up period was 18 months. After TLH, prolapse of stage ≥ III was diagnosed in 1.4% of patients. Stress urinary incontinence occurred in 8.6% of women postoperatively. The main risk factors for pelvic organ prolapse included: hard physical labor, high parity, vaginal deliveries, high birth weight of newborn and postmenopausal status. Quality of life improved after TLH.

Conclusions: Based on objective measurements, TLH with uterosacral ligament suspension does not increase the risk of clinically significant vaginal cuff or vaginal wall prolapse.

Keywords: total laparoscopic hysterectomy, pelvic organ prolapse, quality of life

Assessment of Vitamin D levels in Silesian PCOS patients – a retrospective study

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Background: Polycystic Ovary Syndrome (PCOS) is one of the most common endocrine disorders in women of reproductive age. In recent years, increasing attention has been paid to the role of vitamin D in regulating hormonal and metabolic functions, particularly in patients with PCOS. Vitamin D deficiency may contribute to the exacerbation of PCOS symptoms, including impaired ovarian function.

The aim: To retrospectively analyze the correlation between serum 25-hydroxyvitamin D [25(OH)D] levels and the place of residence in patients diagnosed with PCOS, hospitalized between December 2021 and June 2024 at the Department of Gynecological Endocrinology, University Clinical Center in Katowice, Poland.

Materials and methods: Medical records of 1541 hospitalized patients were reviewed. Among them, 1343 patients resided in the Silesian Voivodeship, while 198 came from other regions of Poland. The study included women aged 18–43 years. Inclusion criteria were: age above 18 and a confirmed clinical diagnosis of PCOS.

Results: The majority of patients (n=1343) were from the Silesian Voivodeship, with 54.8% aged 18–25. Vitamin D deficiency was observed in 77% of all patients. A correlation between patient age and serum vitamin D levels was found regardless of the place of residence. In the total study population and the Silesian subgroup, a statistically significant relationship was identified between PCOS phenotype and age. The lowest mean age was observed in patients with PCOS phenotype 1, averaging 25 years, regardless of residence.

Conclusions: Most PCOS patients had deficient or insufficient vitamin D levels. A positive correlation between age and serum vitamin D concentration was found. Additionally, the distribution of PCOS phenotypes varied across age groups.

Keywords: Polycystic Ovary Syndrome (PCOS), vitamin D deficiency, hyperandrogenism

Where Life Falters: A Study of Spontaneous Abortion and the Shadows It Casts

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Background: Spontaneous abortion is defined as the loss of a non-viable embryo or fetus before 20–24 weeks of gestation. It is a common complication with multifactorial causes, including maternal age, prenatal care, and various medical or lifestyle-related factors. Most occur in the first trimester and remain unmonitored. The emotional toll is significant, with prominent emotional distress.

The aim: This retrospective study aimed to evaluate the incidence of abortion and its psycho-emotional impact and multifactorial causes among patients admitted to the "Elena Doamna" Clinical Hospital of Obstetrics and Gynecology in Iasi between January 1 and December 31, 2022.

Materials and methods: The study included 100 patients diagnosed with ongoing, incomplete, missed, or medically induced abortion or admitted for uterine evacuation. Inclusion criteria: age over 16 and confirmed diagnosis. Patients with psychiatric disorders, incomplete records, or who declined participation were excluded. Data were collected from medical files and interviews, covering demographics, obstetric history, and emotional responses. Descriptive statistics were performed using Microsoft Excel 2010.

Results: Abortion was most common among women aged 26–30 and 36–40 (23% each), and lowest in those over 41 (6%). Most were from rural areas (63%) and had prior pregnancies (86%). Recurrent losses affected 51%, mainly women over 35. Most abortions occurred in the first trimester (79%). Psychological symptoms were prevalent: sadness (94%), guilt (62%), and anxiety (56%). Lack of prenatal care (54%) was strongly linked to early losses, especially incomplete spontaneous abortions (38%). Main risk factors included thrombophilia (9%), uterine scarring (18%), smoking (15%), and poor monitoring (54%).

Conclusions: The study shows the etiology of spontaneous abortion, identifying limited prenatal care as a key modifiable risk factor. The high prevalence of early pregnancy loss and associated mental health emphasize the importance of obstetric monitoring and emotional support.

Keywords: Spontaneous abortion, Psychological symptoms, Prenatal care, First trimester

Double responsibility - eating disorders during pregnancy.

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Background: Pregnancy is characterised by the variety of physiological changes in a woman's body. Binge-eating disorder (BED) is a recently described condition based on frequent and recurrent binge eating episodes without the compensatory behaviors common to bulimia nervosa or other specified feeding or eating disorders (EDs).

The aim: The study aimed to identify the incidence of EDs, including BED and depression among the population of pregnant women and to find and characterise the possible risk factors for developing EDs during pregnancy.

Materials and methods: An anonymous, self-administered survey was distributed by the authors as a web-based questionnaire accessible via QR code to patients hospitalized at the Obstetrics Ward of the University Clinical Center in Katowice, Poland over a 12-month period March 2024–March 2025). The survey incorporated validated assessments, including the Eating Disorder Examination Questionnaire (EDE-Q), Beck Depression Inventory (BDI), DSM-5-based screening tools for Binge Eating Disorder (BED), the Multidimensional Scale of Perceived Social Support (MSPSS) and the Satisfaction with Life Scale (SWLS). The data were collected in an Excel spreadsheet and analyzed statistically using the STATISTICA software.

Results: A total of 183 females aged 19-40 years were surveyed. We identified the incidence of higher risk of EDs in 7.1% of women. We used the U-Mann Whitney test and observed statistically significant that smoking before pregnancy was correlated to higher scores in EDE-Q (p=0,015) and women with BED suffered from obesity before pregnancy (p<0,0001). We also found that depression has a positive correlation with BED during pregnancy (p=0,04).

Conclusions: The findings suggest that certain risk factors such as pre-pregnancy smoking, pre-pregnancy obesity, and symptoms of depression were all significantly linked to a higher likelihood of EDs. These results emphasize the importance of early screening, psychological support, and nutritional counseling for pregnant women.

Keywords: binge-eating disorder, eating disorders, depression, pregnancy

BMI and Insulin Resistance (HOMA-IR) in Women With PCOS: A Cross-sectional Analysis

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Background: Polycystic ovary syndrome (PCOS) is a common endocrine disorder often accompanied by body weight disturbances and insulin resistance. Body composition parameters play a significant role in the severity of metabolic symptoms in women with PCOS.

The aim: To assess the relationship between body mass index (BMI) and insulin resistance (HOMA-IR) in women with PCOS and to compare anthropometric and metabolic parameters with a control group.

Materials and methods: The study included 212 women: 167 diagnosed with PCOS (phenotype A – 43, B – 40, C – 45, D – 39) and 45 women without PCOS. BMI, WHR, VFA, body fat percentage, as well as glucose and insulin levels were analyzed in all participants. The HOMA-IR index was calculated accordingly.

Results: Statistical analysis revealed a positive correlation between HOMA-IR and BMI, suggesting that increased body weight is associated with higher insulin resistance.

Conclusions: In women with PCOS, higher BMI significantly correlates with increased insulin resistance. Body composition parameters should be routinely evaluated in clinical practice as part of the prevention and management of metabolic disorders in PCOS.

Keywords: Polycystic Ovary Syndrome, PCOS, Insulin Resistance, HOMA-IR, Body Mass Index, Metabolic Disorders

Myocardial Strain and Work in Patients with Severe Aortic Stenosis and Mitral Regurgitation Undergoing TAVI

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Background: Non-invasive assessment of myocardial work based on global left ventricular longitudinal strain (GLS) is gaining increasing recognition as a valuable tool for evaluating left ventricular function independent of loading conditions.

The aim: The clinical utility of myocardial work assessment in patients with severe aortic stenosis and mitral regurgitation undergoing TAVI.

Materials and methods: The study cohort consisted of 95 patients with a mean age of 79.1 Ī 5.3 years. Women accounted for 47.4% (45 patients), while men comprised 52.6% (50 patients).
Transthoratic echocardiography was performed in all patients.
Analysis of the myocardial work parameters were assesed on the EchoPac workstation.
Statistical analysis of myocardial work was presented in groups separated on the basis of MR severity.

Results: MR was identified in two-thirds of the study population, with moderate to severe MR present in 28% of patients. According to the Carpentier classification, type IIIa MR was the most prevalent, observed in 39 patients (67.24%), while the remaining 19 patients (32.76%) exhibited type IIIb.
GCW (Global Constructive Work) demonstrated significant differences between groups (p = 0.03). The lowest GCW value was observed in patients with severe MR (1555.0 Ī 521.0 mmHg%), whereas the highest value was recorded in those with moderate MR (2044.0 Ī 592.0 mmHg%). GWW (Global Waisted Work) did not differ significantly between groups (p = 0.72), nor did GWE (Global Work Efficiency) (p = 0.09), suggesting that the severity of MR had no substantial impact on cardiac efficiency within the study population.

Conclusions: In summary, the findings indicate that while parameters such as GLS, GWW, and GWE remain comparable across patient groups with varying degrees of MR, GCW may serve as a more sensitive indicator of changes in cardiac function in relation to MR severity.

Keywords: myocardial work, aortic stenosis, TAVI, mitral regurgitation

Coronary Artery Anomalies: Holter ECG Study

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Background: Anomalous aortic origin of a coronary artery (AAOCA) is an anatomical anomaly in

which coronary arteries arise from an abnormal spot and have an abnormal course. Depending on the location, such defects can be asymptomatic, or they can result in impaired perfusion of the myocardium, causing a wide range of symptoms.

The aim: The aim of the study was to assess the types of heart rhythm in Holter monitoring in patients with AAOCA in relation to their symptoms, age and type of the anomaly.

Materials and methods: We retrospectively analysed cardiac 16680 CT scans from a single center in Poland of

which 102 revealed AAOCA. From the group, we extracted patients who have had Holter monitoring (n=49), and analysed their results in relation to main rhythm, minimal and maximal heart rate, and symptoms.

Results: The study group consisted of 102 patients, of whom 44 were women and 58 were men. The mean age of the study group was 56.8 years, and the median was 60 years. In our group 48% of patients underwent ECG Holter examination. Four of them had AF, there was 1 pacemaker induced rhythm and 1 atrial ectopic rhythm, while 37 patients had normal sinus rhythm. The mean HR was 69/min. In 6 patients the main rhythm was not identified.

In 25 patients, the anomalous artery was the Cx originating from the right sinus, followed by RCA originating from the left anterior sinus (15 patients) and then Cx originating from RCA (12 patients).
The most common courses of arteries were retroaortic (48 cases) and interarterial (29 cases).

Conclusions: Atrial fibrillation was present in 7.5 % of patients diagnosed with coronary artery anomalies who were diagnosed using Holter monitoring. In the general population, at ages 64-75, persistent or permanent AF occurs in 4.8% of patients. Atrial fibrillation is a common condition in the older age, but comorbidity with a coronary anomaly may present a different clinical perspective, which is not yet well understood.

Keywords: atrial fibrillation, coronary anomalies, holter monitoring

Contrast-associated acute kidney injury in patients with glucose abnormalities treated invasively due to AMI

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Background: Renal dysfunction and glucose abnormalities (GA) are high risk comorbidities in patients with acute myocardial infarction (AMI).

The aim: The aim of this study was to determine the prevalence of contrast-associated acute kidney injury (CA-AKI) and its impact on prognosis in patients with newly diagnosed GA, who were treated invasively due to AMI.

Materials and methods: Single-centre registry encompassed 4556 survivors of AMI who were treated with percutaneous coronary intervention in acute phase of myocardial infarction. In all patients without diabetes mellitus (DM) oral glucose tolerance test was performed before hospital discharge defining particular GA. Subgroups with glucometabolic disorders were analysed with respect to coexisting CA-AKI and prognosis. Survival and comparative analyses were performed.

Results: : Among the whole study population, 644 patients developed CA-AKI (14.1%). Regarding particular GA the prevalence of CA-AKI was: 18.1% in previously diagnosed DM (prevDM), 19.8% in newly detected DM (newDM), 15.0% in impaired glucose tolerance (IGT), 9.6% in impaired fasting glycaemia (IFG), and 11.2% in subjects with normal glucose regulation (NGR). Patients who developed CA-AKI had significantly higher post-hospital mortality in all subgroups, with except to IFG: 37.4% vs. 20.1% for prevDM group, 27.2% vs. 13.2% for newDM group, 22.6% vs. 9.5% for IGT group, 22.0% vs. 8.9% for NGR group (all $p < 0.001$). Age was one of the strongest independent risk factors of death in all subgroups: prevDM (Hazard Ratio - HR 1.8, 95% Confidence Interval - CI 1.4-2.5), newDM (HR 1.9, 95% CI 1.1-3.2), IGT (HR 1.7, 95% CI 1.1-2.7), IFG (HR 2.4, 95% CI 1.4-4.3), NGR (HR 2.3 95% CI 1.5-3.4) (all $p<0.05$).

Conclusions: CA-AKI is relatively common renal complication in patients with different glucose abnormalities, who were treated invasively due to AMI. Patients with prevDM, newDM, IGT and NGR who developed CA-AKI had significantly increased long-term mortality.

Keywords: glucose abnormalities, myocardial infarction, acute kidney injury, diabetes mellitus, prognosis

Relation between selected echocardiography parameters and comorbidities in severe aortic stenosis

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Background: Transthoracic Echocardiography (TTE) is a useful tool in the assessment of the severity of aortic stenosis. Obtained parameters are essential for planning further diagnostic and therapeutic decisions. Since degenerative aortic stenosis commonly affects the elderly population, coexisting comorbidities could be a considerable factor in this assessment.

The aim: To evaluate the relationship between the presence of comorbidities and selected TTE parameters in patients with severe aortic stenosis.

Materials and methods: Patients hospitalized for severe aortic stenosis between 2019–2024 in two neighboring cardiology units were included. Medical histories were reviewed for prior PCI/CABG, MI, diabetes, dyslipidemia, hypertension, arrhythmias, kidney, and thyroid disease. TTE-derived echo data within 1 month of interview were analyzed. Exclusions: congenital heart defects, prior valve procedures, non-degenerative valve disease.

Results: 126 patients were included, with an average age of 75±10 (50% female). In concomitant PCI/CABG (44.8±17.8 vs. 54.8±24.5mmHg, p=0.01), hypertension (49.0±17.1 vs. 66.1±38.9mmHg, p=0.046) and arrhythmia (44.4±17.1 vs. 57.0±25.4mmHg, p=0.01) groups, aortic valve mean gradient (AVGmean) values were lower than in patients without those comorbidities. In coexisting PCI/CABG (3.9±0.9vs. 4.5±1.0m/s, p=0.004), hypertension (4.2±1.0 vs. 4.9±1.2m/s, p=0.01) and arrhythmia (4.0±1.0 vs. 4.5±0.97m/s, p=0.002) groups, values of aortic valve peak velocity (AVmax) were also lower. A larger left atrial area was present in patients with diabetes (28.9±5.7 vs. 26.7±6.9cm2, p=0.02), arrhythmias (29.2±6.6 vs. 26.3±6.4cm2, p=0.01), and hypertension (28.1±6.6 vs. 24.8±6.0cm2, p=0.03).

Conclusions: In patients burdened with either a past PCI/CABG, hypertension or arrhythmias, AVGmean and Vmax take on values closer to the physiological range than in patients without those comorbidities. In patients with diabetes, arrhythmias, or hypertension, left atrium enlargement was more pronounced.

Keywords: aortic stenosis, echocardiography, comorbidities

Automatic assessment of coronary artery stenosis from coronary CTA vs reference invasive coronary angiography

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Work's tutor: Magdalena Dobrolińska, MD, PhD

Background: Coronary atherosclerosis remains a leading cause of death in developed countries. Two imaging techniques are used to evaluate stenosis severity: invasive coronary angiography (ICA) and non-invasive coronary computed tomography angiography (CTA). Despite the growing use of CTA in clinical practice, ICA remains the reference standard.

The aim: This study aims to evaluate whether automatic stenosis measurements from CTA are comparable to those from ICA and whether they can be used interchangeably in patients not requiring revascularization.

Materials and methods: A total of 61 coronary segments from 50 patients who underwent both ICA and CTA at the Department of Cardiology and Structural Heart Diseases in Katowice were included in this retrospective analysis. CTA images were assessed using Autoplaque 3.0 (Cedars-Sinai, Los Angeles), a deep learning-based tool, for automatic stenosis quantification. Stenosis severity was calculated as the percentage of plaque volume to vessel volume. Results were divided into six groups (1: 0%; 2: 1–24%; 3: 25–49%; 4: 50–69%; 5: 70–89%; 6: >90%). Plaque composition was defined as: calcified (>350 HU), non-calcified (≤350 HU), lipid-rich (≤30 HU). Agreement between ICA and CTA was assessed using Cohen's kappa.

Results: No statistically significant differences were found between ICA and CTA in stenosis assessment (ICA = 34,56% Ī 22,69%, CTA = 33,39% Ī 19,9%, p = 0.388). Moderate agreement between the methods was observed (k = 0.428, p = 0.0184). In 25 cases (40.9%), stenosis was misclassified, with overestimation in 26.2% (16/61) and underestimation in 14.7% (9/61). 75% (12/16) of overestimated plaques were fully calcified.

Conclusions: Automatic CTA-based assessment is not inferior to ICA. Though overestimation occurs in calcified plaques, CTA remains a valuable non-invasive alternative in selected cases.

Keywords: coronary artery stenosis, coronary CTA, automatic quantification, plaque composition

Do SGLT2 inhibitors impact on efficacy of pulmonary vein isolation and clinical course of patients with heart failure with preserved ejection fraction and atrial fibrillation?

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Background: SGLT2 inhibitors remain a cornerstone of heart failure with preserved ejection fraction pharmacotherapy. Their great impact on HF is well proven. However, little is known about their actual influence on pulmonary veins isolation efficacy.

The aim: The aim of the study was to evaluate an impact of SGLT2i on one-year PVI efficacy and clinical course of patients with HFpEF and atrial fibrillation.

Materials and methods: This is a single centre retrospective study including 48 patients with HFpEF and AF, who underwent PVI (25 52.1% males; mean age at PVI: 63.5Ī10.4 years; NYHA II: 1.7Ī0.7; CHA2DS2-VA: 2.6Ī1.3; LVEF 54.9Ī3.6 %). There were 24 patients treated with SGLT2i (subgroup SGLT2i; patients hospitalized for PVI since 2022) and 24 patients without SGLT2i treatment (subgroup non-SGLT2i; patients hospitalized for PVI before 2022) matched as to the age, sex and concomitant diseases. The patients were analysed at the baseline hospitalization and after one year follow-up. Additionally, the following endpoints were evaluated: all- cause mortality, cardiovascular events, strokes or transient ischemic attacks, cardiovascular- related hospitalizations and severe bleedings.

Results: PVI efficacy was similar in both subgroups: 66.7% in SGLT2i vs 70.8% in non-SGLT2i subgroup. In SGLT2i subgroup the higher prevalence of subjective symptoms reduction (EHRA score) was noted (87.5% vs 70.8%). SGLT2i subgroup demonstrated lower one- year mortality than SGLT2i non- treated subgroup (0% vs 12.5%, p<0.1). Similar incidence of cardiovascular events was obtained in SGLT2i and non-SGLT2i subgroups (4.2% vs 0%), likewise for cardiovascular- related hospitalizations (12.5% vs 16.7%). Neither severe bleedings nor strokes and TIAs were identified.

Conclusions: SGLT2i treatment does not seem to increase PVI efficacy in patients with HFpEF in one year follow- up, but it may provide to symptoms reduction and better prognosis among this population. Due to the small population in the study, more research is needed to be carried out in the future.

Keywords: SGLT2 inhibitors, HFpEF pharmacotherapy, PVI, Noninvasive cardiology

The influence of CT vendor on aortic valve calcification measurement

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Background: Aortic stenosis (AS) is a valvular heart disease in which accurate assessment remains crucial for determining optimal treatment strategies. Both echocardiography and computed tomography (CT) play vital roles in evaluation of AS. Previous studies have revealed existing discrepancies in the Agatston score when evaluating vascular calcification using different vendor-specific systems.

The aim: To examine the role of vendor-neutral Agatston score (vnAS) in the classification of patients with indeterminate AS severity.

Materials and methods: This retrospective study included 100 patients with severe aortic stenosis, 50% were women. CT evaluation was performed at the Department of Cardiology and Structural Heart Diseases in Katowice. Calcification was quantified using the Agatston method (Syngo.via, Siemens Healthineers). The vnAS was calculated using a regression model evaluated by both coefficient of determination and analysis of variance. We assigned patients to aortic stenosis groups, according to previously defined thresholds: unlikely (<1600 men, <800 women), likely (>1600 men, >800 women), highly likely (>3000 men, >1600 women).

Results: The median Agatson score was 2111.8 (IQR 1497.9–2903.4) for women and 2522.7 (IQR 1730.6–3940.0) for men. The median vnAS was 2393.1 (IQR 1778.1–3409.6) for women and 2993.5 (IQR 1889.3–4618.9) for men. According to Agatston score, 28.0% of women were classified as likely and 72.0% as highly likely. In men, 22.0% were classified as unlikely, 36.0% as likely, and 42.0% as highly likely. Based on vnAS, 28.6% of women were reclassified from likely to highly likely, and 14.0% of all men were reclassified into an accurate AS risk group. A significant difference was observed in sex-specific groups after recalculating the calcium score (p<0.05).

Conclusions: In total, 8.0% of women and 14.0% of men were reclassified based on vnAS. The previously developed calibration tool may improve AS severity definition in patients with suspected severe AS.

Keywords: vnAS, computed tomography, aortic stenosis, aortic valve calcification

Morphological Analysis of Coronary Plaques in patients with Aortic Stenosis vs. Matched Controls

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Background: Aortic stenosis (AS) is the most prevalent aortic valve pathology among the elderly population and is often associated with coronary artery atherosclerosis due to shared pathophysiological mechanisms. Comparing the morphology of coronary plaques in patients with AS and those without AS could enhance our understanding of cardiovascular risk.

The aim: To assess differences in coronary plaque morphology between patients with and without AS.

Materials and methods: This retrospective study included 30 patients with AS who underwent transcatheter aortic valve implantation (TAVI) and 30 non-AS patients. Patient selection was based on image quality (Likert scale ≥4) and the presence of visually evident coronary atherosclerosis (CAD RADS score >2). Plaques were categorized as calcified plaque (CP) if their attenuation was greater than 350 HU, non-calcified plaque (NCP) if ≤350 HU, and lipid-rich plaque if ≤30 HU. Plaque morphology was assessed automatically using Autoplaque 3.0 software (AutoPlaque, Cedars-Sinai, Los Angeles).

Results: The AS group included 14 females and 16 males (65-93 yrs). The non-AS group included 16 females and 14 males (50-86 yrs). AS patients showed significantly greater amount of calcified plaque as compared to non- AS patients (Plaque Composition CP [%] – 100 (IQ: 11.25, 96,75) vs CP [%] – 25,6 (IQ: 96.6, 100), p < 0.001). No NCP plaques were found in AS patients. In non-AS patients the amount of NCP plaque was NCP[%] – 74,4; and lipid rich plaque was equal to LD NCP[%] – 9,85.

Conclusions: Based on our automatic analysis, there is a significant difference in plaque morphology between AS and Non-AS patients. These changes may reflect on the pathophysiological differences in plaque development and progression associated with aortic stenosis. Further studies are needed to explore the clinical implications.

Keywords: Aortic stenosis, Plaque morphology, Coronary artery disease, Coronary CTA

Changes in circulating LPS and zonulin following acute myocardial infarction: the impact of smoking

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Work's tutor: prof. dr hab. n. med. Anetta Undas, dr n. med. Elżbieta Paszek

Background: Serum lipopolysaccharide (LPS), a marker of gut dysbiosis and endotoxemia is associated with atherothrombosis and myocardial infarction (MI). We investigated factors affecting changes in LPS levels in patients post MI treated with percutaneous coronary intervention (PCI).

The aim: The aim of this study was to assess changes in LPS and zonulin levels in MI survivors overtime and to establish factors associated with these alterations.

Materials and methods: In 46 PCI-treated MI patients (mean age 57.2 [8.6]) years we measured LPS and zonulin, a marker of gut permeability, on admission, at 30 and 60 days thereafter, along with inflammatory markers (interleukin [IL]-6, IL-18), P-selectin, and an oxidative stress marker, 8-iso-prostaglandin F2α (8-iso-PGF2α).

Results: The median LPS concentration on admission was 44.0 (37.0-57.0) pg/mL and it fell by 11.3% at 1 month, with a further 8.3% drop after the second month, in association with zonulin, but not with P-selectin or inflammatory markers. LPS and zonulin at baseline positively correlated with 8-iso-PGF2α. A <10% decrease in LPS was recorded in 20 (43.5%) patients and was more frequent in smokers, those with a complete occlusion of the infarct related artery (IRA) and a shorter time from symptom onset to admission, with no relation to demographics, co-morbidities, pharmacotherapy, or inflammatory markers. LPS decrease <10% was associated with a decline in IL-10 concentrations 30- and 60-days post MI. On multivariate analysis only current smoking and an initial Thrombolysis in Myocardial Infarction Scale (TIMI) 0 flow in the IRA were independently associated with <10% decrease in LPS levels at 1 month (OR 10.44; 95% CI 2.13-51.21; p=0.004 and OR 6.59; 95% CI 1.21-35.88; p=0.029, respectively).

Conclusions: This study is the first to show factors affecting post-MI changes in LPS, highlighting the role of active smoking and initial complete IRA occlusion in persistent low-grade endotoxemia following MI.

Keywords: lipopolysaccharide, low-grade endotoxemia, myocardial infarction, zonulin, smoking

Elevated Baseline microRNA-92a as a Predictor of Cardiovascular Events in Chronic Coronary Syndrome Patients -

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Background: MicroRNAs are emerging biomarkers with regulatory roles in endothelial function. Specifically, microRNA-92a is known to downregulate KLF2, which is crucial in maintaining atheroprotective function, whereas microRNA-10b downregulates KLF4.

The aim: This study aims to assess the prognostic value of baseline microRNA-92a and microRNA-10b expression in patients with chronic coronary syndrome (CCS) confirmed by coronary angiography.

Materials and methods: A cohort of 39 CCS patients was enrolled. Baseline miR-92a and miR-10b plasma levels were measured using quantitative PCR (qPCR) with spike-in normalization appropriate internal control microRNAs. Patients were followed up for 2 years via clinical database review (Clininet) and structured telephone interviews to monitor for cardiovascular end-points: stroke, myocardial infarction, cardiovascular death, and cardiovascular-related hospitalization. Data were analyzed using the Mann–Whitney U test due to non-normal distribution.

Results: Over the follow-up period, 12 patients developed cardiovascular end-points. Baseline plasma expression of miR-92a was significantly elevated in patients who experienced events (median 93.43 [IQR: 60.38–106.72]) during follow-up compared to those without events (median 54.74 [IQR: 35.08–74.8]; p = 0.036). No significant difference was observed in miR-10b levels between the two groups (p = 0.83).

Conclusions: Baseline miR-92a expression is significantly higher in CCS patients who subsequently experience adverse cardiovascular events. These findings suggest that miR-92a may serve as a potential prognostic biomarker for cardiovascular risk assessment in chronic coronary syndrome.

Keywords: micro-RNA, CCS, biomarkers, atherosclerosis

Late-Night Light Meal and Increased Screen Time are Associated with Hypertension in The Urban Population

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Background: Hypertension has become a cardiovascular global problem as a major risk factor for death and disability. The incidence of hypertension is increasing in association with lifestyle changes. Late-night light meals (related to dysregulation of nutrition metabolism and circadian rhythm) and increased screen time (related to decreased physical activity) are part of these lifestyle changes that lead to metabolic syndrome, including hypertension, especially in urban populations but are lack investigated.

The aim: To evaluate the association between late-night light meal behavior and increased screen time with hypertension in the urban population of Bali, Indonesia.

Materials and methods: A cross-sectional analytic study was conducted in 3 urban area public health centers in Bali, Indonesia, involving 48 respondents. The evaluation was carried out by blood pressure examination and structured interviews of personal risk factors of hypertension, including late-night light meal behavior (less than 3 hours before bedtime) and screen time per day in the one-week recall. Then, bivariate compare means analysis was performed.

Results: The incidence of hypertension occurred in 37.5% of the urban population of Bali, Indonesia. Respondents with hypertension were found to consume snacks before bedtime or late-night light meals more often compared to patients without hypertension, with the frequency of late-night light meals of 0.77 ± 1.70 versus 0.05 ± 0.24 times per week (Mean Difference (MD) 0.71 times per week; $p = 0.031$). Meanwhile, respondents with hypertension had a higher average screen time per day compared to non-hypertensive respondents with a screen time of 5.38 ± 2.12 versus 3.56 ± 1.95 hours per day (MD 1.82 hours; $p = 0.005$).

Conclusions: Respondents with hypertension have more frequent late-night light meal behavior and higher screen time in the urban population of Bali, Indonesia.

Keywords: Hypertension, late-night light meal, screen time, urban population

"Say Aaaa-fib: When the Heart Skips, the Voice Slips"

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Background: The search for new biomarkers is one of the challenges of modern medicine. What if we went beyond analysing blood and focused on non-invasive vocal biomarkers? It would first be necessary to identify disease entities that are frequent and dangerous to the patient's health to the extent that new screening methods are needed.

The aim: This study aimed to evaluate the acoustic features of voice in patients with heart failure to determine whether they could aid in the identification of cardiac rhythm disturbances and serve as potential biomarkers for screening purposes.

Materials and methods: 20 patients with heart failure, 10 of whom were diagnosed with AF and 10 with sinus rhythm, were analysed for voice parameters. Propensity score matching was used to ensure comparability between the groups. Each participant was asked to make a prolonged phonation of the vowel sound under controlled acoustic conditions of the recording studio to obtain a stable vocal tone. The recordings were analysed using the ComParE 2016 package, which allowed the extraction of 390 acoustic parameters, including prosodic, spectral, and phonatory features, which measures the instability of the phonation cycle. Statistical analysis was performed using the Mann-Whitney test and the significance level was set at $p<0.05$.

Results: Patients with AF showed significantly higher 'difference of differences of periods' values than those with sinus rhythm ($p < 0.05$), suggesting increased phonatory instability likely linked to irregular myocardial electrical conduction.

Conclusions: The outcomes suggest that phonatory instability expressed as a change in voice acoustic parameters may reflect pathophysiological changes occurring in the myocardium in AF. This creates hope for the use of such methods for the assessment of vocal biomarkers and early detection of AF as well as other cardiovascular conditions.

Keywords: AF, vocal biomarkers, heart failure, voice analysis

Non-invasive assessment of pulmonary hypertension severity with focus on electrocardiographic changes.

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Work's tutor: dr n. med. Joanna Wieczorek

Background: Pulmonary hypertension (PH), depending on the stage of the disease and comorbidities, may cause characteristic changes in the ECG recording.

The aim: The aim of the study was to characterize a group of patients with PH using non-invasive methods of assessing disease severity, with particular emphasis on the usefulness of ECG parameters.

Materials and methods: The study included 98 patients with PH (median age 69 years (IQR 58–75), women/men 60/38, mPAP 44 (IQR 34–52)) hospitalized in the Cardiology Clinic, 1st Department of Cardiology, Medical University of Silesia in Katowice. In the entire study group, typical parameters used to assess the risk level of PH were evaluated, and the most common ECG abnormalities were analyzed in detail. The study group was divided according to the median of mean pulmonary arterial pressure (mPAP) measured during right heart catheterization (RHC) into subgroup 1: <45 mmHg (median age 69.5 years (IQR 63–75), women/men 29/21) and subgroup 2: ≥45 mmHg (median age 67.5 years (IQR 54.5–73.5), women/men 31/17).

Results: The subgroups did not differ in terms of age and sex. Patients in the subgroup with higher mPAP were characterized by significantly higher: BMI, right atrial area, hematocrit, NT-proBNP, pressures obtained during RHC, and significantly lower: left atrial area, TAPSE, HDL, SaO_2 after completion of the 6-minute walk test, left ventricular end-systolic diameter; they also used statins less frequently and less frequently presented with persistent atrial fibrillation. In ECG analysis, patients from subgroup 2 were significantly more likely to have right axis deviation >110°, P wave >1.5 mm in lead V1 or V2, and T wave inversion in lead aVF.

Conclusions: There are ECG parameters that may indicate clinically and hemodynamically more severe forms of PH. The evaluated ECG parameters can be easily and conveniently used in everyday clinical practice.

Keywords: Pulmonary hypertension, electrocardiography, right heart catheterization, clinical markers

Does the duration of atrial fibrillation and its clinical characteristic influence the ECV efficacy?

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Work's tutor: prof. dr hab. n. med. Katarzyna Mizia-Stec

Background: Atrial fibrillation (AF) is the most common arrhythmia with different clinical presentation. Based on the duration of arrhythmia, it is classified into persistent (lasting over 7 days) and long-standing persistent (lasting >1 year).

The aim: The aim of our study was to evaluate the impact of type of AF and AF clinical characteristic on the effectiveness of ECV.

Materials and methods: A single centre retrospective study of 355 patients (204 men, 151 women) who underwent ECV due to AF in the years 2019-2024 was performed. The mean age was 67,9Ī9,5 years. Patients were divided into 2 groups based on type of AF (persistent and long-standing persistent). We took into consideration the type of AF (persistent vs long-standing persistent), presence of symptoms, AF risk factors and the effectiveness of ECV.

Results: The mean time of AF was 20.1Ī37.8 months. There were 181(64,4%) patients with persistent AF and 100 (35.6%) with long-standing persistent AF. The prevalence of AF risk factors (obesity, heart failure, hypertension, diabetes, dyslipidemia, significant valvular disease, thyroid dysfunction) did not differ statistically significantly between these two groups. The overall effectiveness of ECV was 90.7% (n=320). There was no statistically significant difference of ECV effectiveness between the group with persistent AF and long-standing persistent AF (p=0.15). The percentage distribution of EHRA classes in the study group was: EHRA 1 8.2% (n=22), EHRA 2a 13.4% (n=36), EHRA 2b 40.2% (n=108), EHRA 3 34.9% (n=94), EHRA 4 3.3% (n=9). However, the EHRA class did not influence the effectiveness of ECV (p=0.46). The presence of symptoms also was insignificant (p=0.43). Amiodarone was used in pre-ECV period in 138 (49.1%) patients, including 88 (48.6%) patients with persistent AF and 50 (50%) patients with persistent long-standing AF. No relationship was found between the pharmacotherapy used and the type of AF.

Conclusions: ECV is an effective method for AF termination regardless of its duration and clinical characteristic.

Keywords: atrial fibrillation, electrical cardioversion, persistent AF, long-standing persistent AF

ARNI versus ACEI/ARB in patients with AMI on cardiovascular outcomes: a retrospective analysis

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Background: Angiotensin receptor-neprilysin inhibitor (ARNI) has a well-established advantage over angiotensin converting enzyme inhibitor or angiotensin receptor blocker (ACEI/ARB) therapy in patients (pts) with heart failure with reduced ejection fraction (HFrEF), but in pts after acute myocardial infarction (AMI) with left ventricular (LV) systolic dysfunction the advantage of ARNI has not been clearly proven.

The aim: To compare the efficacy of ARNI with ACEI/ARB therapy for cardiovascular outcomes in pts with first AMI and post-infarction LV systolic dysfunction.

Materials and methods: Overall 1572 pts (1056M, median age 71 [64;75]) with AMI hospitalized in 2022-2024 were enrolled into retrospective cross-sectional analysis. The most important inclusion criteria were: 1) first AMI 2) no prior coronary revascularization 3) LV systolic dysfunction 4) no prior HF history 5) complete coronary revascularization. The study population was categorized into pts receiving ARNI and ACEI/ARB. Then based on ARNI subgroup included age, sex, and LV ejection fraction (LVEF) matching was performed by using the 1:1 nearest neighbour method without returning. Finally two groups (ARNI vs ACEI/ARB) of 30 pts were obtained and analysed.

Results: In ARNI and ACEI/ARB subgroup during 6-week follow-up, a significant improvement in the LVEF was achieved. In ARNI subgroup the median improvement of LVEF was from 30% (28;38%) up to 37% (30;43%) p=0,0005 and in ACEI/ARB subgroup the median LVEF improvement was from 37.5% (33;39%) up to 45% (42;48%) p<0,0001. In 4 months follow-up improvement in LVEF was higher in ARNI subgroup - from 30% (28.5;35%) up to 40% (33;45%) p=0.0001 than ACEI/ARB subgroup - from 38% (33;44) up to 43% (33.75;53%) p=0.0313.

Conclusions: Our current experience in ARNI therapy after AMI is limited to a small group of patients with reduced LVEF. However, ARNI therapy is non-inferior to conventional ACEI/ARB therapy and significantly improves LVEF in 4 months follow-up.

Keywords: Sacubitril/Valsartan, ARNI, ACEI/ARB, AMI, acute myocardial infarction

Impact of obesity, T2D and dyslipidemia on pacemaker vs ablation choice in tachy-brady syndrome.

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Background: Tachycardia-bradycardia syndrome is a form of sinus node dysfunction characterized by alternating bradyarrhythmias and supraventricular tachyarrhythmias, mainly paroxysmal atrial fibrillation. It significantly impairs quality of life and increases the risk of stroke and heart failure. Symptoms result from reduced tissue perfusion and are often non-specific. While pacemakers were the standard treatment, AF ablation has shown benefits in survival and quality of life.

The aim: The aim of this study is to differentiate the indications for ablation or pacemaker implantation in patients with tachycardia-bradycardia syndrome.

Materials and methods: A retrospective analysis included 70 patients with confirmed tachy-brady syndrome (2023–2024) at the 1st Cardiology Dept., GCM. 62 underwent device implantation, 21 catheter ablation, 13 received both. Treatment groups: 8 with ablation only, 49 with device only, 13 with both. Demographics, cardiovascular history, biochemical and cardiological parameters, treatment methods (pacemaker, ablation), and medications were analyzed. Comorbidities like myocardial infarction, stroke, pulmonary embolism, hypertension, coronary artery disease, diabetes, and hyperlipidemia were also considered.

Results: Patients treated with ablation were generally younger than those receiving device implantation (mean age 62.9 vs. 80.4 years). No statistically significant association was found between treatment strategy and metabolic comorbidities: BMI > 29.9 ($p = 0.363$), type 2 diabetes ($p = 1.000$), or hyperlipidemia ($p = 0.699$). These findings support that treatment decisions were primarily guided by arrhythmia burden rather than metabolic status.

Conclusions: The study showed that metabolic comorbidities such as obesity (BMI > 29.9), type 2 diabetes, and hyperlipidemia had no significant influence on the choice of invasive treatment. Decisions were primarily based on electrophysiological indications, highlighting the importance of arrhythmia burden over metabolic profile in managing tachy-brady syndrome.

Keywords: tachy-brady syndrome, ablation, cardiac device, obesity, diabetes, hyperlipidemia.

Clinical implications of AF in patients with HCM: Heart failure symptoms and SCD risk evaluation.

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Background: Atrial fibrillation (AF) is highly prevalent in the general population, including many patients diagnosed with hypertrophic cardiomyopathy (HCM), whose quality of life may degrade more rapidly when this arrhythmia is present. Both of these conditions may lead to complications such as ischaemic stroke or sudden cardiac death.

The aim: The aim of the study was to determine whether AF could be recognized as a risk factor for heart failure symptoms and sudden cardiac death (SCD) in patients with HCM.

Materials and methods: A retrospective tertiary single-centre analysis was conducted on 97 patients hospitalized in First Department of Cardiology, Górnośląskie Centrum Medyczne im. prof. Leszka Gieca w Katowicach in the period from 2020 to 2025, all diagnosed with HCM. Two groups were distinguished - 37 (38.1%) with, and 60 (61.9%) without the diagnosis of AF. A comparative study of their clinical parameters was performed, including NYHA class and HCM SCD-Risk Score evaluation in regard to AF presence.

Results: Among patients with AF, 59.5% of them had HCM-Risk SCD score of <4%, 21.6% between 4 and 6%, and 18.9% ≥6%. In relation to patients without AF: 61.7% patients had HCM-Risk SCD score of <4%, 16.7% 4 to 6%, and 21.7% ≥6%.The stratification of patients according to NYHA classes I-IV was as follows: 40.5%, 43.2%, 13.5%, 2.7% with AF (37 patients), and 53.3%, 33.3%, 11.7%, 1.7% without AF (60 patients). The analysis did not reveal a statistically significant correlation between the presence of AF and the NYHA functional class ($p > 0.05$) or the estimated risk of SCD ($p > 0.05$).

Conclusions: Although no association was demonstrated, the need for continued investigation should not be underestimated. Possible fatal complications of both AF and HCM still oblige us to further expand the research and take action, leading to early diagnosis and treatment of both conditions that can improve patients' daily quality of life and life expectancy.

Implantable cardioverter-defibrillator longevity – comparison of predicted and observed data

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Work's tutor: dr n. med. Artur Filipecki

Background: Implantable cardioverter defibrillators (ICDs) are used for the primary or secondary prevention of sudden cardiac death. The lifespan of the battery is determined by the number of interventions (shocks, ATPs), percentage of pacing, and recharging of capacitors.

The aim: This study aimed to evaluate battery longevity in ICDs within a real-world setting and to compare it to the manufacturers' data.

Materials and methods: Retrospective single-center study of consecutive patients who underwent ICD replacement from January 2022 to February 2025. Battery longevity, pacing parameters and therapy programs of all devices were collected. Demographic and clinical baseline characteristics for all patients were gathered from the electronic medical records. Detailed device history (interventions and percentage of pacing) was extracted from device printouts obtained during routine follow-ups in the outpatient department.

Results: A total of 119 patients (86% males, age 58 Ї 14 years) with implanted ICDs (Medtronic, Boston Scientific, Abbott) were included in the study (89 single-chamber - VVI; 30 dual-chamber - DDD). Median battery longevity was 9,1 years (median for VVI was 9,7 years; median for DDD was 7,8 years). The 5-year survival rate of the device battery was 98%. The mean longevity of both single-chamber and dual-chamber Medtronic devices was longer than the one stated by the manufacturer in product performance reports. The difference between manufacturers in battery lifespan was not statistically significant.

Conclusions: The battery longevity of VVI and DDD ICDs exceeded industry projections. The percentage of pacing (especially in single-chamber devices) and rare interventions, as well as the programming scheme could contribute to that finding. Additional randomized studies are needed to confirm optimal patient care.

Keywords: Implantable cardioverter-defibrillator, Battery longevity

Profile of comorbidity and surgical risk in patients undergoing TEER procedure

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Work's tutor: lek. Tomasz Gallina

Background: Mitral valve regurgitation (MR) is a common valvular heart disease. It induces symptoms of heart failure, conduces decompensations and worsenes the patients' quality of life. Cardiac surgery is a preferred method of treatment. However, the surgery cannot always be performed, especially among patients with high operation risk or significant comorbidities. Nowadays there is an alternative treatment - transcatheter edge-to-edge (TEER), which is a minimally invasive procedure dedicated especially for those patients.

The aim: The aim of this study was to assess comorbidity and surgical risk among patients undergoing TEER.

Materials and methods: This retrospective study included 88 consecutive patients with severe MR who were disqualified from surgical mitral valve repair or replacement and underwent TEER between 08.2022 and 03.2025. The database contains information on the patients' clinical characteristics, pharmacotherapy, and laboratory data.

Results: The analysis included 42 women and 46 men with a mean age of 77,1 years (Ī6,37). The mean amount of coexisting illnesses was 8,7 (Ī3,9) while the mean number of taken medications was 10,2 (Ī2,7) per patient. The most common comorbidities included hypertension (95%), atrial fibrillation (78%), coronary artery disease (78%), chronic kidney disease (65%) or diabetes (42%). The mean ejection fraction (EF) was 42% (±13,89), 48% patients had EF ≤40%, 18% between 41-50%, 34% ≥50%. The mean risk of in-hospital mortality, calculated based on the EuroSCORE II (ESII), was 6,24% (±4,77). Surgical risk based on ESII was significantly higher in patients with type 2 diabetes, chronic kidney disease, after CABG and with lower EF, but there was no correlation with age. Both insulin dependent and nondependent diabetes were associated with higher ESII.

Conclusions: Despite high operative risk there was no in-hospital death. This study shows that despite multiple comorbidity and high preoperative risk minimally invasive methods are a beneficial and safe alternative for cardiac surgery.

Keywords: mitral regurgitation, TEER, comorbidity

Pulmonary root geometry variability during cardiac cycle in light of catheter-based procedures

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

Background: Quantitative data on pulmonary root dimensions remain scarce compared to the aortic valve, largely due to the lower prevalence of pulmonary valve diseases and the reduced number of surgical interventions.However, recent advancements in electrophysiological procedures targeting ventricular arrhythmias originating from the pulmonary trunk have renewed interest in this anatomical region. While previous studies provided detailed morphometric analyses of pulmonary root, they were unable to assess the dynamic changes occurring during cardiac cycle.

The aim: To quantify the morphometric variability of the pulmonary root during cardiac cycle using computed tomography angiography (CTA).

Materials and methods: A retrospective analysis of CTA scans from 100 adult patients was conducted.Pulmonary root dimensions were assessed at four anatomical cross-sections: Basal Ring (BR), Coaptation Center Plane (CCP), Commissural Plane (CP), and Tubular Plane (TP) during both systole and diastole. Additionally, software-generated reconstructions were utilized to measure overall volume, as well as angular changes and structural shifts during cardiac cycle.

Results: During systole, BR constricted, reducing its cross-sectional area by an average of 32.3±30.7%, while the other planes expanded: CCP (5.2±14.2%), CP (9.2±16.2%), and TP (10±14.6%).The pulmonary root volume increased from 13,582.5 mm3(12,031.2–17,005.8 mm3) in diastole to 15,041.1 mm3(12,561.8–17,688.8mm3) in systole (p=0.001),while shifting on average caudally (5.97±3.99mm), ventrally (3.51±2.74mm), and to the left [2.5mm (1.21–3.96mm)]. Its angulation increased from 42±9.9° to 47.6±9.3° between diastole and systole.A weak to moderate correlation was observed between age and the angulation of the pulmonary trunk,which tended to increase with age.

Conclusions: The pulmonary root undergoes significant geometric changes during cardiac cycle.These findings underscore the necessity of accounting for dynamic variability when performing catheter-based procedures involving the pulmonary valve.

Keywords: pulmonary trunk, pulmonary valve, cardiac cycle

Total acute occlusion of the left main stem, a retrospective study – years 2020 - 2024.

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Background: Complete occlusion of the left main coronary artery (LM) is an uncommon, but highly fatal condition. Given its essential role in supplying a large portion of the myocardium, immediate diagnosis and intervention are crucial. Many patients die before reaching medical care, and among those who make it, mortality remains highest during the first 24 hours. A better understanding of this condition could help optimize treatment strategies and improve patient outcomes.

The aim: The purpose of the study was to assess clinical presentation, outcomes and results PCI of patients with total occlusion of LM.

Materials and methods: In this retrospective analysis, data from 15 patients were reviewed. All patients presented with total occlusion of LM (TIMI 0 flow) underwent percutaneous coronary intervention (PCI) at the University Hospital in Kraków between January 2020 and December 2024.

Results: Out of 2,510 emergency PCI procedures performed during the study period, only 15 involved total occlusion of LM. The mean age of the patients was 69.2 years and 87% were male. Most patients had multiple cardiovascular risk factors, including hypertension (83%), smoking (40%), and dyslipidemia (83%). At presentation, 67% were in cardiogenic shock (CS), and sudden cardiac arrest (SCA) occurred in 67%. However, only 60% of patients presented with STEMI. All patients underwent pPCI treatment and 93% were stented successfully.

Conclusions: Managing total LM occlusion remains a significant challenge due to the severe condition of affected patients. Although restoring coronary flow (TIMI 2/3) is generally successful, overall survival rates remain low. Positive outcomes are associated with early diagnosis, rapid and effective intervention, and optimal hemodynamic and respiratory support. Moreover, important factors determining results of pPCI are patients' prior presentation with cardiogenic shock or sudden cardiac arrest. Furthermore, early recognition and timely intervention adjusted to the case are paramount for the patients' survivors.

Keywords: left main coronary disease, percutaneous coronary intervention, acute coronary infarction

Comparison of aortic measurements in angiography, CT, and 3D reconstructions using VR

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Background: Computed tomography (CT) is a standard imaging modality for evaluating coarctation of aorta (CoA). Three-dimensional reconstructions using virtual reality (VR), based on CT or MRI studies, are gaining popularity in the imaging of congenital heart defects. Precision and clinical utility of these reconstructions remain uncertain.

The aim: Assessment of the accuracy of aortic anatomical measurements obtained from angiography, CT, and VR reconstructions.

Materials and methods: This study included all patients with CoA who underwent sequential elective angio-CT followed by cardiac catheterization with aortography within a six-month interval between 2016 and 2024. A total of 39 patients (median age: 10 years, IQR 7.2–16; median weight: 49 kg, IQR 25–68) were enrolled, with 46 pairs of CT+aortography studies performed. Aortic diameter was measured at sinotubular junction (STJ), proximal (PA) and distal aortic arch (DA), and at aortic isthmus narrowing (CoA) in angio-CT, aortography (the largest diameter - systolic), and VR reconstructions. Each measurement was performed twice.

Results: Differences between VR vs. CT measurements were: +0.34±0.4 mm at STJ (+7.4%), -0.13±0.3 mm at PA (-5.3%), -0.56±0.9 mm at DA (-6.6%), and -0.29±0.6 mm at CoA (-10%). Differences between angiography vs. CT measurements were: +0.29±0.5 mm at PA (+9.3%), +0.73±0.6 mm at DA (+10.3%), and +0.02±0.5 mm at CoA (+13.2%). Differences between angiography vs. VR measurements were: +0.62±1.0 mm at PA (+4.7%), +0.23±0.5 mm at DA (+7.9%), and -0.54±0.6 mm at CoA (-19%). All differences were statistically insignificant (p>0.05).

Conclusions: Aortic measurements in VR reconstructions were highly comparable to those obtained in CT. VR showed slight tendency to underestimate aortic dimensions compared to reference CT, particularly at the isthmus. CT exhibited a tendency to underestimate aortic dimensions compared to angiography. VR may serve as a complementary imaging modality, particularly in the planning of interventional treatment for CoA.

Keywords: aorta, coarctation of aorta, computed tomography, angiography, virtual reality

Clinical characteristics and mortality in patients with cardiogenic shock

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Background: Cardiogenic shock remains one of the most severe complications of acute cardiovascular conditions, despite advancements in treatment.

The aim: The purpose of the study was to evaluate different demographic and clinical characteristics and outcomes in patients hospitalized on account of cardiogenic shock of different etiologies.

Materials and methods: The study population comprised of 1662 adult patients diagnosed with cardiogenic shock (median age 71) among whom 38.27% were women. The data was acquired from the database of Academic Repository of Clinical Cases of Medical University of Silesia. The analyzed cohort included patients with a range of cardiovascular conditions consistent with International Classification of Diseases (ICD-10) diagnosis of I25, I20.8, I48, I35.0, I35.1, I34, I.50.0, I.50.9, I40, I20.0, I21. The primary endpoint was in-hospital mortality assessed using data from Polish healthcare provider.

Results: In cardiogenic shock patients, coronary angiography was performed in 54.39% cases and was associated with significantly improved survival (37.1% vs. 28.2%; p<0.001). Higher survival rates were also seen in those undergoing percutaneous coronary interventions (37.1% vs. 29.2%, p<0.001). Patients classified as non-smokers (70.9% vs. 52.5%; p<0.001), those without arterial hypertension (71.0% vs. 62.5%; p <0.001), or patients with type 2 diabetes (71.4% vs. 64.6%; p=0.005) had significantly higher mortality rates. Deceased patients were characterized by higher values of NT-proBNP (p<0.001), lactate (p<0.001), troponin T level upon admission (p <0.001).

Conclusions: Invasive treatment, particularly coronary angiography and PCI, has been associated with improved survival in cardiogenic shock. Patients with type 2 diabetes showed a significant association with higher in-hospital mortality among patients with cardiogenic shock.

Keywords: Cardiogenic Shock, Interventions, Mortality

Long-term outcome in elderly patients with heart failure treated with cardiac resynchronization therapy

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Background: Heart failure (HF) remains a significant cardiovascular concern in elderly patients. HF can be treated with cardiac resynchronization therapy (CRT), which has been proven effective among elderly patients. However, the long-term outcomes of CRT remain unclear, while the aging population continues to grow.

The aim: This study aims to assess outcome in elderly patients with HF undergoing CRT.

Materials and methods: One thousand fifty-nine consecutive patients with CRT implanted between 2002 and 2019 in a tertiary care university hospital in a densely inhabited, urban region of Poland were analyzed (949 subjects [89.6%] with CRT-D; 110 patients with CRT-P [10.4%]). Data on mortality rates and independent mortality predictors of elderly CRT patients (≥75 years) were analyzed.

Results: Patients ≥75 years of age (n=195) constituted 18% of all patients with HF treated with CRT. During the median follow-up of 1117 days (IQR 655-1988), all-cause mortality of patients ≥75 years old was 63.1%, while the overall mortality of younger subjects was 52.3% (P=0.006). On multivariable regression analysis, lower left ventricular ejection fraction (HR 0.97, 95% CI 0.94-0.99, P=0.02), higher creatinine level (HR 1.007, 95% CI 1.003-1.01, P<0.001), higher NYHA class (HR 1.51, 95% CI 1.02-2.27, P=0.04), and secondary prevention of sudden cardiac death (HR 2.27, 95% CI 1.39-3.69, P<0.001) were identified as independent predictors of higher mortality in HF patients ≥75 years old undergoing CRT implantation.

Conclusions: Almost 20% of patients treated with CRT are ≥75 years old. More than 60% of these patients die within an average follow-up period of 3 years. Lower LVEF, increased creatine levels, NYHA class, and secondary prevention of SCD, were identified as independent mortality predictors of HF patients ≥75 years old.

Keywords: Elderly, heart failure, cardiac resynchronization therapy, long-term analysis

Long-Term Outcomes in Heart Failure Patients Undergoing CRT With vs. Without Remote Monitoring

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Background: Cardiac resynchronization therapy (CRT) has become an increasingly integral component in the management of heart failure. 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 depends on whether it is monitored remotely or not.

Materials and methods: One thousand fifty-nine consecutive patients with CRT implanted between 2002 and 2019 in a tertiary care university hospital, in a densely inhabited, urban region of Poland was analyzed. All CRT patients were divided into subjects monitored with and without telemonitoring (n=565; 53.4% and n=494; 46.6%, respectively).

Results: The median follow-up was 1661 days (10th and 90th percentile: 323-3995). All-cause mortality in CRT patients with remote monitoring was significantly lower than in subjects without telemonitoring (51.5% vs. 58.3%, P=0.02). On multivariable regression analysis, older age (HR 1.02, 95%CI 1.01-1.03, P<0.001), ischemic cardiomyopathy (HR 1.33, 95%CI 1.18-2.19, P<0.001), lower left ventricular ejection fraction (HR 0.97, 95%CI 0.94-0.99, P<0.001), higher creatinine level (HR 1.005, 95%CI 1.003-1.008, P=0.001), diabetes (HR 1.36, 95%CI 1.02-1.83, P=0.002), and lack of remote monitoring (HR 0.55, 95% CI 0.46-0.66, P=0.001) 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. These results underscore the prognostic value of telemonitoring in optimizing long-term outcomes in this high-risk population.

Keywords: CRT, remote monitoring, cardiac resynchronization therapy

Prescribing Habits of Antibacterial Therapy for Pediatric Upper Respiratory Tract Infections in Primary Care

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Background: Respiratory tract infections, often viral, are common in children's primary care, yet antibiotic overprescribing remains prevalent. Diagnostic tests assist doctors decide whether to initiate antibacterial therapy, particularly for respiratory tract infections with often nonspecific symptoms.

The aim: The aim of the study was to understand and analyse the habits of prescribing antibacterial therapy for children with acute upper respiratory tract infections (URTIs) who sought medical help in Children's Clinical University Hospital at Emergency Room Primary Care department.

Materials and methods: The retrospective study involved 746 paediatric patients with acute infections from the Children's Clinical University Hospital Emergency Room who were consulted at Primary Care department. The analysis was based on data from patients with URTIs.

Results: In total, 746 children with acute infections were enrolled in the study and more than a half, 74.0% (N=552), had acute upper respiratory tract infections. In 43.3% (N=239) of patients with URTIs received antibiotic treatment. Overall, antibiotics were prescribed on the median third day of illness (p=0.001). Less than half of the patients (49.3%) with URTIs underwent diagnostic testing in the decision-making process regarding antibacterial therapy. Antibiotics were prescribed without diagnostic testing in 37.5% of patients with URTIs, while 39.3% of those who underwent diagnostic testing received antibacterial therapy (p=0.6). C reactive protein (CRP) test was performed in 18.1% of cases with URTIs. The median CRP with antibacterial therapy was 38.7 mg/L. The most prescribed antibiotics for children with URTIs were from the penicillin group (31.0%).

Conclusions: The prescription of antibacterial therapy in cases of URTIs remains high. In this study the initiation of antibacterial therapy is significantly associated with the patient's day of illness. More frequent use of diagnostic tests, including CRP, should be performed before prescribing antibiotics.

Keywords: antibiotic prescription; children; primary care; upper respiratory tract infections;

Sleep Quality and Disturbances in Individuals with Type 1 Diabetes and Their Caregivers

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Background: Type 1 diabetes (T1D) is an autoimmune disorder that destroys pancreatic β-cells, impairing insulin production. In 2017, the American Diabetes Association (ADA) included sleep assessment in its Standards of Medical Care, highlighting the link between sleep quality and glycemic control. Sleep disturbances, such as short duration, irregular patterns, difficulty falling asleep, nocturnal awakenings, and daytime fatigue, are associated with negative emotional, physiological, and behavioral outcomes.

The aim: The purpose of this research was to explore sleep-related challenges in people living with Type 1 Diabetes and their caregivers.. We focused in particular on how sleep quality correlates with self-reported restfulness in both groups.

Materials and methods: The study was conducted using a custom online questionnaire created in Google Forms. The survey consisted of three main parts: general demographic and clinical questions, items assessing symptoms of insomnia based on the Athens Insomnia Scale (AIS), and an evaluation of current well-being using the CHIC Scale. A total of 161 individuals completed the questionnaire. Among them, 90 respondents (55.9%) were individuals diagnosed with T1D, while 71 (44.1%) were caregivers.

Results: Among all respondents, 60.9% (98/161) had difficulty falling asleep, and only 24.8% (40/161) reported satisfactory sleep duration. Overall, 83.2% (134/161) rated their sleep quality as unsatisfactory. Among caregivers, 88.4% (61/71) experienced anxiety about nocturnal hypoglycemia in their child, and 79.7% (55/71) used an alarm to monitor their child's blood glucose levels overnight.

Conclusions: Our study indicates that both individuals with Type 1 Diabetes and their caregivers experience poor sleep quality. These findings emphasize the need for further research into the causes and long-term effects of sleep disturbances, which could inform future strategies to improve sleep and well-being in this group.

Keywords: type 1 diabetes, sleep disorders, sleep quality

Tracking Type 1 Diabetes in Children – Insights from Lublin Voivodeship

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Background: Type 1 diabetes (T1D) is one of the most common chronic diseases diagnosed in the pediatric population. Its pathogenesis is associated with an autoimmune process leading to the destruction of pancreatic β-cells, ultimately resulting in a complete loss of insulin production. As a consequence, lifelong exogenous insulin supplementation is required for disease management.

The aim: The aim of this study was to analyze trends and insights in the incidence of T1D in the pediatric population. Additionally, it aimed to assess the relationship between the occurrence of the disease and selected factors, such as age, place of residence, and previous infections.

Materials and methods: A retrospective analysis was conducted on 526 patients aged 0–18 years who were hospitalized in the Department of Pediatrics Endocrinology and Diabetology at the University Children's Hospital in Lublin and diagnosed with T1D between 2019 and 2024 according to the existence of beta-cell specific autoantibodies. Statistical analysis was performed using MedCalc 15.8, with significance set at $p<0.05$

Results: The analysis revealed a significant increase in the incidence of type 1 diabetes in years 2019-2024, especially after 2020, immediately following the COVID-19 pandemic ($p<0,0001$). Moreover, parameters like glycaemia and ketoacidosis were significantly higher when diagnosed during and after the pandemic than before. T1D was significantly associated with higher body mass and elevated lipid levels, with patients diagnosed during and after the COVID-19 pandemic showing increased total cholesterol ($p=0.0304$) and triglycerides ($p=0.0097$). These results suggest a potential influence of the pandemic on disease's onset and progression.

Conclusions: T1D is considered as a multifactorial disease with genetic predispositions as probably the most important cause. However sex, age, body mass, place of residence and especially COVID-19 infections have an impact on the T1D course and occurrence and can be considered as potential risk factors.

Keywords: diabetes type 1, epidemiology, pediatrics

Analysis of Functioning Profile, Mobility, and Quality of Life in Children with Arthrogryposis

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Background: Arthrogryposis is a heterogeneous condition characterized by congenital joint contractures, resulting in limited motor function. Evaluating children with AMC (arthrogryposis multiplex congenita) requires tools that enable objective assessment of their mobility and quality of life. The Functional Mobility Scale (FMS) assesses independent ambulation levels, while the Pediatric Outcomes Data Collection Instrument (PODCI) evaluates functioning across various daily life domains.

The aim: The aim of this study was to analyze the level of mobility and overall functioning in children with arthrogryposis using the FMS and the PODCI global functioning score.

Materials and methods: The study included 76 children with arthrogryposis, aged 2.4 to 18.9 years. Among them, 52 children (68.4%) were diagnosed with amyoplasia, while 24 (31.6%) had another type of arthrogryposis. All participants were assessed using the Functional Mobility Scale and the PODCI functional indices.

Results: The average PODCI global functioning score was 60 out of 100 points.
 FMS results revealed varied levels of mobility among participants. The most frequent scores were at the extremes:
 • 18.4% of children scored 1, indicating no independent ambulation
 • 34.2% scored 5, indicating independent walking on level surfaces but requiring assistance on stairs
 • 39.5% scored the maximum of 6, indicating full independent mobility
 The remaining children fell within intermediate functional levels.

Conclusions: Most children with arthrogryposis are independently mobile or experience only minor limitations, although a significant proportion require a wheelchair. The global functioning index indicates a moderate level of everyday performance. The FMS is a sensitive tool for differentiating mobility levels and may be valuable for assessing therapeutic needs and planning rehabilitation for children with arthrogryposis.

Keywords: Arthrogryposis, Functional Mobility, Pediatric Rehabilitation, Quality of Life, PODCI, FMS

Tracking the tumor trail: ultrasound and histopathology of thyroid tumors in pediatric patients

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Background: Thyroid nodules in children carry a higher malignancy risk than in adults, often requiring extensive endocrine evaluation and surgical treatment. As not all solid thyroid tumors are malignant, differentiation between benign, borderline and malignant lesions is essential to ensure optimal therapeutic strategies. In some non-malignant cases, conservative treatment may be appropriate.

The aim: To characterize ultrasound–histopathological correlations in pediatric thyroid nodules, focusing on benign conditions (dyshormonogenetic goiter, thyroid follicular nodular disease), borderline tumors (noninvasive follicular thyroid neoplasm with papillary-like nuclear features, follicular tumor of uncertain malignant potential, and well-differentiated tumor of uncertain malignant potential) and malignant neoplasms (papillary and follicular thyroid carcinoma).

Materials and methods: This retrospective study included 47 well-documented pediatric cases (2010–2023) with thyroid nodules treated surgically, selected from 262 patients. Each case included high-resolution ultrasound evaluation performed using EU-TIRADS-PL criteria, comprehensive hormonal profiling, and correlation with detailed histopathological examination—including FNAB categorized by the updated Bethesda system.

Results: Nodules were subclassified by ultrasound and histopathological features. Benign lesions were typically isoechoic or hypoechoic with regular margins and non-invasive histology. Borderline tumors showed mixed echogenicity and occasional capsular features suggestive of malignancy. Malignant nodules exhibited hypoechogenicity, irregular margins, microcalcifications, and signs of invasion. Significant sonographic overlap was observed between categories.

Conclusions: Ultrasound alone is insufficient for precise differentiation of pediatric thyroid nodules due to overlapping features. Fine-needle aspiration biopsy remains essential. Advances in AI may enhance risk stratification and support conservative management strategies in selected pediatric cases.

Keywords: thyroid nodules, pediatrics, endocrinology, ultrasound imaging, thyroid carcinoma

Analysis of Basic Physical Activity in Children with Type 1 Diabetes and Its Impact on Glycemic Control

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Background: Physical activity (PA) plays a crucial role in the effective management of type 1 diabetes mellitus (T1DM). It enhances insulin sensitivity, supports metabolic balance, and improves overall quality of life. However, the impact of PA on glycemic control in children with T1DM is complex. Without proper preparation and monitoring, there is a risk of both hypoglycemia and hyperglycemia.

The aim: The aim of this study was to analyze the level of basic physical activity in children with T1DM and its impact on glycemic control.

Materials and methods: A preliminary cross-sectional survey was carried out based on ISPAD 2022 guidelines. The study included 28 children with T1DM under the care of the Upper Silesian Child Health Centre in Katowice. The questionnaire contains questions regarding participation in physical education classes, modifications to insulin therapy, occurrence of post-exercise hypoglycemia, and nutritional strategies related to PA.

Results: All surveyed patients (28/28) reported regular participation in school-based physical education classes. Post-exercise hypoglycemia was reported in 64% of respondents. It was also observed that many children resumed or continued physical activity at blood glucose levels close to 70 mg/dL, which falls below the recommended safe threshold of 90 mg/dL, increasing the risk of hypoglycemia.
 According to insulin therapy 78% of patients do not modify the basal insulin, 41% of children do not modify the pre-exercise meal bolus, 78% do not modify the post-exercise bolus, 70% do not modify the basal insulin after exercise. The answer sheets indicate that both the meals consumed before physical activity and the timing of their consumption vary greatly and do not follow a consistent pattern.

Conclusions: Preliminary findings indicate that children with T1DM face challenges in maintaining stable glycemia during physical activity. A major contributing factor is inadequate or improperly timed insulin modification. Effective glycemic control requires individualized therapeutic adjustments.

Keywords: hypoglycaemia, physical activity, type 1 diabetes mellitus

Clostridioides difficile infection in children treated at gastroenterology department - retrospective study

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Background: Clostridioides difficile is a common bacteria that affects many hospitalised patients, including children. This microorganism can cause a great number of complications, such as toxic megacolon, perforation, obstruction or ectasia of the bowel, sepsis, or even shock.

The aim: This study's aim was to evaluate the clinical course, risk factors, and outcomes of C. difficile infection in hospitalized children at the Department of Pediatrics and the Paediatric Gastroenterology Outpatient Clinic, Medical University of Silesia in Katowice. based on a retrospective analysis of medical records.

Materials and methods: The study included 109 pediatric patients diagnosed with C. difficile infection and hospitalized in the Department of Pediatrics in the years 2020-2024. Clinical data were collected from medical records and included anthropometric measurements, clinical symptoms, laboratory results, disease severity, number of recurrences, and treatment methods.

Results: 109 patients, of which 44% were girls, 56% were boys and aged from 1.5 months to 17 years (average 11,4 years). Clinical presentation was mainly abdominal pain (62%) and diarrhoea (64%). 47% were underweight. 16% of the children had remarkable pregnancy and delivery history. CRP was elevated in 58% of the patients, and faecal calprotectin was elevated in 55/109 patients. Many of the children had comorbidities (102/109), of which 49% had ulcerative colitis and 20% had Crohn's disease. 36% of patients had a recurrence of the infection. The majority were treated with antibiotics-94% (vancomycin/metronidazole). One had undergone a faecal transplant.

Conclusions: Clostridioides difficile infection in hospitalized children is often associated with comorbidities, inflammation, and undernutrition. Early recognition and individualized treatment are crucial, especially in children with inflammatory bowel disease or poor nutritional status.

Keywords: Clostridioides difficile, children, gastroenterology, risk factors, retrospective study,

VACTERL and CHARGE- diagnosis of complex congenital anomalies syndromes

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Background: VACTERL association and CHARGE syndrome are both presenting with wide range of symptoms, and thus the diagnostic process for both of them is complex.

The aim: The aim of this study is to present the current diagnostic criteria for the VACTERL association and CHARGE syndrome, as well as to describe cases of patients whose phenotypes correspond to these conditions.

Materials and methods: Firstly, a review of literature was conducted and the most recent publications proposing guidelines for diagnosis of VACTERL and CHARGE were identified.
Then two patients under the care of the genetics outpatient clinic were selected. Their medical records were reviewed and compared with the diagnostic criteria for VACTERL and CHARGE.

Results: The currently accepted diagnostic criteria for VACTERL are based on the study by van de Putte et al. (2019). The authors define the characteristic malformations from which the acronym derives—vertebral, anorectal, cardiac, tracheoesophageal, renal, and limb anomalies—and outline criteria for four subtypes of VACTERL The authors also emphasize that a diagnosis of VACTERL should only be made after excluding known genetic causes of the anomalies.
In contrast, the diagnostic criteria for CHARGE syndrome are based on the study by Hale et al. (2016). According to their proposal, a diagnosis requires the presence of two major criteria and one minor criterion. Major criteria are: coloboma, choanal atresia or cleft palate, anomalies of ear, pathogenic CHD7 variant. Minor criteria refer to less typical anomalies.

 The analyzed patients include a 4-year-old boy who meets the criteria for VACTERL-PLUS, and a 10-year-old girl who fulfills the diagnostic criteria for CHARGE syndrome, despite the absence of a CHD7 gene mutation.

Conclusions: The currently accepted diagnostic criteria for CHARGE and VACTERL allow for the diagnosis to be made even in patients who do not present with all the classical features typically associated with these syndromes.

Keywords: VACTERL, CHARGE, CONGENITAL ANOMALIES, CLINICAL GENETICS

Clinical and Emotional Aspects of T1D in Families with Multiple Diagnosed Siblings: A Parental View

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Background: Parents' knowledge of prodromal symptoms, opportunities for early detection of the type 1 diabetes (T1D) and potential risk factors can affect both the clinical course and the level of psychological stress associated with the diagnosis in other affected child.

The aim: The main objective of the present study was to analyze clinical data at the T1D onset in the first and subsequent child in the family and to assess the emotional state of the parents at that time.

Materials and methods: 37 families from the Diabetes Outpatient Clinic, Upper Silesian Child Health Centre in Katowice were surveyed. Clinical data was collected from medical records. The original questionnaire assessed parents' knowledge of their next child's risk of T1D, screening possibility for T1D, psychological stress, and implementation of any lifestyle changes.

Results: The clinical condition at the onset of the second child was better - the average blood glucose level in the first child was 462 mg/dL [SD=239.2], while in the second - 278 mg/dL [SD=137.8] (p<0.05). Diabetic ketoacidosis [DKA] occurred in 32.4% of the first and in 16.2% of the second children (p<0.05). With the first diagnosis, the most frequently experienced emotions were fear of the unknown (21%) and shock (20%), while with the second diagnosis, sadness (24%) and grief (20%) dominated. 72% of parents were mindful of their second child's disease risk, 29 of them had made lifestyle changes. 20 families were aware of the existence of screening program, 6 of them participated.

Conclusions: Thanks to diabetes education and screening programs, families with a positive history of T1D had a greater awareness of the disease, the second affected child was in a better overall condition at the onset, but parents were not fully emotionally prepared for diagnosis and it was not easy for them to accept it.

Keywords: type 1 diabetes, multi-case families, screening

The role of Intraoperative Neuromonitoring in the surgical treatment of Spinal Lipomas in pediatric patiens

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Background: Spina bifida results from incomplete neural tube closure during embryogenesis. Spinal cord lipomas, part of occult spinal dysraphism, are often associated with tethered cord syndrome and may require surgery. Intraoperative Neuromonitoring (IOM)—triggered electromyography (EMG), motor evoked potentials (MEP), and the bulbocavernosus reflex (BCR)—enables real-time neural mapping, minimizing iatrogenic injury during lipoma resection and untethering.

The aim: The aim is to assess the role of IOM in surgical treatment of spinal lipomas in pediatric patients.

Materials and methods: Retrospective analysis of 39 children treated between 2012–2022 at the Department of Pediatric Neurosurgery in Katowice.

Results: The cohort included 24 girls and 15 boys (mean age 2.9 years). IOM was used in 21 cases (53.8%), mainly with triggered EMG (100%) and MEP in 2 cases (9.5%). The remaining 18 patients underwent surgery without neuromonitoring (NIOM). IOM use was associated with higher rates of complete resection and better neural function preservation. No significant motor deterioration occurred, and early postoperative complication rates were similar. The average follow-up period was 4.4 years (SD = 3.26 years) across the entire cohort, with longer follow-up in the NIOM group (mean 6.39 years) compared to the IOM group (mean 2.7 years). Early postoperative outcomes showed no significant difference in the rate of complications between groups. However, IOM contributed to safer tumor resection and may be associated with better long-term functional outcomes.

Conclusions: IOM proved sufficient to prevent lower limb motor deterioration and may improve long-term outcomes. Its use increased complete lipoma resection rates without raising early neurological complication risk. While BCR analysis was not routinely used, its integration may reduce postoperative sphincter dysfunction. IOM should be considered a standard in pediatric spinal lipoma surgery

Keywords: Neurosurgery, IOM, EMG, BCR, Spinal, Lipoma

Facial Injuries from Animal Bites: A Multidisciplinary Challenge

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Background: Animal bite injuries in children, particularly those to the head region, are a significant concern in pediatric emergency departments. Facial bites can vary from minor lacerations to life-threatening injuries, often resulting in long-term physical and psychological effects.

The aim: The study aims to assess the characteristics of facial bites in the pediatric population, available management strategies, and the physical and psychological impact on bite victims.

Materials and methods: The study is a retrospective analysis of 25 cases of facial bite injuries treated from January 1, 2019, to March 31, 2024, at the Regional Specialized Children's Hospital in Olsztyn, Poland. Statistical analyses were performed using GraphPad Prism, Statistica and MedCalc.

Results: The cohort included 9 females and 16 males, with an age range from 3 months to 12 years. Significant differences between gender and age at the time of injury were noted (p = 0.043). Of the 25 patients, 64% of incidents occurred at home, with dogs responsible for 96% of the injuries. Most injuries were superficial; however, severe injuries included large defects of soft tissues, fractures, eye globe trauma or brain edema were noted. Comprehensive treatment is based on debridement, prompt surgical intervention and infection prophylaxis. Nearly all patients (96%) received antibiotic prophylaxis, while 76% received rabies vaccination.

Conclusions: Animal bites to the face require multidisciplinary care due to potential for severe physical and psychological impacts. This study underscores the potential psychological impact of such trauma and need for preventive education to reduce the incidence of animal bites in children.

Keywords: bite wounds, facial trauma, infection prophylaxis, animal bites

Pediatric familial hypercholesterolemia in Silesia – early findings in 50 patients

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Background: Familial hypercholesterolemia (FH) is a monogenic disorder inherited in an autosomal dominant manner, leading to premature atherosclerosis and cardiovascular events (CHD). Most cases are caused by mutations in the LDLR gene (>90%), while APOB and PCSK9 mutations account for ~5% and ~1% respectively. In 5–30% of patients with an FH phenotype, no causative gene is identified. FH exists in two forms: heterozygous (HeFH; 1:250–500 prevalence) and homozygous (HoFH; 1:160,000–300,000).

Persistent elevation of LDL-C from childhood correlates with adult vascular disease. However, the LDL-C threshold and duration necessary to cause atherosclerosis in children remain unclear. Early treatment is recommended, yet pharmacological therapy, especially statins, in children remains controversial.

The aim: To assess the genetic background and familial burden of hypercholesterolemia in a pediatric population.

Materials and methods: This study included 50 patients (28 girls) referred to the Outpatient Clinic between Jan 2023–Dec 2024 with suspected lipid disorders. Data included family history, anthropometrics, and laboratory results. Genetic testing was performed.

Results: Median age was 9.85 years (range 0.4–17.9). A family history of cardiovascular disease was reported in 37/50 children. Obesity (BMI >97th percentile) was present in 3/50. Genetic mutations consistent with FH were found in 20/50 patients: LDLR (11), APOB (5), APOE (3), LPL (1), ABCG5 (1). Testing was pending in 10 cases. All patients received dietary therapy and omega-3. Statins were initiated in 11 children; 2 required ezetimibe.

Conclusions: 1. LDLR mutation is the most common genetic cause.
2. Genetic testing lacks complete sensitivity.
3. Early diagnosis enables cascade screening and early intervention in family members, improving long-term prevention of cardiovascular disease.

Keywords: familial hypercholesterolemia, hyperlipidemia, obesity, cascade screening, genetic testing

Which test is the best? The early diagnosis of secondary hyperparathyroidism in children with CKD

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Background: Disturbances of calcium-phosphate metabolism in the course of (CKD-MBD – chronic kidney disease-mineral bone disorder) are present in pediatric CKD, contributing to failure to thrive and cardiovascular risk. Hyperphosphatemia, hypocalcemia, vitamin D deficiency and increased activity of parathyroid hormone (PTH), form a web of subsequent anomalies leading to secondary hyperparathyroidism, becoming clinically overt in the late stages of CKD.

The aim: To analyze calcium-phosphate metabolism in children with CKD, in relation to their age and CKD stage.

Materials and methods: Serum concentrations of phosphate, calcium, 25(OH)vitamin D, and PTH, were analyzed in 100 pediatric patients with newly diagnosed CKD. Patients were grouped by age (0–2 y vs. 2–18 y), those over 2yo were also stratified according to CKD stages 1 to 5. Statistical analysis was performed with the use of nonparametric tests.

Results: Children aged 0–2 y had significantly higher phosphate levels compared to the 2–18y group, irrespective of the CKD severity. Other parameters remained independent of age. PTH activity rose systematically with CKD progression, ranging from normal values in CKD stage 1 to 4-fold increase in end stage kidney disease. A parallel rise in phosphate concentrations was observed. Contrarily, serum calcium levels remained relatively stable, whereas 25(OH) vitamin D levels were consistently low across all stages. Strong positive correlation was observed between PTH and phosphate ($r \approx 0.58$), a negative one-between PTH and calcium ($r \approx -0.43$). Vitamin D didn't correlate with PTH.

Conclusions: Serum phosphate and PTH seem more relevant to CKD stage at diagnosis than calcium concentration and 25(OH) vitamin D activity. Low vitamin D concentrations may result from both CKD-related and population-specific deficiencies. Phosphate concentrations require age-specific interpretation due to higher normal range values in younger children. Routine monitoring of these parameters may enable earlier interventions in order to delay CKD-MBD development.

Keywords: chronic kidney disease, secondary hyperparathyroidism

They way from heart to the liver - hepatic compilations of fontan circulation?

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Work's tutor: dr hab. n med. Sabina Więcek, dr n. med. Krzysztof Kocot

Background: Fontan-associated liver disease (FALD) refers to congestive hepatopathy that develops in patients who have undergone Fontan surgery during childhood due to congenital heart disease with single ventricle physiology. The hemodynamic changes resulting from the Fontan circulation can lead to chronic liver disease.

The aim: The aim was to analyze laboratory and imaging parameters of liver disease and clinical course in patients who underwent Fontan surgery.

Materials and methods: A retrospective analysis was conducted on 24 patients (17 males, 70.83%, and 7 females, 29.17%) who underwent Fontan surgery and actually treated at the Department of Paediatrics and Pediatric Cardiology Department of the Upper Silesian Children's Health Center in Katowice between 2011 and 2025. The study assessed clinical course, laboratory and imaging tests, heart defect type, and time from Fontan surgery to liver dysfunction diagnosis. Data were statistically analyzed.

Results: The average age at the time of Fontan surgery was 37.8 months, with the current mean age being 11.95 years. Hypoplastic Left Heart Syndrome was diagnosed in 10 patients (41.7%), while Tricuspid Atresia was found in 12 (50%). 11 patients (45.83%) presented with other heart defects. The mean pulmonary pressure measured during cardiac catheterization was 12.25 mmHg (SD 4.2), and the pulmonary vascular resistance index was 1.59 (SD 0.69). The mean BMI was 17.41. The mean values of liver injury and cholestasis markers were as follows: AST – 38.48 U/L, GGT – 52.9 U/L and total bilirubin – 17.89 mg/dL. Average liver stiffness in elastography was 11.44 kPa. Fibrosis stage F2 was observed in 2 cases (8.33%), F3 in 10 (41.67%), and F4 in 12 (50%). The mean NT-proBNP level was 397.7 pg/mL, suggesting the need for further cardiac evaluation.

Conclusions: FALD is a long-term complication following Fontan surgery. Despite stable physical development, results indicate the need for close monitoring of liver and heart function.

Keywords: Fontan surgery, FALD, hepatopathy

Immunological analysis of cytokines in CSF in patients with de novo diagnosed RRMS

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Background: Cytokines regulate immune responses and are crucial in the pathogenesis of multiple sclerosis.

The aim: The aim of this study was to evaluate the concentrations of selected pro- and anti-inflammatory cytokines in the cerebrospinal fluid of patients diagnosed with de novo multiple sclerosis compared to healthy individuals in the control group.

Materials and methods: Cytokines regulate immune responses and are crucial in the pathogenesis of multiple sclerosis. The aim of this study was to evaluate the concentrations of selected pro- and anti-inflammatory cytokines in the cerebrospinal fluid of patients diagnosed with de novo multiple sclerosis compared to healthy individuals in the control group.

Results: The study group showed increased concentrations of IL-2, IL-4, IL-6, IL-13, FGF-basic and GM-CSF and lower concentrations of IL-1β, IL-1RA, IL-5, IL-7, IL-9, IL-10, IL-12p70, IL-15, G-CSF, PDGF-bb and VEGF were elevated compared to the control group. Levels of IL-2, IL-4, IL-12p70, PDGF, G-CSF, GM-CSF, and FGF-basic increased over time, while IL-10 levels decreased. Levels of IL-1β, IL-1RA, IL-6, TNF-α, and PDGF-bb correlated negatively with serum vitamin D levels. TNF-α levels correlated positively with contrast-enhanced brain lesions. IL-15 levels correlated negatively with T2 and Gd(+) lesions on C-spine MRI, while TNF-α, PDGF-bb, and FGF-basic levels correlated positively with T2 lesions on C-spine MRI. IL-6 levels positively correlated with contrast-enhanced lesions on C-spine MRI.

Conclusions: The distinct profiles of pro- and anti-inflammatory cytokines in the cerebrospinal fluid of patients diagnosed with multiple sclerosis provide new insights into the role of cytokines in the development of multiple sclerosis and inform the planning of immunomodulatory therapy.

Keywords: Multiple Sclerosis; Cytokines; Immune System; Biomarkers; Pathomechanism; CSF

Assessment of cerebral autoregulation in SAH patients using deep canonical correlation analysis

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Background: Traumatic Subarachnoid Hemorrhage (tSAH) is a bleeding into the subarachnoid space caused by a traumatic brain injury (TBI). It can lead to life-threatening dysfunction of the autonomic nervous system. Severe tSAH is linked to impairment of respiratory centers leading to acute respiratory distress in 48 hours post-admission. The severity of tSAH is determined using Fisher scale on computed tomography scans. The link between severity of tSAH and impaired cerebral autoregulation is unclear and could be described by Deep Canonical Correlation Analysis (DCCA), a technique which measures nonlinear associations between two multivariate sets of variables.

The aim: To explore how severity of tSAH affects cerebral autoregulation, by examining changes in relationship between Intracranial Pressure (ICP) and Arterial Blood Pressure (ABP) through DCCA.

Materials and methods: ICP and ABP recordings from 125 TBI patients from the CENTER-TBI high-resolution sub-study were retrospectively analyzed. Patients were divided into two groups: present tSAH (n=111) and absent tSAH (n=14). A high Fisher grade was defined as a grade between 3 and 4 (n=47), while a low grade was defined as a grade between 1 and 2 (n=78). Signals were transformed using DCCA and the first five canonical components were analyzed. The National Science Center (UMO-2022/47/D/ST7/00229) supported this study.

Results: The first five canonical correlations were higher in the absent tSAH group (0.99, 0.89, 0.83, 0.46, 0.31) than in the present tSAH group (0.69, 0.41, 0.29, 0.23, 0.12). There were no meaningful differences between a high Fisher grade (0.72, 0.45, 0.36, 0.29, 0.07) and a low Fisher grade (0.77, 0.59, 0.43, 0.30, 0.02) groups.

Conclusions: Differences in the relationship between ICP and ABP in the absent-tSAH and present-tSAH groups indicate impaired autoregulation in the latter. No differences between high and low Fisher grade groups were observed, suggesting similar influence of hemorrhage severity on cerebral autoregulation.

Keywords: canonical correlation, cerebral autoregulation, traumatic subarachnoid hemorrhage

Functional Pathway Enrichment of Let-7b-5p Targets in Microglial Response to Ischemic Injury

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Background: Ischemic stroke (IS) is a leading cause of death and disability worldwide. Microglia, the brain's main immune cells, have multiple effects during IS. Microglia maintain a healthy brain environment under normal conditions; however, they become activated adopting either a pro-inflammatory (M1) or anti-inflammatory phenotype (M2). Let-7b-5p is a crucial factor in how microglia respond and are activated after a stroke. Research indicates higher levels of let-7b-5p in microglia suppresses the M1 phenotype. Consequently, it improves cognitive and neurological function following a stroke. Neuroinflammatory diseases are more severe and exhibit more inflammation when let-7b-5p levels are low. These findings propose let-7b-5p as a potential biomarker for inflammation in the central nervous system.

The aim: The purpose of this research was to investigate the relationship between the targets of let-7b-5p and molecular pathways.

Materials and methods: We used miRDB to identify let-7b-5p targets, considering a score > 80 statistically significant. Next we used ShinyGO for pathway analysis of the targets, considering enrichments with FDR < 0.05 and a minimum of 10 target genes.

Results: The microglial activation and polarization after IS are significantly regulated by Let-7b-5p. Its target genes are involved in the MAPK pathway, which reduces inflammation, and the PI3K-Akt pathway, which supports microglial survival and the M2 phenotype. It also adjusts the mTOR pathway, influencing microglia's metabolic and neuroprotective roles, and the FoxO pathway, which governs responses to oxidative stress and glial cell death.

Conclusions: Our findings show that let-7b-5p significantly impacts pathways like mTOR, FoxO, PI3K-Akt, and MAPK by targeting key components within them. These pathways promote anti-inflammatory and neuroprotective effects, suppress inflammation, and improve microglial survival following stroke. Consequently, let-7b-5p shows promise as both a biomarker for neuroinflammation during IS and a therapeutic target.

Keywords: Ischemic stroke, let-7b-5p, inflammation, pathway enrichment

Identification of Factors Favouring the Occurrence of Challenges in Dementia Caregivers

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Background: As of 2023, Polish National Health Fund reports that 365,400 patients in Poland were treated for dementia. This number is projected to triple by 2025 and accordingly, the number of informal caregivers is increasing.

The aim: The aim of the study is to identify the most frequent complications encountered by familial caregivers and to evaluate the correlation between these challenges and the characteristics of both the caregivers and their care recipients.

Materials and methods: Between autumn 2023 and autumn 2024, 129 informal caregivers filled in the survey distributed via the online forums and in dementia clinics and day-care centres across Poland. The relationships between identified obstacles and various variables were analyzed using the chi-square or fisher test.

Results: The most frequent intrinsic obstacle was physical fatigue among caregivers. The data analysis revealed statistically significant positive correlations between caregiver fatigue and the following factors: female gender ($p = 0.0481$), being a child of the care recipients ($p = 0.0308$), care recipient's low Activities of Daily Living (ADL) score ($p = 0.0203$), cohabitation with the care recipient ($p = 0.0001$), primary caregiving responsibility ($p = 0.0154$) and self-reported burnout ($p < 0.0001$). The most prevalent extrinsic challenge was the lack of an available substitute caregiver. It correlated significantly with the size of the caregiver's place of residence ($p = 0.0239$). Furthermore, those caregivers' reported insufficient time for personal responsibilities and leisure activities, as well as a lack of support from family and friends more often then those non-affected.

Conclusions: This study identified several factors associated with caregiving challenges in familial dementia care. These findings underscore the need for targeted interventions to support informal caregivers in the high-risk groups.

Keywords: Dementia, familial caregiver, health care solutions

Acute Kidney Injury After Thrombectomy for a Stroke: Common Yet Underrecognized. Two-Center Study

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Background: Mechanical thrombectomy (MT) is a key treatment for acute ischemic stroke, with major cerebral artery occlusion, involving the insertion of a catheter into a blocked cerebral artery to remove the clot. One potential complication of this procedure is acute kidney injury (AKI), which is estimated to occur in approximately 10% of patients undergoing MT.

The aim: This study aimed to evaluate the impact of common clinical factors on the incidence of AKI in stroke patients undergoing MT and to determine the impact of AKI on outcomes in this group of patients.

Materials and methods: This was a dual-center retrospective study involving 484 patients (mean age: 68.3 Ī 12.8 years; M/F: 250/234) undergoing MT due to ischemic stroke. We analyzed prehospital comorbidities, medical history, initial referring center, laboratory tests results, outcomes of performed procedures and other relevant clinical factors.

Results: AKI following MT was observed in 73 cases (15.08%). Patients who developed AKI, in comparison to individuals free of AKI, had lower rates of successful reperfusion (expressed as TICI 2b–3, 52.1 vs 71.5%; $p<0.001$), longer mean duration of MT (121 vs 102 min; $p<0.001$), presented with a more severe neurological status upon admission (expressed as higher rates in NIHSS score; $p<0.001$) and had greater prevalence of baseline comorbidities (measured by Charlson's Comorbidity Index; $p<0.001$). Amongst factors predisposing to AKI development, pre-hospital use of statins ($p=0.012$), nonsteroidal anti-inflammatory drugs (NSAIDs) ($p=0.023$) and angiotensin receptor blockers (ARBs) ($p=0.05$) proved to be statistically significant. Moreover, the mean values of CRP and fasting glucose were also higher in patients with AKI.

Conclusions: Various factors such as unsuccessful recanalization, longer duration of MT, use of statins, NSAIDs and ARBs contribute to the risk of developing AKI. Furthermore, AKI is associated with a worse prognosis and increased morbidity following MT.

Keywords: Acute kidney injury, Mechanical Thrombectomy, Stroke

Infections incidence in treated Relapsing Remitting Multiple Sclerosis patients.

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Background: Multiple sclerosis (MS) is a chronic autoimmune disease that damages nerve cells. Newer therapies more effectively suppress inflammation in RRMS than older disease modyfing theraphy (DMTs) but may carry specific risks. B-cell depleting treatments are effective, though they may increase infection risk.

The aim: This pilot study aimed to compare the incidence of infections in RRMS patients treated with B-cell depleting therapies versus those receiving other DMTs.

Materials and methods: The study included RRMS patients treated in UCK Katowice, and was based on analysis of medical records and infection history surveys. Patients were divided into two groups: B-cell therapy (55/82) and other DMTs (27/82). The survey included infections (gastrointestinal infection, urinary, respiratory, skin) over 12 month period. Infection risk was assessed based on prior DMT use, treatment duration, EDSS score, recent relapses, and current therapy.

Results: A total of 82 RRMS patients (68 females; median age: 40 [IQR 35–50]; EDSS: 2.6 ± 1.4) and 34 healthy controls (11 females; median age: 33 [IQR 26–40]) were enrolled. A statistically significant difference in urinary tract infection (UTI) frequency was observed between patients and controls ($p = 0.02$). Subgroup analysis showed this difference remained significant only in the B-cell depleting therapy group ($p = 0.01$), but not in those on other DMTs. Logistic regression analysis did not identify any significant impact of the assessed risk factors.

Conclusions: These findings are important for both patients and neurologists in evaluating the benefit–risk balance of different therapeutic strategies. Further efforts are warranted to develop risk mitigation strategies related to B-cell depleting therapies, particularly through improved screening and management of urinary tract dysfunction.

Keywords: RRMS, B-cell therapy, DMTs, infections, UTIs, immunosuppression

Influence of clinical and radiological parameters on cerebral infarction in patients with aneurysmal SAH

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Work's tutor: TA dr Nebojša Lasica

Background: Cerebral infarction following aneurysmal subarachnoid hemorrhage (aSAH) is a serious complication associated with significant morbidity and mortality. Identifying protective and risk factors may help optimize clinical management and improve patient outcomes.

The aim: To investigate the influence of clinical and radiological parameters on early and delayed cerebral infarction in patients with aSAH.

Materials and methods: In this prospective study, we followed patients with aSAH who were admitted in 2024 to the Clinic of Neurosurgery at the University Clinical Center of Vojvodina. Demographic, clinical and radiological data were recorded during the first 14 days of hospitalization. Study endpoints included early cerebral infarction (ECI, ≤72 hours post-ictus) and delayed cerebral infarction (DCI, >72 hours).

Results: Of 80 patients (mean age: 58.4 years; 63.7% female), ECI occurred in 12.5% and DCI in 23.75%. Intracerebral hematoma, neurosurgical clipping and greater mean arterial pressure (MAP) oscillation on day 2 post-ictus were significantly associated with ECI. In multivariate analysis, only MAP oscillation remained an independent predictor of ECI (OR=1.198 p=0.019). MAP during delayed phase (days 4-9) was significantly greater in patients with DCI. In multivariate analysis nimodipine was identified as a protective factor (OR=0.072 p=0.028), while older age as predictive factor (OR=1.088 p=0.043) of DCI.

Conclusions: In this study, early post-ictus hemodynamic instability was linked to ECI. Nimodipine administration was identified as protective factor against DCI, while each additional year of age increased the risk of DCI by 8.8%. These findings highlight the need for individualized hemodynamic monitoring and tailored approach in managing aSAH patients.

Keywords: aneurysmal subarachnoid hemorrhage, cerebral infarction, predictors

The role of vitamin D supplementation in alleviating depressive symptoms in RRMS

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Work's tutor: Martyna Lis M.D.

Background: In recent years, studies have explored the pathomechanisms of depression, identifying oxidative stress and inflammation as key factors involved in its development. This discovery has initiated the search for substances with potential to support depression treatment, with particular attention given to vitamin D due to its antioxidant and anti-inflammatory properties.

The aim: To examine the relationship between the severity of depressive symptoms and vitamin D status, as well as the effect of low-dose vitamin D supplementation on the severity of depression in patients with Relapsing-Remitting Multiple Sclerosis (RRMS).

Materials and methods: The study included 72 individuals who met the inclusion and exclusion criteria and provided informed consent. All participants had blood drawn on the day of enrollment and completed the Beck Depression Inventory (BDI) questionnaire (n=72). Of these, 54 patients used vitamin D supplementation in low (n=29) or high (n=25) doses. Follow-up assessments were conducted after 6 months.

Results: At baseline, hypovitaminosis D was present in 74.07% of participants. After 6 months of supplementation, it persisted in 44.4% of individuals. Approximately 31.5% of participants who supplemented with vitamin D3 reported an improvement in well-being; however, no statistically significant differences in depression severity were observed after the supplementation period. No significant correlations were found between BDI scores and serum 25(OH)D levels.

Conclusions: Vitamin D supplementation does not appear to reduce the severity of depressive symptoms in patients with RRMS. Further studies are needed to determine the impact of vitamin D supplementation on the mental health of individuals with multiple sclerosis.

Keywords: Multiple Sclerosis, RRMS, Vitamin D, Depression

Cannabinoid Receptor Modulation in Alzheimer's: New Paths to Cognitive and Neuroinflammatory Restoration

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Background: Alzheimer's disease (AD) is a complex neurodegenerative disorder with limited therapeutic options and current treatments offer only modest clinical benefits. Growing evidence implicates the endocannabinoid system (ECS) as a key regulator of memory, neuroinflammation, and neurotransmission, highlighting its potential as a novel therapeutic target in AD.

The aim: This study evaluated the effects of prolonged, intermittent treatment with two cannabinoid receptor ligands—JWH-133, a selective CB2 agonist, and Cannabixir® Medium Flos (15.6% THC, <1% CBD), an EU GMP-certified Cannabis sativa L. inflorescence—on cognitive function and brain metabolism in an AD mouse model. The goal was to assess their potential to modulate neuroinflammatory and neurodegenerative pathways associated with AD progression.

Materials and methods: Male APP/PS1 transgenic mice (12 weeks old) received oral gavage treatments for 90 days with JWH-133 (0.2 mg/kg) or Cannabixir® (2.5 mg/kg), alone or in combination with donepezil (0.65 mg/kg). Cognitive performance was assessed via the Novel Object Recognition (NOR) test. Brain glucose metabolism was evaluated using ^{18}F-FDG PET-MRI. Post-mortem brain tissue was analyzed histologically and immunohistochemically for amyloid-beta (Aβ) deposition, glial activation, and receptor expression. All procedures adhered to EU and national ethical standards.

Results: After 90 days, mice treated with JWH-133 or Cannabixir® showed significantly improved memory (68–70% novel object preference vs. 56% in controls, $p < 0.05$). PET imaging revealed a marked reduction in brain glucose metabolism (SUVmean decreased from 1.044 in controls to ~0.4 in treated groups). Histological analysis showed smaller and fewer Aβ plaques (30–50 µm² vs. 50–150 µm² in controls).

Conclusions: These findings support the therapeutic potential of targeting the ECS with non-psychoactive cannabinoids in AD. Although promising, further studies are warranted to elucidate the underlying mechanisms and optimize treatment strategies.

Keywords: Alzheimer's disease, endocannabinoid system, neuroinflammation, cognitive function

Beyond Diabetes: The Synergistic Power of Canagliflozin and Donepezil in Alzheimer's Disease

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Background: Alzheimer's disease (AD) is a complex neurodegenerative condition, currently lacking curative treatment. Canagliflozin, a sodium-glucose co-transporter 2 inhibitor used in type 2 diabetes, has shown promising neuroprotective effects in recent studies, such as anti-inflammatory action, blood–brain barrier protection, and acetylcholinesterase (AChE) inhibition.

The aim: This study aimed to evaluate the potential cognitive benefits of canagliflozin, alone or in combination with donepezil, in a mouse model of scopolamine-induced memory impairment. The goal was to investigate whether these two drugs could complement each other to improve memory function and reduce neuroinflammation associated with AD.

Materials and methods: A total of 50 adult mice (female and male), were randomly assigned into five groups: untreated control, scopolamine-treated, donepezil-treated, canagliflozin-treated, and combined donepezil and canagliflozin treatment. All treatments were given daily for 21 days. From day 13, all mice except controls were given scopolamine injections to induce cognitive impairment. Behavioral assessments included memory and anxiety tests such as Novel Object Recognition Test and Elevated Plus Maze. At the end of the study, blood samples and brain tissue were analyzed to evaluate enzyme activity and inflammation markers.

Results: Mice treated with canagliflozin showed improved memory performance in the object recognition test, with results comparable to those treated with donepezil. The combination of both drugs led to even better outcomes. Brain analysis revealed reduced activity of AchE, lower inflammation, and decreased expression of proteins related to oxidative stress and neuronal damage. These effects were more pronounced in male mice.

Conclusions: These findings suggest that the combination of canagliflozin and donepezil may offer a promising approach for improving memory and reducing inflammation in AD. Further studies are needed to confirm its potential as a supportive therapy beyond its current use in diabetes.

Keywords: Alzheimer's disease, canagliflozin, donepezil, memory impairment, neuroinflammation

ORGANIZATION OF THE DORSAL ROOT OF THE SPINAL NERVE – OWN OBSERVATIONS

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Background: Spinal nerves connect to the spinal cord bilaterally via ventral and dorsal roots. The current understanding is that each root is made up of 5-10 bundles of nerve fibers. The dorsal root emerges directly from the spinal cord, containing afferent (sensory) fibers. A rhizotomy involves damaging certain nerve fibers as a treatment for chronic pain or spasticity.

The aim: The objective of the study was to establish the anatomical pattern of spinal root bundles in relation to clinical significance.

Materials and methods: Microanatomical dissection of the posterior roots of the lumbar nerves L1-L5 was performed (eight cadavers fixed in 10% formalin). A total of 80 nerve roots from L1 to L5 were examined using a Zeiss surgical microscope. Sketches and photographs were used to document observations.

Results: The number of root's bundles and the presence of interradicular fibers were investigated. The posterior root of the spinal nerve can be divided into 3 sections: paraspinal section, middle section, and paraganglionic one. The patterns presented by the bundles forming the dorsal root of the lumbar spinal nerves are characteristic for a specific section and are summarized, taking into account the exchange of fibers between individual bundles. Anastomoses both within the same segment and adjacent segments are taken into account in reference to existing literature.

Conclusions: The morphology of the posterior roots of the lumbar spinal nerves is not consistent with previous reports. It is proved that diverse morphology depending on the root section can be found which is crucial carrying out rhizotomy procedures. The overlap of segmental innervation ranges could be influenced by the presence of interradicular fibers. Proper knowledge of the organization of the posterior roots of lumbar nerves and the possible patterns presented by the fascicles may help us to gain a deeper understanding of the pathologies of this region.

Keywords: Spinal cord, Dorsal root of spinal nerve

Evaluation of brain injury markers in the cerebrospinal Fluid of patients with smoldering multiple sclerosis

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Background: Inflammatory demyelination and impaired recovery processes in multiple sclerosis result in permanent neurodegeneration and neurological disability.

The aim: The aim of this study was to determine the concentrations of neurodegeneration markers in the cerebrospinal fluid of MS patients during relapse and in those without MS exacerbation.

Materials and methods: A single-center prospective observational study was conducted. We evaluated the concentrations of brain injury markers—neurofilaments (NF-H), glial fibrillary acidic protein (GFAP), S100 calcium-binding protein B (S100B), and ubiquitin C-terminal hydrolase L1 (UCHL1)—in the cerebrospinal fluid (CSF) of 123 patients with relapsing-remitting MS and 88 with progressive MS, grouped into 30 RPG (relapse phase group) and 181 WPG (without relapse phase group).

Results: In the RPG group, active lesions were more frequent compared to the WPG group on brain magnetic resonance imaging, as well as on cervical and thoracic spine MRI. Compared to the RPG group, the WPG group showed a higher Expanded Disability Status Scale (EDSS) score and a longer duration of MS symptoms.

 The concentrations of GFAP and NF-H were higher in the RPG group than in the WPG group. In the entire MS cohort, EDSS correlated positively with the concentrations of GFAP and NF-H, while the duration of MS symptoms correlated positively with the levels of SB and UCHL.

Conclusions: The concentrations of selected markers of brain injury were higher in MS patients during relapse and correlated positively with EDSS, compared to individuals without MS exacerbation. These findings support the concept of smoldering MS, in which focal inflammatory lesions related to relapses are secondary to ongoing axonal and neuronal loss.

Keywords: multiple sclerosis, parameters of brain injury, neurology

The assessment of BMI, lipid and carbohydrate metabolism parameters in patients with MS

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Background: Obesity has become a common problem. As a result, there are more studies on the influence of diet and lifestyle on human health. The impact of the adipose tissue on inflammation has been confirmed.

The aim: The aim of this review is to verify connections between BMI, lipid and carbohydrate parameters and the progression and the course of MS.

Materials and methods: 175 patients with RRMS were enrolled in the study. Concentrations of insulin and glucose as well as lipid and carbohydrate metabolism parameters were assessed. $P < 0.05$ was considered statistically significant. Normal data were compared using the student t-test, whereas the Kruskal-Wallis test was used to compare data with non-normal distribution. Relationships between the attributes were assessed using the linear Pearson's correlation. The study population was divided into groups according to gender, BMI, age, EDSS, duration of MS, age at diagnosis of MS and ARR. The correlations of the selected parameters were conducted in the overall population with the division into groups.

Results: 59% of patients had normal BMI (BMI was higher in patients with a lower level of disability).
 BMI correlated negatively with the EDSS score in men. Among the lipid parameters, the statistical significance was observed only for HDL which was higher in younger patients at diagnosis than in older ones. Insulin levels were higher in patients with a long-lasting disease and they were positively correlated with CRP, TG and the EDSS.

Conclusions: BMI is not the only indicator which assesses the adipose tissue and chronic inflammation caused by cytokines produced in adipose tissue. It affects the development and progression of the disease. Insulin resistance develops in MS, which may be of great importance in patients with MS and may require assessment before immunomodulatory therapy.

Keywords: Multiple Sclerosis, BMI, lipid metabolism parameters, carbohydrate metabolism parameters,

Sense of responsibility for one's health condition and the treatment process in patients after a stroke

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Background: Stroke is one of the most common diseases in the modern world. It causes multi-system disorders and dysfunctions, significantly impairs the quality of life and functional independence. It is suggested that due to the increasing number of patients suffering from stroke, appropriate preventive measures should be introduced, especially because the risk of recurrent stroke is high.

The aim: The aim of the study was to determine whether patients after a stroke incident feel responsible for their health and the process of recovery.

Materials and methods: The study was conducted on 30 people (x=54,6 age, SD=7,80), including 18 women and 12 men. The assessment of the sense of responsibility was conducted using an anonymous survey, which consisted of the MHCL scale examining beliefs about the ability to cope with difficult situations, the AIS disease acceptance scale and the GSES health locus of control scale, and the assessment of functional disability using the Rankin scale.

Results: The patients' opinions were very diverse, both in terms of their responsibility for their health MHCL (x=70,90, SD=14,1), acceptance of the disease AIS (x=23,5, SD=9,4), and sense of agency GSES (x=26,1, SD=16,9).

Conclusions: The study group mostly had a sense of responsibility for their health and a sense of self-efficacy and showed an average level of disease acceptance.

Keywords: stroke, sense of responsibility, sense of agency, neurology

Artificial psychiatrist – Large language models in the diagnosis of psychiatric consulted patients

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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 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 10 days. A total of 40 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

Assessment of the Mental Well-being of First-Year Medical Students at Polish Medical Universities

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Background: As medical students, we have observed a persistent decline in well-being among our peers. Concerned by our observations, we decided to assess the extent of this problem.

The aim: High levels of stress and pressure are well-known aspects of studying medicine. It is essential to investigate the impact of these factors on the mental health of students and young doctors, as well as how they may influence their future performance in the medical profession.

Materials and methods: In our survey-based study, we assessed the mental well-being of first-year medical students at nine Polish medical universities (Katowice, Kraków, Łódź, Opole, Gdańsk, Rzeszów, Zabrze, Bielsko-Biała) using the Beck Depression Inventory (BDI). The BDI questionnaire was conducted at the beginning of the first academic year and then again between the summer exam session and the retake session.

Results: After comparing the results, we observed an increase of 1.5 points in the average BDI score among full-time students, while among part-time students the increase was four times greater than that of the full-time group. Even more concerning, the percentage of students reporting suicidal thoughts rose by over 30% compared to the initial results. The proportion of students reporting decreased interest in others increased by 37%, and the number of respondents declaring decreased motivation to carry out daily activities and responsibilities increased by 25%.

Conclusions: The comparison of results revealed a decline in mental well-being, and increased difficulties in managing everyday responsibilities among the surveyed students. Average BDI scores varied significantly between universities, suggesting considerable differences in the comfort of studying during the first year depending on the institution. The analysis clearly indicates the emergence of intensified suicidal thoughts in individuals who had not reported them previously.

These preliminary findings highlight the need for further research and a more detailed analysis of the issue.

Keywords: Medical students, Mental health, Depression, Beck Depression Inventory, Stress, Suicidal Ideation

Artificial intelligence in polish psychiatry: myth or medical revolution?

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Background: Artificial intelligence (AI) in psychiatry refers to using computer-based techniques to support the diagnosis, prevention, and treatment of mental disorders. Although its use has increased globally, AI remains rarely implemented in psychiatric practice in Poland. When it comes to the use of AI in psychiatry in Poland, AI-based tools are currently mainly at the stage of research and pilot implementation.

The aim: This study aimed to assess current AI use, willingness to adopt it, and gender-based differences in attitudes among Polish mental health professionals. Ethical considerations were also examined, especially regarding the feminization trend in medical professions.

Materials and methods: A paper-based survey was conducted during a psychiatric conference, with 135 participants (psychiatrists, residents, doctors in training, psychologists). Women represented 62.96% of the sample, men 35.56%, and 1.48% identified as "other." Most participants (40.74%) were aged 30–40, and 49.63% had up to 10 years of experience. The respondents were asked questions about the use of AI in working with patients and in research. After consent was obtained from the respondents and the questionnaire responses were collected, the data were analyzed using Microsoft Excel and Statistica.

Results: Most respondents (76.3%) reported not using AI in diagnostics but expressed openness to future use, with no significant gender differences. However, ethical views varied: Women responded much more often that additional patient consent is always required for the use of their data for AI purposes (women 42.86%, men 26%), while 40% of men did not notice such a need at all, which was statistically significant (Chi-square, $p < 0.005$).

Conclusions: In conclusion, AI is not yet widely used in Polish psychiatry, but professionals show interest in its implementation. Ethical concerns, especially regarding consent, differ by gender. Further studies are needed to explore how AI could be responsibly integrated into psychiatric practice in Poland.

Keywords: Artificial intelligence, psychiatric practice, diagnostic process, medical ethics

Societal Attitudes Toward Human Papillomavirus (HPV) Vaccination in Poland

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Background: Human papillomavirus (HPV) is one of the most common sexually transmitted pathogens and a leading cause of various cancers, including cervical, anal, penile, and head and neck malignancies. In Poland, HPV-related cancer burden is particularly high among women—especially cervical cancer—while in men, laryngeal cancer is most prevalent. Despite the proven efficacy of HPV vaccines, vaccination coverage among children and adolescents in Poland remains among the lowest in the European Union. Current preventive strategies have not accelerated the elimination of cervical cancer as expected, highlighting a pressing need to understand the psychosocial factors underlying vaccine hesitancy. Currently, there are no active treatments for HPV infection, but the risk of infection can be significantly reduced through the use of protective vaccination.

The aim: This study aims to assess the level of knowledge and attitudes of Polish individuals toward HPV vaccination and to explore their associations with selected psychological factors.

Materials and methods: The study uses standardized questionnaires to measure depressive and anxiety symptoms, stress-prone personality traits, and conspiratorial and paranoid thinking. A custom questionnaire was developed to evaluate participants' knowledge and attitudes toward HPV vaccination. Data collection is conducted via online survey tools.

Results: The findings will offer insights into the psychological determinants potentially influencing health-related behaviors, particularly decisions about HPV vaccination. These results may inform the development of more effective, psychologically attuned public health strategies and educational campaigns.

Conclusions: Understanding the cognitive and emotional drivers behind attitudes toward HPV vaccination may enhance public trust and contribute to increased vaccine uptake. This study underscores the importance of an interdisciplinary approach to public health communication in efforts to reduce HPV-related disease burden in Poland.

Keywords: HPV vaccination, vaccine hesitancy, psychological factors

Cognitive Resilience on the Chessboard: How Strategic Play Delays Mental Decline

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Background: With the global population aging rapidly, over 1 billion people worldwide are now aged 60 or older (WHO, 2022), maintaining mental and emotional well-being in seniors has become a priority. Engaging in stimulating activities is key to healthy aging, and chess, a strategic game requiring memory, focus, and problem-solving, has gained attention for its potential benefits.

The aim: This research aims to explore how chess influences cognitive function, emotional health, and social engagement in older adults.

Materials and methods: The study involved 12 seniors, divided into two groups: 6 beginners who learned chess under a student instructor and 6 experienced players. Participants' well-being was evaluated using the Geriatric Depression Scale (short form), the Montreal Cognitive Assessment (MoCA), and the Satisfaction with Life Scale (SWLS). Assessments were conducted at the start and after six months of weekly 2.5-hour chess sessions.

Results: Of the 10 seniors who completed the study (attending at least 20 sessions), 9 showed improvements across all tests. The beginner group demonstrated the most significant progress, with an average increase of 4 points on the SWLS and a 3.4-point improvement in MoCA scores. Notably, two participants with mild depression at baseline no longer exhibited symptoms after the program.

Conclusions: Chess appears to enhance memory, mood, and social interaction in older adults, offering a promising intervention for healthy aging. While these findings are encouraging, further large-scale studies are needed to confirm the benefits and optimize chess-based programs for seniors.

Keywords: Chess, geriatrics, mental decline

ALEXITHYMIA AND ITS ASSOCIATION WITH ALCOHOL USE DISORDERS AMONG RESIDENT PHYSICIANS IN LATVIA

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Background: Alexithymia has been linked to alcohol use disorders (AUDs), although the mechanism remains unclear. Previous Latvian research highlighted the need to explore this link in at-risk groups. Resident physicians, exposed to high stress and emotional burnout, may be especially vulnerable.

The aim: To assess the prevalence of alexithymia and its association with alcohol use disorder risk among resident physicians in Latvia.

Materials and methods: A cross-sectional, anonymous online survey was conducted among resident physicians from two Latvian universities. The questionnaire included socio-demographic and occupational data, the Alcohol Use Disorders Identification Test (AUDIT), and the Toronto Alexithymia Scale (TAS-20). Data were analyzed using IBM SPSS

Results: The study sample included 188 residents, of whom 19% were male and 81% female. Alexithymia was found in 11.7%, and possible alexithymia in 17%. No significant associations were found between alexithymia and age, gender, relationship status, university, or residency year.
 Among residents without alexithymia, 87.3% had low-risk alcohol use and 12.7% high-risk. With possible alexithymia: 71.9% low-risk, 28.1% high-risk. With alexithymia: 68.2% low-risk, 31.8% high-risk. The association between alexithymia and increased alcohol use disorder risk was statistically significant (p=0.018).

Conclusions: Alexithymia is significantly associated with high-risk alcohol consumption among medical residents. While demographic variables did not exhibit statistically significant associations, the presence of alexithymia may reflect increased susceptibility to alcohol use disorders. Further research is required, expanding the study population

Keywords: Alexithymia, Residency, TAS-20, Alcohol, AUDIT

Association between insomnia and symptoms of depression, anxiety and type D personality in polish firefighters

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Background: Firefighters due to their line of work are exposed to having an irregular sleep schedule connected with numerous unpredictable, emergency calls. Those, among other factors make them prone to developing insomnia. Moreover, they're at high risk for different mental and physical disorders.

The aim: This study is focused on evaluating the prevalence of insomnia, as well as it's intended to investigate the association between insomnia and depression, anxiety, stress levels and type D personality in polish firefighters.

Materials and methods: The study was conducted between January and March 2025 as we invited polish career firefighters to complete a survey consisting of sociodemographic questions and validated questionnaires like the Athens Insomnia Scale [AIS], Type D Scale-14 [DS-14], Perceived Stress Scale-10 [PSS-10], Hospital Anxiety and Depression Scale [HADS]. R-Pearson's coefficient and t-test were used as statistical methods.

Results: 186 firefighters were included in the study among whom 12.37% ($\geq$10 in AIS) screened positive for insomnia, whilst 30.65% (6-9 in AIS) screened positive for borderline insomnia. The prevalence of insomnia was statistically significantly higher in firefighters working in specialty groups (p=0.046) as well as firefighters who denied engaging in regular physical exercise (p=0.012). Insomnia was significantly, positively correlated with type D personality, especially with negative affectivity (r=0.504). Firefighters with a higher AIS score presented a greater severity of depressive symptoms (r=0.614). Furthermore, firefighters with insomnia faced a higher likelihood of screening positive for anxiety (r=0.487) and higher stress levels (r=0.468).

Conclusions: The importance of sleep disorders and their association with other mental health disorders should be taken as a clue to investigate the problem among firefighters and implement preventive measures in the form of education and standardized screening to maintain the general health and well-being of firefighters.

Keywords: insomnia, firefighters, occupational stress, type D personality, mental health

Evaluating the Effectiveness of Schultz Autogenic Training Versus Immersive VR Relaxation: A Pilot Study

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Background: Virtual reality (VR) is increasingly seen as a therapeutic tool with the potential to benefit mental health. This study examined the relationship between the use of immersive relaxation techniques via VR headsets and the mental well-being of female patients hospitalized in a psychiatric ward, comparing the effects with those of Schultz autogenic training.

The aim: To compare the effectiveness of Schultz autogenic training and immersive VR-based relaxation in a psychiatric inpatient setting.

Materials and methods: The study involved 14 female patients diagnosed with depressive and/or anxiety disorders, hospitalized in the psychiatric ward of the Dr. B. Hager Multispecialty District Hospital in Tarnowskie Góry. Participants were randomly assigned to either a VR relaxation group (n=4) or a Schultz training group (n=10), completing 10 sessions each. The Hospital Anxiety and Depression Scale (HADS), Athens Insomnia Scale (AIS), Addenbrooke's Cognitive Examination III (ACE-III), and Montreal Cognitive Assessment (MoCA) were administered pre- and post-intervention. Statistical analysis was conducted using Excel 365 and Statistica 13.3 with dependent samples t-tests (α=0.05).

Results: Both groups showed improvements in anxiety symptoms and sleep quality. In the control group, anxiety levels (HADS) and sleep quality (AIS) improved significantly. Similar benefits were observed in the VR group, where anxiety symptoms and sleep quality also improved. No significant changes were noted in depression levels (HADS) or cognitive functioning (MoCA, ACE-III) in either group.

Conclusions: Immersive VR relaxation was associated with reduced anxiety symptoms and improved sleep quality among psychiatric inpatients, yielding comparable results to Schultz autogenic training. Further research is needed to clarify the link between immersive relaxation techniques and mental health.

Keywords: depression, anxiety, sleep disorders, VR, Schultz autogenic training, relaxation

From Silence to Statistics - Uncovering the Hidden Face of Sexual Abuse in Poland

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Background: Rape is defined as any form of sexual penetration (vaginal, oral, or anal) without consent. Although many people associate rape with a stranger and vaginal intercourse, in reality, the majority of sexual assaults are perpetrated by someone the victim knows.

The aim: The investigation of the prevalence of sexual abuse in relationships and marriages, with a specific focus on marital rape.

Materials and methods: The online survey consists of 38 questions filled out anonymously. The questionnaire was distributed on social media, including Facebook and Instagram. 600 individuals took part in this study, 87.8% of whom were females, 11% - males, 0.83% - transsexual, and 0.3% - non-binary. The survey examined instances of sexual abuse in relationships, how individuals responded to such situations, and the measures taken by those affected. All respondents received a unified definition of rape and indicated whether they had ever encountered such an experience.

Results: Among the 600 individuals, 28.6% (n=172) reported experiencing abuse within a relationship. The most prevalent forms of abuse included ignoring disagreement or boundaries (65.7%, n=113), exploiting emotion for sexual activities (60.5%, n=104), forced oral sex (40.7%, n=70). Other reported forms were forced vaginal (49.42%, n=85), anal penetration (24.4%, n=42), forcible touching (45%, n=36), and taking advantage of a partner's state of insobriety (48.8%, n=84).Only 2.33% (n=4) reported it to the law enforcement. When presented with a unified definition of "rape," only 36.6% (n=63) of those who experienced abuse identified their experience as such.

Conclusions: The expanded study underscores the significant discrepancy between the number of reported cases of sexual abuse and their actual prevalence. Additionally, the results highlighted significant limitations of the "old" definition of rape in Polish law, which did not include the concept of "lack of consent." Further research is necessary to continue raising awareness about sexual abuse in society.

Keywords: sexual abuse, marital rape, relationships, intimate partner violence, forced sex

Red or Orange Autofluorescence of Selected Candida Strains Exposed to 405 nm Laser Light.

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Background: During oral mucosal examination using a 405 nm laser as a supplement to conventional
clinical assessment, healthy tissue typically displays green autofluorescence. However,
red or orange fluorescence (R/OF) is occasionally observed—most frequently on the
dorsal surface of the tongue. This phenomenon is generally associated with the
presence of various bacterial species. In the research was shown that, Candida spp. may also contribute to this R/OF signal.

The aim: The aim was to determine whether both the diseased and healthy oral area can equally show the presence of different fluorescence colors in various areas of the mouth and show Candida spp. autofluorescence under 405 nm

Materials and methods: Fresh suspensions of Candida spp. (10 µL aliquots) were inoculated onto Sabouraud
dextrose agar plates in a predefined circular arrangement, with eight equidistant
colonies positioned along the perimeter and one central colony, following a
standardized template. The control group consisted of a 1 µM quantum dot solution (655
nm and 685 nm; 1 mL). Image analysis was conducted using the HSV (hue, saturation,
value) color space, which aligns closely with human visual perception and is commonly
used in image content analysis. Minimum and maximum hue values were determined
for each fungal colony.

Results: The colonies were monitored over 144 hours. Candida albicans ATCC 60193 and
Candida glabrata ATCC 66032 exhibited consistent autofluorescence patterns
throughout the observation period. A distinct pattern was noted in Candida krusei ATCC
14243, where fluorescence was concentrated centrally with little to no emission at the
periphery. Both C. albicans and C. glabrata demonstrated the most prominent R/OF,
with this pattern consistently observed in all nine colonies for each strain.

Conclusions: This study confirms that several Candida spp. strains exhibit red/orange
autofluorescence under 405 nm laser excitation. It can help to 405 nm laser light as a rapid, non-invasive method for
detecting Candida spp. on oral mucosa.

Keywords: Autofluorescence, Candida, Mucosa, Laser

Do patients avoid dental care due to fear and economic burden?

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Background: The study of factors that lead to the cancellation of dental appointments.

The aim: The study aimed to assess the level of fear of dental treatment and to investigate the percentage of respondents in whom aspects such as fear and economic factors caused them to cancel a planned dental visit.

Materials and methods: The study was conducted using a questionnaire among 100 adults in one of the private dental offices in the Silesian province. The questionnaire included questions about the frequency of visits to the dentist in the last year and the impact of fear and treatment costs on decisions to cancel a dental visit. A numerical scale (NRS) was used to measure the level of fear of a dental visit.

Results: Over half (55%) of respondents visited a dentist in the last year. The average level of fear felt before a visit among respondents on the NRS scale of 0-10 was 5.85. In the last year, 66 patients canceled a dental visit once or several times due to fear, and 67 patients for financial reasons. Additionally, 48% of respondents declared that they would use dental services more often if they were half the price.

Conclusions: Both fear and high treatment costs are barriers to dental treatment. It is important to implement educational and systemic activities that can help reduce dental fear (e.g. by promoting painless dentistry) and increase the financial availability of services (e.g. as part of preventive programs financed from public funds).

Keywords: dental care, fear, economic burden,

Survey-Based Assessment of Dental Anxiety Among Patients: A Cross-Sectional Study

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Background: Dental anxiety is a significant barrier to oral healthcare, contributing to treatment delays and adverse outcomes. This study aims to assess its prevalence, demographic determinants, coping strategies, and to identify approaches that better address patient needs.

The aim: This study aimed to assess the prevalence of dental anxiety, examine its influence on oral health behaviors, and identify patient-informed strategies to enhance the psychological comfort of dental care.

Materials and methods: A 14-item survey was administered during the 2024/2025 academic year in dental clinics (UCS in Bytom and private practices in the Rybnik region) and via online patient groups (e.g., Dentyści pacjentom). The questionnaire assessed dental anxiety, past experiences, oral hygiene behaviors, treatment avoidance, and preferred support strategies. The final sample comprised 168 respondents (122 females, 46 males), with the 31–50 age group most represented (71 participants). Most respondents (74) resided in medium-sized cities (50,000–150,000 inhabitants). Data were analyzed to explore anxiety patterns and patient preferences across demographic variables.

Results: A total of 68 respondents (40.47%) reported experiencing dental anxiety, with a markedly higher prevalence among females (80.88%) compared to males (19.12%). The highest anxiety levels were observed in the 31–50 age group, with 36 participants responding "definitely yes" or "rather yes." Elevated anxiety was also noted among residents of medium-sized cities (44.05%), compared to those in rural or large urban areas.

Conclusions: Dental anxiety represents a notable barrier to regular dental attendance. Patients acknowledge its impact on their care-seeking behavior and suggest that dentists can help mitigate this anxiety through courteous, empathetic communication and the incorporation of calming elements, such as soothing background music, within the clinical environment.

Keywords: dental anxiety, dentophobia, dental treatment

Assessment of oxidative stress markers in non-stimulated saliva from various nicotine delivery methods.

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Background: Smoking remains one of the most harmful addictions. The oral cavity, being in direct contact with tobacco smoke, is the first line of defense against its pro-oxidant effects. Tobacco use increases the production of free radicals, contributing to oxidative stress and protein oxidation. Alternative nicotine delivery systems, such as heat-not-burn (HNB) products and e-cigarettes, are often considered less harmful, though their precise health effects are not yet fully defined.

The aim: The aim of the study was to assess and compare the concentrations of advanced glycation end products (AGE) and advanced oxidation protein products (AOPP) in non-stimulated saliva (NWS) among users of traditional cigarettes, e-cigarettes, and heat-not-burn products.

Materials and methods: The study enrolled 100 participants: 75 nicotine users divided into three equal groups (traditional cigarettes, e-cigarettes, and HNB products) and 25 non-smokers as a control group. All subjects were comparable in age, BMI, and general health. Non-stimulated saliva samples were collected under standardized conditions and analyzed for AGE and AOPP concentrations.

Results: AGE levels were significantly elevated in all nicotine-using groups compared to the control group. The highest values were observed in traditional cigarette smokers and HNB users. E-cigarette users also showed increased AGE concentrations, though to a minor extent. Similarly, AOPP levels were significantly higher among all nicotine users. The greatest increases occurred in traditional cigarette and HNB groups, with e-cigarette users exhibiting a milder but still notable elevation.

Conclusions: Smokers of traditional cigarettes as well as those using alternative methods show a significant increase in the concentration of AGE and AOPP in unstimulated saliva, which may lead to the development of many diseases occurring both in the oral cavity and the entire body.

Keywords: cigarette smoking, oxidative stress, saliva

Income influence on dental service use: patient awareness and treatment choice decisions

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Background: Advances in dental technology have improved treatment quality but increased costs, creating financial barriers—especially for lower-income patients—in accessing care in Poland, where National Health Fund coverage is limited, particularly for older adults.

The aim: To analyze how income influences patients' awareness of dental treatment costs and their treatment choices.

Materials and methods: A cross-sectional survey of 282 participants (dental patients, medical students, healthcare and education professionals, and their family members) was conducted from late 2023 to early 2024. Participants were classified by gender, age, residence, education, and monthly income. Data from a self-administered questionnaire were analyzed in Python (v3.11.1) using chi-square tests, Cramér's V, and phi coefficients (significance: $p < 0.05$). Income was dichotomized (<PLN 3,500 vs. >PLN 3,500) when subgroup sizes were small.

Results: Lower-income patients (<PLN 3,500) were more likely to postpone dental check-ups due to cost (24.82% vs. 13.12%, $p = 0.03$, $V = 0.16$) and chose treatments reimbursed by the National Health Fund more frequently, whereas higher-income individuals favored private services. No significant associations were found between income and awareness of reimbursed benefits, installment usage, or treatment withdrawal rates.

Conclusions: Income significantly affects dental care utilization, influencing check-up postponement and the choice between public and private treatments. However, weak correlations suggest other factors—such as health awareness, service quality, and appointment availability—also play important roles.

Keywords: Income, Dental Services, National Health Fund, Treatment Choice, Patient Awareness, Dental Costs

The impact of social media on body perception among young people

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Background: In today's world, we constantly encounter new technologies, including social media, where social interactions and public life exist virtually. Users control how they present themselves, showing only selected aspects of their lives. This creates an idealized reality, which may lead others to perceive their own lives as less appealing. Chasing this perfection can have harmful effects, especially on mental health.

The aim: the aim of the following study is to assess the impact of social media use on self perception.

Materials and methods: A survey was conducted using a questionnaire consisting of seventeen original questions on the influence of social media on self-perception, Body Esteem Scale (BES) and a scale of silhouettes with different degrees of nutrition according to A. Sobczak. The study group consisted of 211 respondents. The survey was conducted electronically on the Google Forms platform between November 2022 and March 2023.

Results: Respondents most often feel bad about photos of athletic people (37%), while 34.6% feel motivated, and 28.4% are indifferent. Additionally, 58.3% of respondents have felt their life was inferior compared to others on social media. Gender differences were statistically significant in reactions to athletic images ($p = 0.004$) and self-comparison with them ($p = 0.02$).

Conclusions: Studies show that users are prone to imitating celebrities. Our research indicates that gender influences self-perception on social media, with women being more self-critical. However, BMI does not affect how individuals view their bodies or lives.

Keywords: Social media, self-esteem, body

Public awareness of total laryngectomy and its consequences – survey results

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Background: Total laryngectomy, primarily used in the treatment of advanced laryngeal cancer, entails significant changes in a patient's life, including the need to adapt to new methods of communication and functioning.

The aim: The aim of this study was to assess public awareness of total laryngectomy and the perception of individuals who have undergone this procedure.

Materials and methods: The study was conducted through an anonymous online survey with 98 participants, both from the medical field and the general public.

Results: The analysis of the results revealed that total laryngectomy evokes considerable fear and uncertainty in society. A low level of awareness regarding communication methods available to patients after laryngeal removal was also observed.

Conclusions: The findings highlight the urgent need to raise public awareness about the lives of patients after total laryngectomy. Proper educational initiatives can not only support individuals directly affected by this condition but also shape social attitudes, fostering greater acceptance and support for post-laryngectomy patients. Educational campaigns can play a crucial role in improving their social integration and overall quality of life.

Keywords: Total laryngectomy, laryngeal cancer, public awareness

Assessment of knowledge about probiotics among people aged 30-50

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Background: Probiotics are living microorganisms that provide health benefits when consumed in appropriate amounts. Most often, these are bacteria that naturally occur in the human body, especially in the digestive system. They support the gut microbiota, which plays a key role in digestion and the absorption of nutrients. They boost immunity by stimulating the immune system to effectively combat pathogens, and even contribute to mental health by influencing serotonin production and regulating stress hormones.

The aim: The aim of the study was to assess respondents' knowledge about probiotics and their impact on gut microbiota, as well as to determine the reasons for their use.

Materials and methods: Data were collected over a three-month period using Google Forms. A self-reported questionnaire containing 25 closed-ended questions was used for the study. Respondents (N=140), who consented to participate, completed the questionnaire anonymously.

Results: The vast majority (78.6%) of respondents know what probiotics are, while only 55% believe they positively impact the human body. Among the positive aspects, respondents pointed to: regulation of bowel function (40%), elimination of constipation (37.9%), and reduction in the frequency of diarrhea (33.6%). The main factors considered when purchasing probiotic products are the substances present in them (44.3%) and their health value (40.7%).

Conclusions: People aged 30-50 have a good level of knowledge about probiotics, as most respondents correctly identified the definition, sources, and their effects on the human body. However, it is still necessary to popularize knowledge about gut microbiota, mainly through mass media.

Keywords: probiotics, gut microbiota, immune system, fermented products

Aluminum Salts as Environmental Risk Factors in Female Breast Carcinogenesis - A Survey Study

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Background: Aluminum salts, particularly aluminum chlorides used in antiperspirants, block sweat glands to reduce perspiration. Studies suggest their regular use may increase breast cancer risk by enhancing estrogen receptor activity, activating oncogenes (ER-alpha, p53, cyclin D1, c-Fos), and causing DNA damage in breast cells, potentially leading to tumor formation.

The aim: The aim of the study was to evaluate consumer awareness regarding the potential risks associated with the use of antiperspirants containing aluminum salts, to examine their mechanism of action in the context of breast cancer risk, and to highlight the importance of enhancing public education on this issue.

Materials and methods: An anonymous survey consisting of 37 questions was conducted regarding consumer knowledge and habits related to the presence of aluminum in cosmetics and breast cancer prevention. The survey was conducted online from November 11 to 22, 2024. The study involved 159 respondents, mainly women aged 18-25 with higher education.

Results: The study showed that 58% of respondents are aware of the presence of aluminum salts in antiperspirants and the risk of their association with breast cancer. 54% of respondents choose cosmetics advertised as "aluminum-free", and as many as 89% declare their readiness to give up these products due to their potential harmfulness. 84% of respondents gain knowledge about the composition and effects of cosmetics from the Internet, media and friends, but only 11% consider these sources credible. Regular preventive tests are performed by 35% of survey participants, while 69% attach great importance to health prevention.

Conclusions: The study showed that awareness of the risks associated with aluminum in cosmetics is low. Although most respondents recognize its harmfulness, few choose "aluminum-free" products or analyze their composition. The low trust in media emphasizes the need for reliable educational campaigns, increasing public engagement, and strengthening health prevention based on credible sources.

Keywords: breast cancer, aluminum salts, cosmetics, antiperspirants, health prevention, tumor   formation

Impact of the COVID-19 pandemic on the occurrence of pulmonary embolism

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Background: A pulmonary embolism is a severe condition caused by sudden occlusion or narrowing of the pulmonary artery. It is one of the most common causes of death due to cardiovascular diseases. SARS-CoV-2 is presumed to increase the risk of this event in the initial phase of COVID-19 and after the recovery.

The aim: This study aimed to assess the impact of the COVID-19 pandemic on the occurrence of pulmonary embolism in the Polish population, using a vast database of adults provided by the Polish National Health Fund (NFZ).

Materials and methods: Statistical methods such as Student's t-test and ANOVA were performed using the Python algorithm and SciPy library on data from 2018-2024 from the adult Polish population.

Results: Utilized methods proved that the COVID-19 pandemic had and still has a significant impact on the occurrence of pulmonary embolism both in the general population ($p < 0,001$) and in all groups based on gender and age. Moreover, it was among the most frequently reported comorbidities in 2020-2023.

Conclusions: The COVID-19 pandemic and its long-term complications have had a considerable impact on the health of Poles, showing that this is still an invisible threat that should be remembered, especially in the context of vaccinations.

Keywords: COVID-19, pandemic, SARS-CoV-2, pulmonary embolism

Assessment of potential human exposure to ticks and elected tick-borne infection in areas of Mazovian province

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Background: In Poland Ixodes ricinus and Dermacentor reticulatus ticks are the main vectors and/or reservoirs of many pathogens including Borrelia burgdorferi sensu lato, Rickettsia spp., and Anaplasma phagocytophilum.

The aim: To assess the potential risk of human exposure to ticks and tick-borne infections with Borrelia afzelii, Rickettsia spp. and A. phagocytophilum in selected recreational areas of the Mazovian province.

Materials and methods: Ticks were collected by flagging method in Błonie and Pruszków. Then, the individuals were identified to species and developmental stages. DNA was extracted using the ammonia method, quantified spectrophotometrically, and analyzed for pathogens using PCR and nested PCR. To detect B. burgdorferi s.l. and A. phagocytophilum specific primers to the flaB and 16S rRNA genes were used, respectively. In turn, Rickettsia spp. was detected using specific primers for gltA gene. Amplification products were separated electrophoretically and visualized under UV light. Next, positive samples were isolated from gels and sequenced.

Results: A total of 100 ticks were collected from the studied areas: 91 D. reticulatus (only adults), and 9 I. ricinus (adults and nymphs, only from Pruszków). Borrelia afzelii was detected in one male I. ricinus, while Rickettsia spp. was found in 63.13% of studied D. reticulatus and in 77.77% of I. ricinus.

Conclusions: The presence of D. reticulatus was confirmed east of the Wisła River, with a high potential risk of human exposure in both studied areas. In turn, there is a low potential risk of infestation with I. ricinus in these areas was shown. The potential risk of human exposure to B. afzelii infection was low in Pruszków, whereas the risk of Rickettsia spp. infection was high across all studied locations.

Keywords: Ticks, Ixodes ricinus, Dermacentor reticulatus, tick-borne infection,

Self-reported treatment adherence in primary health care patients with type 2 diabetes

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Background: Clinicians are increasingly concerned about treatment non-adherence among type 2 diabetes patients. One effective, non-invasive, low-cost, and time-efficient tool that can be easily implemented in healthcare settings is the Haynes-Sackett test.

The aim: To evaluate treatment adherence among patients with type 2 diabetes in primary healthcare.

Materials and methods: The study was conducted from January to March 2025, involving 54 patients diagnosed with type 2 diabetes who were recruited from three primary care clinics. Patients treatment adherence was assessed using the Haynes-Sackett test. This test consists of a single question: "Most patients have difficulty taking all their pills; Do you have difficulties in taking yours?" A response of "I had no difficulties with medication intake" indicated good adherence. The statistical evaluation of the results was performed using Statistica 12.0 software, with a significance threshold set at $p<0.05$.

Results: Subjects included 24 women and 30 men with an average age of 64.7 ± 11.1 years, all patients were citizens. Almost half of the respondents had a secondary level of education (46.3%, N = 25), most of them were in a relationship (70.4%, N = 38), and one in five (20.4%, N = 11) declared insufficient income. Also, 75.9% (N= 41) of respondents use oral antidiabetic drugs. One in four patients surveyed in the Haynes-Sackett test admitted that he/she had difficulties with medication intake, a similar number of male and female patients (7 vs 6 respectively). Patients in the age category ≥ 65 years old, with a higher level of education, those who were in a relationship, were professionally inactive, lived alone, used one hypoglycemic drug, and with satisfied income more often declared difficulties with medication intake. However, these differences were not statistically significant.

Conclusions: Further studies are necessary with a larger patient group to achieve a balanced number of subjects within the subgroups based on variables influencing self-reported treatment adherence.

Keywords: treatment adherence, type 2 diabetes, Hayness-Sackett test

Assessment of Women's Knowledge about Cervical Cancer

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Background: Women's knowledge of cervical cancer prevention plays a key role in the effectiveness of screening and early detection strategies.

The aim: Assessment of women's knowledge of cervical cancer and identification of areas with the greatest information gaps.

Materials and methods: The study included 160 women. Responses to a closed-ended questionnaire, covering areas such as prevention methods, early symptoms, screening program organization, and HPV vaccination were analyzed. The correctness of the answers was assessed, and the results were classified according to the knowledge thresholds: low (<50%), moderate (50–79%) and high (≥80%).

Results: The greatest difficulty was to indicate who was authorized to perform cytology - only 41.88% of respondents answered correctly. A total of 16.25% of women did not know that virgins and pregnant women can have cytological test. In contrast, high knowledge was noted in questions about the duration of the test (98.75% correct answers) and its painlessness (95.63%). Importantly, 8.13% of the respondents had never heard of the HPV vaccination, and 45% of the respondents were unable to indicate the correct phase of the cycle to perform the test. Of the 14 analyzed questions, 7 were classified as high knowledge, 6 as moderate, and 1 as low.

Conclusions: The participants demonstrated strong awareness of the importance and frequency of Pap smears. However, significant knowledge deficits regarding screening programme, staff qualifications, and physiological details highlight the need for broader and better-targeted health education initiatives.

Keywords: cervical cancer, cancer prevention, Pap smear, health knowledge, HPV vaccination

Artificial Intelligence vs. Polish State Exams: Is AI Competent Enough to Become a Medical Specialist?

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Background: Artificial intelligence (AI) excels at data analysis, yet its clinical reasoning remains under scrutiny.

The aim: This study aims to evaluate whether 3 AI models (Gemini 2.0 Flash-Lite, DeepSeek-V3, and GPT-4o) could pass the Polish State Specialty Exams (PES) across 10 medical disciplines.

Materials and methods: We evaluated the models across 10 standardized tests (120 questions each) from the Autumn 2024 PES, comparing their performance against physician benchmarks. We assess whether current models can match or exceed average clinical performance, and where their limitations still emerge.

Results: Among human, the highest mean performance was observed in Endocrinology (98.4 points) and the lowest in Pathomorphology (83.3 points). This trend was partially replicated by the AI models, all of which exhibited their weakest performance in Pathomorphology (mean score: 86.7), while achieving their highest mean scores in Geriatrics (98.7 points - in contrast to human performance: 89.2). Among the evaluated models, DeepSeek-V3 achieved the highest diagnostic accuracy, whereas GPT-4o consistently scored lowest. When aggregated across all specialties and models, the average AI performance reached 91.2 points. Importantly, none of the AI models failed any exam. However, a subset of items (n = 74) was consistently answered incorrectly by all 3 models. These items predominantly consisted of complex, integrative clinical case scenarios, underscoring persistent limitations in AI models' capacity for advanced clinical reasoning and context-sensitive decision-making.

Conclusions: The results indicate that AI achieve performance levels even surpassing those of the average physician. However, the models continue to exhibit deficiencies in contextual and interpretive reasoning, reinforcing the indispensable role of human clinicians in delivering personalized care. While AI holds promise as an adjunctive tool in clinical decision-making, it remains incapable of emulating the comprehensive judgment required for holistic patient management.

Keywords: AI, PES, examination, medical speciality

Retrospective Analysis of Psychotropic Drug Use to Estimate Delirium Prevalence in Geriatric Hospital Units

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Background: Delirium is a common, underdiagnosed condition in hospitalised elderly patients. However, detailed documentation of delirium is often absent in patient charts, making it difficult to assess its prevalence directly.

The aim: This study aims to explore the prevalence of delirium in elderly patients based on psychotropic drug consumption, as the consumption of certain medications can serve as an indirect indicator of delirium.

Materials and methods: A retrospective analysis was conducted on data from two hospital units: the Internal Medicine Unit (IMU), which treated 731 geriatric patients from October 1, 2023, to October 17, 2024, and the Psychiatric Acute Geriatric Unit (PAGU), which treated 42 patients in the same period. Drug consumption data, including quetiapine, haloperidol, and diazepam, were analysed in milligrams (mg) per day per patient.

Results: In the IMU: average age 77.3 years, 56.39% female. Average hospitalisation: 7.76 days. The psychotropic drug consumption per patient per day: 22.404 mg of quetiapine, 0.212 mg of haloperidol, and 1.062 mg of diazepam. In the PAGU: average age 79.65 years, 76.19% female. Average hospitalisation: 382 days. The consumption was significantly higher: 79.770 mg of quetiapine, 0.218 mg of haloperidol, and 0.125 mg of diazepam.

Conclusions: The data indicate that the consumption of psychotropic drugs, especially quetiapine, is considerably higher in the PAGU. This trend may suggest a greater prevalence of delirium among these patients. Therefore, early detection and management of delirium are crucial, particularly in psychiatric contexts where the practice of polypharmacy is more prevalent.

Keywords: delirium, psychotropic drugs, geriatric, elderly patients

Awareness and Knowledge of Clostridioides difficile Outbreaks Among Medical Field Students

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Background: Clostridioides difficile is a Gram-positive, anaerobic, sporeforming bacterium. It is the main bacterial cause of hospital outbreaks in Poland, related to antibiotic-associated diarrhea. Its spores are highly resistant and can survive in the hospital environment for many months.

The aim: Assessment of the awareness of Medical University of Silesia (ŚUM) students, from different years and faculties, concerning the epidemiology and treatment of Clostridioides difficile infections (CDI).

Materials and methods: A questionnaire was developed and validated, consisting of 17 questions—8 concerning students' faculty, year of study, department, self-assessed level of knowledge, sources of information about outbreaks, and 9 factual questions regarding C. difficile. The survey was conducted between January 2025 and February 2025. The validation process assessed both reproducibility and reliability, with the Cohen's kappa statistic calculated to quantify agreement. Preliminary results on students' knowledge of C. difficile infections were presented. Further data collection among a larger group of students is planned.

Results: Among the 68 respondents, 91.2% were medical students. Preliminary results showed that 25% of respondents declared their knowledge of outbreaks as low, and 4.4% as very low. A total of 97.1% of medical field students declared that they had heard of C. difficile. However, only 26.5% of respondents correctly identified the hyperepidemic ribotype of C. difficile. More than half of the respondents (55.9%) correctly indicated fidaxomicin as the most effective drug for the treatment of CDI. Additionally, 82.4% of participants stated that a patient infected with C. difficile should always be isolated.

Conclusions: The vast majority of students at ŚUM demonstrated knowledge of C. difficile. A high percentage of respondents correctly identified the recommended treatment for CDI. Awareness of the factors contributing to these infections is essential for future healthcare professionals educated at ŚUM.

Keywords: CDI, C. difficile, medical students, treatment of CDI, survey study

Social Media and Eating Disorders: Insights from Medical and Non-Medical Students in the Silesian Voivodeship

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Background: Eating disorders (ED) are considered one of the most prevalent health concerns. When ignored, they can lead to serious health implications. Today, social media (SM) exerts an influence on attitudes and health-related behaviours within society, potentially affecting the issue of ED.

The aim: To assess the opinions of medical and non-medical students regarding the importance and influence of social media in the context of eating disorders.

Materials and methods: The survey was conducted online using a questionnaire distributed among students from the Silesian Voivodeship. Taking the exclusion criteria into account, the final analysis included 217 participants – 146 medical and 71 non-medical students from years I to V. Data analysis was performed using MS Excel and the Statistica software. Relationships were assessed using the Chi-square test, with a p-value < 0.05 considered statistically significant.

Results: 87.6% of respondents recognized ED as a notable current health and social issue. No statistically significant association was observed between the medical and non-medical students and the focus on eating habits, implementation of dietary changes, or self-assessment of knowledge in this area. Respondents in the earlier years of study were significantly more likely to report paying attention to their eating habits (p < 0.05). A total of 92.2% of participants had encountered content related to ED on SM. The most frequently indicated platforms were Instagram (82.5%) and YouTube (71%), while the most identified content included personal stories, such as podcasts or interviews. In response to the question of whether SM can increase the risk of ED, 63.6% answered "definitely yes", and 28.6% – "rather yes".

Conclusions: Despite the medical and non-medical backgrounds, the level of awareness regarding the role of SM in ED is comparable. Probably, the year of study may be more relevant. Given the impact of SM on daily life, further research into its effects on health, including ED, remains crucial.

Keywords: social media influence, eating behaviours, students' opinions

Evaluation of serum cystatin C levels in children and adolescents with type 1 diabetes mellitus: An associations with urinary glycosaminoglycans excretion

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Background: Diabetic kidney disease (DKD) is one of the major microvascular complications of type 1 diabetes mellitus (T1DM). Therefore, early detection and management of diabetes and its complications are crucial in preventing DKD and preserving kidney function. Serum cystatin C is promise biomarker for DKD due to its sensitivity to detect changes in glomerular filtration rate (GFR) and its potential to reveal early kidney dysfunction. Although, its utility in clinical practice for DKD diagnosis and monitoring remains under investigation.

The aim: The aim of this study was to evaluate serum cystatin C levels and its association with urinary excretion of glycosaminoglycans (GAG) in early DKD detection in children and adolescents of T1DM with normoalbuminuria.

Materials and methods: The study included 40 children and adolescents with T1DM and 16 age- and sex- matched healthy controls. Serum cystatin C levels were measured by immunoassay kit, and its correlation with estimated glomerular filtration rate (eGFR), albuminuria, urine albumin-to-creatinine ratio (uACR) and urinary GAG excretion were also assessed.

Results: Serum cystatin C levels in patients with T1DM were not significantly different from those in healthy controls. There were no significant differences between serum cystatin C levels of diabetic patients with HbA1 c ≤ 6.5% or HbA1c > 6.5%. Furthermore, in patients with T1DM, serum cystatin C levels were positively correlated with urinary GAG excretion.

Conclusions: The results of this study suggest that evaluation of serum cystatin C levels in combination with the assessment of urinary GAG excretion may present diagnostic utility as complementary biomarkers in both early detection, and monitoring progression of diabetic kidney damage. However, these findings support the need for further research in larger study groups to confirm the clinical applicability of these markers in daily practice and in the early detection of DKD.

Keywords: Cystatin C, type 1 diabetes mellitus, diabetic kidney disease, urinary glycosaminoglycan, eGFR, uACR

Robotic and Conventional Minimally Invasive Pedicle Screw Instrumentation in Thoracolumbar Fractures

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Background: Robotic-assisted minimally invasive surgery (RA-MIS) is becoming increasingly applied
to spinal surgery, offering an alternative to conventional minimally invasive spinal surgery (C-MIS). Recently, RA-MIS has been proposed for pedicle screw instrumentation in thoracolumbar fractures; however, clinical effectiveness and patient safety on RA-MIS versus C-MIS remain unclear in this area.

The aim: This systematic review with meta-analysis aims to evaluate R-MIS and C-MIS for screw instrumentation among the thoracolumbar fracture population.

Materials and methods: This study followed PRISMA and Cochrane guidelines. Five medical databases were searched (PubMed, Embase, Cochrane Library, Web of Science, and Scopus) from inception to January 10, 2025. Finally, 10 studies were included in the meta-analysis, with a total of 562 patients. Data extraction included patient demographics, robot models, and clinical outcomes. A random-effects meta-analysis was conducted in R software with Mantel-Haenszel and Inverse-Variance methods. We assessed heterogeneity with the I2 statistic.

Results: RA-MIS showed superiority in terms of accurate (GR A) screw placement (OR: 3.58, 95% CI: 2.30–5.58, p<.001) and satisfactory (GR A+B) screw placement (OR: 3.86, 95% CI: 2.14–6.96, p<.001) compared to C-MIS. RA-MIS led to a significantly lower incidence of severely misplaced (GR D+E) screws (OR: 0.26, 95% CI: 0.13–0.51, p<.001) and lower blood loss (MD: -12.03, 95% CI: -20.85 to -3.21, p<.01). However, we found no statistically significant differences in operation time (MD: -4.92, 95% CI: -12.06 to 2.22, p=.18) or complications (screw loosening, nerve injury, or infection).

Conclusions: R-MIS spinal surgery is superior in terms of higher pedicle screw accuracy and reduced perioperative blood loss, at the cost of significantly higher costs of surgery. Due to the lack of any randomized studies, future trials should provide a less biased methodology to confirm the findings and establish the role of robotic surgery

Keywords: Robot, minimally invasive, thoracolumbar fracture, spine, technology

Pedicle Screw Placement for Adolescent Idiopathic Scoliosis - Bayesian Network Meta-Analysis

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Background: Adolescent idiopathic scoliosis (AIS) is a prevalent spinal deformity, often requiring surgical intervention. Posterior pedicle spine instrumentation, a common procedure for correcting AIS, can be performed using freehand fluoroscopic (FHF), navigation-assisted (NVA), or robotic-assisted (RBA) techniques for pedicle screw insertion.

The aim: This study aimed to evaluate the accuracy and clinical outcomes of these techniques among AIS patients through a Bayesian network meta-analysis (BNMA).

Materials and methods: We conducted a comprehensive literature search to identify relevant studies. The primary outcome was surgical accuracy using the Gertzbein-Robbins (GR) classification and screw placement time. Secondary outcomes included blood loss, surgery duration, Cobb angle, correction rate, and hospital stay. Bayesian network meta-analysis (BNMA) was employed to synthesize the evidence and estimate the relative effects of each approach.

Results: A total of 764 patients and 8,144 pedicular screws implanted from twelve studies were included in this BNMA. FHF was not statistically different from NVA for GR A/0 (OR 0.43 [0.19, 1.02]) but was inferior to RBA (OR 0.32 [0.13, 0,79]). Moreover, FHF was inferior to RBA surgery for GR A+B/0+1 (OR 0.28 [0.12, 0.55]) and NVA (OR 0.27 [0.12, 0.64]). For GR D+E/3, NVA (OR 0.14 [0.03, 0.75]) and RBA (OR 0.17 [0.02, 0.87]), were superior to FHF. We observed no statistically significant differences in operation time, correction rate, Cobb angle, and blood loss between arms. No statistically significant differences were found between RBA and NVA.

Conclusions: Our findings suggest that RBA surgery may offer superior accuracy in pedicle screw placement compared to FHF and NVA techniques. However, it may be associated with longer operative times. Meanwhile, NVA offers a balance between accuracy and surgery time. Further research is needed to assess the long-term outcomes, radiation exposure, and cost-effectiveness of these approaches.

Keywords: Robot, Navigation, Freehand surgery, Adolescent idiopathic scoliosis, Bayesian Network Meta-Analysis

Comparison of Different Pedicle Fixation Methods in Congenital Scoliosis - Bayesian Meta-Analysis

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Background: Pedicle screw fixation is a commonly used surgical technique in the treatment of congenital scoliosis (CS). Precise screw insertions are challenging, especially for patients with deformities like CS. The use of alternatives to the classic freehand fluoroscopy technique (FHF), such as intraoperative navigation systems (NAV), robotic assistance (RBA), 3D printed-assisted pedicle guides (3D-PG) and anatomical models (3D-AM), could improve the accuracy of pedicle screw placement.

The aim: This network meta analysis (NMA) aims to compare different techniques of screw placement in CS surgery.

Materials and methods: Studies from five databases were included, and the study population was patients under 25 years with CS. Bayesian NMA was employed to calculate Odds Ratio (OR) and Mean Difference (MD), and estimate the relative effects of each approach. Outcomes included blood loss, coronal Cobb angle, hospital stay, curve correction rate and the accuracy of screw placement, which was evaluated with Gertzbein-Robbin (GR) classification.

Results: Eleven studies were included. The analysis demonstrated that 3D-AM significantly improved the odds of achieving Grade 0 screw placement compared to FHF ((OR 5.327 (1.279, 24.457))). Additionally, FHF accuracy was lower than 3D-AM (OR 0.333 (0.126, 0.741)), 3D-PG (OR 0.257 (0.118, 0.516)), NAV ((OR 0.148 (0.042, 0.363)) and RBA (OR 0.17 (0.027, 0.943)) for Grade 0+1 placements. NVA had a longer operation time (OT) compared to 3D-PG (MD 106.48 (4.16, 226.74)). No statistically significant differences in blood loss, coronal Cobb angle, hospital stay, or curve correction rate were found.

Conclusions: 3D-AM, 3D-PG, RBA, and NAV may offer superior accuracy in pedicle screw placement compared to FHF, which exhibited the poorest results. Also, 3D-AM and 3D-PG have shorter operation time compared to NAV. Although screw accuracy was improved, no statistically significant differences in clinical outcomes were found.

Keywords: Congenital scoliosis, robot, navigation, freehand surgery

Artificial Intelligence in Surgery: Current Applications and Future Potential

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Background: Artificial Intelligence (AI) has rapidly integrated into surgical practice, offering significant advancements in precision, efficiency, and patient safety.

The aim: This literature review evaluates the current applications of AI in surgery and explores its potential for transforming future clinical practice.

Materials and methods: A systematic search of the PubMed database was performed to identify studies on AI in surgery published from 2020 to 2025. Inclusion criteria were literature reviews, original clinical or preclinical articles in English that reported quantifiable outcomes on AI applications in surgery. Exclusion criteria included opinion pieces, and articles lacking empirical data. From the initial results, 10 studies were selected based on their relevance and methodological rigor. These studies primarily focused on AI's role in diagnostics, surgical assistance, intraoperative decision-making, and postoperative care.

Results: The synthesis of data across the selected studies revealed consistent findings regarding AI's contributions to surgical practice. AI-assisted diagnostic algorithms demonstrated improved sensitivity and specificity in detecting pathologies, reducing diagnostic errors by 20-30%. Robotic surgery systems enhanced with AI algorithms significantly decreased operative times by 9-15% and improved precision in minimally invasive procedures. Predictive AI models for postoperative complications achieved an accuracy rate of over 85%, outperforming conventional scoring systems. Across studies, the integration of AI into surgical workflows was associated with a 25% reduction in intraoperative complications and a measurable improvement in patient outcomes.

Conclusions: AI's integration into surgery is driving substantial advancements in diagnostics, intraoperative performance, and patient safety. Future research should aim to optimize AI algorithms, ensure equity in access, and further validate clinical outcomes.

Keywords: Artificial Intelligence, Surgery, Robotics, Diagnostics

AI-ASSISTED MINIMALLY INASIVE SURGERY

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Background: The integration of artificial intelligence (AI) in minimally invasive surgery (MIS) has revolutionized therapeutic approaches by enhancing precision, reducing complications, and optimizing postoperative recovery. Recent advancements in AI technology have significantly improved surgical outcomes, making MIS safer and more efficient.

The aim: This review aims to analyze recent developments in AI-assisted MIS, evaluating its impact on surgical precision, intraoperative decision-making, and postoperative recovery.

Materials and methods: A systematic search of the PubMed database was conducted to identify studies published between 2020 and 2025 on AI applications in MIS. The inclusion criteria encompassed review articles and original studies evaluating the impact of AI on surgical outcomes. Studies lacking empirical data or with insufficient methodology were excluded. A total of 10 studies were selected and analyzed in detail, focusing on AI-driven intraoperative imaging, robotic-assisted surgery, decision optimization, and postoperative complication prediction.

Results: Data analysis highlighted significant benefits of AI in MIS. AI-enhanced imaging algorithms improved anatomical structure detection accuracy to 95%, reducing intraoperative injury rates. AI-integrated robotic surgical systems, such as the da Vinci Xi, decreased operative time by 15-20% and enhanced suture precision in laparoscopic and thoracoscopic procedures. Predictive models for postoperative complications demonstrated over 90% accuracy, enabling early interventions and reducing postoperative mortality. Overall, AI implementation led to a 30% reduction in intraoperative complications and faster patient recovery.

Conclusions: The incorporation of artificial intelligence in minimally invasive surgery marks a significant advancement in modern surgical practice. Future research should focus on refining AI algorithms, integrating them into accessible clinical systems, and assessing their long-term effects on patient safety and surgical efficiency.

Keywords: Artificial intelligence, minimally invasive surgery, robotic-assisted surgery

Neuroimmunological Correlates of Depression and Schizophrenia – A Review of Hypotheses

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Background: Recent years have brought increasing evidence pointing to a key role of the immune system in the pathophysiology of depressive disorders and schizophrenia. Cytokine imbalance, chronic low-grade inflammation, and microglial activation may influence neurotransmission and the structural integrity of neural networks.

The aim: This study aimed to present the most recent (2020–2025) original findings regarding neuroinflammatory mechanisms in depressive disorders and schizophrenia, as well as their clinical and therapeutic significance.

Materials and methods: Original research articles published between 2020 and 2025 were reviewed using the PubMed and Scopus databases. Included were clinical studies (cytokine levels, PET, CRP), preclinical studies (LPS, EAE models), and interventional trials (e.g., celecoxib, minocycline, tocilizumab).

Results: Clinical studies reported elevated serum levels of IL-6, TNF-α, and CRP in patients with treatment-resistant depressive disorders and those with schizophrenia showing prominent negative symptoms. PET imaging revealed increased microglial activation in the prefrontal cortex and hippocampus, positively correlating with cognitive deficits. Celecoxib improved SSRI treatment response in patients with a CRP level greater than 3 mg/L. Minocycline demonstrated anti-inflammatory and neuroprotective effects in schizophrenia. Tocilizumab reduced negative symptoms. In murine models, blocking IL-6 and IDO resulted in decreased depressive-like behaviors, and the protection blockade against synaptic loss.

Conclusions: Between 2020 and 2025, evidence has strengthened the role of proinflammatory cytokines—especially IL-6—in the pathophysiology of depressive disorders and schizophrenia. Immunotherapy may offer a promising treatment direction for patients with an inflammatory phenotype. However, larger-scale and targeted clinical trials are still needed.

Fungal infections of cerebrospinal fluid shunt in pediatric patients: a systematic literature review.

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Background: The standard treatment of hydrocephalus consists of the implantation of a cerebrospinal fluid (CSF) shunt. However, infection of the CSF shunts affects 5-15% of patients, primarily due to bacterial pathogens, with rare cases of fungal infections, particularly from Candida species. These infections may occur due to the extended use of antibiotics and the prolonged application of external ventricular drains (EVD).

The aim: This study aimed to systematically review the available literature on fungal CSF shunt infections in the pediatric population.

Materials and methods: A systematic review was conducted in accordance with PRISMA guidelines. PubMed, Scopus, Web of Science, Mendeley, and Cochrane Library databases were searched for studies on fungal CSF shunt infection in pediatric patients, published from inception until 6 September 2024.

Results: A total number of 26 studies reporting on 38 pediatric patients were found eligible. Together with our institutional case, 39 patients were further analyzed. The mean age at diagnosis was 6.27 Ї 4.10 years. Candida was the most common causative agent (76.92%), with Candida albicans being the most prevalent (58.97%). In 17.95% of cases, bacterial central nervous system (CNS) infection co-occurred with a fungal infection. CSF culture confirmed the infection in 77.78% of the cases. Amphotericin B was the main antifungal agent used in monotherapy, primarily administered intravenously (92.86%). Intraventricular and intrathecal routes were used in 27.59% and 20.00% of patients, respectively. Fungal infections recurred in 10.81% of cases, and the overall mortality rate was also 10.81%.

Conclusions: Fungal CSF shunt infections pose significant treatment challenges, requiring comprehensive strategies, including intraventricular and intrathecal drug administration and potential surgical removal of fungal vegetation to reduce biofilm volume.

Exploring Treatment Approaches for Neuromyelitis Optica Spectrum Disorders (NMOSD)

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Background: Neuromyelitis optica spectrum disorder (NMOSD) is a rare autoimmune demyelinating disease of the central nervous system, distinct from multiple sclerosis. Its pathogenesis is primarily associated with anti-AQP4-IgG antibodies, though some patients present with anti-MOG-IgG. The most common symptoms include optic neuritis and longitudinal extensive transverse myelitis (LETM) often leading to blindness and tetra- or paraparesis.

The aim: This systemtic review summarizes current and emerging treatment strategies for NMOSD, including therapies used in acute attacks, long-term immunosuppression, and targeted biological agents.

Materials and methods: The paper is based on a systematic review of current literature and clinical trial data. It discusses conventional immunosuppressants (e.g., azathioprine, mycophenolate mofetil, rituximab), targeted therapies (satralizumab, eculizumab, inebilizumab), and the latest Polish drug program (B.138.FM).

Results: Biologic therapies show significant effectiveness in relapse prevention, especially in AQP4-IgG-positive patients. Satralizumab and inebilizumab reduce relapse rates and disability progression, with favorable safety profiles. Eculizumab provides rapid and sustained complement inhibition, offering high efficacy. Satralizumab is now reimbursed in Poland for eligible patients.

Conclusions: Modern, targeted therapies for NMOSD greatly improve patient outcomes and quality of life. Accurate and timely diagnosis, access to appropriate treatment, and individualized therapeutic approaches remain key to reducing long-term disability in NMOSD.

Keywords: Neuromyelitis optica spectrum disorder, Autoimmune demyelination, AQP4 antibodies, Biologic therapy

PERSISTENT MULTI-SYSTEM INVOLVEMENT AFTER PEDIATRIC COVID-19

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Background: The COVID-19 pandemic has had profound global health implications, particularly among children and adolescents. While the acute phase of SARS-CoV-2 infection tends to be mild in the young population, there is growing evidence of long-term symptoms. This prolonged condition, known as Long COVID or Post-Acute Sequelae of SARS-CoV-2 (PASC), has increasingly affected pediatric populations, although much less studied than in adults.

The aim: This systematic review aims to analyze the epidemiology, immunopathogenesis, and management strategies of Long COVID in children.

Materials and methods: A comprehensive review was conducted using PubMed, ResearchGate, ScienceDirect, and the European Journal of Pediatrics, evaluating symptoms, organ system effects, and management.

Results: A review of 40 studies found a 23.36% prevalence of Long COVID in children. Dyspnea had the highest prevalence at 22.75%, followed by fatigue, headache, respiratory distress, neurological dysfunction, and psychiatric symptoms. Severe Long COVID cases often present as multisystem disorders, including myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), dysautonomia, vascular dysfunction, and coagulation abnormalities. Children over ten years old exhibited higher prevalence rates. Elevated antibodies, cytokines, and CCL11 (specific for cognitive impairment) were observed. Dysregulated Treg cells indicated persistent immune activation. Diagnoses are made with clinical evaluation, MRI (for neurological dysfunction), ultrasound, electrocardiogram, and SPECT scans. Follow-ups at 1-3 months are crucial for diagnosing persistent symptoms.

Conclusions: Although significant progress has been made in understanding Long COVID, there are no specific biomarkers for diagnosis or effective treatments. Further research is needed into viral persistence, neuroinflammation, and autoimmune dysregulation to develop targeted therapies.

Keywords: Post-Acute Sequelae of SARS-CoV-2 (PASC), Immunopathogenesis, Neurological dysfunction, Covid-19

The abscopal effect - from a rarely phenomenon to a breakthrough in cancer therapy.

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Background: The abscopal effect, associated with regression of tumor lesions beyond the site of irradiation, remained a rarely observed phenomenon for years. The development of immunotherapy has renewed interest in its importance in modern therapy of multiple tumor lesions.

The aim: The purpose of our study was to meta-analyze data from clinical trials on the abscopal effect and to identify treatment regimens conducive to its onset.

Materials and methods: The literature available in the MEDLINE database was analyzed. Inclusion criteria were (1) studies involving onset of abscopal effect as well as treatment regimens, (2) studies addressing side effects of radio- and immunotherapy alliance. The MEDLINE database was searched using the keyword "abscopal effect".

Results: 54 articles met the full criteria. It was observed that the abscopal effect occurs more often in the combination of radiotherapy with immunotherapy, especially with toll-like receptors agonists (TLR) (72,2%) Granulocyte-Macrophage Colony-Stimulating Factor (GM- CSF) (26.8% - non-small-cell lung cancer, breast cancer, thymic cancer, glioma) or PD-1 (programmed-death receptor-1) (30.6%).

Conclusions: Although still rare, the abscopal effect may play a crucial role in modern approaches to cancer treatment. Further randomized trials are needed to better understand its biological mechanisms and clinical use.

Keywords: Abscopal effect, radiotherapy, immunotherapy,

Amelanotic melanoma – a diagnostic challenge in the field of dermatology and oncology

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Background: It is estimated that about 2–20% of all melanoma cases are amelanotic, presenting as pink, red or skin-colored lesions. This type of cancer poses a significant challenge in the field of dermatology and oncology due to the lack of specified recognition criteria, leading to an 89% rate of misdiagnosis.

The aim: This work aims to present the currently recognized characteristics of amelanotic melanoma (AM), highlighting the difficulty of its diagnosis.

Materials and methods: This review was performed according to the PRISMA standard and using "amelanotic melanoma", "melanoma", "nonpigmented", "dermatoscopy" and "diagnosis" as keywords. Forty-eight papers were retrieved from the Google Scholar and PubMed databases, covering articles published from September 2010 to December 2024.

Results: Cases of amelanotic melanoma include pink or milky-red macules and nodules, mostly on the sun-exposed areas of the body. Low pigment amounts found in histologic examination and short white lines observed across the lesions are notably mentioned in relevance to establishing its potential diagnostic criteria. Moreover, dotted vessels are considered characteristic for the early stages of this melanoma, while linear and hairpin types prevail in thicker lesions. Therefore, utilizing diagnostic methods such as dermatoscopy allows for a better chance of an accurate diagnosis.

Conclusions: Regarded characteristics of amelanotic melanoma remain non-specific, which may lead to recognizing it as other malignant or benign lesions. Consequently, late diagnoses and high mortality rates can be observed. Further research on potential AM-specific criteria is necessary for raising the probability of accurate recognition at its early stages.

Keywords: amelanotic melanoma, melanoma, nonpigmented, dermatoscopy, diagnosis

Pharmacotherapeutic aspects of nanoparticle-based systems used in drug delivery across the blood-brain barrier

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Background: Affecting 276 million people worldwide and responsible for 16% of deaths, neurological disorders rank among the leading medical problems. Diseases affecting the central nervous system (CNS) are an exceptional therapeutic challenge. The blood-brain barrier (BBB) plays a crucial role in protecting the brain but simultaneously limits the efficiency of conventional treatments. The development of nanomedicine is seen as a potential opportunity for more effective therapy of neurological diseases.

The aim: The purpose of this research is to elucidate the challenges of drug delivery across the BBB and demonstrate the potential of nano-based medicine used in neurological treatment.

Materials and methods: The research was conducted in accordance with the PRISMA guidelines. It was based on 56 articles from the PubMed and Google Scholar databases. The keywords used in this study included: "nanoparticles", "nano-based medicine", "drug delivery", "blood-brain barrier", and "neurology".

Results: Reviewed literature revealed a clearly positive impact of employing small molecules in drug delivery across the BBB. All of the analyzed articles highlighted the potential of using nano-based treatments as a significant advancement in neurological medicine.

Conclusions: The use of conventional therapies in neurology is limited by the anatomical and physiological barriers. The BBB, while serving the essential purpose of protecting the brain and the CNS, imposes many constraints on regular drug delivery. In order to enhance the therapeutic potential of applicable substances, the development of nano-neuroscience is crucial in modern medical practice. It involves creating smaller drug carriers, such as nanoparticles, and implementing other nanomaterials.

Keywords: nanoparticles, nano-based medicine, drug delivery, blood-brain barrier, neurology

MicroRNAs as Non-Invasive Biomarkers in Small-Cell Lung Carcinoma: Comprehensive Review of Current Literature

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Background: This review synthesizes recent literature on the role of microRNAs (miRNAs) in the treatment and understanding of small-cell lung carcinoma (SCLC).

The aim: The study focuses on the expression patterns of individual miRNAs and their potential as non-invasive biomarkers for SCLC detection, prognosis, and insights into disease pathogenesis.

Materials and methods: A systematic literature search across PubMed and Scopus was performed, yielding relevant studies that explored the intervention of miRNA expression in SCLC patients and its correlation with diagnostic markers and prognostic outcomes.

Results: The findings highlight the dysregulation of miRNAs as critical players in cancer progression and treatment resistance, influencing various biological processes including immune cell infiltration, cell proliferation, and apoptosis.

Conclusions: Notably, specific miRNAs such as miR-7-5p, miR-335, miR-22-3p, and others have shown promise in modulating chemoresistance and tumor dynamics. Despite the potential of miRNAs as therapeutic targets and biomarkers, further research is required to establish their clinical applicability. This review underscores the need for more extensive investigations into the mechanistic roles of miRNAs in SCLC, aiming to enhance diagnostic and therapeutic strategies in managing this aggressive cancer type.

Keywords: SCLC, miRNA, microRNA, genetics, diagnostics, treatment

Implementation of a DTW algorithm to assess the similarity of biosignals in patients after SAH

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Background: Subarachnoid hemorrhage leads to damage to the autonomic nervous system, which affects its parameters as well as those of cerebral autoregulation. These parameters play a crucial role in monitoring the patient's state, and the relationship between them remains a subject of research.

The aim: The aim of this study was to implement dynamic time warping (DTW) algorithm to assess the similarity of biosignal characterising the autonomic nervous system and cerebral autoregulation in patients after a subarachnoid hemorrhage, using the Python programming language.

Materials and methods: For the analysis, ABP and rSO2 signals had been collected from patients after a subarachnoid hemorrhage (KB-620/2020, KB-133/2023). Based on them, metrics of the autonomic nervous system and cerebral autoregulation were calculated using ICM+ software. They were preprocessed in Python, with particular attention to normalization, and subsequently they were verified for availability, and standardized. By comparing the metrics of the autonomic nervous system with the metric of cerebral autoregulation, the alignment cost was calculated using DTW. The analysis was performed in time blocks simulating consecutive phases after the subarachnoid hemorrhage. These blocks were analysed both as a whole and using a moving window. This work was supported by the National Science Centre, Poland (grant no UMO-2022/47/D/ST7/00229).

Results: The obtained results were compared to the clinical data of the patients. Statistical analysis indicates that greater desynchronization between the metrics may be associated with poorer treatment outcomes.

Conclusions: It can be assumed that a higher cost of matching between autonomic nervous system metrics and cerebral autoregulation is associated with a poorer treatment outcome. However, these observations require confirmation in a larger group of patients.

Keywords: subarachnoid hemorrhage, dynamic time warping, autonomic nervous system, cerebral autoregulation

The usefulness of the forced oscillation technique in the diagnosis of bronchial asthma in seniors

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Background: Obstructive pulmonary diseases are common in the elderly but often remain underdiagnosed due to limited spirometry availability or challenges with patient cooperation during testing.

The aim: This study evaluated the potential of the forced oscillation technique (FOT) as a diagnostic tool for bronchial asthma in individuals over 60 years old.

Materials and methods: A total of 189 patients diagnosed with asthma after age 60 and a control group of nonasthmatic seniors were included. Participants underwent spirometry, FOT, and bronchial reversibility testing using both methods. The primary outcomes were correlations between positive results from resting spirometry and FOT in asthmatics and the agreement between reversibility test results across the two methods.

Results: FOT parameters (FEV1, V5, R5) effectively distinguished asthmatics from nonasthmatics. Positive reversibility test results were observed in 71 (73.2%) patients using FOT and 68 (70.1%) using spirometry, with both methods aligning in 64 (66%) cases.

Conclusions: These results highlight the value of FOT, particularly for bronchial reversibility testing, in improving asthma diagnosis in seniors. FOT offers a practical alternative for patients who face difficulties performing spirometry, addressing a critical need in this population.

Keywords: Asthma; bronchial obstruction; forced oscillation technique; senior; spirometry

Assessment of iPSC-derived Cardiomyocytes Using Bioinformatics Analysis of RNAseq and Single-cell RNA-seq Data

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Background: The quality assessment of induced pluripotent stem cell (iPSC)-derived cardiomyocytes (CMs) remains a significant challenge in stem cell research. Standard methods, such as flow cytometry, fail to assess the same cell population used for transcriptomic analysis. We propose a novel bioinformatics-based approach to evaluate differentiation outcomes using bulk RNA sequencing (RNA-seq) and single-cell RNA-seq (scRNA-seq) reference data.

The aim: This study aimed to establish a comprehensive and cost-effective bioinformatics method to assess iPSC-derived cardiomyocytes using transcriptomic profiling.

Materials and methods: Cardiomyocytes were differentiated from the UKKi0360-A iPSC line using the GiWi-modified Lian et al. 2013 protocol. Beating cells were collected, and total RNA from 16 samples was extracted using the mirVana™ miRNA Isolation Kit. RNA integrity was high (RIN: 8.8–9.1), and libraries were prepared using Stranded Total RNA Prep, Ligation with Ribo-Zero Plus (Illumina). Sequencing was performed on a NextSeq 550 system. The bioinformatics pipeline included TrimGalore for trimming, FastQC for quality assessment, alignment to GRCh38 using Bowtie2, and quantification with FeatureCounts. scRNA-seq data from Grancharova et al. 2021 was used as a reference. Data were analyzed in R and Python.

Results: Our analysis revealed that the majority of the sequenced cells were cardiomyocytes, with a minor fraction resembling stromal-derived populations. Statistical comparisons of gene expression profiles demonstrated that our CMs closely matched reference populations (e.g., TNNT2 $p = 0.03$ for CM-D24).

Conclusions: We present a novel transcriptomics-based approach for assessing iPSC-derived cardiomyocytes, providing a more comprehensive and cost-effective alternative to flow cytometry. This method ensures that the same cell population used in experiments is accurately evaluated, improving the reliability of differentiation assessment.

Keywords: cardiomyocytes, iPSC, RNAseq, single cell seq

Pan-immune-Inflammatory Value (PIV) as a Predictor of Cognitive Decline in Geriatric Patients

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Work's tutor: Professor Tomasz Kostka MD, PhD, Dr Bartłomiej Sołtysik, MD, PhD

Background: Chronic inflammation is associated with aging and conditions such as cognitive decline and dementia in older adults.

The aim: This study explores the relationship between the Pan-immune-Inflammatory-Value (PIV) and cognitive status in hospitalized geriatric patients, assessing its potential as a predictive biomarker for cognitive impairment.

Materials and methods: Patients aged 60 and older, recruited from the Department of Geriatrics, Lodz, Poland, between January 2017 and December 2023, were included. Data of 2098 patients (1490 women, 608 men) were analyzed. PIV was calculated using the formula: PIV = (neutrophil count x platelet count x monocyte count) / lymphocyte count. Blood biomarkers were measured using the Sysmex XN 2000 analyzer. Cognitive function was assessed using the Mini-Mental State Examination (MMSE), with scores below 24 indicating cognitive impairment. Statistical analysis was performed using Statistica 13.1.

Results: The median age of the study population was 83 years (77–88). PIV and MMSE were significantly higher in men. Statistical analyses revealed a negative correlation between cognitive function and PIV in the whole studied population (rho = - 0.093; p=0.0001) as well as both in women (rho = -0.07, p = 0.02) and men (rho = -0.08, p = 0.04), supporting the reliability of this relationship.

Conclusions: This study demonstrates a significant association between PIV and cognitive function in geriatric patients. The findings suggest the potential for using PIV as a biomarker of systemic inflammation in cognitive decline. Further research is needed to explore the mechanisms linking inflammation and sex to cognitive impairment and to assess whether PIV could serve as a predictive marker for cognitive decline in the geriatric population.

Keywords: Pan-immune-Inflammatory-Value (PIV), neuroinflammation, inflammatory biomarkers

Invisible Risks: Bisphenol Contamination in Early Childhood

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Background: Bisphenols are endocrine-disrupting compounds commonly found in everyday products such as plastics, resins, and thermal paper. Human exposure occurs regularly through daily contact with these materials. The most studied bisphenols—BPA, BPF, and BPS—can interfere with hormonal systems, potentially affecting growth, metabolism, neurodevelopment, and overall health in children. According to the European Food Safety Authority (EFSA), the tolerable daily intake (TDI) for BPA is set at 0.2 ng/kg body weight/day.

The aim: This study aimed to assess urinary levels of BPA, BPF, and BPS in Polish children, estimate their daily intake, evaluate potential health risks, and explore key exposure-related factors.

Materials and methods: We analyzed 150 urine samples from 7-year-old participants in the Polish Mother and Child Cohort (REPRO_PL) using high-performance liquid chromatography with online solid-phase extraction and tandem mass spectrometry (online-SPE-LC-MS/MS). Data on socio-demographic background, parental education and employment, number of siblings, place of residence, and passive smoking exposure (via urinary cotinine) were collected through maternal questionnaires.

Results: BPA, BPF, and BPS were detected in 100%, 95%, and 20% of samples, respectively. BPF showed the highest maximum concentration (90 µg/L), followed by BPA (27.3 µg/L) and BPS (7.0 µg/L). Median daily intakes were 45.9 ng/kg bw/day (BPA), 33.1 ng/kg bw/day (BPF), and <4.4 ng/kg bw/day (BPS), exceeding EFSA's TDI for BPA in all children. Boys had higher exposure levels than girls. No statistically significant associations with socio-demographic or lifestyle factors were observed, although trends were noted with passive smoke exposure, maternal education, and socioeconomic status.

Conclusions: BPA exposure in Polish children clearly exceeded safety thresholds. Although no definitive predictors of exposure were identified, the observed trends point to the need for further research and urgent public health action to reduce bisphenol exposure in children.

Impact of Sedation Depth on Cognition in Spinal Anesthesia: BIS vs. Clinical Assessment

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Background: Postoperative cognitive decline after spinal anaesthesia with sedation is common in elderly patients. Traditional clinical assessments of light sedation are subjective and may vary. Bispectral index (BIS) monitoring offers an objective method to control sedation depth.

The aim: To compare the impact of sedation depth monitoring according to BIS versus clinical assessment on cognitive performance in elderly patients undergoing spinal anaesthesia.

Materials and methods: Elderly patients (>65 years old) scheduled for elective knee replacement surgery under spinal anesthesia with sedation were included in the study. Patients were randomly assigned to two groups. In the first group (BIS group), sedation was administered based on BIS (targeting 70-80). In the control group (non-BIS group), sedation was guided only by clinical signs (standard clinical practice, Ramsay sedation scale 4). Propofol was used for sedation, with the dose titrated according to the group.
Cognitive function was assessed using the Mini-Mental State Examination (MMSE) part of Addenbrooke's Cognitive Examination – Revised (ACE-R) test. The maximum MMSE score is 30. Cognitive assessments were performed four times: preoperatively (preOP) and at 2, 30, and 90 days postoperatively (2 POD, 30 POD, 90 POD respectively). Results are presented as median with minimum and maximum values.

Results: Total number of 60 patients were enrolled in this study. There were no statistically significant differences between two groups MMSE scores at all time points: preOP BIS group 28 (24-30) vs. non-BIS 28 (17-30), p=0.988; 2 POD BIS group 28.5 (23-30) vs. non-BIS 28 (13-30); p=0.468; 30 POD BIS group 28.5 (24-30) vs. non-BIS 28 (16-30), p=0.553; 90 POD BIS group 29 (27-30) vs. non-BIS 29 (16-30), p=0.951.

Conclusions: Sedation depth monitoring using BIS versus clinical assessment did not significantly impact cognitive performance in elderly patients undergoing spinal anaesthesia.

Keywords: Bispectral Index (BIS), Cognitive performance, Spinal anesthesia, Sedation depth monitoring

Use of HPLC to determine the content of short-chain fatty acids (SCFAs) in selected food products.

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Work's tutor: dr hab. n. med. Łukasz Bułdak, dr hab. n. med. Grzegorz Machnik

Background: Commensal bacteria residing in the large intestine are known for producing short-chain fatty acids (SCFAs) by anaerobic fermentation of indigestible carbohydrates. These metabolites are thought to exert numerous biological effects ranging from nourishing colonocytes to regulating metabolic functions through activation of G protein-coupled receptors. One of SCFAs, namely butyric acid, is commonly used in the therapy of irritable bowel syndrome. A change in the composition of the gastrointestinal microbiota, among others as a result of quantitative and qualitative alterations in SCFAs produced in the intestines, may disturb the homeostasis of the organisms. Not only are SCFAs produced in the digestive tract, but they are thought to be present in food products as well, especially in those manufactured by bacterial fermentation.

The aim: To determine whether defined food products might be significant sources of SCFAs, especially of butyric acid.

Materials and methods: Extraction of SCFAs with diethyl ether from over dozen different food products was performed. Subsequently, obtained extracts were inserted to high-performance liquid chromatography and ultraviolet-visible spectrophotometry (HPLC-UV-Vis) detectors in order to assess the content of propionic, butyric and valeric acids in each of the analyzed products.

Results: None of the tested products has been confirmed to contain significant amounts of butyric acid in terms of its supplementation.

Conclusions: Diet modification is not an effective method of supplying SCFAs in comparison to taking natrium butyrate supplements.

Keywords: short-chain fatty acids (SCFAs), high-performance liquid chromatography (HPLC), nutrition, microbiom

Nutrition and Sleep Quality Among University Students: Comparison Between Academic and Exam Periods

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Work's tutor: Assoc. Prof. Dr. Şule Aktaç

Background: Adequate and balanced nutrition is essential for maintaining a healthy life. University students are considered a high-risk group in this regard, and various studies have shown that their nutritional habits are often inadequate. Moreover, sleep problems frequently observed in this population have been associated with the consumption of high-energy foods and irregular eating patterns.

The aim: This study aimed to evaluate the relationship between university students' dietary habits and sleep quality during the regular academic term and the exam period.

Materials and methods: This descriptive study was conducted between December 2019 and June 2020 with 96 students aged 18–24 years, enrolled at a public university. Data were collected using a 45-item questionnaire covering demographic characteristics, lifestyle, and periodic eating and sleeping habits, a 24-hour dietary recall, and the Pittsburgh Sleep Quality Index (PSQI). Nutritional analyses were conducted using the BeBis software, and data were analyzed with SPSS version 23.0. A p-value of <0.05 was considered statistically significant.

Results: Of the participants, 80.2% were female and 19.8% were male. A significant increase in water and snack consumption was observed during the exam period ($p<0.05$). Intake of protein, fiber, vitamins A, E, and B (riboflavin, B12, folate), as well as sodium, potassium, calcium, magnesium, phosphorus, and zinc, increased, while carbohydrate consumption decreased ($p<0.05$). A statistically significant improvement in sleep quality was also observed, as indicated by lower PSQI scores ($p<0.05$).

Conclusions: The exam period appears to be a time when students can make positive changes in certain nutritional components. However, it is important to acknowledge the role of individual variability in nutrition and sleep quality in overall quality of life. Educational initiatives promoting healthy eating and regular sleep should be provided to students.

Keywords: Nutrition, Sleep Quality, University students

Body Positivity, Eating Behaviors and BMI: A Study Among Active Women

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Background: Body positivity is popular trend that promotes self-acceptance towards one's body. We can observe this view in media, mainly in movies and advertisement, by showing people of various body shapes and skin colors. Previous research indicates the impact of body positivity on self-acceptance and well-being, but we still don't know how body positivity affects eating behaviours and body weight control.

The aim: The aim of study was to gain a deeper understanding of perspectives of female gym-goers on body positivity, examine the correlation between these opinions and eating behaviors and analyze relationship between eating behaviors and BMI.

Materials and methods: The study was conducted using a questionnaire on body positivity opinions created by the author of the study, as well as the Three Factor Eating Questionnaire (TFEQ-13). The survey was conducted both in person and online. 121 women participated in the study.

Results: The results indicated no significant relationship between body positivity opinions and eating behaviors, but pointed out positive correletion between emotional eating and BMI (p=0,006) as well as between cognitive restraint and BMI (p=0,004).

Conclusions: These findings indicate the importance of psychological factors in body weight control and suggest the need for further research into the impact of body-positivity views on eating behavior.

Keywords: Body positivity; Body image; Eating behavior; Overweight; BMI; Active women

QUALITY ASSESSMENT OF SELECTED VEGETARIAN PRODUCTS AVAILABLE ON THE POLISH MARKET AND THEIR PROPRIETARY COUNTE

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Work's tutor: dr n. med. Agata Kiciak

Background: Plant-based products are gaining popularity, with the result that vegetarian diets are becoming a dietary staple among many segments of society. Growing consumer awareness is driving market growth and the rise of plant-based food alternatives.

The aim: The purpose of the study was to evaluate the quality of selected vegetarian products available on the Polish market and their proprietary counterparts.

Materials and methods: The study of sensory evaluation of selected plant products, was carried out by 126 students of the Silesian Medical University in Katowice and 131 participants of the project "Appetite for healthy eating". The analysis included sensory evaluation of vegetarian products and their proprietary counterparts, using a proprietary product evaluation card on a five-point scale and a product evaluation card using a ranking method.

Results: Consumer evaluation of the intensity of selected sensory attributes using the five-point method showed that in the group of hummus pastes, "NaturAvena" hummus was rated most favorably among all tested products. In the falafel group, the highest scores were given to the author's falafel, while in the group of vegetarian chocolates, "Vegan Heart" and "Las Vegan's" were rated highest. Participants in the survey evaluating the appearance of the products, the highest points were awarded to the hummus paste "NaturAvena" and "Lavica Food", and among falafels, the author's falafel received the highest points. Among chocolates, the highest scoring was "Vegan Heart" and "Las Vegan's" chocolate. Evaluation using the ranking method taking into account taste showed that the highest scores were given to "Lavica Food" hummus, the author's falafel and "Soligrano" falafel with chickpeas and spelt, and among chocolates, "Vegan Heart" and "iChoc".

Conclusions: The choice of plant products made by consumers, mainly depends on individual dietary preferences. The key factor guiding consumers in choosing plant products is taste, which drives repeat purchases.

Keywords: plant-based products, plant analogues, vegetarian diet

Evaluation of the effect of combined use metformin and pterostilbene on breast and colon cancer cells

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Background: Cancer is the second leading cause of death worldwide. According to estimates from the World Health Organisation (WHO), the number of new cases is expected to increase by 77% by 2050. One of the main reasons for this rise is the growing incidence of lifestyle diseases, including type 2 diabetes mellitus (T2DM) and obesity. In recent years, there has been a growing body of evidence suggesting the potential anticancer properties of pterostilbene, a derivative of resveratrol and metformin, commonly used in the treatment of T2DM.

The aim: The aim of this study was to evaluate the effects of metformin and pterostilbene, both individually and in combination, on breast and colon cancer cells in vitro and in silico.

Materials and methods: A computational in silico evaluation of the possible effects of combined use of metformin and pterostilbene was performed by ChemDIS-Mixture. Additionally, the effect of both compounds, alone and in combination, on the growth of MCF-7 and HT-29 cancer cells in vitro was analyzed after 48 hours of treatment using the SRB assay.

Results: Computer-based analysis has shown diseases, proteins, and pathways that are susceptible to alteration by these two drugs simultaneously. Metformin and pterostilbene alone reduced the growth of studied cell lines in concentration-dependent manner. The combination of these compounds led to greater inhibition of cancer cell growth.

Conclusions: Both metformin and pterostilbene exhibit effects on the expression of proteins with anticancer properties. Their combination may lead to enhanced therapeutic outcomes in cancer treatment; however, further research and analysis are necessary to confirm these findings.

Keywords: **metformin, pterostilbene, colon cancer, breast cancer, in silico**

Assessment of cf-DNA concentration in patients with schizophrenia

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Background: Circulating free DNA (cf-DNA) is studied as a biomarker in various conditions, but its role in psychiatric disorders remains unclear. As schizophrenia involves structural and inflammatory brain changes, cf-DNA may offer insights into its molecular basis.

The aim: This study evaluates levels of total cf-DNA, nuclear cf-DNA (cf-nuc-DNA), and mitochondrial cf-DNA (cf-mt-DNA) in 30 schizophrenia patients compared to 30 healthy controls.

Materials and methods: Blood samples were collected from schizophrenia patients and healthy controls. Cf-DNA was isolated from serum and quantified using fluorometry and droplet digital PCR (ddPCR) to assess nuclear and mitochondrial DNA concentrations. Statistical analyses, including Mann-Whitney U tests and correlation analyses, were conducted in Python to compare the cf-DNA levels between the two groups. All analyses were performed with a significance threshold set at $\alpha = 0.05$.

Results: Patients with schizophrenia showed significantly higher cf-nuc-DNA levels ($p = 0.03$). Males had higher total cf-DNA ($p < 0.001$) and cf-nuc-DNA ($p = 0.04$, controls only) than females. In control group females, age positively correlated with cf-mt-DNA levels ($r = 0.66$). No association was found between cf-DNA levels and symptom severity (SANS/SAPS).

Conclusions: Our findings suggest a potential involvement of cf-DNA, particularly its nuclear fraction, in biological processes underlying schizophrenia. The observed sex- and age-related differences in cf-DNA levels highlight the complexity of its regulation and potential relevance as a peripheral biomarker. Although cf-DNA did not correlate with symptom severity, its elevation may reflect enhanced cell turnover, apoptosis, or neuroinflammatory activity—processes increasingly linked to schizophrenia's pathophysiology. Further research should validate these findings in larger, longitudinal cohorts and explore cf-DNA's diagnostic or monitoring potential in clinical settings.

Keywords: schizophrenia, cell free DNA

Reflectance Profile of Solid Pharmaceutical Dosage Forms in the Infrared Spectral Range

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Background: The photodegradation of active pharmaceutical ingredients (APIs) under ultraviolet (UV) and visible (VIS) radiation is well-established and documented. In contrast, the impact of infrared (IR) radiation on drug stability has been largely overlooked, despite its potential to induce thermal stress, API degradation, and the formation of degradation by-products.

The aim: The aim of this study was to evaluate the exposure of solid pharmaceutical dosage forms to infrared radiation using directional hemispherical reflectance (DHR) as a quantitative assessment method.

Materials and methods: DHR was applied to assess the IR reflectance profiles of solid dosage forms and their interaction with infrared radiation. Reflectance measurements were performed using the SOC 410 Reflectometer across seven wavelength bands (335–2500 nm) for 49 solid oral dosage forms and their respective blister packagings, composed of various materials.

Results: The tested dosage forms exhibited the lowest reflectance within the infrared spectral range. DHR values for blister packaging varied depending on the material composition. Notably, aluminum-based blisters demonstrated significantly higher reflectance compared to those made of PVC or PVDC.

Conclusions: DHR can serve as a quantitative parameter for evaluating the interaction between radiation within a defined spectral range and solid oral pharmaceutical dosage forms.

Keywords: directional–hemispherical reflectance, dosage form, drug stability, infrared radiation

Safety and Tolerability of Electrical Muscle Stimulation (EMS) Training in Women of Reproductive Age

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Background: Electrical muscle stimulation (EMS) has emerged as a widely utilized modality in adjunctive training and physiotherapeutic interventions, particularly for the activation of deep musculature. Nonetheless, empirical evidence concerning its safety and tolerability in women of reproductive age remains insufficient.

The aim: The aim of this study was to assess the safety and subjective tolerability of an eight-week EMS training program in healthy women.

Materials and methods: The study included 38 participants (aged 20–40 years; M = 28.0±1.0) who underwent EMS training sessions twice a week (20 min per session, at a frequency of 85 Hz and a pulse width of 350 µs). The following were monitored: the occurrence of adverse events, changes in menstrual cycles, muscle fatigue level, presence of delayed onset muscle soreness (DOMS), and general well-being of the participants. For this purpose, a visual analogue scale (VAS), an original tolerance questionnaire and a perceived mood scale (FS) were used. Measurements were taken before, halfway through and after the training programme. Statistical analysis included the Wilcoxon signed-rank test for dependent variables (VAS, tolerance, well-being) and repeated-measures analysis of variance (ANOVA RM) for quantitative variables (DOMS).

Results: A statistically significant reduction in muscle fatigue ($Z = -3.42$, $p < 0.01$) and an improvement in the participants' general well-being ($Z = -2.87$, $p = 0.004$) were obtained during the programme. DOMS appeared mainly after the first training sessions and their intensity decreased over time. There were no significant changes in the length of the menstrual cycle ($p > 0.05$). Among the participants, 92% (N = 35) assessed the training as well or very well tolerated, and no serious adverse effects were observed.

Conclusions: EMS training, carried out in accordance with the adopted guidelines, is safe and well tolerated by women of reproductive age. It can be a valuable complement to preventive and therapeutic programs in the area of women's health.

Exploring the Role of Chronic Neuroinflammation in Idiopathic Parkinson's Disease

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Background: Parkinson's disease (PD) is the second most common neurodegenerative disorder, characterized by a progressive decline involving both motor and non-motor symptoms. Although significant progress has been made in identifying genetic and environmental factors that may influence the course of PD, the underlying mechanisms remain incompletely understood. Among these, the role of inflammation in PD pathogenesis warrants further investigation.

The aim: The purpose of our study was to determine the role of chronic inflammation as a possible factor influencing PD course.

Materials and methods: We conducted a retrospective analysis of medical records from patients diagnosed with Parkinson's disease (PD) who were hospitalized at the Department of Neurology, University Clinical Centre in Katowice. We analyzed medical data of 140 PD patients. Data collected included age, age at disease onset, sex, disease duration, and symptom severity, assessed using the MDS-Unified Parkinson's Disease Rating Scale (MDS-UPDRS), the Hoehn and Yahr (HY) scale, and current dopaminergic treatment. Laboratory parameters were also analyzed, the neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) were calculated.

Results: Patients with earlier-onset PD had significantly higher levels of lymphocytes and neutrophils. Neutrophil and total white blood cell counts were positively correlated with increased disease severity as measured by the HY scale. NLR was associated with higher scores on both the MDS-UPDRS part III and the HY scale. PLR was associated with higher levodopa equivalent daily dose (LEDD).

Conclusions: Chronic inflammation may act as a modifying factor in the course of Parkinson's disease (PD), particularly in its early stages. It could potentially predict a more severe disease trajectory and a greater need for levodopa. Further research is warranted to clarify the role of chronic neuroinflammation in PD and its influence on disease development and progression.

Keywords: Parkinson's disease, neuroinflammation, neurodegeneration, Hoehn - Yahr scale, PLR, NLR

Unveiling the molecular mechanisms of PACS2 syndrome through proteomic profiling.

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Background: PACS2 syndrome is a ultra-rare genetic disorder caused by mutations in the PACS2 gene, specifically E209K or E211K. It's characterized by seizures, developmental delays, low muscle tone, speech and motor difficulties, and behavioral problems. The PACS2 protein is a crucial intracellular transporter involved in apoptosis, mitochondrial function, and stress response. Mutations in PACS2 disrupt protein interactions and increase cells susceptible to apoptosis. Moreover, mutations prevent phosphorylation at specific sites, hindering the transport of polycystin-2 (PKD2) and leading to mitochondrial dysfunction. While in vitro studies have provided insights, the precise effects of these mutations on intracellular signaling in different tissues remain largely unknown.

The aim: To gain a deeper understanding, we conducted the first in vivo proteomic analysis of PACS2 syndrome.

Materials and methods: We used adult mice with the E209K mutation and control mice (each group n=6). Tissue samples were analyzed using Data Independent Analysis (DIA) mode of data collection. Spectronaut software was used for data analysis.

Results: Our research revealed that the PACS2 mutation has a tissue-specific impact on the proteome. The hippocampus showed the most significant changes, with upregulation of proteins involved in cellular stress, apoptosis, autophagy, and ion homeostasis. Conversely, proteins involved in reducing calcium levels, RNA metabolism, and membrane trafficking were downregulated. Other tissues showed more subtle changes, suggesting a tissue-dependent role of PACS2

Conclusions: This study provides valuable insights into the molecular mechanisms underlying PACS2 syndrome, highlighting the importance of the hippocampus in the disorder's pathogenesis. Further research is needed to fully understand the complex interplay of proteins and pathways affected by these mutations.

Keywords: PACS2 syndrome, ultra-rare, genetic disorder, proteomics, animal models

Evaluation of Pharmaceutical Packaging Protective Properties via Hemispherical Reflectance and Hyperspectral Imaging

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Work's tutor: lek. wet.

Background: Degradation of solid veterinary medicines under the influence of electromagnetic radiation leads to reduced efficacy and safety of pharmacotherapy. Currently used packaging materials often show insufficient spectral adaptation to the optical properties of active pharmaceutical ingredients (APIs), exposing drugs to photodegradation during storage and transport.

The aim: The study aims to evaluate and optimize the photoprotective performance of pharmaceutical packaging materials for solid veterinary dosage forms using hemispherical directional reflectance and hyperspectral imaging.

Materials and methods: Total reflectance coefficients of various pharmaceutical packaging materials were determined using hemispherical reflectometry (SOC 410 Solar DHR) across seven spectral bands (335–2500 nm). Hyperspectral imaging (Specim IQ) in the 400–1000 nm range was applied to visualize and quantify spectral interactions between the packaging and model drug formulations. Solid forms were also supplemented with radioprotective additives (TiO_2, ZnO, halloysite, bentonite), and the spatial distribution and spectral behavior of these additives were assessed to support packaging optimization.

Results: The combination of hemispherical reflectance and hyperspectral imaging enabled detailed assessment of packaging efficacy in limiting light penetration and identifying photoprotective material characteristics. Optimized packaging materials exhibited superior spectral matching with the APIs and minimized potential for degradation.

Conclusions: Hemispherical reflectance combined with hyperspectral imaging provides a powerful analytical approach for developing next-generation pharmaceutical packaging tailored for photoprotection. This methodology enhances our ability to protect veterinary medicines from environmental radiation and improve overall drug stability.

Keywords: pharmaceutical packaging, photodegradation, hemispherical reflectance, hyperspectral imaging

Bioinformatic identification of blood biomarkers linked to miR-9 and miR-129 after ischemic stroke

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Work's tutor: dr n. med. Daria Gendosz de Carrillo

Background: Ischemic stroke is a leading cause of death and disability. The detection of early ischemic events and the prediction of long-term prognosis remain challenges for current diagnostic tools. MicroRNAs have recently emerged as promising stable biomarkers in bodily fluids. New diagnostic possibilities may arise from identifying specific miRNA genetic targets and their corresponding proteins.

The aim: This study aimed to identify common biomarkers and biological metabolic pathways regulated by miR-9-3p, miR-9-5p, and miR-129-5p which are differentially expressed after reperfusion in ischemic stroke.

Materials and methods: We searched the miRDB database, which yielded 2265 target genes for all three miRNAs: miR-9-3p, miR-9-5p and miR-129-5p. Combining each query with "blood," "plasma" and "serum" in Google Scholar returned 339 proteins/mRNAs. After removing the animal measurements, 335 proteins remained. Focusing on articles using ELISA and Western blot methods, we identified 135 proteins. We then excluded those unrelated to nervous or cardiovascular disease, leaving 106 for further analysis. After removing assays using blood PBMC cells, 33 proteins tested in serum or plasma remained. We performed a pathway enrichment analysis using the STRING database, filtering out interactions with a strength above 0.3 and a false discovery rate below 0.05.

Results: The findings revealed associations between the identified proteins and neurodegenerative diseases, vascular disorders, and endothelial inflammation. Their activity is greatest during tissue growth and differentiation, particularly in the brain, platelets, and connective tissue.

Conclusions: Our in silico analysis identified potential biomarkers and molecular pathways of miR-9-3p, miR-9-5p, and miR-129-5p in ischemic stroke, focusing on pathways relevant to treatment. MicroRNAs and their target genes may offer therapeutic benefits in managing post-stroke inflammation and could potentially serve as biomarkers for stroke severity and recovery; however more research is necessary.

Keywords: ischemic stroke, miRNA, genetic target, biomarker

The Steroid Signature of Newborns: Clinical Applications of Metabolomic Profiling in Neonatal Care

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Work's tutor: prof. dr hab. n. med. Aneta Gawlik-Starzyk, dr hab. n. med. Dominika Januś

Background: The simultaneous quantification of the full spectrum of urinary steroids using mass spectrometry-based methods enables the acquisition of a comprehensive and integrated overview of the steroid metabolome, referred to as the steroid profile.

The aim: This study aimed to identify steroidomic clusters among NICU neonates and to correlate them with clinical outcomes.

Materials and methods: In a prospective observational design (March 2023 – April 2024), 50 neonates (12 early preterm, 18 late preterm, and 20 full-term) admitted to NICU with respiratory distress underwent continuous 24-hour urine collection via an urinary catheter on the third day of life. Steroid profiles were analyzed by gas chromatography–mass spectrometry (GC-MS). K-means clustering was employed to classify peer group normalized metabolomic data, which were subsequently correlated with mortality, bronchopulmonary dysplasia (BPD), small for gestational age (SGA), and intraventricular hemorrhage (IVH).

Results: K-means analysis delineated three distinct metabolic clusters. Cluster 1 displayed a profoundly suppressed steroidogenesis (low steroid excretion, diminished 3β-hydroxysteroid dehydrogenase and 5α-reductase activities), correlating with an increased incidence of BPD, high mortality risk scores, and significant rates of SGA/intrauterine growth restriction. Cluster 2 exhibited adrenal hyperactivation with elevated cortisol/cortisone derivatives, moderately increased steroid metabolites, and partial 3β-HSD deficits, associated with a heightened risk of IVH and mortality. Cluster 3 showed robust steroidogenesis (high steroid excretion and high 3β-HSD/5α-reductase activities), accompanied by the lowest mortality rates and absence of BPD or SGA.

Conclusions: Suppressed steroidogenesis was associated with a higher risk of BPD, SGA, and mortality, while excessive cortisol output in Cluster 2 was correlated with a higher risk of IVH. Robust steroidogenesis supported favorable outcomes, highlighting the potential for metabolome-guided interventions.

Keywords: Steroid, Metabolome, GCMS, Clustering, Neonates, NICU

Evaluation of brain injury markers in the cerebrospinal fluid of patients with smoldering multiple sclerosis

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Background: Inflammatory demyelination and impaired recovery processes in multiple sclerosis result in permanent neurodegeneration and neurological disability

The aim: The aim of this study was to determine the concentrations of neurodegeneration markers in the cerebrospinal fluid of MS patients during relapse and in those without MS exacerbation.

Materials and methods: A single-center prospective observational study was conducted. We evaluated the concentrations of brain injury markers—neurofilaments (NF-H), glial fibrillary acidic protein (GFAP), S100 calcium-binding protein B (S100B), and ubiquitin C-terminal hydrolase L1 (UCHL1)—in the cerebrospinal fluid (CSF) of 123 patients with relapsing-remitting MS and 88 with progressive MS, grouped into 30 RPG (relapse phase group) and 181 WPG (without relapse phase group).

Results: In the RPG group, active lesions were more frequent compared to the WPG group on brain magnetic resonance imaging, as well as on cervical and thoracic spine MRI. Compared to the RPG group, the WPG group showed a higher Expanded Disability Status Scale (EDSS) score and a longer duration of MS symptoms.
The concentrations of GFAP and NF-H were higher in the RPG group than in the WPG group. In the entire MS cohort, EDSS correlated positively with the concentrations of GFAP and NF-H, while the duration of MS symptoms correlated positively with the levels of SB and UCHL

Conclusions: The concentrations of selected markers of brain injury were higher in MS patients during relapse and correlated positively with EDSS, compared to individuals without MS exacerbation. These findings support the concept of smoldering MS, in which focal inflammatory lesions related to relapses are secondary to ongoing axonal and neuronal loss

Keywords: neurology, multiple sclerosis, parameters of brain injury

POSTOPERATIVE DELIRIUM FOLLOWING CORONARY ARTERY BYPASS GRAFTING ON – PUMP SURGERY

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Background: Postoperative delirium (POD) is a frequent complication post-cardiac surgery, often due to impaired cerebral autoregulation during cardiopulmonary bypass (CPB).

The aim: This study investigates how cerebral autoregulation impairment affect POD occurrence after on-pump coronary artery bypass grafting (CABG).

Materials and methods: A prospective pilot observational study from 2021 to 2023 was approved by the Kaunas Regional Biomedical Research Ethics Committee (No. P1-BE-2-64/2021, date: 2021-12-15). Delirium was diagnosed using CAM-ICU. Cerebral autoregulation was monitored via transcranial Doppler, and the status index – Mx was recorded in real-time using ICM+ software (Cambridge, U.K.).

Results: The study enrolled 104 patients undergoing elective CABG surgery in the Hospital of Lithuanian University of Health Sciences Kaunas Clinics. Patients were divided into non-delirium(n=91) and delirium(n=13) groups. The results revealed that age, education level and sex distribution were not significantly different between the groups (p > 0.05). The delirium group had a significantly longer total duration of cerebral autoregulation impairment events (median: 4783 sec vs. 4204.5 sec, p = 0.047). Additionally, cardiopulmonary bypass time (median: 95 min vs. 83 min, p = 0.036) and aortic cross-clamping time (median: 47 min vs. 40 min, p = 0.021) were significantly longer in the delirium group.

Conclusions: Postoperative delirium factors include the longest cerebral autoregulation impairment duration, cardiopulmonary bypass time, and aortic cross-clamping time. Early identification and management of these factors can reduce delirium risk and enhance patient outcomes.

Keywords: Delirium; CABG surgery, cerebral autoregulation.

SARS-CoV-2 Infection in Neonates: Disease Course and Diagnostic-Therapeutic Challenges

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Background: The COVID-19 pandemic, caused by the SARS-CoV-2 virus, significantly affected all age groups, including neonates, in whom the course of infection can vary. Common symptoms include fever, cough, breathing difficulties, and gastrointestinal manifestations.

The aim: This study aims to analyze the demographics, clinical presentation, test results, and treatments in neonates infected with SARS-CoV-2 hospitalized in a tertiary care center.

Materials and methods: A retrospective analysis was conducted based on the medical records of neonates who tested positive for SARS-CoV-2 using an antigen test and were hospitalized in a tertiary center in Opole between 2020 and 2024. Cases transferred for continued treatment or those with death immediately after birth were excluded.

Results: In the study period, 698 tests for SARS-CoV-2 were performed on neonates, identifying 30 (4.3%) positive cases, with 28 hospitalized. Four patients were excluded from the analysis. Symptomatic patients accounted for 95.83%. Respiratory symptoms were most common: rhinorrhea (70.83%), cough (29.17%), and respiratory distress (25%). Additionally, fever, gastrointestinal symptoms, and conjunctivitis were noted. Hypoxemia was observed in 62.5%, and 45.83% required oxygen therapy. Abnormal lung ultrasound findings were noted in 50% of cases. Most received symptomatic treatment, with 20.83% treated with antibiotics. Hospitalization ranged from 2 to 60 days, with a median of 5 days.

Conclusions: SARS-CoV-2 infection in neonates is relatively rare but often symptomatic. Both mild and severe disease courses were observed, primarily affecting the respiratory system. Frequent deviations in oxygen saturation and the need for oxygen therapy highlight the importance of monitoring respiratory parameters in neonates.

Keywords: SARS-CoV-2, neonates, infection

Carotid Near Occlusion: Can Endovascular Treatment Revolutionize Its Management?

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Background: Carotid artery near occlusion (CNO) pose therapeutic problems, one of the recognized methods of their treatment is percutaneous angioplasty with carotid artery stenting (CAS). However, the safety and efficacy of this method in such advanced lesions is still a matter of debate.

The aim: Evaluation of risk and outcome of endovascular treatment of CNO

Materials and methods: A single-center retrospective study was conducted in a group of 1132 patients who were subsequently treated with CAS for carotid artery stenosis. Patients' neurological status was assessed five times using the NIHSS scale at various points of time. Data on general, surgical, clinical characteristics, along with long-term outcomes, were collected

Results: The study involved 167 (14.75%) patients with CNO, including 29 (17.37%) patients with CNO with distal vessel collapse. Symptomatic CNO was observed in 79 (47.31%). Preoperative internal carotid artery (ICA) diameter was 0.8 IQR 0.36 mm and increased significantly to 5.6 IQR 1.94 mm (p<0.001). In 164 (98.80%) patients the procedure was successful, increasing the ICA diameter. Duration of the procedure was 40 IQR 15 min. Thirty-day stroke ratio was 0.62%, while thirty day mortality was 0.62%. Median follow-up time was 14.53 months. One-year: stroke-free survival was 97.71%, in-stent restenosis-free survival was 99.35%, while overall mortality was 99.40%.

Conclusions: Endovascular treatment of CNO may be one of the therapeutic options. However, it requires operator's extensive experience and constant monitoring of the patients in peri- and postoperative period.

Keywords: carotid near occlussion, endovascular treatment, carotid artery stenting

Awareness of Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) Among Poles

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Background: Nonsteroidal anti-inflammatory drugs (NSAIDs) are among the most commonly used pain-relieving medications. Some of them are available over the counter and pose a significant risk to individuals who use them contrary to the instructions provided in the information leaflet. We present the results of a previously unpublished study about nonsteroidal anti-inflammatory drugs, conducted on a sample of 567 individuals.

The aim: The aim of the study was to analyze differences in behavior and attitudes related to the use of over-the-counter medications in the general population.

Materials and methods: A survey study in the general population was conducted between November 2024, and January 2025, using an anonymous questionnaire available in both online and paper formats. Statistical analysis was carried out, and relationships between demographic variables were examined.

Results: The internet is the primary source of medication-related information for individuals under the age of 40. Older individuals tended to rely on sources such as medication package leaflets or information provided by physicians. The majority of respondents are aware of the potential adverse effects of NSAID use, but no statistically significant differences were found in responses regarding the perceived safety of concurrent NSAID use across different education levels ($p = 0.085$). Most respondents (56.8%) believe that these drugs should only be available in pharmacies, while only 14.1% believe they should be available by prescription only. Urban residents use NSAIDs more frequently than those living in rural areas, highlighting the potential impact of accessibility and healthcare-seeking behaviors. Individuals who smoke cigarettes may tend to use over-the-counter NSAIDs less frequently than non-smokers.

Conclusions: The results of the study provide a foundation for a targeted health education strategy and highlight the need for further research to better understand the underlying mechanisms of behavior and perceptions related to over-the-counter medications.

Keywords: Nonsteroidal anti-inflammatory drugs, awareness of adverse drug reactions, frequency of NSAID use

The Relationship Between Blood Pressure, Blood Sugar and Anthropometric Measurements in Male Workers

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Background: Hypertension and diabetes mellitus are among the most common chronic diseases worldwide. Obesity, physical inactivity and poor eating habits are among the reasons for this increase. Anthropometric measurements, such as body mass index (BMI), waist circumference, are often used to predict the risk of cardiovascular diseases, hypertension, and diabetes. However, few studies have investigated the relationship between these measurements and blood pressure or blood sugar levels in male workers, especially those in physically demanding jobs.

The aim: This study aimed to determine the relationship between anthropometric measurements and blood pressure, as well as blood sugar levels in male workers employed in the construction sector in Istanbul, Turkey.

Materials and methods: A total of 173 male workers, aged between 20-65 years, participated in the study. Anthropometric measurements including weight, height, waist circumference, and hip circumference were recorded. Blood pressure and blood sugar levels were measured using standardized methods. Data were analyzed using SPSS to assess the correlation between anthropometric measurements and health parameters.

Results: The results revealed that waist circumference and BMI showed significant correlations with systolic blood pressure and diastolic blood pressure. Specifically, BMI was positively associated with systolic blood pressure (p<0.05), while waist circumference showed a significant correlation with diastolic blood pressure (p<0.05). However, no significant relationship was observed between anthropometric measurements and blood sugar levels.

Conclusions: The study found significant associations between certain anthropometric measurements and blood pressure levels, suggesting that these measurements can be used as practical indicators for assessing cardiovascular risk among male workers in physically demanding occupations. However, further studies with larger sample sizes are needed to validate these findings and explore the potential relationship with blood sugar levels.

Keywords: blood pressure, blood sugar, anthropometric measurements

COMPARISON OF FUNCTIONAL TEST RESULTS WITH STATIC STABILITY OF LOWER LIMBS IN FOOTBALL PLAYERS

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Background: The motor demands, dynamic nature, and physical contact in soccer are directly associated with an increased risk of injury. According to research, a professional football team experiences nearly fifty injuries per year. The significant financial losses resulting from these injuries drive continuous research and development in this field, as evidenced by the growing number of publications addressing football-related injuries.

The aim: The aim of this study is to evaluate the correlation between the results of the Functional Movement Screen (FMS) and the overall lower limb stability index in professional athletes, taking into account the players' positions. It was hypothesized that a high functional test score would have a positive impact on the overall stability index.

Materials and methods: The study utilized the Biodex Balance System stability platform and FMS assessment equipment. The study group consisted of 30 male football players from Ekstraklasa. The Shapiro-Wilk test was used to verify the normality distribution. To examine the statistical relationship between the analyzed variables, the chi-square test was used. A 5% level of significance was adopted, and a $p<0.05$ was considered statistically significant.

Results: Statistical analysis revealed no significant correlation between the athletes' functional performance and their static stability outcomes ($p= 0.901$ and $p= 0.221$). The lack of statistical significance applied to both the overall FMS score and its individual components for the left lower limb ($p= 0.591$; $p= 0.841$; $p= 0.445$) and the right lower limb ($p= 0.514$; $p= 0.758$; $p= 0.087$). Goalkeepers and defenders achieved the highest FMS scores ($p= 0.038$).

Conclusions: The study demonstrated that the goalkeeper and defender positions are characterized by the highest functional performance demands. Despite achieving higher overall FMS scores and better results in selected asymmetry tests, defenders and goalkeepers did not exhibit superior stability parameters compared to forwards and midfielders.

Keywords: Functional movement screen, soccer, stability, Biodex Balance System (BBS)

Molecular karyotypes in children with autism spectrum disorder – analysis of SNP microarray results

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Background: Autism spectrum disorder (ASD) is a group of neurodevelopmental disorders that include deficits in social communication, maintaining relationships, and repetitive sensory-motor behaviors. Genetic causes can be indicated in 25-35% of ASD cases. Single nucleotide polymorphism (SNP) microarray detects deletions, duplications, loss of heterozygosity, and unbalanced aberrations of the number and structure of chromosomes.

The aim: The study aims to analyze molecular karyotypes from SNP microarray in children with ASD.

Materials and methods: In 234 children with ASD diagnosed from 2012 to 2024 CytoScan HD 750K or XON SNP microarrays were performed.

Results: 58.97% of patients presented with normal molecular karyotype. The most common variants were single duplications (14.53%) and deletions (11.97%). Multiple copy number variations occurred in 12.82%, and other lesions (monosomy X, additional Y, loss of heterozygosity, mosaicism) – in 1.71%. Medium duplication size was 745.87 Kbp, deletion – 409.64 Kbp. Duplications were most often located on chromosomes 1, 2, 3, 9, 15, while deletions – 1, 2, 7, 16, X. Duplication 15q13.3 were noted 4 times (OTUD7A, CHRNA7). Duplications 1p36.32 (ACTRT2, PRDM16), 3q22.1, 5q14.1, 9p24.1, 9p24.3, 11q23.3 (KMT2A, TMEM25), 12q24.13q24.21 (RBM19), 12q24.33 (TMEM132D), 15q11.2 (NIPA2, NIPA1, CYFIP1, TUBGCP5), 22q11.21 (RIMBP3C, RIMBP3B, 1 HIC2), and deletions 7q33, 22q12.3, Yq11.23 (DAZ3, DAZ2) were noted 2 times each. The following known or potential candidate genes causing ASD were found: ACTRT2, ANKRD11, ASTN2, CHRNA7, DOCK8, EFR3, NRXN1, OTUD7A, PCDH11X, PDZK1, PRDM16, RBM19, TOP3B. Most patients carried variants of unknown clinical significance or known to cause only intellectual disability.

Conclusions: The study indicated a noticeable heterogeneity in the genetic profile of children with ASD. It is impossible to indicate a single gene to cause autism. Further analysis of point mutations in next-generation sequencing and investigation of epigenetic changes in a wider research group are needed.

Keywords: autism spectrum disorder, single nucleotide polymorphism microarray, molecular karyotype, genes

The Role of miRNAs and Their Interactions in the Pathogenesis of Myocarditis

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Background: Heart failure remains one of the leading causes of death in modern societies. Among its many etiologies, myocarditis — defined as an inflammatory process affecting the myocardium — is a significant contributor. However, the underlying pathophysiology of this disease remains unclear. miRNAs are known to regulate mRNA expression and are involved in the development of various diseases, including myocarditis. Therefore, investigating the role of miRNAs in myocarditis may provide valuable insights into its molecular mechanisms.

The aim: The aim of this study was to determine the expression of Chr8:96, miR-1, miR-155, miR-125, miR-143, and miR-222 in myocarditis patients, and to explore their correlations with each other and with inflammatory markers.

Materials and methods: Histopathological examination was performed to confirm the presence of myocarditis. Twenty patients were included in the study — fourteen with confirmed myocarditis and six without, serving as controls. The number of macrophages and lymphocytes was counted, and immunohistochemical staining was used to assess HLA-ABC and HLA-DR expression. miRNAs were isolated and reverse transcribed, followed by qRT-PCR to assess expression levels. Statistical analyses were performed to evaluate potential correlations between miRNA expression levels.

Results: Patients with the most severe histopathological signs of myocarditis exhibited markedly elevated levels of Chr8:96, which correlated with increased inflammatory biomarkers. Spearman's rank correlation revealed moderate positive associations between specific miRNA pairs: miR-143 and miR-125 ($\rho = 0.622$, $p = 0.018$), miR-143 and miR-155 ($\rho = 0.591$, $p = 0.026$), and miR-155 and miR-222 ($\rho = 0.555$, $p = 0.049$).

Conclusions: Our findings suggest functional interactions among the analysed miRNAs and support their potential involvement in the pathogenesis of myocarditis. These results may pave the way for further studies exploring miRNA-based therapeutic strategies and a deeper understanding of inflammatory heart diseases.

Evaluation of health behaviors among patients diagnosed with schizophrenia

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Background: Schizophrenia, being known as a disease from a circle of psychotic perturbations, is associated with significant difficulties in the patients' experience of comfort in life. These difficulties concern various areas, such as self-perception, acceptance of disease or functioning in the scope of professional work, influencing health behaviors.

The aim: The aim of the study was to assess health behaviors among patients with schizophrenia, as well as to determine their relationship with the level of acceptance of the disease, satisfaction with life or the intensity of anxiety and depression symptoms.

Materials and methods: We included 70 patients treated in the Mental Health Clinic in the study. Of them, 54.29% were women and 45.71% were men. Patients were examined using psychometric questionnaires: Satisfaction with Life Scale (SWLS), Hospital Anxiety and Depression Scale (HADS), Acceptance of Illness Scale (AIS), Health Behavior Inventory (HBI) and an original demographic data questionnaire. The consent to conduct the study was obtained from the Bioethics Committee of the Silesian Medical University.

Results: Assessment of the relationship between parameters showed a statistically significant negative correlation of the average result achieved in the general scale of declared health behaviors (SDHB), and in the subscales: health practices, preventive behaviors and positive attitude with the results of the HADS-D scale. The average result obtained in the subscale of positive mental attitudes, on the other hand, correlated negatively with both anxiety and depressive symptoms, no matter of gender.

Conclusions: Taking care of one's own well-being in the group of patients diagnosed with schizophrenia, assessed on the basis of the HBI scale, is associated with higher satisfaction with life, contributing to the reduction of mood disorders and emotional tension, regardless of gender. It seems essential to plan further studies that will allow for the verification of the conclusions drawn in our work.

Keywords: Schizophrenia, health behaviors, satisfaction with life, acceptance of illness, ankiety, depression

Reflectance and Emissivity of Tablets in Whole and Crushed Form

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Background: The stability of a drug plays a vital role in maintaining its therapeutic effectiveness. According to pharmaceutical guidelines, various environmental factors must be considered when evaluating the stability of the active pharmaceutical ingredient (API), including humidity, temperature, pH, oxidation, and exposure to light. Photostability testing—assessing how sunlight affects the drug—is a key part of this process.
 Crushing tablets is a common practice, but it can make the drug more vulnerable to UV radiation. Sunlight that reaches the Earth's surface mainly consists of ultraviolet (UV), visible (UV-VIS), and infrared (IR) radiation. When this light hits a tablet, some of it is reflected while the rest is absorbed. The reflectance coefficient quantifies how much light is reflected versus absorbed, helping researchers understand how UV exposure may lead to the degradation of the API.

The aim: This study investigated how tablet color and physical form (whole vs. crushed) influence these optical properties.

Materials and methods: Researchers analyzed two groups—15 white and 10 yellow tablets—using the Solar 410 reflectometer and the ET100 emissometer. These instruments allowed for precise measurements across a wide spectrum of light wavelengths.

Results: The results revealed significant differences in light behavior between whole and crushed tablets, with color also playing a key role. Both white and yellow tablets reflected more light in their intact form. Once crushed, their reflectivity significantly dropped. Notably, white tablets consistently demonstrated higher reflectance than yellow ones, regardless of their physical state.

Conclusions: White tablets with highly smooth surfaces represent the most favorable option for solid dosage forms. These surface properties help reduce emissivity while enhancing reflectivity. In contrast, crushing tablets—regardless of their color—increases the exposure of the active pharmaceutical ingredient to radiation.

Keywords: reflectance, emissivity, photostability, API degradation, tablet reflectance

Non-invasive imaging of individual histological carotid plaque features: A diagnostic accuracy meta-analysis

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Background: Accurately detecting carotid plaque characteristics is crucial for identifying high-risk patients due to the risk of cerebrovascular events and complications during revascularizations.

The aim: The diagnostic accuracy of individual and overall carotid plaque characteristics using computed tomography (CT), magnetic resonance imaging (MRI), and ultrasound (US) compared to histology in patients with symptomatic/asymptomatic carotid plaques was aimed.

Materials and methods: After registration on PROSPERO (ID CRD42022329690), Medline Ovid, Embase.com, Cochrane Library, and Web of Science were searched without limitations. The QUADAS-2 tool was used to study quality assessment, the GRADE framework to assess evidence certainty, and univariate and bivariate random-effect meta-analyses for data analysis.

Results: Of 5,960 studies screened, 107 were identified (6136 patients), resulting in 253 diagnostic accuracy comparisons of 16 individual plaque characteristics (28 CT/120 MRI/105 US). CT detected intraplaque hemorrhage (IPH) and lipid-rich necrotic core (LRNC) with good accuracy (86%[95%CI 67–95] and 84% [95%CI 72–91], respectively) and exhibited very high accuracy for ulceration (92% [95%CI 87–95]; 76% on MRI and 75% on US) and calcification (90% [95%CI 58–98] vs. 89%[95%CI 87–91] on MRI). MRI identified LRNC and IPH with good accuracy (86% [95%CI 81–89] and 86% [95%CI 84–88], respectively), and differentiated between acute/subacute/old IPH (accuracy >87%). US accurately detected ruptured fibrous cap (85% [95%CI 77–91]), comparable to MRI (85% [95%CI 79–90]), but demonstrated lower performance for other characteristics. Finally, CT detected overall carotid morphology with 89% accuracy, followed by MRI (86%; p=0.374 to CT), and significantly lower by US (78%; p<0.001).

Conclusions: CT identified key plaque features, especially ulceration and calcification. MRI provided a thorough plaque assessment by detecting all features and differentiating IPH age. For overall morphology, CT and MRI surpassed US accuracy.

Keywords: Carotid artery plaque, intraplaque hemorrhage, ulceration, ultrasound, computed tomography, MRI

The role of neuroinflammation in the course of Parkinson's Disease (PD)

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Background: Parkinson's disease (PD) is a neurodegenerative disorder involving dysfunction of the brain's dopaminergic system. The condition is associated with progressive loss of ability in daily functioning, consequently leading to disability in both motor and cognitive aspects.
Currently, attempts are still being made to determine and clarify what factors exert an influence on the onset of the disease, to monitor its progression, and to study the possible predictors of PD.

The aim: The purpose of our study was to determine the role of neuroinflammation in the development of PD, by analyzing the influence of inflammatory parameters on the assessment of disability and the need for drugs.

Materials and methods: Using the University Repository of Medical Data (URDM) of the Medical University of Silesia in Katowice, we obtained data on the epicycles of 300 patients, suffering from PD, hospitalized at the Department of Neurology of the UCK in Katowice to assess the optimality of treatment and possible implementation of therapy modifications. Patients were included in the study on the basis of their scores on the UPDRS international scale and the Hoehn - Yahra (HY) disability progression scale. Finally, 140 patients were included in the study.

Results: We obtained a significant negative correlation of lymphocyte and platelet (PLT) levels with age of the patients. In addition, PLT negatively correlates with the age of the disease. We also obtained a positive correlation between neutrophile (NEU) and white blood cells (WBC) levels and HY score. Moreover, Platelet-to-lymphocyte ratio (PLR) shows a positive correlation with higher Levodopa Equivalent Daily Dose (LEDD).

Conclusions: Early-onset disease shows higher levels of neuroinflammation, and is more conducive to the development of symptoms. In turn, the correlation of PLR with LEDD may indicate the onset of more severe disability in the course of PD and a
greater need for medication.
It seems necessary to conduct further studies to verify the conclusions obtained in our work.

Keywords: Parkinson's disease, neuroinflammation, neurodegeneration, PLR, NLR, Levodopa

Nutritional status and dietary strategies in tertiary prevention in patients with gastrointestinal cancers

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Background: Due to the increased risk of developing or worsening malnutrition during invasive treatment of patients with gastrointestinal cancers [GIC] (30–85% of cases), nutritional status and dietary strategies should be systematically monitoring as part of tertiary prevention standards, which can significantly increase the effectiveness of therapy.

The aim: Assessment of nutritional status and dietary strategies in patients with GIC.

Materials and methods: The study included 75 patients (n=75; 100%) diagnosed with GIC (colon, stomach, liver and pancreas). The project was carried out in two clinical facilities in Silesia. A standardized MNA (Mini Nutritional Assessment) was used to interpret nutritional status (correct, risk of malnutrition, undernutrition) and OQ (Original Questionnaire) was used to assess dietary strategies of the patients.

Results: After conducting the MNA questionnaire, almost 60% of patients were at risk of malnutrition, which could be related to weight loss in the last 3 months and too infrequent consumption of dairy products, meat, fish, vegetables, fruit. OQ results showed that 48% of study group consumed only 3 meals a day and the knowledge about nutritional impact on body composition was poor (n=36). Most patients (n=67) believed the amount of food was sufficient. Only about 30% of patients declared regular consumption of food for special medical purposes or high-protein products. Many patients (n=60) claimed they did not need a consultation with an oncology dietitian.

Conclusions: Due to the unsatisfactory results of the nutritional status assessment and dietary strategies in the study group, it is worth implementing preventive and therapeutic strategies. As part of tertiary prevention, constant support from an oncology dietitian seems to be crucial at every stage of the disease and treatment.

Keywords: nutritional status, dietary strategies, tertiary prevention, patients, gastrointestinal cancers

Comparison of Human Milk Macronutrient Composition in Mothers with and without Gestational Diabetes

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Work's tutor: Assoc. Prof. Dr. Şule Aktaç

Background: The literature presents varying findings regarding the impact of gestational diabetes mellitus (GDM) on the energy and macronutrient content of human milk. Some studies suggest that the energy value of human milk from mothers with GDM is either unchanged or lower compared to healthy mothers, while others report no effect of GDM on milk energy content. One study indicated that the composition of protein, lactose, and fat in transitional and mature milk did not change; however, a reduction in protein content was observed in the milk of mothers with GDM, with no significant difference in lactose and fat levels.

The aim: To compare the energy and macronutrient composition of human milk on the 14th and 30th postpartum days between mothers diagnosed with GDM and healthy mothers.

Materials and methods: To determine the energy and macronutrient content, 5 mL of human milk was manually expressed from the right breast after breastfeeding, collected into an Eppendorf tube, and analyzed within 2 hours using MIRIS HMA. Data were analyzed using SPSS 23.0 software, with a significance level set at $p < 0.05$.

Results: The mean age of mothers in the GDM group was 29.5 Ī 4.71 years, and 29.4 Ī 3.03 years in the control group. Although there were more mothers with primary and secondary education in the GDM group, educational levels between the groups were similar ($p > 0.05$). In the GDM group, lactose content on day 30 was significantly higher than on day 14 ($p < 0.001$). In the control group, no significant differences were observed in energy or macronutrient composition between the two time points. Between-group comparisons showed that on day 14, lactose levels were significantly lower in the GDM group ($p = 0.01$), and on day 30, the energy content of human milk was significantly lower in the GDM group ($p = 0.04$).

Conclusions: GDM may affect the composition of human milk, particularly in terms of lactose and energy levels.

Proteomic and phosphoproteomic landscape of testicular germ cell tumors

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Background: Testicular cancer (TC) accounts for approximately 1% of adult cancers and around 5% of diagnosed urological cancers, with germ cell tumors (GCTs) being the most common type (90–95% of cases).

The aim: The aggressive metastatic potential of TC, particularly to retroperitoneal lymph nodes, mediastinum, lungs, brain, liver, and bones, highlights the need for a thorough understanding of the molecular mechanisms driving its rapid progression.

Materials and methods: To uncover the molecular alterations associated with TC, we conducted comprehensive proteomic and phosphoproteomic analyses of tissue samples. Proteins were digested with trypsin, separated using nano-liquid chromatography coupled with an Orbitrap Fusion mass spectrometer, and subsequently analyzed using PEAKS 11 software. Phosphoproteins were enriched using Ti-IMAC beads and analyzed similarly.

Results: Results showed significant upregulation of pathways involved in immune response modulation, cell signaling, cytoskeletal organization, and proteasome activity in tumor. Specifically, increased expression was observed for proteins of the Actin-Related Protein 2/3 Complex family, along with immune-related proteins, including HLA-DPA, HLA-DPA1, and B2M, which are essential for antigen presentation via MHC class I and II pathways.
 Phosphoproteomic analysis identified approximately 400 proteins that differentiate tumor tissues from controls, primarily involved in regulating cellular structures, metabolic processes, cytoskeletal organization, and immune system functions, thus corroborating findings from the global proteome analysis. Notably, KIF5B and LRRFIP1 showed increased expression in cancerous tissues, further suggesting their indirect involvement in modulating immune responses and reinforcing our proteomic observations.

Conclusions: These findings significantly advance our understanding of testicular cancer at the molecular level, potentially guiding the development of targeted therapeutic strategies and novel diagnostic or prognostic biomarkers.

Keywords: testicular cancer, germ cell tumors, proteomic, phosphoproteomic

Outcome in heart failure patients with CRT with vs. without remote monitoring

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Background: Cardiac resynchronization therapy (CRT) has become an increasingly integral component in the management of heart failure. 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 depends on whether it is monitored remotely or not.

Materials and methods: One thousand fifty-nine consecutive patients with CRT implanted between 2002 and 2019 in a tertiary care university hospital, in a densely inhabited, urban region of Poland was analyzed (949 subjects [89.6%] with CRT-D; 110 patients with CRT-P [10.4%]). All CRT patients were divided into subjects monitored with and without telemonitoring.

Results: The median follow-up was 1661 days (10th and 90th percentile: 323-3995). All-cause mortality in CRT patients with remote monitoring was significantly lower than in subjects without telemonitoring (51.5% vs. 58.3%, P=0.02). On multivariable regression analysis, older age (HR 1.02, 95%CI 1.01-1.03, P<0.001), ischemic cardiomyopathy (HR 1.33, 95%CI 1.18-2.19, P<0.001), lower left ventricular ejection fraction (HR 0.97, 95%CI 0.94-0.99, P<0.001), higher creatinine level (HR 1.005, 95%CI 1.003-1.008, P=0.001), diabetes (HR 1.36, 95%CI 1.02-1.83, P=0.002), and lack of remote monitoring (HR 0.55, 95% CI 0.46-0.66, P=0.001) 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. These results underscore the prognostic value of telemonitoring in optimizing long-term outcomes in this high-risk population.

Keywords: CRT, remote monitoring, cardiac resynchronization therapy

Oxidative stress in obstructive sleep apnea patients – a prospective study

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Background: Obstructive sleep apnea (OSA) is a prevalent sleep-related breathing disorder characterized by repeated episodes of apnea and hypopnea, leading to redox imbalance.

The aim: The study aimed to evaluate the oxidant/antioxidant status in the blood of OSA participants.

Materials and methods: Participants were divided into two groups: a study and a control group. The study group consisted of OSA patients. Healthy volunteers were included in the control group. All participants underwent the same diagnostic protocol (anamnesis, upper airway endoscopy, and a sleep study type III). They also completed standardized questionnaires (STOP-BANG, ESS, SF-36, and PSQI). Venous blood (10 ml) was taken on enrolment and centrifuged to obtain plasma, which was immediately frozen at –80°C for further assessments. Study group participants were selected for surgical procedures under general or local anesthesia. Follow-up assessment was performed 4-6 months postoperatively. Redox homeostasis was assessed via colorimetric assays by measuring the concentration of total oxidative status (TOS), total antioxidative capacity (TAC), and malondialdehyde (MDA) in plasma. Oxidative stress index (OSI) was calculated.

Results: A significant difference between pre-and post-operative in the OSA group was related to TAC concentration in plasma (higher concentration before the surgery). OSI was significantly lower before the surgery compared to after the surgery in the OSA group. Standardization to milligram protein enabled reliable comparisons, standardized tissue metabolism, and enhanced the reliability of plasma-based techniques. No differences in TOS and MDA were observed. A final statistical assessment is forthcoming.

Conclusions: In patients with OSA, systemic adaptation mechanisms are stimulated, boosting the antioxidant barrier. Surgical treatment normalizes the concentration of antioxidants in plasma. After treatment, the redox balance shifts in favor of the oxidation process.

Keywords: obstructive sleep apnea, oxidative stress, redox homeostasis

Comparison of the efficacy of laparoscopic and robot-assisted cholecystectomy using the Versius robotic system

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Background: Laparoscopic cholecystectomy (LC), which is currently the treatment of choice, has recently been increasingly performed using robotic systems, like da Vinci, Versius, due to their technical advantages compared to conventional laparoscopic surgery. However, it remains unclear whether robot-assisted cholecystectomy (RC) provides greater safety than standard LC.

The aim: The aim of our study was to compare the efficacy of LC and RC using the Versius robotic system, as well as to analyze perioperative complications.

Materials and methods: A retrospective analysis of medical records of patients 75 (26 men, 49 women) undergoing planned LC and RC, in the Department of Digestive Tract Surgery, between 01.06.2023 and 31.10.2023, was performed.

Results: There were 39 (52%) LC and 36 (48%) RC in the analyzed group. The mean patient's age was 52.25 (24-87) and median BMI was 27 (19-40), respectively. One (1.33%) LC patient and 2 (2.66%) RC patients, had acute pancreatitis prior to the procedure (p=0.5). The most frequent ASA score was II reported in 32 (32.66%) 28 patients (37.33%) in LC and RC groups, respectively (p=0.5). The median postoperative hospitalisation duration was 1(1-11) 1 (1-3) days in LC and RC respectively. The median operative time was 80 (40-205) and 85 (50-210) in LC and RC, respectively (p=0.7). Conversion to open surgery was performed in 2 (2.66%) LC cases (p>0.05). Intraoperative complications were observed in 15 (20%) patients - 11 in LC and 4 in RC (p=0.06), the most often was gallbladder perforation in 10 patients (13.3%), both groups equally. Postoperative complications were observed in 0 patients. In-hospital mortality was 0%, and reoperations and rehospitalisations were not observed.

Conclusions: RC procedure was related to a lower incidence of intraoperative complications than laparoscopic cholecystectomy, demonstrating increased safety profile of the method.

Keywords: Cholecystectomy, Laparoscopy, Robotic, Minimally invasive surgery.

Bariatric Surgery – is It a Good Choice of Treatment for Young People with Obesity?

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Background: In response to the continuously increasing prevalence of extreme obesity among youth and due to the inconsistent and short-term effect of lifestyle interventions, bariatric surgery has been introduced in the group of younger patients since the early 2000s. Bariatric surgery is associated with a risk of perioperative complications, however they are negligible when compared to complications associated with obesity and its comorbidities. Bariatric surgery is a mainstay of treatment for obesity as the only method leading to long-term effect of weight loss and remission of comorbidities. Efficient treatment for obesity is of special importance for young people in the period of psychophysical, mental and social development.

The aim: The purpose of the study was to analyze the efficacy and safety of bariatric surgery in young people in terms of weight loss and remission of comorbidities, as well as short-term and long-term perioperative complications.

Materials and methods: The study was designed as an online survey that included questions about the operation and its effect measured by the weight loss and remission of comorbidities. Data was collected from 60 patients from the youth group [18-24 years old] and from 60 patients from the control group (>24 years old).

Results: There were no statistically significant differences between the younger and the older group in terms of estimated weight loss, remission of comorbidities and the incidence of perioperative complications.

Conclusions: Bariatric surgery, followed by adequate lifestyle changes, should be considered a the mainstay of treatment for obesity also in young people. Further research is needed to establish bariatric surgery as a golden standard in treatment of adolescent obesity.

Keywords: bariatric surgery, obesity, remission

Prehospital hybrid mobile stroke unit for acute neuroemergency patients in rural and mountainous regions

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Background: Mobile stroke unit (MSU) ambulances enable to provide swift diagnosis and intravenous thrombolytic therapy to eligible stroke patients directly at the emergency site. Expansion of the single-purpose MSU could increase effectiveness and integration into clinical practice, especially in rural mountainous areas with long transport times to hospitals.

The aim: We aimed to determine the efficacy and feasibility of hybrid-MSU (h-MSU) in advanced prehospital work-up for patients with acute medical neuroemergencies in rural mountainous regions in Czechia.

Materials and methods: In our pilot prospective open-label cohort study, the h-MSU was available constantly for 19 consecutive days (November/December 2023) in a mountain and rural Moravian Wallachia region (Czechia). Patients with acute nontraumatic medical neuroemergencies were diagnosed with computed tomography (CT), portable ultrasound (US), point-of-care laboratory, and treated at the emergency site. The efficacy and feasibility of implementing h-MSU into standard medical care were tested, not only for stroke patients.

Results: Of 54 dispatches, 46 patients were treated, 37 CT scans and 6 US examinations were conducted during the 24/7 operation of h-MSU in 19 days. Six stroke patients were treated with thrombolysis, one was transported for thrombectomy, three were found with intracerebral hemorrhage or brain tumors, and 7 epileptic statuses were treated. Patients were transported to specialized hospitals (intensive care, neurological, internal medicine, etc.) based on their condition. Specific antiplatelet treatment was provided to three additional patients.

Conclusions: The h-MSU concept in rural and mountainous areas of Czechia was found effective and feasible for patients with acute neuroemergencies, rather than only for stroke patients, based on the amount of timely provided specialized prehospital diagnosis and treatment within the relatively short study period. Mobile-CT and portable US were beneficial for faster treatment decision-making.

Keywords: stroke, mobile stroke unit, prehospital emergency care, neuroimaging, CT, ultrasound

Dental Health Status of Incarcerated Individuals in Silesia: A Five-Year Retrospective Analysis

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Background: Incarcerated individuals often face barriers to dental care, leading to advanced oral health issues.

The aim: This study assessed the dental health status of inmates from the cities of Bytom, Gliwice, Tarnowskie Góry, and Zabrze over a five-year period, utilizing the DMFT (Decayed, Missing, and Filled Teeth) index as a standardized measure of dental health.

Materials and methods: A retrospective observational analysis was carried out at the University Centre for Dentistry in Bytom, covering the period from January 2017 to December 2021. Data from 139 incarcerated individuals (13 women; 9.4%) were analyzed. Patient records were systematically reviewed to extract demographic information, DMFT index values, and details of dental treatments performed. Diagnoses were categorized according to the International Classification of Diseases, 10th Revision (ICD-10). The control group consisted of non-incarcerated individuals.

Results: The mean age of the study population was 37.07 years (SD = 7.75), with the majority of patients falling within the 30–49-year age range. The mean DMFT score was found to be 12.52 (SD = 5.18), indicating a substantial burden of dental disease. This total included an average of 3.90 decayed teeth, 3.89 missing teeth, and 4.78 filled teeth per individual. A considerable proportion of inmates (65.5%) required surgical interventions, primarily extractions, while only 33.1% underwent restorative procedures such as fillings. Preventive care was rarely documented, highlighting a gap in proactive oral health management within the prison system.

Conclusions: The elevated DMFT scores observed in this study, along with the predominance of surgical over restorative treatments, reflect a significant level of unmet dental need among incarcerated populations. Addressing these disparities is crucial for promoting oral health equity and enhancing the overall well-being of individuals within the penal system.

Keywords: Incarceration, Dental Health, DMFT Index, Restorative Dentistry, Oral Surgery

Choice of Physical Activity and Time Spent in the Summer Period by Students

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Background: Physical activity during adolescence plays a key role in shaping healthy habits for a lifetime. Choosing suitable forms of exercise and allocating an appropriate amount of time to physical activity are essential for proper physical and mental development.

The aim: The aim of this work is to examine how students utilize the potential of the summer period to increase their physical activity and identify the factors that motivate them to engage in exercise.

Materials and methods: Respondents' answers were collected via an online Google Forms survey. The questionnaire consisted of 16 original questions, including 5 demographic questions and 11 substantive ones. All questions were closed-ended with single or multiple-choice options. A total of 212 people participated in the study, the majority of whom are pursuing higher education.

Results: The most common reasons for engaging in physical activity include the desire to improve health, including fitness (61.5%), and body appearance (53.5%). For 22.2% of participants, the average number of daily steps exceeds the 10,000 steps recommended by WHO. Nearly 70% of respondents remember to stay hydrated during various forms of physical activity. Over 80% noticed an increase in their physical effort during the summer months.

Conclusions: Students most frequently choose activities that are easily accessible, provide entertainment, and allow them to spend time with friends. The average time spent on physical activity during the summer by surveyed students is 3–4 training units. Boys tend to choose competitive activities requiring increased physical effort, while girls prefer recreational activities.

Keywords: physical activity, students, summer holidays, health

Changes in the Method of Teaching Anatomy and the Importance of Body Donation Programs – A Study of Physicians

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Background: The teaching of anatomy, both in terms of content and the methodology of knowledge transfer, has become a subject of ongoing discussion due to the rapid advancement of new technologies, time constraints, evolving requirements, and the limited availability of cadavers in some academic centers.

The aim: To investigate physicians' opinions on the methods of educating medical students in anatomy, attitudes toward body donation programs, as well as the perceived importance of this subject in their future professional practice, we developed a questionnaire that was distributed among physicians working in Poland.

Materials and methods: The study was conducted using an anonymous online questionnaire. The questionnaire consisted of 24 question. The study was carried out among Polish physicians between May 2024 and December 2024.

Results: The survey included 114 medical professionals—specialists, residents, and interns. Nearly 94% of respondents believe that anatomical knowledge is essential for their future professional work. Furthermore, 86% stated that effective anatomy education is not possible without access to cadavers during classes.
 In response to the question, "Which of the following learning tools do you consider most useful in studying anatomy?", 74% selected "specimens obtained through body donation programs."
 Additionally, 92% of participants agreed that learning anatomy using human bodies plays a significant role in shaping the proper attitude of future physicians—for example, fostering respect for cadavers, humility, awareness of mortality, and an understanding of the reality of death.

Conclusions: The results of the study conducted among medical professionals highlight the strong position of traditional methods of teaching anatomy, while also pointing to existing challenges. Addressing these issues could contribute to increasing the popularity and acceptance of voluntary body donation programs within society.

Keywords: Anatomy, donation, medical education

Awareness Level of Students Regarding Testicular Cancer and Its Prevention – A Questionnaire-Based Study

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Background: Testicular cancer (TC) is the most common cancer in men aged 20-44 years. Symptoms are non-specific. The key to early detection is testicular self-examination (TSE) and knowledge of risk factors.

The aim: The aim was to assess the knowledge and behavior of students aged 18-40 years regarding TSE and knowledge about TC.

Materials and methods: Data were collected in 2025 from 320 students at universities in the Silesian and Lesser Poland voivodships using an electronic survey. The analysis included knowledge and behavior related to TSE and knowledge about TC.

Results: 43.4% of respondents knew that TC is common among men aged 20-45 years; 14.7% reported experiencing symptoms they considered worrying, but only 44.6% of them consulted a urologist. Those who did were more likely to perform a TSE (OR=4.29, p<0.0001), although no association was found between this and greater knowledge of worrying symptoms. While 42.5% of respondents knew that TSE should be performed monthly, only 15% did so regularly and 60.3% admitted to not performing TSE at all. In addition, 52.5% had never received any information about TSE. Those who had received information were more likely to perform TSE (OR=23.26, p<0.0001), had greater knowledge of symptoms (p=0.007) and were more likely to choose the correct frequency of TSE (OR=2.0, p=0.0025). The mean score of the respondents was 70.0% for symptoms, 48.0% for risks and 43.8% for protective factors.

Conclusions: Most men do not perform TSE and have limited knowledge about alarming symptoms. Awareness of risk and protective factors is insufficient. Many people who experience worrying symptoms during TSE do not consult a urologist. There is a need for TSE and TC education to improve men's knowledge and health behaviors

Keywords: Testicular cancer, Testicular self-examination

Quality of Life in Patients with Laryngeal Dystonia Qualified for Botulinum Neurotoxin Injection

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Work's tutor: dr hab. Paulina Krasnodębska

Background: Laryngeal dystonia (LD) remains a clinical challenge. As a rare and lesser-known disease, it is often undiagnosed for long and thus patients do not receive proper treatment. Voice impairment in the course of LD may result in several social and professional difficulties.

The aim: This cross-sectional study aims to assess the quality of life of the patients qualified for botulinum neurotoxin (BoNT) injections, the current gold standard treatment, on the basis of several questionnaire methods currently used in clinical practice and to compare their results with each other.

Materials and methods: Patients of a specialised phoniatric outpatient clinic with a diagnosis of LD, qualified for BoNT administration, were enrolled in the study. During the appointment, the patient completed the VHI-10, VHI-30, Swallowing Disorder Scale, and Voice-Related Quality of Life questionnaires and rated the severity of selected 4 symptoms on a NRS. Voice was then assessed also by the physician using Dysphonia Rating Scale. Spearman correlations with Fisher's z Transformation between the tools were computed. The Wilcoxon Two-Sample Test was used to assess differences associated with first or subsequent administration.

Results: Forty-six records (n=29 of woman) were included in the study. The difference between first (n=16) and subsequent (n=30) administration groups was insignificant for every tool. The scores of all questionnaires were significantly correlated with each other to varying degrees (range 0.31 to 0.76). They were also correlated with almost all NRS scale scores, though not with patient age.

Conclusions: The various tools for assessing the quality of life of patients with LD provide correlated results. It suggests that, despite differences in their design, they ultimately provide similar insights into the patient's perspective. Perception of the impact of the disease appears to be unrelated to patient's age or the number of BoNT injections already received.

Keywords: quality of life, laryngeal dystonia, patient-reported outcome measures

Measuring Matters: Hypertension Awareness in Białystok and Surrounding Areas - Insights from a Study Conducted

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Background: The study emerged as an integral component of the pro-health campaign during World Hypertension Day 2023 and 2024, conducted in Bialystok.

The aim: The aim of the study was to evaluate the incidental blood pressure (BP), heart rate (HR), glycemia and electrocardiography (ECG) among residents of Bialystok, Poland and the surrounding region.

Materials and methods: The study included 342 random participants, 59.94% of whom were female. Data was gathered through physical measurements and surveys regarding age, sex, education level, residence, smoking status, alcohol consumption, physical activity, and the presence of cardiovascular or diabetes disease. Parameters measured included blood pressure (BP), heart rate (HR), blood glucose levels, and electrocardiogram (ECG).
 Participants were categorized according to age (≥65 or <65 years), BP (≥130/80 or <130/80 mmHg), sex, and BMI (≥25 or <25). Data were statistically analyzed.

Results: The mean SBP was 136 mmHg, DBP 77 mmHg, HR 78 /min, glycemia 101.70 mg/dl, BMI 26.69.
 Most participants were city residents (87.58%), higher educated (50%), and 28.57% reported no physical activity.
 Those with BP ≥130/80 mmHg had a mean BMI of 27.
 Adults aged ≥65 years had higher SBP (133.1 vs. 138.2 mmHg, p-0.002), and lower DBP (79.7 vs. 75.9 mmHg, p-0.0032).
 In hypertensive individuals, SBP was higher (140.0 mmHg vs. 133.0 mmHg p=0.002) as well as DBP, BMI and physical inactivity.

Conclusions: The findings indicate age-related variations in blood pressure, with older adults exhibiting higher SBP and lower DBP. Hypertension was associated with elevated BP, increased BMI and physical inactivity, with a higher prevalence among men. Individuals with diagnosed hypertension often had poorly controlled blood pressure, indicating suboptimal treatment or adherence. Especially in high-risk older adults, lifestyle modification and patient education are key to effective blood pressure control.

Keywords: hypertension, health awareness, blood pressure

Stigmatization of Patients with Obesity in the Healthcare System: Results of a Study on Discrimination by Medi

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Background: Obesity is a chronic disease with a complex etiology, leading to excessive accumulation of adipose tissue. Its treatment is challenging, and lack of therapy results in complications that place a burden on the healthcare system. The stigmatization of obesity is rooted in false beliefs, biases, and stereotypes, which hinder weight reduction efforts and contribute to negative psychological, health-related, and social outcomes.

The aim: The aim of the study was to examine the prevalence of stigmatization and discrimination of patients with obesity by healthcare professionals.

Materials and methods: The study was conducted using a questionnaire consisting of a demographic section and questions concerning attitudes toward obesity as well as experiences related to the stigmatization of patients with obesity. The survey was carried out among 201 healthcare professionals employed in medical facilities located in the Silesian Voivodeship. The collected data were analyzed using Microsoft Excel software.

Results: A considerable proportion of respondents indicated that they do not harbor negative emotions toward patients with obesity. Just under half had witnessed situations in which an obese patient was subjected to discriminatory behavior, although respondents did not consider such incidents to be widespread. Despite the presence of certain biases, the vast majority of healthcare professionals expressed a willingness to work with patients who are overweight or obese.

Conclusions: The study revealed the presence of certain biases toward patients with obesity. A better understanding of these biases and misconceptions may contribute to improving the quality of medical care, which is essential for the effective treatment of excess body weight.

Keywords: obesity. obesity stigmatization. obesity discrimination. medical personnel.

Ergonomic Assessment and Musculoskeletal Symptoms in Young Retail Workers

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Background: Employees in the service sector operating within shopping malls are exposed to chronic ergonomic strain, which may contribute to the development of musculoskeletal disorders. Despite the growing interest in office work ergonomics, there is a lack of data concerning this specific occupational group in Poland.

The aim: The aim of the study was to assess the frequency and intensity of musculoskeletal pain, identify factors potentially influencing its occurrence, and conduct an ergonomic analysis of workstations.

Materials and methods: The study was conducted in January and February 2025 among 70 retail employees of a company operating in shopping malls. The majority of participants were women (91%) aged 19–26. An electronic questionnaire was used, consisting of demographic data, a standardized tool for assessing pain complaints, and an author-designed section on workstation ergonomics.

Results: The most frequently reported complaints concerned the lower and upper back, neck, head, and shoulders. The highest pain intensity was observed in the lumbar region. No statistically significant relationship was found between work experience and pain severity.

Conclusions: The findings indicate a high prevalence of musculoskeletal complaints among the respondents and a general awareness of ergonomic issues. Further action is needed to improve working conditions, including ergonomic education and the implementation of preventive solutions.

Keywords: musculoskeletal disorders, ergonomic assessment, workplace ergonomics, retail employees

Talc in Cosmetics: Public Perception, Health Concerns, and Labeling Preferences

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Background: Talc is one of the most commonly used ingredients in powder-form cosmetics, primarily due to its absorbent properties. Despite its widespread use, there remains a general lack of awareness regarding the differences between natural and purified talc, as well as the potential health risks associated with its application.

The aim: The objective of this study was to assess consumer awareness regarding the use of talc in cosmetics, their perception of associated risks, and their preferences concerning labeling on cosmetic product packaging.

Materials and methods: The study was conducted using a questionnaire administered in both electronic and paper formats. The sample was selected through a snowball sampling method, which facilitated access to a diverse group of respondents varying in age and educational background.

Results: The findings indicate that 43% of respondents were aware of the presence of talc in cosmetic products. The most frequently identified functions of talc included moisture absorption and the enhancement of product smoothness. The primary health concerns cited were skin irritation and respiratory issues. Furthermore, 72% of participants expressed the view that warning labels on cosmetic packaging should be mandatory.

Conclusions: The results highlight the need to educate consumers about the properties of talc, distinctions between its various forms, and relevant safety regulations. It is recommended that clear and informative labeling be introduced on cosmetic packaging, alongside efforts to promote alternative, safer ingredients.

Keywords: talc, cosmetics, consumer awareness, product labeling, health risks, cosmetic safety

Assessment of knowledge about vaccinations among students of the Medical University of Silesia in Katowice.

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Work's tutor: Dr hab. n. med. Sabina Więcek

Background: In recent years, vaccinations have sparked public debate, and healthcare professionals still face vaccine hesitancy. Knowledge about vaccines is key in conversations with unsure patients.

The aim: This study aimed to assess vaccination knowledge among students at the Medical University of Silesia.

Materials and methods: Participants filled out questionnaires on received vaccines, mandatory vaccinations, and possible contraindications. Results were statistically analyzed.

Results: The survey included 281 individuals: 69.4% women, 29.5% men, between the ages of 20 and 31 (average age: 23,23). Among them, 275 were medical students-57.3% in their third year and 29.9% in their fourth. Most students have been vaccinated against childhood diseases. Lower rates were seen for additional vaccines: rotavirus (39.1%), pneumococcus (49.5%), chickenpox (46.6%), and exotic vaccines like Japanese encephalitis (1.4%) and yellow fever (5.7%). Additionally, 18.1% of students are vaccinated against HAV, while 26.7% do not know whether they have been vaccinated against HAV. 30.6% of the respondents have been vaccinated against HPV, and 15% of them are men. Only 16.4% of respondents get vaccinated against influenza annually. Moreover 79% of students consider vaccines completely safe, 20.3% relatively safe, and 99.3% are aware of post-vaccination reactions. However, only 29.2% believe their curriculum covers vaccinations adequately, and just 9.3% feel prepared to educate patients.

Conclusions: Among students of the Medical University of Silesia, it is necessary to conduct classes covering the topic of preventive vaccinations - especially in the context of a practical approach to them. The low percentage of individuals who have received non-mandatory vaccinations (against influenza, HPV) is concerning.

Keywords: vaccinations, students, knowledge about vaccinations

White Coats, Black Ignorance: Do Medical Students Know the Rules?

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Background: Hospital-acquired infections (HAIs) remain a major challenge in healthcare, affecting 5–10% of hospitalized patients, even in countries with the highest care standards. They often result from poor hand hygiene, unsterile equipment, environmental contamination, lack of proper isolation for high-risk patients, or non-compliance with infection control procedures.
The most endangered patients are those undergoing immunosuppressive or oncological treatment, with immune disorders, extensive injuries, long-term antibiotic use, children, and the elderly. The main clue in limiting HAIs is an effective infection prevention and control system, established according to legal regulations, to minimize infection risks and improve care quality and patient safety. Action in this field is crucial, given the rising issue of antimicrobial resistance and the increasing presence of multidrug-resistant pathogens in hospitals.

The aim: To assess the knowledge of medical students about HAIs and infection prevention methods.

Materials and methods: A survey was conducted among 200 medical students at Medical Universities, using a diagnostic questionnaire consisting of 20 questions. It covered demographic data, knowledge of HAIs, and risk-reduction procedures.

Results: The findings indicate that students havee a limited understanding of HAIs. However, many students are able to recognize appropriate methods of infection prevention.

Conclusions: Medical students' knowledge of HAIs is inconsistent. Although they show a general awareness of the topic, there is a clear need for more comprehensive education. More focus should be placed on practical training and updated knowledge in hygiene and infection control procedures.

Keywords: hospital-acquired infections, prevention of hospital-acquired infections, hospital pathogens

The incidence and characteristics of demanding attitude among patients in Poland

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Background: In everyday medical practice physicians have to deal with demanding patients. Nearly 15% of medical appointments are described by clinicians as difficult and challenging due to patients' behaviour. Demanding attitude among patients becomes more and more common which leads to an increasing number of imaging and laboratory tests ordered.

The aim: The aim of our study was to evaluate the prevalence of a demanding attitude among patients, its forms and consequences based on the experience of Polish physicians.

Materials and methods: The anonymous survey was conducted from September 2023 to November 2024 among 248 doctors practicing in Silesia, Poland. The self-designed questionnaire consisted of 16 close-ended questions, four of them were multiple choice. Collected data was analyzed using Statistica 13.3 software.

Results: The analysis was based on 238 complete survey responses. 72.69% of physicians claim that demanding attitude became more common over the years and 74.79% feel more concerned with the possibility of making a medical error and facing legal consequences. Moreover, these concerns significantly correlate with excessive ordering of additional laboratory and imaging tests ($p < 0.001$). Most often forms of entitlement are: rudeness (80.3%), persistent requests (54.6%) and aggressive behaviour (50.4%). Referrals for imaging tests (55%) or admissions to the hospital (52.5%) are the most frequent subjects of claims. In the opinion of 45.8% of respondents the general number of laboratory tests can be reduced without patients' harm.

Conclusions: The incidence of patients' demanding attitude has increased in recent years. Physicians feel more concerned with the possibility of making a medical mistake, which is associated with excessive ordering of laboratory and imaging tests.

Keywords: demanding patient, entitlement, imaging tests, laboratory tests

Riboflavin- and Hypericin-Mediated aPDT as Alternative Treatments for Candidiasis: Systematic Review

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Background: Oral candidiasis, predominantly caused by Candida albicans, presents significant challenges in treatment due to increasing antifungal resistance and biofilm formation. Antimicrobial photodynamic therapy (aPDT) using natural photosensitizers like riboflavin and hypericin offers a potential alternative to conventional antifungal therapies

The aim: To systematically evaluate the efficacy of riboflavin- and hypericin-mediated antimicrobial photodynamic therapy (aPDT) in reducing Candida infections, with a focus on their potential as alternative treatments to conventional antifungals, particularly against resistant strains and biofilm-associated infections.

Materials and methods: A systematic review was conducted to evaluate the efficacy of riboflavin- and hypericin-mediated aPDT in reducing Candida infections. The PRISMA framework guided the selection and analysis of 16 eligible studies published between 2014 and 2024. Data on light parameters, photosensitizer concentrations, and outcomes were extracted to assess antifungal effects.

Results: Both riboflavin- and hypericin-mediated aPDT demonstrated significant antifungal activity, achieving substantial reductions in Candida biofilm and planktonic cell viability. Riboflavin activated by blue light and hypericin activated by yellow or orange light effectively targeted fluconazoleresistant Candida strains with minimal cytotoxicity to host tissues. However, complete biofilm eradication remained challenging, and variations in protocols highlighted the need for standardization.

Conclusions: Riboflavin- and hypericin-mediated aPDT present promising, biocompatible alternatives for managing antifungal resistance in Candida infections. Further clinical trials and standardized protocols are essential to optimize outcomes and confirm efficacy in broader clinical settings.

Keywords: aPDT, biofilm, Candida, denture stomatitis, diode laser;, planktonic cells

Therapeutic Potential of Cannabidiol (CBD) in Disorders of the Upper Quarter: A Systematic Review

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Background: Cannabidiol (CBD), a non-intoxicating component of Cannabis sativa, exhibits analgesic, anti-inflammatory, and anxiolytic effects that could benefit disorders of the upper quarter, including temporomandibular disorders and orofacial pain.

The aim: This systematic review aims to evaluate the therapeutic efficacy and safety of CBD in treating upper quarter conditions.

Materials and methods: A comprehensive literature search was conducted across multiple databases, adhering to PRISMA guidelines. Included studies consisted of preclinical and clinical research evaluating CBD's effects on pain, inflammation, muscle function, and overall quality of life in upper quarter disorders. Study quality and risk of bias were assessed systemati-cally.

Results: Studies included in this review demonstrated varying degrees of efficacy, with CBD showing potential benefits in reducing pain intensity, decreasing muscle tension, and improving functional outcomes. However, substantial heterogeneity in dosages, ad-ministration routes, study designs, and outcome measurements was noted. Clinical ev-idence remains limited, and methodological variability complicates definitive conclu-sions.

Conclusions: CBD appears promising for managing upper quarter disorders, particularly in terms of pain relief and muscle relaxation. However, the evidence base is characterized by methodological inconsistencies and limited long-term data. Further rigorous, standard-ized clinical trials are necessary to establish clear guidelines for CBD use in clinical practice.

Keywords: cannabidiol, upper quarter disorders, temporomandibular disorders, orofacial pain

Cutaneous Clues to Hematologic Malignancies: A scoping review of dermatologic signs in leukemia and lymphoma

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Background: Hematological malignancies, including cancers of the bone marrow and immune system cells, often present with cutaneous manifestations. Despite their diagnostic significance, these dermatological signs are frequently overlooked. Emerging evidence suggests specific skin lesions may serve as early indicators of hematological malignancies, but a comprehensive review consolidating these findings is lacking.

The aim: This scoping review aims to assess the evidence linking cutaneous manifestations to hematological malignancies, highlighting their diagnostic and prognostic value.

Materials and methods: A systematic literature search was conducted in PubMed, Scopus, and Web of Science to identify studies published between 2005 and 2025. Eligible publications included peer-reviewed articles, systematic reviews, meta-analyses, and case studies focusing on dermatological manifestations of hematological disorders.

Results: The review identified strong correlations between cutaneous signs and hematological malignancies, particularly leukemia and lymphoma. In leukemia, common skin manifestations included petechiae, ecchymosis, pallor, rashes, and ulcerations, with petechiae and ecchymosis strongly linked to thrombocytopenia. In lymphoma, pruritus was prevalent, especially in Hodgkin lymphoma, and erythroderma was frequently observed in cutaneous T-cell lymphoma. Angioimmunoblastic T-cell lymphoma often presented with persistent rashes, while livedo reticularis was rarely but notably associated with cryoglobulinemia in multiple myeloma. Additionally, jaundice indicated disease progression and a poor prognosis.

Conclusions: This review underscores the diagnostic and prognostic significance of dermatological manifestations in hematological malignancies. A multidisciplinary approach, integrating dermatology and hematology, is crucial for early detection, timely management, and improved patient outcomes.

Keywords: Hematological malignancies, leukemia, lymphoma, skin lesions, petechiae, pruritus.

NEUROIMAGING INSIGHTS: BRAIN CHANGES IN ASYMPTOMATIC COVID-19 PATIENTS USING ADVANCED MRI

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Background: More than 15 million cases have been reported as a result of SARS-COV-2 corona virus epidemic. 36% of COVID-19 individuals have been reported to have involving the central and peripheral nerve systems. Anosmia, agesia, headaches, myelitis, stroke and other neuropsychiatric symptoms are among the consequesnces that have been documented. There are very few reports of direct viral neurotropism. This research is being conducted because neurological complications of COVID-19 lead to early death and longterm effects that lower patients's quality of life.

The aim: This research is aimed at investigating subclinical brain changes in asymptomatic COVID-19 patients using advanced MRI techniques.

Materials and methods: A thorough review was conducted using databases such as PubMed, Google Scholar, and ResearchGate. Analysis were focused on published articles within the last five years.

Results: COVID-19 causes cytokine-induced inflammation, which results in a hypercoagulable conditions. Angiotensin-converting enzyme 2 receptor-mediated platelet activation and epithelial injury. These mechanisms raise the risk of stroke by causing microvascular thrombosis, blood flow, ischemic stroke and cerebral venous thrombosis are more common in patients with severe COVID-19 than in those with mild or asymptomatic COVID-19, according to statistical representation of cohorts. Cerebrovascular accidents and abnormalities of cerebral circulation are reported in COVID-19 instances. In COVID-19 cerebrovascular accidents can be caused by venous or arterial circulation disorders.

Conclusions: Despite the similarity of symptoms, the pathogenesis of neurological damage in these patients it was different due to damage to the arterial system in the first case and to the venous system in the second. These clinical cases indicate that during the COVID-19 pandemic, doctors need to be wary of to all patients with new onset neurological symptoms.

Keywords: COVID-19, SARS-COV-2, brain changes, MRI techniques

BDNF and GDNF in Parkinson's disease: associations with symptoms, disease course, and progression.

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Background: Glial cell line-derived neurotrophic factor (GDNF) and brain-derived neurotrophic factor (BDNF) are proteins essential for neuronal survival. These proteins play a role in the pathophysiology of Parkinson's disease (PD). A reduced level of GDNF and BDNF was observed in PD, but their relationship with disease progression and severity remains unclear.

The aim: The aim of the study is to assess the levels of BDNF and GDNF in relation to Parkinson's disease progression and clinical features.

Materials and methods: A systematic search was conducted independently by two authors across four databases using predefined key terms: Parkinson AND (GDNF OR BDNF OR neurotroph) AND (serum OR blood OR cerebrospinal fluid), following established criteria. The search identified 1,898 records, with 33 studies ultimately included in the analysis.

Results: Research on BDNF serum levels revealed divergent findings concerning disease duration, severity, motor impairment, and L-DOPA treatment. Numerous studies reported that a decline in BDNF level was associated with more severe motor symptoms. Some studies suggest that BDNF level rise in advanced PD and correlate positively with PD duration, but is low in the early stages of the disease. A few studies linked these results to levodopa treatment, indicating that despite greater disease severity, BDNF level may still be elevated due to its effect. Few studies have explored the relationship between GDNF and PD progression. Lower levels of GDNF and BDNF were associated with worse cognitive performance. A reduced level of BDNF was also found in PD patients with depression.

Conclusions: BDNF serum level is associated with more severe motor and some neuropsychiatric symptoms; however, in longer disease duration, it is probably increased by levodopa treatment, which requires further clarification in future studies. The relation of GDNF level and the disease motor progression warrants further investigation, though a decline seems to be related to cognitive deterioration.

Keywords: Parkinson's disease, GDNF, BDNF, serum markers

Sildenafil as a cause of sudden cardiac death - factors and clinical circumstances characteristics

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Background: Sildenafil was originally dedicated for a treatment of hypertension and angina when accidentally there was noticed its effect on inducing erections. Therefore this drug, under the name Viagra, became a treatment for erectile dysfunction. This is a phosphodiesterase type 5 (PDE5) inhibitor which enhances the effects of nitric oxide and by relaxing blood vessels it improves blood flow. First with a prescription, now in many places it can be bought over-the-counter what promotes excessive and uncontrolled consumption. Unfortunately, sildenafil is not free from side effects. Apart from the harmless ones like headaches, dizziness, vision blurred, nausea there can also happen myocardial infarction and even sudden cardiac death.

The aim: Identification the factors and potential mechanisms that may contribute to the sudden cardiac death in men after the intake of sildenafil.

Materials and methods: Comprehensive literature analysis from 2010 to 2025 found in the PubMed, Scopus and Google Scholar database. Used key words: "sildenafil", "sudden cardiac death", "myocardial infarction".

Results: The literature revision depicts middle-aged and older men with undetected or insufficiently controlled cardiovascular diseases as well as combination of sildenafil with nitrates or alcohol that caused rare cases of death after medication intake. A significant proportion of deaths were recorded immediately after sexual activity which is an additional burden on the circulatory system. Excessive vasodilation and a drop in blood pressure seem to be the main pathophysiological mechanism leading to myocardial ischemia or arrhythmia.

Conclusions: The availability of sildenafil without prescription increases the likelihood of unsupervised use. The need for public education and clinical awareness hence arise - patients with specific risk factors such as eg. advanced age or symptoms suggesting cardiac pathology should be identified and properly advised before the sildenafil intake.

Keywords: sildenafil, sudden cardiac death, myocardial infarction

The Role of Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) in Dental Practice

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Background: Pain is one of the main reasons why patients seek dental care. In dental practice, the '3-D' principle is helpful: i/ diagnosis, ii/ dental treatment and medication (diagnosis, dental treatment and drugs). The foundation of effective therapy lies in the precise identification of the source of pain and understanding its underlying cause.

The aim: The aim of this study is to evaluate the potential of therapeutic substances, in the context of pharmacotherapy within the contemporary pain management strategy in dental practice.

Materials and methods: An analysis was made of the products available and compared with the literature data. Databases were searched: PUBMED, ReaserchGate. The analysis of publications was based on specific criteria, including keywords: i/ 'Dental pain', ii/ 'NSAIDs', iii/ 'Dentistry'.

Results: Acetylsalicylic acid (ASA) has found use in the treatment of periodontitis, by increasing the production of specialised inflammatory mediators, having an anti-inflammatory and bone-protective effect. ASA and chlortetracycline have been used as a topical dressing in the alveolar cavities of HIV-positive patients to reduce the risk of infection and relieve post-extraction pain. A combination of ASA and mefenamic acid has been used as a form of the pain management for dental procedures. NSAIDs (ibuprofen, meloxicam, etoricoxib) are also the most effective drugs for orthodontic tooth movement. In vivo studies have shown that the local application of analgesics, such as flurbiprofen, paracetamol, or ASA, has proven to be equally effective as oral medications. This has reduced the risk of side effects, providing faster relief to the patient and achieving lower drug concentrations in the plasma compared to oral administration.

Conclusions: Painful conditions requiring the use of analgesics arise due to the presence of inflammatory mediators. In such situations, drugs such as NSAIDs or paracetamol, are primarily used. NSAIDs are effective due to their dual action: anti-inflammatory and pain-relieving properties.

Keywords: Pharmacy, Pain, NSAIDs, Dentistry

Original AI model to support analysis of research on vitamin B12 and its deficiencies

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Background: The dynamic development of Artificial Intelligence (AI) in recent years creates an opportunity to explore its potential in many areas of modern medicine and academic research. Modern Natural Language Processing (NLP) techniques not only can facilitate information retrieval, but also they support its interpretation by automatically generating summaries, identifying key research trends and uncovering potential knowledge gaps.

The aim: The aim of the study is to analyze the potential of using language model training in scientific research, using the database of available scientific publications on cobalamin as an example.

Materials and methods: The study was based on the Retrieval-Augmented Generation (RAG) model using cloud computing. The scientific publications were retrieved from Pubmed and categorized into: "melanogenesis human", "melanin phototoxicity", "melanin biological role human", "cobalamin deficiency pigmentation", "cobalamin deficiency nervous", "cobalamin deficiency hematological", "cobalamin deficiency cardiological", "cobalamin biological role". From the original PDF format, the files were converted to text, removing unnecessary elements. The finished texts were converted to vectors and indexed for easy comparison with the questions. The GPT-3 generation model was used to generate the answers and long articles were broken into smaller fragments to reduce system load. The study was conducted in cooperation with Paweł Popielski, PhD (Institute of Biomedical Engineering, University of Silesia, Katowice).

Results: For the most part, the model's responses provided the expected information. Overly generalized responses were eliminated through additional validation mechanisms, such as comparison with previously recorded responses.

Conclusions: Preliminary analysis of the results shows significant potential for the possible use of artificial intelligence language models in scientific research. However, further testing is needed to optimize the model's performance and improve the verification of the answers provided.

Keywords: artificial intelligence, cobalamin, scientific research

Metabolic Profiles in Systemic Lupus Erythematosus, Primary Sjögren's Syndrome, and Systemic Sclerosis

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Background: Systemic lupus erythematosus (SLE), primary Sjögren's syndrome (pSS), and systemic sclerosis (SSc) are systemic autoimmune diseases characterized by significant diagnostic delays due to high interindividual variability and unpredictable clinical courses. Recent metabolomic data suggest that new molecular signatures are closely linked to autoimmune disease phenotypes, and their ability to differentiate patient groups from healthy controls may have valuable clinical applications.

The aim: This review aims to synthesise current findings from metabolomics studies analysing the metabolomic profiles associated with SLE, pSS, and SSc. First, we consolidate knowledge on metabolic alterations—focusing on those most relevant to the pathophysiology of systemic autoimmune diseases—by identifying pathways capable of differentiating patients from controls. Second, we highlight biomarkers associated with organ involvement and disease activity. Finally, we compare metabolomic patterns among the three diseases.

Materials and methods: Metabolites identified in metabolomics studies on SLE, SSc, and pSS were collectively mapped to the KEGG database using the MetaboAnalyst 6.0 platform for pathway enrichment analysis, creating a comprehensive overview of metabolic pathways associated with these diseases.

Results: We summarised the most impactful findings from experimental metabolomics studies on SLE, pSS, and SSc. Over-representation analysis revealed a broad overlap in metabolic pathways among the three conditions. Five altered pathways were related to amino acid metabolism, one to carbohydrate metabolism, and one to cofactor metabolism.

Conclusions: Altered metabolomic profiles reveal key metabolic changes in SLE, pSS, and SSc, offering insights into disease mechanisms. These changes often precede clinical symptoms, enabling earlier intervention and organ-specific patient stratification.

Keywords: Metabolome analysis, Review, Systemic autoimmune diseases

Heart Rate Variability in Patients with Type Two Diabetes

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Background: Heart rate variability (HRV) reflects the autonomic nervous system's regulation of heart rhythm and serves as a vital marker of cardiovascular health. Cardiac autonomic neuropathy in type 2 diabetes mellitus is frequent and associated with high cardiovascular mortality. In individuals with type two diabetes (T2D), HRV is frequently diminished, suggesting an increased risk of cardiovascular complications and autonomic dysfunction.

The aim: This review consolidates current knowledge on HRV in T2D patients, focusing on its impact on cardiovascular health and glycemic control.

Materials and methods: A comprehensive literature review was conducted using databases such as PubMed, Scopus, Embase, and the Cochrane Library from 2018-2025. Studies addressing HRV in the context of T2D were selected based on their relevance, methodological rigor, and key findings. The search was done following PRISMA guidelines.

Results: Research consistently shows a significant inverse relationship between reduced HRV and glycemic control in T2D patients, evidenced by elevated HbA1c levels. Additionalfactors, such as obesity, hypertension, and dyslipidemia, further exacerbate HRV impairment. Notably, lower HRV has been associated with heightened cardiovascular event risk, emphasizing the necessity for thorough cardiovascular risk assessments.

Conclusions: T2D was linked to an overall reduction in HRV. Both sympathetic and parasympathetic activities were diminished, which can be attributed to the negative impacts of disrupted glucose metabolism on HRV, resulting in cardiac autonomic neuropathy. Monitoring HRV provides critical insights into the autonomic dysfunction commonly in T2D, highlighting its potential as a predictive marker for cardiovascular risk. Future research should emphasize longitudinal studies to elucidate causal relationships and explore interventions to improve HRV in T2D patients.

Keywords: Heart Rate Variability (HRV), Type Two Diabetes (T2D), Autonomic Dysfunction

THE MECHANISM AND ROLE OF BRCA MUTATIONS AND PARP INHIBITORS IN TRIPLE NEGATIVE BREAST CANCER

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Background: Breast cancer is the most prevalent cancer among women globally, with treatment strategies that depend on 2 major factors: tumor hormone receptor status and human epidermal growth factor receptor 2 (HER2) status. Notably, BRCA proteins are critical in maintaining genomic integrity, and use a homologous recombination process to repair double-stranded DNA breaks (DSBs). Approximately 5% of breast cancer patients are BRCA mutation carriers, and this occurs in an aggressive triple-negative breast cancer (TNBC) subtype. Poly ADP Ribose Polymerase (PARP) inhibitors cause apoptosis of cancer cells by inhibiting DNA repair pathways.

The aim: This review aims to provide insight into the relationship between BRCA gene mutation and TNBC as well as assessing the effects of PARP inhibitors as an alternative treatment approach.

Materials and methods: A review was conducted using various databases such as PubMed, Science Direct, BioMed Journal, EMBASE from 2015-2025. Inclusion and exclusion criterias were used to refine and retrieve essential articles. The search was done in accordance with PRISMA guidelines.

Results: Using synthetic lethality, PARP inhibitors target and kill BRCA deficient cancer cells while preserving the normal cells. It is suggested that PARP inhibitors induce an accumulation of DNA single-strand breaks (SSBs), which, during the replication process, leads to irreparable toxic DNA double-strand breaks (DSBs) in cells that are BRCA1 or BRCA2 deficient, thereby contributing to their efficacy in treating BRCA-mutated tumors.

Conclusions: PARP inhibitors show promising results as the FDA has given approval for Olaparib and Talazoparib to be used by patients who have breast cancer with BRCA mutations. Further research is required due to the previous studies being limited in sample size.

Keywords: BRCA, PARP inhibitors, Triple Negative Breast Cancer (TNBC)

Prevalence, characteristics and clinical significance of Os Calcaneus Secundarius: A systematic review with me

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Work's tutor: lek. Dominik Taterra

Background: The common presence of anatomical variations on the foot and ankle region may be oftentimes associated with painful syndromes. For medical professionals, their resemblance to fractures may pose a diagnostic conundrum, particularly following an incident. Os calcaneus secundarius (OCS), is a rare accessory ossicle located between the anterior process of the calcaneus and the navicular bone. Up to this date, the epidemiology of OCS is not established and poorly understood, as it varies between 0.1% to 15.2%.

The aim: This study aimed to synthesize the relevant data regarding the prevalence of this accessory ossicle and key clinical aspects, to provide a comprehensive summarization of the existing knowledge, subsequently helping clinicians make a precise diagnosis and plan treatment

Materials and methods: A thorough search of Pubmed/Medline, Embase, and ScienceDirect was conducted for studies presenting relevant information on OCS. The structure of this study strictly adhered to the PRISMA guidelines and was pre-registered on PROSPERO (ID: CRD42024626488). The random-effect model has been used to calculate the pooled prevalence estimates (PPE).

Results: In total, 25 articles (25 029 feet), qualified for the inclusion into the quantitative analysis. The PPE of OCS was 1.1% (95%CI: 0.7%-1.6%). There was no significant difference in the prevalence of OCS between sex-based subgroups. The PPE of OCS in studies that used X-ray was 0.7% (95%CI: 0.4%-1.2%) and was substantially lower than in the cadaver-based subgroup, which was 4.4% (95%CI: 2.4%-8.0%; 95%PI: 0.00-0.45). The highest PPE of OCS was noted in Europe – 1.6% (95%CI: 1.1%-2.5%), and the lowest in Asia - 0.5% (95%CI: 0.4%-0.8%).

Conclusions: In order to minimize orthopedic consultations or even procedures, clinicians should be aware of the significance of the potential encounter of this anatomical variety. Differentiating between an anterior process fracture and the OCS is particularly crucial in the emergency room because of their distinct treatment protocols.

Keywords: Accessory ossicle, Os calcaneus secundarius, clinical anatomy, foot

The implementation of PeriCord for the regeneration of cardiomyocytes after MI as an alternative

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Work's tutor: Olena Solomko MD, PhD

Background: Myocardial infarction is a leading cause of morbidity and mortality worldwide. This causes tissue necrosis followed by scar formation, decreasing heart function and in advanced stages the only therapy to restore cardiac function is cardiac transplantation. Advanced therapy methods for patients with myocardial infarction have emerged giving good prognosis for cardiomyocyte regeneration and revascularization.

The aim: The aim is to review the effectiveness of PeriCord for cardiomyocyte regeneration to reduce the need of heart transplantation.

Materials and methods: Medical literature databases such as PubMed, AHA/ASA Journals, The Lancet were used to evaluate the outcomes of PeriCord. These databases were searched by two authors according to the stablished criteria and following every parameter of PRISMA guideline. We studied the medical literature from 5 articles excluding those with insufficient data.

Results: Good safety outcomes were obtained from this investigation showing nonserious adverse effects related to the patch for one year follow up. Only 20% of the control patient experience arrhythmias leaving 80% of the control trial free from this complication. With the help of cardiac magnetic resonance assessment revealed not significant improvement in cardiac size. PeriCord suggest potential immunomodulatory effects and significant reduction in the peak of Metrnl levels post-surgery.

Conclusions: Our review concludes that the PERISCOPE trial demonstrated PeriCord and its potential safety for patients with non-acute myocardial infarction can improve cardiac function, regeneration of cardiomyocytes and therapeutic effects. Further investigations are needed; however, this is a good begging for thinking about if cardiac transplant will be always the gold standard treatment for heart failure.

Keywords: myocardial infarction, cardiac patch, regeneration, scaffold

Machine Learning Model for Predicting Hearing Preservation After Vestibular Schwannoma Surgery: A MetaAnalysis

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Background: Vestibular schwannomas (VS) are benign tumors causing hearing loss, tinnitus, and balance issues. While radiosurgery and open surgery are standard treatments, predicting hearing preservation remains challenging. Machine learning (ML) has shown promise in forecasting hearing outcomes in VS patients.

The aim: This meta-analysis aims to systematically evaluate the diagnostic accuracy of ML models in predicting hearing preservation in VS patients undergoing surgery and to identify key factors influencing model performance.

Materials and methods: We conducted a systematic review and meta-analysis following PRISMA-DTA guidelines, including studies that applied ML to predict hearing preservation in VS patients undergoing surgery. Studies were selected based on predefined inclusion criteria, and diagnostic accuracy metrics, such as sensitivity, specificity, and accuracy, were extracted. The pooled diagnostic performance was assessed using a random-effects model, and heterogeneity was evaluated using I2 statistics.

Results: A total of 15 models from 3 studies were included. The overall pooled sensitivity was 0.856 (95% CI 0.758–0.919), specificity was 0.853 (95% CI 0.713–0.931), and accuracy was 0.839 (95% CI 0.748–0.902). The area under the summary ROC curve was 0.883 (95% CI 0.770–0.910), indicating high diagnostic effectiveness. Significant heterogeneity was observed (I^2=87% for sensitivity, 84% for specificity).

Conclusions: Machine learning models demonstrate good diagnostic accuracy in predicting hearing preservation in VS patients undergoing surgery, with some models achieving near-perfect (>95%) sensitivity and specificity. However, significant heterogeneity exists across studies, indicating the need for further research to optimize model performance and enhance their generalizability across diverse patient populations. ML has the potential to assist clinicians in providing personalized treatment strategies and improving patient outcomes in the management of vestibular schwannomas.

Robotic PCI and Clinical Effectiveness: Is Newer Always Better? A Systematic Review and Network Meta-Analysis

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Background: Robotic percutaneous coronary intervention (R-PCI) is becoming increasingly common in clinical practice.

The aim: This frequentist network meta-analysis (NMA) aims to compare robotic devices used for R-PCI.

Materials and methods: A systematic search was performed across PubMed, Scopus, Embase, and Web of Science. We included papers evaluating robot-assisted (RA) models, either head-to-head or compared to manual PCI (M-PCI). Random-effects frequentist NMA was performed to analyze clinical and radiation outcomes.

Results: Nine papers were included. R-PCI had lower Air Kerma radiation compared to M-PCI. Additionally, the CorPath 200 model was inferior to CorPath GRX (mean difference (MD) 708.28 [95% confidence interval (CI) 188.07; 1228.49]) and CorPath GRX-II (MD 326.87 [95.73; 558.01]). No heterogeneity was observed (I2 = 0%). Other outcomes, including clinical success, procedure time, fluoroscopy time, MACE, and contrast volume, were not statistically different between different R-PCI models or when compared to M-PCI. The risk of bias showed moderate concerns.

Conclusions: This NMA reveals a clear benefit of R-PCI in reducing operator radiation exposure, with some evidence suggesting superior radiation reduction with newer CorPath models. However, we found no significant differences between robotic platforms or compared to M-PCI in terms of clinical success, procedure time, or other clinical outcomes. This raises important questions about the cost-effectiveness of R-PCI. Future research should focus on robust clinical trials and comprehensive cost-effectiveness analyses to justify the widespread adoption of R-PCI.

Keywords: Robot, PCI, Technology, Radiation

Excessive smartphone use as a risk factor for the development of De Quervain's tenosynovitis.

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Work's tutor: lek. Agnieszka Woźniak

Background: Prolonged daily smartphone use among young adults may predispose to tenosynovitis of the tendons in the first compartment of the wrist extensors, a hallmark feature of De Quervain's disease. As smartphone use continues to increase globally, understanding the potential musculoskeletal consequences of this behavior becomes crucial for early prevention and intervention strategies.

The aim: The aim of this study was to investigate the correlation use and the development of De Quervain's tenosynovitis, with particular emphasis on the increased incidence of inflammation in the dominant hand. This association was clinically evaluated using the Finkelstein test to verify the presence of tenosynovitis.

Materials and methods: The study was based on an original dataset collected via a structured questionnaire assessing smartphone use, addiction level (SAS-SV scale), and musculoskeletal symptoms (Finkelstein's test). The final analysis encompassed 202 respondents. Statistical analysis involved Spearman's rank correlation, Mann–Whitney U tests, and logistic regression to explore associations between smartphone use, addiction level, and musculoskeletal pain in the dominant hand.

Results: The study revealed significant associations between smartphone use intensity and pain in the unlocking hand. A moderate positive correlation was observed between the number of phone unlocks and reported pain (rho = 0.596, $p < 0.001$), as well as between daily smartphone use time and pain (rho = 0.524, $p < 0.001$). Notably, individuals classified as addicted according to the SAS-SV scale demonstrated higher levels of smartphone use, which further corresponded with elevated reports of pain.

Conclusions: The study demonstrated that intensive smartphone use, particularly the frequency of phone unlocks and screen time, correlates with the occurrence of pain in the dominant hand. Individuals classified as addicted to smartphones (according to the SAS-SV scale) exhibited higher levels of device usage, which were associated with greater pain reports.

Keywords: De Quervain's disease, smartphones, young adults, Finkelstein's test

Correlation between the occurrence of flatfoot and overweight or obesity in children aged 10-15.

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Background: Obesity and overweight can cause many complications from various systems, such as the musculoskeletal system. Proper foot arches translate into biomechanics of movement and function of joints in the lower extremities. BMI and Clark's angle depend on many factors such as age, gender and level of physical activity.

The aim: The aim of the study was to determine whether there is a correlation between the incidence of flatfoot in obese or overweight children aged 10-15, taking into account the gender distribution.

Materials and methods: The retrospective study was conducted on 92 young people of the Silesian agglomeration participating in the foot pilot program for children and teenagers by the National Health Fund. The average BMI of women was 19.54, and of men was 19.04, indicating a normal weight-for-height ratio. The average Clark's angle in the right foot was 47.87 in women and 46.40 in men. In the left foot the values were 47.55 and 48.29, respectively. During the study, measurement data such as BMI, FM (Fat mass) and TBW (Total body water) measured with the Tanita device and Clark's angle calculated from foot scans were used. Calculations were made using Statistica STATSOFT 13.0 for an assumed significance level of $\alpha=0.05$. The assumption of normality of distribution was verified using the Shapiro-Wilk test. To compare two quantitative variables, a non-parametric test was used: the Wilcoxon, Mann-Whiteney U or parametric test: the Student's t-test for independent variables. The correlation coefficient was calculated using Pearson's or Spearman's test. To compare more than two dependent variables, ANOVA or Friedman's test was used.

Results: Analysis of the results indicates that regardless of gender, there is no statistically significant correlation between Clark's angle of the feet and BMI.

Conclusions: The study group of children of the Silesian agglomeration had a normal BMI in relation to the centile grid range, as well as a normative foot arch. The conducted study needs to be continued on a larger group of patients.

Keywords: flatfoot, BMI, obesity, overweight, Clark's angle

The Impact of Erupted Third Molars on the Occurrence of Temporomandibular Disorders (TMD)

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Background: Temporomandibular disorders (TMD) are a common clinical and social issue, affecting approximately 31% of the population. Symptoms of these dysfunctions may include pain in the temporomandibular region, jaw locking, and acoustic symptoms. The eruption of third molars is also considered in the differential diagnosis of TMD.

The aim: The aim of the study was to determine the impact of erupted third molars on the occurrence of temporomandibular disorders (TMD) and pain in this region, as well as to assess the prevalence of bruxism and increased tension of the masticatory muscles in patients with erupted third molars.

Materials and methods: The study was conducted among 80 individuals aged 18–40 years, with 51 included in the analysis. The questionnaire contained 48 questions regarding demographic data, the presence of third molars, TMD symptoms, and psychosomatic symptoms. The RDC/TMD questionnaire and additional questions were used. Appropriate inclusion and exclusion criteria were applied.

Results: In the study group, 53% had erupted third molars, of whom 63% experienced facial pain (VAS 4.29; Ϊ2.05). Jaw locking or bruxism occurred in 30% of the participants, acoustic symptoms in 41%, and 59% reported teeth grinding or clenching. Headaches in the last six months were reported by 78% of this group. In the control group, facial pain was present in 54% (VAS 3.77), jaw locking in 12%, and headaches in 50%.

Conclusions: Based on the conducted research, it was found that the presence of erupted third molars may increase the risk of temporomandibular disorders, such as jaw locking, bruxism, intense and frequent headaches. The study results may support the differential diagnosis in stomatognathic physiotherapy and improve pain modulation and patients' quality of life.

Keywords: temporomandibular disorders, third molar eruption, jaw locking, stomatognathic physiotherapy

Optimization of Patient Body Positioning in the Physiotherapy Office – Pilot Study

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Background: The survey serves as an introduction to the development of therapeutic support forms – a solution aimed at optimizing the patient's body position in the physiotherapy office while ensuring both comfort and anatomically correct posture.

The aim: The aim of the study was to gather opinions on comfort and ergonomics of body position while lying on a physiotherapy treatment tables, and to identify the body areas that patients perceive as uncomfortable or causing discomfort.

Materials and methods: A survey was conducted among 45 patients: 82.2% women (n=37) and 8 men (n=17.8%) with an average age of M=39.51 (SD=17.59), average height 168.97 cm (SD=8.16), and average body weight 70.11 kg (SD=16.49). The research tool was an original 13-question questionnaire.

Results: The reason for undergoing physiotherapy for 86.7% (n=39) of respondents was a therapeutic visit, while 22.2% (n=10) cited relaxation and stress relief. Respondents reported using massages (n=31; 68.9%), physical therapy treatments (n=20; 44.4%), and exercises or active participation (n=17; 37.8%). In 88.9% (n=40) of cases, treatments were performed using a rehabilitation table. The most commonly reported issues were related to the face hole in massage tables – 66.66% (n=30) – patients reported discomfort due to pressure around the jaw, cheekbones, temples, and mouth, as well as breathing difficulties. Additional discomfort was caused by the lack of space for placing the upper limbs and the texture of the material from which the table and therapeutic forms were made.

Conclusions: Available basic models of physiotherapy tables do not ensure optimal comfort in the lying position, especially for the head and upper limbs, also in terms of the texture and type of materials used for their production.

Keywords: comfort, therapeutic forms, physiotherapy, physiotherapy office equipment

Back pain and physical activity levels among office workers

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Background: Each year, more and more people suffer from back pain. In 2020, as many as 619 million people were affected. Due to the sedentary nature of their work, office workers are particularly vulnerable to these ailments.

The aim: To assess the frequency of back pain occurrence.

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 ±9, average BMI was 25.4 ±3.78. The research instrument were author's survey, International Physical Activity Questionnaire (IPAQ), Numerical Rating Scale (NRS).
 The Shapiro-Wilk test was used to statistical analysis.
 U Mann Whitney test and chi2 were used to analyse data.

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). 97% of respondents declared that they are familiar with ergonomic work principles, but only 42% apply this knowledge in their work.
 19% of the respondents led a sedentary lifestyle, 28.16% had a moderate level of physical activity, and 53% had a high level of physical activity.
 The level of physical activity did not significantly affect pain in the cervical (p=0.42), thoracic (p=0.055), or lumbar spine (p=0.55). A significant factor influencing pain was the application of ergonomic principles at work (p<0.05).

Conclusions: Although most office workers exhibit moderate or high levels of physical activity, it did not significantly reduce back pain. The key factor protecting against pain was the application of ergonomic principles in the workplace.

Keywords: Office workers, back pain, physical activity, workplace ergonomics

Selective Muscle Activation and Verbal Cueing: sEMG-Based Evaluation of Glute Engagement During Exercise

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Background: Verbal cueing is a common physiotherapy tool for improving motor control and targeting specific muscle groups during movement. While it appears effective, the role of individual factors such as sex and body composition remains unclear.

The aim: This study investigated how verbal internal focus cues influence gluteal muscle activation during hip thrusts and whether sex or body composition affects this response.

Materials and methods: Participants performed two sets of hip thrusts: one following a demonstration only, and one with the verbal instruction to focus on glute contraction during the upward phase. sEMG recorded activity in:
- Gluteus Maximus
- Gluteus Medius
- Hamstrings
- Rectus Femoris
- Multifidus.

Body fat and muscle mass percentages were assessed. Muscle activation levels and selectivity ratios (glute activation vs. synergist activation) were analyzed and compared across conditions, sex, and body composition.

Results: Gluteus maximus activation increased significantly with verbal cueing, along with improved glute selectivity in most participants. Those with greater muscle mass showed more precise activation, while higher fat mass was associated with broader, less specific recruitment. Females exhibited a stronger relative response than males, potentially reflecting biomechanical or neuromuscular differences. These findings suggest that individuals with more muscle and training experience benefit more from cueing, while others may require foundational motor retraining.

Conclusions: Verbal internal focus cues are an effective method to increase gluteal activation and movement specificity during the hip thrust exercise. However, the effectiveness of these cues is influenced by individual characteristics such as muscle mass, body fat percentage, and sex. These findings highlight the need for personalized cueing strategies in physiotherapy and training to maximize neuromuscular activation and functional movement outcomes.

Keywords: sEMG, Verbal Cueing, Hip Thrust

Muscle strength of the knee flexors and extensors in patients with systemic sclerosis

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Background: Systemic sclerosis is a chronic connective tissue disease characterized by progressive fibrosis of the skin and internal organs. It can lead to changes in the musculoskeletal system and disturbances in body biomechanics. Understanding the differences in muscle strength between the knee joint flexors and extensors may help in better selection of therapeutic strategies.

The aim: This study compared knee extension and flexion strength in both limbs of systemic sclerosis patients and analyzed strength changes at different angles (30°, 45°, 60°).

Materials and methods: A retrospective study was conducted in a group of 13 individuals diagnosed with systemic sclerosis. The average age of females was 61±12,62 years, and males 59±10,26 years. The assessments were performed using the Biodex device. Data analysis was carried out using the Statistica software (StatSoft S.A.), with a significance level set at α=0.05. Statistical tests included the Student's t-test for independent variables, the Mann-Whitney U test, ANOVA, and the Friedman test.

Results: Statistical analysis did not reveal a significant relationship between the right and left sides for peak torque or the agonist-to-antagonist muscle ratio at the tested flexion and extension angles. However, a statistically significant difference was found for extension at 30°, 45°,60° between the right (p=0.000) and left lower limb (p=0.000). In contrast, no significant difference was observed for flexion at 30°, 45°, 60° between the right (p=0.971) and left side (p=0.978).

Conclusions: There is a significant difference in extension strength, but not in flexion strength. In the physiotherapy of patients with systemic sclerosis, exercises should be used to restore the balance between flexion and extension strength at different angular positions.

Keywords: systemic sclerosis, knee joint, muscle strength, movement angle

EVALUATION OF THE RELATIONSHIP BETWEEN BODY MASS COMPOSITION AND MATTHIAS TEST VARIABLES

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Background: Obesity has become a widespread lifestyle disease, prompting increasing interest in its impact on the human body. This study examines the relationship between body composition in children aged 5 to 16 and parameters assessed using the Matthias test

The aim:

Materials and methods: This retrospective study was conducted as part of the National Health Fund's pediatric foot assessment program and included 92 participants (46 girls and 46 boys) from the Silesian urban area. Body composition was evaluated using a Tanita bioelectrical impedance analyzer. Spinal curvatures—thoracic kyphosis and lumbar lordosis—were assessed in a relaxed standing position and during the Matthias test using a light-video-optical scanning system based on stereographic imaging. Clark's angle was also measured in each participant. Statistical analysis was performed using Statistica StatSoft 13.0, with a significance level set at $\alpha = 0.05$. The Shapiro–Wilk test was used to verify the normality of distribution.

Results: In the group of girls, statistically significant positive correlations were found between fat-free mass (FFM) and the angles of thoracic kyphosis and lumbar lordosis in a relaxed stance, as well as the kyphosis angle during the Matthias test. These were moderate correlations, indicating that higher FFM was associated with increased spinal curvature. Among boys, a significant correlation was observed between FFM and kyphosis angle in the relaxed position ($p = 0.038$).

Conclusions: Body composition, particularly fat-free mass (FFM), may influence spinal curvature in children and adolescents, especially in static posture and under functional loading as assessed by the Matthias test. Clark's angle values may also reflect alterations in spinal alignment, although these relationships appear more pronounced in girls. These findings may serve as a basis for further research on the impact of body composition on postural development in the pediatric population

Keywords: FFM, Matthias test, DIERS, Tanita, children,

Evaluation of quality of life of persons permanently using a wheelchair - a pilot study

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Background: The study of the quality of life of wheelchair users is an important area in the department of medicine. Research shows that the quality of life of permanent wheelchair users is dependent on socio-psychological support, ability to work and the availability of infrastructure adapted to this group.

The aim: The aim of the study was to assess the quality of life of permanent wheelchair users. The secondary objective was to identify factors affecting QoL.

Materials and methods: The study was conducted between 03.01-31.03.2025 on a group of adult permanent wheelchair users. The analysis included 33 patients, 15.15% women (n=5) and 84.85% men (n=28). The mean age of the female was 28.6 (sd 6.84), and that of the male was 38.61 (sd 17.26). The research tool was a self-report questionnaire and the WHOQOL-BREF International Quality of Life Questionnaire. The Shapiro-Wilk test, Mann-Whithey U, Kruskal-Wallis and Spearman correlation were used for statistical analysis. The level of statistical significance was taken as $p<0.05$.

Results: Of the subjects, 15.15% were married, 15.15% were engaged, 54.55% were single, 9.09% were divorced. 36.36% of respondents had higher education, 30.30% had secondary education,12.12% primary education, 21.21% vocational education. 41.42% of respondents were in a wheelchair due to an injury. 66.67% of the respondents had paraplegia, 30.3% tetraplegia, 3.03% hemiplegia. The mean quality of life of the female respondents was 100.8 (sd 12.44), and that of the male respondents was 94.96 (sd 14.00), ($p = 0.366$). The longer the respondents were in a wheelchair, the better the quality of life ($R = 0.31$, $p = 0.076$). Quality of life was statistically significantly different in relation to relationships with loved ones ($p =.0183$).

Conclusions: The quality of life of men and women who are constantly in wheelchairs is at a similar level, and its level significantly depends on the relationship with loved ones. The study is being continued..

Keywords: wheelchairs, quality of life, WHOQOL-BREF

Ultrasound Evaluation of Core Muscle Thickness After Local and Global Motor Control Training

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Background: Core stabilization is essential in physiotherapy and athletic training, based on the anticipatory activation of deep trunk muscles, especially the transverse abdominis (TrA). This study aimed to assess the effects of a four-week motor control training program, both local and global, on lateral abdominal wall muscle thickness and selected functional outcomes. Additionally, the study examined the reliability of ultrasound muscle thickness measurements depending on transducer positioning.

The aim: The primary objective was to evaluate the influence of local and global core training on the morphology and functional performance of lateral abdominal wall muscles. A secondary aim was to assess the impact of transducer orientation on the reliability of ultrasound-based measurements.

Materials and methods: Fourty-eight participants (33 females, 15 males) completed the study. They were randomly assigned to three groups: global training (GT), local training (LT), or control (CG). The intervention lasted four weeks, with one session per week. GT used the Pressure Biofeedback Stabilizer, and LT used sonofeedback. Ultrasound was used to measure TrA, internal oblique (IO), and external oblique (EO) thickness. Trunk mobility was assessed with Fingertip-to-Floor and Sit-and-Reach tests. Jump performance was also evaluated. Statistical analysis was conducted using Wilcoxon and Kruskal-Wallis tests.

Results: The GT group showed significant hypertrophy of TrA (+0.7 cm), IO (+0.1 cm), and EO (+0.06 cm) ($p < 0.01$). LT showed a non-significant trend in TrA thickness (+0.3 cm; $p = 0.07$). No improvements were observed in trunk mobility or jump performance ($p > 0.05$). Ultrasound measurement reliability for oblique muscles varied with transducer orientation.

Conclusions: Global training induced hypertrophic adaptations in the lateral abdominal wall. Local training showed a trend toward TrA growth. Transducer positioning influences measurement reliability, supporting the need for standardized ultrasound protocols.

Keywords: Core stabilization; lateral abdominal wall muscles; transverse abdominis; ultrasound

Determinants of Functional Capacity in Older Adults Based on the 6-Minute Walk Test and the TUG Test

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Background: As society ages, there is a growing need to monitor and support the functional capabilities of seniors, which are crucial for maintaining both independence and quality of life. The 6MWT and TUG tests are effective tools for assessing physical fitness.

The aim: The aim of the study was to identify selected factors determining the functional capabilities of seniors, assessed using the 6MWT test and the TUG test.

Materials and methods: The study included 47 (M=14; F=33) elderly individuals at the Senior Activity Center in Tarnowskie Góry, aged between 58 and 93 years (x=47; SD=7.91). The qualification process for the study included completing a questionnaire and undergoing a basic measurements (weight, height), as well as measuring blood pressure. Subsequently, the qualified participants underwent the 6MWT and the Timed Up and Go test, in accordance with the current recommendations.

Results: The findings indicate that sex, morphological parameters, and the total number of chronic conditions do not show significant correlations with the results of the Up and Go and 6MWT tests. Both tests revealed significant associations with age – older individuals achieved shorter distances and longer completion times (r = -0.499 for 6MWT distance and r = 0.611 for TUG, p < 0.05). Additionally, the result of the Up and Go test strongly negatively correlated with the parameters obtained in the 6MWT (r = -0.813 for distance, p < 0.05)

Conclusions: Age is a significant factor influencing the functional fitness of older adults. This is particularly evident in coordination abilities measured by the Timed Up and Go (TUG) test, as well as in the walking distance and number of steps assessed during the 6-Minute Walk Test (6MWT). The TUG test demonstrates high prognostic value in evaluating exercise capacity as measured by the 6MWT – especially in situations where performing the 6MWT is not feasible.

Keywords: older adults, 6-MWT, TUG, physical fitness, functional performance

PERSISTENT MULTI-SYSTEM INVOLVEMENT AFTER PEDIATRIC COVID-19

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Background: The COVID-19 pandemic has had profound global health implications, particularly among children and adolescents. While the acute phase of SARS-CoV-2 infection tends to be mild in the young population, there is growing evidence of long-term symptoms. This prolonged condition, known as Long COVID or Post-Acute Sequelae of SARS-CoV-2 (PASC), has increasingly affected pediatric populations, although much less studied than in adults.

The aim: This systematic review aims to analyze the epidemiology, immunopathogenesis, and management strategies of Long COVID in children.

Materials and methods: A comprehensive review was conducted using PubMed, ResearchGate, ScienceDirect, and the European Journal of Pediatrics, evaluating symptoms, organ system effects, and management.

Results: A review of 40 studies found a 23.36% prevalence of Long COVID in children. Dyspnea had the highest prevalence at 22.75%, followed by fatigue, headache, respiratory distress, neurological dysfunction, and psychiatric symptoms[5]. Severe Long COVID cases often present as multisystem disorders, including myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), dysautonomia, vascular dysfunction, and coagulation abnormalities. Children over ten years old exhibited higher prevalence rates[2-4]. Elevated antibodies, cytokines, and CCL11 (specific for cognitive impairment) were observed. Dysregulated Treg cells indicated persistent immune activation. Diagnoses are made with clinical evaluation, MRI (for neurological dysfunction), ultrasound, electrocardiogram, and SPECT scans. Follow-ups at 1-3 months are crucial for diagnosing persistent symptoms[2].

Conclusions: Although significant progress has been made in understanding Long COVID, there are no specific biomarkers for diagnosis or effective treatments. Further research is needed into viral persistence, neuroinflammation, and autoimmune dysregulation to develop targeted therapies.

Keywords: Post-Acute Sequelae of SARS-CoV-2 (PASC), Immunopathogenesis,Neurological dysfunction,Covid-19

New Frontiers in IPF: Insights from Clinical Trials on Therapeutic Strategies

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Background: Idiopathic pulmonary fibrosis (IPF) is a progressive lung disease with irreversible scarring. While antifibrotics like pirfenidone and nintedanib slow progression, better symptom-targeted treatments are needed.

The aim: To evaluate the efficacy, safety, and outcomes of recent clinical trials investigating approved, novel, and ongoing treatments for IPF.

Materials and methods: A total of 77 Phase 3 clinical trials were identified via ClinicalTrials.gov and selected based on relevance to IPF, availability of results, and study design. Of these, 30 trials were included, comprising 16 completed studies on novel therapies, 10 on approved antifibrotics (pirfenidone and nintedanib), and 4 ongoing trials. Study designs, patient characteristics, and key outcomes were analysed.

Results: Most novel agents, including endothelin receptor antagonists, sildenafil, cyclophosphamide, inhaled nitric oxide, ziritaxestat, and pamrevlumab, did not show significant improvements in FVC decline, six-minute walk test, or mortality. Thalidomide and morphine offered symptomatic relief for chronic cough, though thalidomide raised safety concerns. Pirfenidone and nintedanib consistently slowed FVC decline, with pirfenidone reducing one-year mortality in some cohorts. The combination of nintedanib and sildenafil showed no primary efficacy benefits but suggested potential subgroup advantages. Four active trials are investigating new biologics, pulmonary vasodilators, and glucocorticoids, with results pending.

Conclusions: Antifibrotics remain the mainstay of IPF treatment, but most novel therapies have yet to show meaningful disease-modifying effects. Symptomatic agents like thalidomide and morphine offer potential relief but pose safety concerns. Variation in trial design and endpoints complicates comparisons. Future research should focus on biomarker-led approaches, improved clinical endpoints, and combination strategies. Personalised treatments targeting patient subgroups may help bridge current gaps in IPF care.

Keywords: idiopathic pulmonary fibrosis, clinical trials, treprostinil, admilparant, nerandomilast

Laryngological manifestations of zoonoses in the paediatric population in Europe

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Background: Zoonotic diseases represent a significant public health concern, particularly among children, who are more prone for such diseases due to frequent contact with animals and consumption of contaminated water. Laryngological manifestations often may be non-specific, making early diagnosis challenging and potentially delaying appropriate treatment.

The aim: The aim of the study was to evaluate otolaryngological manifestations in the pediatric population of Europe up to 18 years of age diagnosed with cat scratch disease and tularemia.

Materials and methods: We conducted literature review in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A comprehensive literature search was performed using the PubMed database. The literature search was conducted using 6 articles, which were published between July 2024 and March 2016. We focused on pediatric patients (<18 years old) diagnosed with tularemia and cat scratch disease.

Results: We included six patients (83% of men, 27% of women), with a mean age of 11.33 Ī 5.43 years. In 2 patients coinfection was diagnosed, involving Borrelia burgdorferi and Leischmania infantum, respectively. The most common manifestation of laryngological symptoms was lymphadenopathy - presented in 4 patients (67%), followed by abscesses (33%), swelling in submandibular region (17%). The vast majority of patients were treated with amoxicillin-clavulanate antibiotics.

Conclusions: The majority of searches identified lymphadenopathy in the cervical region as the most prevalent manifestation of zoonotic infections in paediatric patients. Thus, clinical presentations are similar across various zoonoses, complicating differential diagnosis. Empirical treatment with amoxicillin-clavulanate is considered a first-line therapy, however microbiological confirmation is always needed to start targeted treatment.

Keywords: Cervical lymphadenopathy, CSD, tularemia, zoonoses, laryngological manifestations, European children

The Effect of Attention-Deficit/Hyperactivity Disorder on the Prevalence of Risky Sexual Behaviors

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Background: Attention-Deficit/Hyperactivity disorder (ADHD) is a neurodevelopmental disorder increasingly diagnosed worldwide, manifesting in three main presentation: inattentive, hyperactive-impulsive, and combined.

The aim: This study reviews current literature on the relationship between ADHD symptoms and sexual risk-taking behavior (SRTB), examining factors such as symptom severity, ADHD presentation, gender differences, and the effects of pharmacological and psychotherapeutic interventions.

Materials and methods: We hypothesised that individuals with ADHD report a higher prevalence of SRTB with reduced rates among those receiving treatment. Impulsivity and emotional dysregulation appeared to be risk factors. It was also hypothesised that there were likely gender differences in the phenomenon and that it was more common in the hyperactive-impulsive presentation. Studies published in medical databases from 2019 onwards were searched for keywords such as ADHD sexual risk taking, adhd sexuality, adhd adult risk taking. 337 results were obtained, from which 37 items were selected and analysed.

Results: The literature review found that ADHD patients report a higher frequency of SRTB than peers without the disorder, though gender differences remain unclear. The researchers observed a tendency for people with ADHD to overestimate the positive effects of risky sexual behaviour. Symptoms such as impulsivity and emotional dysregulation may increase the risk of engaging in this type of behaviour. The relationship between ADHD presentation and the incidence of SRTB remains unclear and is subject to further research. However, it is possible to reduce the risk of SRTB by treating ADHD.

Conclusions: The psychological mechanisms responsible for the existence of this phenomenon are still insufficiently documented, which indicates areas for further research work. However, the current state of knowledge allows us to identify directions for both physician training and preventive work with the patient, which will be proposed during the presentation.

Keywords: ADHD, Sexual Risk-Taking Behavior, Neurodevelopmental Disorder

Efficacy and Safety of Factor XI Inhibitors for the Prevention of Venous Thromboembolism: A Meta-Analysis

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Background: Venous thromboembolism (VTE) has become a global concern as a hospitalization complication which is the third most common cause of heart attack and stroke with high mortality and morbidity. A novel anticoagulant agent, factor XI inhibitors, has been further explored to prevent thromboembolism and preserve hemostasis in response to vascular injury. However, its comparison with standard treatments, such as low-molecular-weight heparin (LMWH) and direct oral anticoagulants (DOACs), is still unclear.

The aim: This study aims to evaluate the efficacy and safety of factor XI inhibitors for the prevention of venous thromboembolism

Materials and methods: We conducted a systematic review and meta-analysis of randomized controlled trials from PubMed, ScienceDirect, and the Cochrane Library based on PRISMA methods. The analysis of primary outcomes, including the incidence of VTE and major or clinically significant nonmajor bleeding, was carried out using Review Manager 5.4 software.

Results: A total of nine studies involving 5010 patients at risk of VTE with orthopedic surgery, atrial fibrillation, stroke, and myocardial infarction were included. Factor XI inhibitors in the class of antisense-oligonucleotides, monoclonal antibodies, and small peptidomimetic molecules were compared with LMWH, DOAC (Factor Xa inhibitors), and placebo. Overall analysis shows that factor XI inhibitors prevent the incidence of VTE significantly superior to the comparators with the protective ratio of 0.40 (p= 0.003). The subgroup analysis showed that factor XI inhibitors were significantly better at preventing VTE compared to LMWH and small molecule inhibitors showed the best protection. Factor XI inhibitors also showed better safety in preventing major or clinically significant nonmajor bleeding in overall comparison 0.40 (95%CI: 0.18-0.92), compared to LMWH, and factor Xa inhibitors (DOAC).

Conclusions: Factor XI inhibitors effectively prevent VTE incidence with a low risk of major or clinically significant nonmajor bleeding

Keywords: Anticoagulant, factor XI inhibitors, bleeding, venous thromboembolism

Synergistic Effects of Combined Oral and Topical Antioxidants in Photoaging: A Systematic Review for Clinical

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Work's tutor: Dr Jason Williams-James

Background: Recent advances in antioxidant research have demonstrated significant potential for both topical and systemic approaches to combat photoaging. This paradigm shift has led to investigations optimizing delivery methods for phytonutrients, vitamins, and enzymes to maximize skin rejuvenation.

The aim: This study evaluates the efficacy of oral supplementation versus topical application of antioxidants (phytonutrients, vitamins C/E, and enzymes) in treating photoaging in Caucasian adults, while assessing the synergistic potential of combined regimens.

Materials and methods: A PRISMA-guided review of PubMed, Scopus, and ProQuest Central yielded 35, 26, and 315 results respectively. Eight clinical studies met inclusion criteria (Fitzpatrick I-III, age 35+) after rigorous screening.

Results: Topical antioxidants (n=2): 0.1% retinol serum reduced wrinkles by 84% at 8 weeks (Dhaliwal et al., 2019)

Oral antioxidants (n=3): Carotenoid supplementation increased collagen density by 23% (Meinke et al., 2017)

Combined regimens (n=3): Showed 28.2% greater photoprotection versus monotherapies (Egoumenides et al., 2018)

Conclusions: Combined oral-topical antioxidant therapy offers superior photoaging management, delivering both rapid epidermal improvement and sustained dermal repair. This dual approach provides dermatologists with a safe, effective protocol adaptable to patient-specific needs.

Keywords: Photoaging, Antioxidant protocol, Combined therapy, Clinical dermatology, Skin rejuvenation

The diagnostics of minimal residual disease in patients with hepatocellular carcinoma - a systematic review

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Background: The monitoring of minimal residual disease (MRD) is widely applied in haematological diseases. There are attempts to assess it also in solid tumour patients. Much research regarding MRD has been conducted so far on colorectal cancer.

The aim: This work aimed to summarise the methods of monitoring MRD and its clinical use in patients with diagnosed hepatocellular carcinoma (HCC).

Materials and methods: This systematic review was conducted between October and December 2024. We formulated the research question following the PICO framework and then searched 3 databases: PubMed, Embase, and Web of Science. The full-text, English-language articles concerning the detection, assessment, or management of MRD in HCC patients were sought for inclusion independently by two co-authors. No publication date filters were selected in the search strategy. The abstract screening and full-text screening were conducted separately in the Rayyan.ai tool. The data from retrieved studies were gathered independently into a spreadsheet. The I-ROBINS tool was used to assess the risk of bias. A third researcher solved all disagreements in the methodology phase.

Results: Ten studies of Asian (n=9) and European (n=1) origin were included in this systematic review. The trials varied significantly, ranging 3-493 patients (median: 66) or analysing the cell lines (n=1). The samples were collected from patients undergoing surgery (including liver transplantation) or transcatheter arterial chemoembolisation therapy. Three reports focused on statistical differences in α-fetoprotein mRNA levels, 6 trials on cell-free DNA and two on free circulating HCC cells. Few studies focused on developing genetic panels for MRD detection.

Conclusions: The majority of trials indicated the value of monitoring MRD in HCC in routine practice, especially during postoperative follow-up. MRD detection helped to determine the risk of early recurrence and the benefit of adjuvant therapy for some patients. A few more biomarkers could potentially be screened in further studies.

Keywords: Hepatocellular carcinoma, liver, minimal residual disease, recurrence, biomarkers

The effects of GAHT on gender incongruence and body dissatisfaction in transgender adults: a systematic review

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Background: Gender-affirming hormone therapy (GAHT) is a widely used medical intervention designed to align physical characteristics with an individual's gender identity. Emerging evidence suggests that hormone therapy may play a crucial role in improving psychological outcomes, alongside physiological effects.

The aim: This systematic review aimed to identify and summarize studies that investigate the relationship between GAHT and gender incongruence and body dissatisfaction among transgender adults.

Materials and methods: A systematic search was conducted in Pub Med, Web of Science, Scopus and Google Scholar for studies published between 2005 and 2024. Studies were considered eligible if they included transgender adults (over 18 years old), who were seeking hormone therapy with no medical history of any gender-affirming surgeries (GAS) and diagnosed with gender dysphoria through DSM or ICD protocols. Both cross-sectional and longitudinal studies were included, alongside one randomised control trial. PRISMA guidelines were followed to conduct this review.

Results: Across the 11 studies included, majority of them reported that GAHT was consistently associated with a statistically significant reduction of gender incongruence symptoms and body dissatisfaction over time. Participants reported an increased comfort with their bodies and alignment with their gender identity. However, variability in outcomes was noted depending on factors such as the duration of hormonal therapy, applied self-reported scales and access to healthcare.

Conclusions: Gender-affirming hormone therapy has a positive effect on alleviating gender incongruence and body dissatisfaction in transgender adults. These findings highlight the importance of worldwide access to gender-affirming care and medical support. Further research needs to be conducted to better understand long-term outcomes of GAHT and its impact on transgender individuals' mental health.

Keywords: adults, body dissatisfaction, gender-affirming hormone therapy, gender incongruence, transgender

Behind the Symptoms: Untangling Lyme Neuroborreliosis from Multiple Sclerosis

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Background: Lyme neuroborreliosis (LNB) is an inflammatory disease caused by the spirochete Borrelia burgdorferi, which invades the central nervous system, causing meningitis and cranial neuritis. Multiple Sclerosis (MS) is an autoimmune illness characterised by the breakdown of the myelin sheath. These two neurological illnesses can have nonspecific symptoms or overlapping clinical presentations, creating a diagnostic challenge and delaying treatment.

The aim: The aim of this research is to identify precise criteria for the differential diagnosis of LNB and MS based on clinical presentation, imaging methods, and blood/cerebrospinal fluid (CSF) markers.

Materials and methods: We used the PubMed database and the MeSH Library to conduct our research. The keywords were "Lyme Neuroborreliosis", "Multiple Sclerosis" and "Diagnosis", connected by the Boolean operator "AND". This search method returned 18 items and we included all of them.

Results: LNB is defined by the presence of 3 criteria: new neurological symptoms and objective findings suggestive of LNB, lymphocytic pleocytosis in CSF, and intrathecal anti-Borrelia antibody production. MS signs include oligoclonal bands in CSF and gadolinium-enhanced demyelinating lesions in the white matter. The main challenge is the unreliability of serum/intrathecal antibody levels (absent during the first 6 weeks, or present even after the bacteria disappeared, being false positive).
 Moreover, CXCL13, a B-lymphocyte attracting chemokine, has been proven to be highly accurate in the early identification of LNB, being significantly elevated compared to MS and normalizing following therapy, earlier than intrathecal antibody levels.

Conclusions: We can point out that in rare cases, LNB can resemble MS, particularly in terms of clinical signs. There are several approaches to making the differential diagnosis, however, it is obvious that serum/intrathecal antibodies alone are insufficient. CSF CXCL13 may be a useful addition in the early identification of LNB.

Keywords: Multiple Sclerosis, Lyme Neuroborreliosis, Diagnostic criteria, CXCL13, Intrathecal antibodies

How does hydroxyapatite filler influence the properties of dental restorative resin-based composite materials

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Background: The success of dental restorations relies on their mechanical as well as biological properties. One of the leading causes of restoration failure is secondary caries, caused by bacterial colonization and subsequent demineralization of surrounding dental tissues. Proposed solutions to this problem include the development of bioactive materials with remineralizing properties. While resin-based composite (RBC) materials are seen as the golden standard in restorative dentistry due to their favourable mechanical properties and superior aesthetic qualities, they notably lack such bioactive potential. Inclusion of functional fillers such as hydroxyapatite (HA) is proposed to overcome this limitation.

The aim: To evaluate the evidence regarding influence of HA as a functional filler in RBC on their mechanical properties and potential bioactivity.

Materials and methods: A literature search was performed in PubMed and Semantic Scholar database with the use of selected keywords ("hydroxyapatite filler", "mechanical properties", "bioactivity" and "dental resin-based composite" with relevant operators) from January to March 2025. Only original in vitro studies published in 2020-2025 were considered. Studies concerning commercial and experimental RBC were eligible. Additional hand search was performed in bibliographies of eligible works. The RoBDEMAT risk of bias tool was employed for assessment of included papers.

Results: Initial search returned 152 papers. After assessment for eligibility 6 met the inclusion criteria. Additional 10 records were identified by citation searching within included works. Of these, 4 were found to meet the inclusion criteria. Overall, the study analyzed 10 papers.

Conclusions: Results indicate that HA fillers positively influence hardness of RBC, but higher concentrations may decrease their flexural strength. Additionally, there is evidence of in vitro ion release and precipitate layer formation which increases with hydroxyapatite content and time of soaking.

Keywords: hydroxyapatite, dental composite, remineralization

A Systematic Review of Ovarian Teratoma-Associated Anti-NMDA Receptor Encephalitis and Diagnostic delay

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Work's tutor: Proffesor Malwina Botor

Background: Anti-NMDA receptor encephalitis is a rare autoimmune encephalitis, often triggered by ovarian teratomas and presenting with acute psychiatric symptoms. Due to its deceptive clinical picture, it is frequently misdiagnosed as primary psychiatric illness, delaying treatment and increasing the risk of permanent neurological damage or death. Although individual cases have been reported, no comprehensive synthesis of global data exists regarding diagnostic delay and patient outcomes.

The aim: To systematically review published cases of ovarian teratoma-associated anti-NMDA receptor encephalitis, focusing on diagnostic timing, misdiagnosis patterns, therapeutic strategies, and neurological outcomes.

Materials and methods: This review adhered to PRISMA guidelines. PubMed, Scopus, and Web of Science were searched for studies involving female patients diagnosed with both ovarian teratoma and anti-NMDA receptor encephalitis. Extracted data included age, presenting symptoms, diagnostic delay, misdiagnosis, treatments, and outcomes. Risk of bias was assessed using Joanna Briggs Institute tools.

Results: Forty-eight studies involving 102 patients were included. The mean diagnostic delay was 27.4 days (range: 4–210). In 68% of cases, patients were initially misdiagnosed with psychiatric illness. Most received tumor resection combined with corticosteroids, IVIG, or plasma exchange. Full neurological recovery occurred in 74% of cases, while 9% experienced persistent deficits. Early diagnosis (<14 days) was significantly associated with better outcomes ($p < 0.01$).

Conclusions: Anti-NMDA receptor encephalitis linked to ovarian teratomas remains underrecognized. Early oncologic screening in young females with acute psychosis or seizures is essential. Greater interdisciplinary awareness can reduce diagnostic delay and improve survival in this curable, life-threatening condition.

Keywords: anti-NMDA encephalitis, ovarian teratoma, paraneoplastic, systematic review, psychosis.

COMPARISON OF RADIOLOGICAL IMAGING METHODS IN DIAGNOSIS OF PULMONARY EMBOLISM

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Background: Pulmonary embolism (PE) is a pathological condition characterized by occlusion or narrowing of the lumen of the pulmonary artery or its branches due to the presence of embolic material. Among its causes, thrombi predominate. After PE, the ventilation-perfusion ratio is disturbed, which leads to tissue hypoxia and ischemia. The gold standard in radiological diagnostics of PE is CTPA. However, this method has its drawbacks, such as exposure of patients to X-rays, the risk of contrast-induced nephropathy, allergic reactions and relatively high cost.

The aim: The aim of this study was to compare the most widely used computed tomography pulmonary angiography (CTPA) with single-photon emission computed tomography (SPECT), quantum perfusion scintigraphy (V/Q SPECT), magnetic resonance angiography (MRA) and the participation of artificial intelligence (AI).

Materials and methods: A comprehensive literature search was conducted using PubMed and Scopus to identify studies evaluating the advantages and disadvantages of imaging modalities in the diagnosis of pulmonary embolism caused by thrombotic emboli. A total of 365 articles published within the past two years were initially retrieved. Following the application of predefined inclusion criteria, 28 relevant studies were selected for analysis.

Results: Analysis of the obtained data showed that the most common CTPA is the fastest and most effective method in the field of PE diagnosis. Although, SPECT and V/Q SPECT can be more accurate in doubtful cases, but routinely not preferred. Moreover, these two methods are cheaper compared to CTPA. MRA is less dangerous, as the iodinated contrast is not needed. Therefore, it can be used among patients with renal failure. AI-based methods have promising results in faster assessment of patients for invasive diagnostics.

Conclusions: CTPA is the most reliable modality for diagnosing thrombotic pulmonary embolism, though alternative imaging techniques may be beneficial in cases with contrast contraindications or persistent diagnostic uncertainty.

Keywords: Pulmonary embolism, Radiology, Imaging, Computed Tomography, Angiography, Artificial Intelligence

Music Therapy – Is it effective in reducing symptoms of alzheimer's disease? A Review Paper

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Background: Alzheimer's disease (AD) is the most common form of dementia, an incurable and progressive neurodegenerative disease that has a profound impact on cognitive, emotional, and social functioning. While treatment is mainly based on pharmacology, there is growing interest in non-pharmacological therapies, such as music therapy, that may potentially reduce symptoms without side effects.

The aim: This review examines recent evidence (post-2020) on the effectiveness of music therapy in managing cognitive, emotional, and behavioral symptoms in AD patients. It focuses on therapeutic outcomes, neurological mechanisms, and the role of music therapy as a complementary treatment.

Materials and methods: A systematic review was conducted using databases such as PubMed, including studies published after 2020. Eligible studies included randomized controlled trials, observational research, and meta-analyses involving music interventions such as listening, singing, or instrument playing. Primary outcomes included changes in memory, mood, and behavioral symptoms.

Results: Findings suggest music therapy improves memory and attention and reduces anxiety, depression, and agitation. It stimulates areas like the hippocampus and frontal cortex and enhances social interaction. Combining music therapy with other interventions can increase overall effectiveness.

Conclusions: Music therapy is a very promising non-pharmacological treatment for Alzheimer's disease that is safe, inexpensive, and enjoyable for patients and can help alleviate symptoms. Despite the benefits, standardization of treatment protocols and further exploration of long-term consequences are needed. Randomized controlled trials are recommended to optimize interventions and expand clinical applications. Music therapy can be a valuable form of treatment for Alzheimer's disease, improving cognitive and emotional functions and quality of life of patients.

Keywords: music therapy, alzheimer's disease, dementia

Are non-nutritive sweeteners responsible for inflammatory bowel disease?

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Background: Inflammatory bowel disease (IBD) is group of diseases of intestines, which consists on chronic inflammation of unknown mechanism. A known risk factor for IBD is so-called western diet. Non-nutritive sweeteners (NNS) are group compounds, used as replacers for sucrose. Increasing IBD prevalence rises a question whether NNS consumption is linked to its pathogenesis.

The aim: To summarize works on impact of artificial sweeteners on gut health and it possible connection to IBD.

Materials and methods: Systematic search of Pubmed and Web of Science databases was performed. Following terms were used to describe NNS and gut health: "stevia", "steviol", "aspartame", "neohesperidin dihydrochalcone", "saccharin", "sucralose", "acesulfame", "advantame", "neotame", "cyclamate", "crohn", "IBD", "colitis", "microbiota", "inflammation", "intestine", "TNF", "IL", "lymphocyte". Included works investigated NNS impact on human epithelial cells cultures, leukocytes cultures, bacterial in vitro cultures, healthy and IBD-like animal models and clinical trials of NNS impact on healthy individuals microbiota. Additionally, obesity models were included.

Results: NNS have an inhibitory effect on human immunological cells in vitro. However, in vivo data suggest that NNS consumption cause significant changes on gut microbiota structure in both animals and humans. NNS decrease alpha-diversity. Sucralose reduces Feacalibacterium prausnitzi population. Animal IBD models showe that sucralose, acesulfame-K and aspartame either enhance susceptibility or directly cause IBD-like onset. In opposite, stevia ans stevia alleviate IBD-like symptoms. Molecular investigation shows that NNS modulate sweet taste receptors sigalling downstream and decrease expression of tight junction proteins in colon cells, causing increase of intestinal permeability.

Conclusions: Sucralose, acesulfame-K and aspartame should be re-evaluated for gut health safety. Sachharin and stevia seems as alleviating IBD symptoms. These findings should be validated in further clinical studies.

Keywords: IBD, NNS, epidemiology, diet

Aggression towards healthcare workers. Literature review and initiation of SAFE MEDIC project.

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Background: Recently there have been reports of various acts of violence against health care workers. One of the most recent incidents took place in Siedlce on 25 January this year. On that day, a paramedic was killed by a 57-year-old male patient. Despite the devastating nature of such events, the issue of violence against medical personnel is still neglected and underestimated by society.

The aim: Therefore, the purpose of our article was to examine this issue in other countries before conducting an assessment of this phenomenon in Poland.

Materials and methods: The literature review was based on the search strategy used in Pubmed. The key words were: aggression, violence, abuse, health care workers, doctors, medical doctors, nurses and general practitioners. 24 articles were selected for further analysis.

Results: According to WHO statistics, the prevalence of violence against physicians ranged from 8% to 38%. In many European countries, most doctors were exposed to different types of aggression. One of the studies conducted in Germany shows that more than 50% of the doctors surveyed had been confronted with a mild or moderate type of aggression. Similar statistics were found in France and the Netherlands. A Canadian study in 2020-2021 concluded that 90% of abusive incidents were caused by patients and their families and friends. Another report from Italy showed that perpetrators were more likely to be male and were mainly patients (68.3%) or visitors (21.7%). Aggression took many forms, from raising voices to physical acts against healthcare workers. Death threats are not uncommon. 34% of respondents in the UK reported this type of threat.

Conclusions: The growing problem of aggression towards healthcare workers has led us to consider launching a project, SAFE MEDIC, to assess the prevalence and nature of aggression towards healthcare workers.

Keywords: aggression, violence, abuse, health care workers, doctors, nurses, general practitioners

Laryngological manifestation of tularemia in children - a systematic review.

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Work's tutor: dr n med. Agata Gierlotka

Background: Tularemia is a serious threat to public health. It is a zoonosis caused by the Gram-negative bacteria Francisella tularensis. The disease can progress as a form of ulcerative-glandular pulmonary, oropharyngeal, oculo-glandular, intestinal, and typhoidal. Infection occurs through contact with infected animals, arthropod bites, or inhalation of contaminated aerosol. The clinical presentation of tularemia is diverse, sometimes confused with streptococcal pharyngitis, infectious mononucleosis, or other diseases. Although tularemia is well described in the literature, it remains underdiagnosed in Central European countries. Rapid diagnosis and treatment are crucial to prevent serious consequences.

The aim: The purpose of the study is to investigate the laryngological manifestations of the disease among the pediatric population.

Materials and methods: A review of the literature from 2000–2025 was conducted using the PubMed database, in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Clinical symptoms, routes of transmission, diagnostic methods, and differential diagnoses were analyzed.

Results: The review initially identified 179 studies, of which 12 articles were finally analyzed. The results were divided into three groups describing the variants of tularemia: oropharyngeal, ulcerative-glandular, and middle ear tularemia. Among children aged 8–17 years, the dominant clinical forms were oropharyngeal and ulcerative-glandular. The main vectors were rodents and ticks.

Conclusions: The most commonly observed symptoms were fever, sore throat, lymphadenopathy, and skin lesions. Effective antibiotic therapy included aminoglycosides and fluoroquinolones.

Histopathological characterization of PACS2 syndrome: A first look into the tissue structures

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Work's tutor: MSc Arkadiusz Żbikowski

Background: PACS2 syndrome (PS) is a ultra-rare genetic disorder caused by mutations in the PACS2 gene (PACS2E209K and PACS2E211K). PS is characterized by seizures, developmental delays, hypotonia, speech and motor skill delays, and behavioral problems. Some patients also experience organ involvement like eye abnormalities, limb malformations, and cardiac and kidney dysfunction. These diverse clinical manifestations are linked to the multifaceted functions of the PACS2 protein, which is involved in intracellular protein transport, apoptosis/survival, mitochondrial function regulation, and stress response. This alternations may lead to tissue dysfunctions, however, there is a lack of published data that would investigate potential changes within tissue structures in PS.

The aim: Therefore, in our study we aimed to evaluate histological images of murine PS, focusing on tissue structure in liver, lungs, and kidneys, organs susceptible to stressors.

Materials and methods: Adult mice with the +/E209K mutation and control mice (+/+) were examined (n=6 per group). Hematoxylin & eosin staining was used for basic structural assessment, while trichrome and von Kossa staining evaluated collagen and calcium deposition, respectively. qPCR was employed to analyze gene expression levels related to tissue remodeling.

Results: These findings suggest a predisposition to fibrotic tissue development in PS. It's important to note that this study used a young adult murine model without exogenous stressors. Most PS patients are younger and exposed to environmental factors that could influence disease progression. Despite this, the study's results could serve as a potential prognostic indicator for disease development and contribute to the development of more effective therapies for PS.

Conclusions: While no significant differences were found in many parameters, histopathological examination of the liver revealed aberrant collagen deposition. Alterations in gene expression were also observed in the lungs and liver.

Lung Resident Fibroblasts in Airway Remodeling Across Experimental Asthma Phenotypes

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Work's tutor: dr Marlena Tynecka, dr hab. Andrzej Eljaszewicz

Background: Inflammation is a key feature of asthma, contributing to bronchial hyperresponsiveness, mucus hypersecretion, airway narrowing, and remodeling. Chronic inflammation activates repair processes, leading to structural changes such as smooth muscle proliferation, fibroblast expansion, and ECM deposition.

The aim: Therefore, here we investigate the role of lung fibroblasts in airway remodeling across various inflammatory asthma phenotypes, using experimental asthma models and complementary in vitro approaches.

Materials and methods: C57BL/6J mice were challenged with 10 µg or 100 µg of house dust mite extract for 2 or 12 weeks to induce T2-low and non-T2-mediated inflammation. Lung tissues were used for histological, transcriptomic, cellular, and protein analysis. In vitro, Normal Human Lung Fibroblasts (NHLFs) and Diseased Human Lung Fibroblasts (D-HLFs) were stimulated with TGF-β1, FGF-2, and/or FGF-21. Fibroblast-to-myofibroblast transition was assessed via confocal microscopy, qPCR, and western blot.

Results: We confirmed asthma-like inflammation in all models. Increased subepithelial collagen and α-SMA deposition were observed, along with myofibroblast presence confirmed by immunofluorescence. Transcriptomics revealed dysregulated genes linked to ECM remodeling, FGFs, and differentiation. Notably, fibroblast expansion was found only in T2-low asthma, correlating with elevated FGF-2 levels. TUNEL assay showed increased apoptosis under specific conditions. Expression of ACTA2, Vimentin, TGF-β1, COL1A1, and COL3A1 supported myofibroblast identity.

Conclusions: In summary, distinct inflammatory asthma phenotypes trigger specific fibroblast responses, influencing their proliferation, differentiation, and ECM deposition. Further research is warranted to better understand how the heterogeneous inflammatory milieu in asthma affects lung fibroblast function.

Keywords: asthma, airway remodeling, ECM deposition, fibroblasts, FMT

The Role of Minocycline in Modulating Th2 Cytokine Expression After Subarachnoid Hemorrhage in a Rat Model

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Background: Subarachnoid hemorrhage (SAH) constitutes ~20% of strokes, mostly due to ruptured cerebral aneurysm. It triggers a complex inflammatory reaction leading to early and delayed brain injury, resulting in secondary ischemic brain damage. Th2 anti-inflammatory cytokines (IL-4, IL-10, IL-13) limit inflammation in the early phase but may impair regeneration if prolonged. IL-5, though part of the Th2 group, is pro-inflammatory. Minocycline, an anti-inflammatory antibiotic, may modulate the Th2 response and offer protection in SAH.

The aim: To assess the effects of minocycline on the expression of Th2 cytokines (IL-4, IL-5, IL-10, IL-13), and to explore its potential neuroprotective role in a rat model of SAH.

Materials and methods: SAH was inducted in rats via pre-chiasmatic injection of 250 Ķl of fresh arterial blood. The animals underwent euthanasia on day 1, 3, or 7 post-SAH. Lymphocytes isolated before euthanasia were cultured for 24h, and cytokine levels in culture media were measured using the Bio-Plex Multiplex Immunoassay System. Minocycline (1 mg/kg/day) was given daily after SAH; results were compared to untreated control groups.

Results: Levels of IL-4, IL-5, IL-10, and IL-13 increased significantly following SAH, with the most pronounced effect observed on day 7. IL-10 and IL-13 levels were most significantly increased, indicating a counter-regulatory anti-inflammatory response. Minocycline altered the cytokine profile; during the early phase, it raised the levels of IL-4, IL-10, and IL-13. In the delayed phase, minocycline treatment reduced IL-4 and IL-5 and significantly suppressed IL-10, while IL-13 levels remained high.

Conclusions: Minocycline may offer protection in SAH by increasing IL-4, IL-10 and IL-13 in early phase. In later stages, it reduces IL-5 and IL-10, potentially preventing prolonged inflammation, though possibly limiting regeneration. Minocycline's effects seem to depend on the phase and are closely tied to Th2 cytokine expression dynamics.

Keywords: Subarachnoid hemorrhage, Minocycline, Th2 cytokines, Neuroinflammation

CXCL-1 in Subarachnoid Hemorrhage: The effect of Minocycline on Its Activity.

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Background: In a subarachnoid hemorrhage (SAH), arterial blood leaks from the brain's blood vessels into the subarachnoid space. SAH has a high mortality rate among those who survive. Studies indicate SAH induces inflammation, leading to higher levels of the proinflammatory chemokine CXCL-1. This primarily impacts the CXCR2 pathway, attracting neutrophils to inflamed areas. The anti-inflammatory antibiotic minocycline may lessen the immune response to a subarachnoid hemorrhage by altering CXCL-1 activity.

The aim: We aimed to examine the impact of SAH on lymphocyte production of CXCL-1 during early and delayed brain injury in a rodent model, and to assess the effect of minocycline on CXCL-1 levels.

Materials and methods: SAH in rats was induced by injecting 250 ĶL of arterial blood into the prechiasmatic cistern. A daily dose of 1 mg/kg Minocycline was given intraperitoneally to the rats. Rats were euthanized 1, 3, and 7 days after the SAH. Lymphocytes from pre-euthanasia peripheral blood samples were isolated and cultured for 24 hours; the culture media was then collected. CXCL-1 levels in 24-hour lymphocyte culture media were measured using a Bio-Plex Multiplex Immunoassay System.

Results: In rats after SAH induction, CXCL-1 levels were reduced compared to the SHAM group. The concentration of CXCL-1 was slightly reduced at 72 hours compared to 24 hours. A significant increase in CXCL-1 levels (~100 pg/ml) was observed by day 7. Initially, minocycline administration increased CXCL-1 concentration at both 24 and 72 hours; however, this increase was not statistically significant. A significant reduction in chemokine levels was observed with minocycline by day 7.

Conclusions: CXCL-1 is involved in the inflammatory response after SAH. Fluctuations in CXCL-1 levels suggest a transition from immunosuppression to inflammation. Minocycline lowers the levels of the chemokine, potentially protecting against worse outcomes in SAH by reducing excessive inflammation.

Keywords: Subarachnoid hemorrhage, CXCL-1, inflammation, Minocycline

Inflammatory cytokine profile in a rat model of SAH and the role of Minocycline

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Background: Aneurysmal rupture causes ~80% of subarachnoid haemorrhages (SAH), which make up ~20% of all strokes. SAH outcomes are difficult to predict because of its inflammation-driven pathophysiology. Cytokines such as IL-1β, TNF-α, MIP-1α, and MIP-3α—released by glial and immune cells—promote inflammation and brain oedema, increasing intracranial pressure and worsening prognosis. Minocycline was found to reduce oedema and inflammation by inhibiting pro-inflammatory cytokine activity.

The aim: The study's aim was to determine the levels of IL-1β, TNF-α, MIP-1α, and MIP-3α cytokines in circulating lymphocytes following SAH in rats, both early and late post-injury, and assess minocycline's effect on these levels.

Materials and methods: SAH was induced by injecting 250 µL of arterial blood into the prechiasmatic cistern. Rats were euthanized at 1, 3 and 7 days post-ictus. A daily dose of 1 mg/kg Minocycline was given intraperitoneally to the rats. Rats were euthanized 1, 3, and 7 days after the SAH. Lymphocytes from pre-euthanasia peripheral blood samples were isolated and cultured for 24 hours; the culture media was then collected. IL-1β, TNF-α, MIP-1α, and MIP-3α levels were measured in 24-hour lymphocyte culture media using a Bio-Plex Multiplex Immunoassay System.

Results: Cytokine levels increased at specific time points post-SAH. IL-1β levels initially dropped but significantly rose by day 7 (~12 pg/ml). A similar pattern was seen for MIP-1α (~450 pg/ml at day 7). TNF-α peaked at 24 hours (~55 pg/ml) and remained stable. MIP-3α showed the highest level at 24 hours (~0.9 pg/ml), followed by a notable decline. Of all, only IL-1β exhibited a statistically significant reduction on day 7 in minocycline-treated animals.

Conclusions: Minocycline may improve long-term results after SAH by lessening inflammation and brain swelling via the modulation of inflammatory cytokines production by circulating lymphocytes.

Keywords: Subarachnoid Haemorrhage (SAH), Cytokines, Minocycline, Neuroinflammation

Role of splicing regulators esrp1 and esrp2 in epithelial-mesenchymal transition in bladder cancer cells

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Background: ESRPs (Epithelial Splicing Regulatory Proteins) play a key role in the regulation of alternative pre-mRNA splicing, which is important in pathological processes such as cancer metastasis. This process alters epithelial cells to mesenchymal cells, promoting migration and invasion. TGF-β is the main inducer of EMT, resulting in a decrease in the expression of epithelial markers (E-cadherin), while an increase in mesenchymal markers (Vimentin).

The aim: To date, the role that ESRP1 and ESRP2 in the EMT process has been studied mainly in the context of breast, lung and pancreatic cancer. However, with regard to bladder cancer, there is a lack of research on their involvement in this process, which is a key objective of this project.

Materials and methods: We analyzed four commercially available bladder cancer cell lines: two from invasive cancer (T-24 and UM-UC-3) and two from non-invasive (RT-4 and 5637). We examined the expression profile of EMT-related genes: SNAIL, SLUG, TWIST and ZEB1, as well as EMT markers such as E-cadherin (E-cad) and vimentin (Vim), using RT-qPCR. At the same time, we examined the expression of ESRP1 and ESRP2 in these cell lines. We confirmed the results at the protein level by performing Western Blot analysis. Additionally, we performed siRNA transfection to silence the expression of ESRP1 and ESRP2, as well as overexpression of these genes in the UM-UC-3 cell line.

Results: The results indicate that invasive bladder cancer cell lines exhibit an EMT gene expression profile, with ZEB1 as a key inducer, while non-invasive lines show an epithelial phenotype, marked by high E-cad and elevated ESRP1 and ESRP2 expression levels. Silencing ESRP1 and ESRP2 reduces E-cad level and increases VIM and ZEB1 expression, while overexpression of these genes restores E-cad levels, suggesting their role in maintaining the epithelial phenotype.

Conclusions: Preliminary results suggest the potential role of ESRPs in regulating the EMT process, in that case futher studies are necessary.

Keywords: EMT, ESRP1, ESRP2, bladder cancer

Dynamic Changes in IL-2 After Subarachnoid Hemorrhage: Immune Dysregulation and Minocycline Effects

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Background: Subarachnoid hemorrhage (SAH) leads to high mortality and disability, with complications like early brain injury (EBI) and delayed brain injury (DBI) worsening outcomes. Immune dysregulation and neuroinflammation contribute to post-SAH pathology. Interleukin-2 (IL-2), a key cytokine in immune homeostasis, has an unclear role in SAH. Understanding IL-2 dynamics may provide insight into immune mechanisms of injury and support development of immunomodulatory therapies such as minocycline, which possesses anti-inflammatory and neuroprotective properties.

The aim: To examine changes in IL-2 levels in a rat model of SAH, assess IL-2's role in the inflammatory response, and evaluate the impact of minocycline on IL-2 dynamics post-SAH.

Materials and methods: SAH was induced by injecting 250 Ķl of arterial blood into the prechiasmatic cistern. Tissues and fluids were collected at 24h, 72h, and 7 days post-SAH. Lymphocytes from blood samples taken before euthanasia were isolated and cultured in vitro for 24 hours. IL-2 levels in culture medium samples were analyzed using the Bio-Plex Multiplex Immunoassay System.

Results: In the SHAM group, IL-2 levels remained stable (~50 pg/ml). In the SAH group, IL-2 decreased significantly at 24h and 72h, followed by an increase at day 7 (>75 pg/ml), suggesting a biphasic immune response. In the SAH + minocycline group, IL-2 levels were similar to the SAH group at 24h but increased to approximately 25 pg/ml by 72h and remained stable through day 7.

Conclusions: SAH induces dynamic changes in IL-2 levels, reflecting transitions between immune suppression and inflammation during EBI and DBI phases. Minocycline partially modulated this dysregulation by attenuating the late-phase IL-2 increase, suggesting a stabilizing effect on immune homeostasis. IL-2 may serve as a biomarker and therapeutic target in post-SAH management. Further studies are needed to clarify the immunomodulatory mechanisms of minocycline in this context.

Keywords: Subarachnoid hemorrhage, Interleukin-2, Minocycline, Neuroinflammation

Changes in Lipid Profile After Sleeve Gastrectomy (SG) With Postoperative Monacolin K Supplementation

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Background: Obesity is one of the most significant challenges in modern medicine. One surgical method of treating obesity is sleeve gastrectomy (SG), which involves removing a portion of the stomach and leaving a narrow sleeve. This reduces stomach volume and limits food intake. Monacolin K, a compound found in red yeast rice, has beneficial effects on the lipid profile.

The aim: In this retrospective study, we aimed to assess the impact of monacolin K supplementation on lipid profile parameters in female patients undergoing SG.

Materials and methods: The study analyzed data from 90 female patients who underwent SG as part of the KOS-BAR program. All patients meeting the program's criteria were treated with SG, and a subset of them received monacolin K supplementation at a defined postoperative period. Lipid parameters—including total cholesterol (TC), LDL, HDL, and triglycerides (TG)—were measured before and after surgery during follow-up visits. The results were compared with a control group that did not receive monacolin K supplementation.

Results: A significant decrease in total cholesterol levels was observed in the monacolin group 6 months after surgery compared to the control group (-13.4 mg/dl vs. -2.1 mg/dl), although final TC values did not differ significantly between the groups. Both groups experienced a similar increase in HDL levels (+4.13 mg/dl vs. +4.1 mg/dl), but the HDL level was significantly higher in the control group. LDL levels decreased in the supplemented group (-11.1 mg/dl), while an increase was seen in the control group (+21.9 mg/dl). Triglyceride levels declined in both groups, with a more pronounced decrease in the monacolin group (-36.2 mg/dl).

Conclusions: SG improves lipid profile parameters within six months postoperatively. Supplementation with monacolin K may be a valuable adjunct in achieving a favorable lipid profile in patients after SG.

Keywords: sleeve gastrectomy, lipid profile, monacolin K

Assessment of the Impact of Hyperbaria and Hyperoxia on the Epithelial-Mesenchymal Transition (EMT) Process an

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Background: Glioma is the most common and aggressive primary brain tumor, with a median survival of 15–18 months. Glioma-associated microglia/macrophages (GAMs) contribute to tumor progression, mainly through epithelial-mesenchymal transition (EMT). Elevated EMT marker expression is combined with higher tumor grade and worse patient prognosis.

EMT plays a crucial role in cancer progression by reducing cell polarity and adhesion, and altering protein expression. Triggered mainly by TGF-β, it activates transcription factors such as Slug, Snail, Zeb1/2, and Twist, which suppress epithelial markers. Deeper in sight into EMT in glioma could improve tumor sensitivity to temozolomide (TMZ), the standard chemotherapy.

During the COVID-19 pandemic, hyperbaric oxygen therapy (HBOT) was explored as a supportive treatment for long-COVID by promoting cellular repair through intermittent hypoxia. In glioma, HBOT is being investigated as an adjunct therapy, as it may counteract tumor hypoxia and inhibit EMT, potentially even promoting its reversal to Mesenchymal-Epithelial Transition (MET).

The aim: In this study, we investigated the effects of HBOT and TMZ on the expression profile of EMT-related genes (ZEB1, Snail, Slug, Twist, VIM, and E-cad) in a primary glioma cell line, HROG17, derived from a recurrent tumor.

Materials and methods: Cells were treated with TMZ and exposed to hyperbaric conditions (97-98% O_2 at 1.3 ATA) in three 1-hour sessions. Gene expression levels were assessed using RT-qPCR.

Results: Preliminary results show increased ZEB1 expression in HROG17 cells under hypoxia (2.5% O_2). E-cadherin was significantly up regulated after HBOT or TMZ treatment, with the strongest effect seen when both were combined. VIM and ZEB1 levels slightly decreased under the combined condition.

Conclusions: These findings suggest that HBOT may complement TMZ by suppressing EMT, enhancing treatment efficacy and reducing tumor invasiveness.

Keywords: glioma, EMT, HBOT, TMZ

Effects of exercise after 8-day starvation on the fatty acid profile: a metabolomic analysis

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Background: Fasting and exercise are well-known metabolic interventions that independently modulate the body's energy metabolism. Combining these two factors can lead to synergistic effects, especially in the mobilisation of fatty acids and their use as an energy source.

The aim: The aim of this study was to evaluate changes in the profile of selected plasma fatty acids following starvation and exercise.

Materials and methods: The study included five healthy adult volunteers who underwent an 8-day water fast, which was followed by a standardised exercise test of increasing intensity. Blood samples were taken immediately before and after exercise. Changes in plasma concentrations of individual fatty acids were analysed using mass spectrometry.

Results: After exercise, a significant increase in the concentration of lauric acid, which can activate the PPARα receptor and enhance lipid oxidation in the liver, was observed. In parallel, oleic acid concentrations increased, indicating an intensification of lipolysis and increased metabolism of fat reserves. After 60 minutes of exercise, there was also an increase in isopentadecanoic acid, a biomarker of dairy fat intake and microbiota metabolism, which may suggest its involvement in the metabolic response after starvation.

Conclusions: After 8 days of starvation, exercise induces significant changes in fatty acid metabolism, particularly those related to oxidation and metabolic signalling.

Keywords: fasting, exercise, blood metabolites, fatty acids, metabolome, metabolism

Regulated post-vaccination status in the context of future maternity

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Background: Future maternity requires adequate preparation of the patient in terms of immunity to viruses and other infectious diseases. Young women may have varying concentrations of specific antibodies, which may require additional prophylaxis before pregnancy which prevents the possibility of vertical infection. One of the risks to the fetus is infection with Rubella virus which has been classified as one of the TORCH member. Infection during early pregnancy can cause fetal death or Congenital Rubella Syndrome (CRS) which can lead to many birth defects.

The aim: The aim of the study was to evaluate the levels of specific anti-Rubella immunoglobulins in young women of reproductive age.

Materials and methods: The study group consisted of 30 women (20-25 years old) who answered a few questions about Rubella and their vaccination status. Anti-Rubella IgG levels were measured in serum, using commercial ELISA kit.

Results: All of the patients were vaccinated with two doses, according to the vaccination calendar. The last dose was given at the age of 6. Each of the samples tested was interpreted as a positive value, total average antibody titers was 101,21IU/l (range: 22,91–192,76, SD:51,91) .

Conclusions: In the era of anti-vaccine movements, and spreading misinformation about infectious diseases, actions should be particularly concerned on checking and providing an adequate immune response. Anti-Rubella IgG should last a lifetime. All of the women examined had differentiated antibody levels, all titers were >10U/ml, which indicating preserved immunity to the virus. Although it has been 15 years since the last dose of vaccination, antibody levels significantly reduce the risk of infection during pregnancy and subsequent consequences.

Keywords: Rubella, CRS, immunization

From diabetes to oncology – the influence of flosins on basic life processes of bladder cancer cells

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Background: The use of sodium-glucose cotransporter inhibitors (flozins) in medicine is steadily increasing. These drugs are currently recognized as established therapies for diabetes, cardiovascular diseases, and chronic kidney disease. However, little is known about their potential effects on bladder cancer cells. At the same time, the incidence of bladder cancer, often associated with multiple comorbidities, is also rising. Therefore, adapting chronic disease treatments to potentially provide additional oncological benefits has become an emerging area of interest.

The aim: The study aimed to evaluate the effects of selected SGLT2 inhibitors—dapagliflozin, empagliflozin, and canagliflozin—on key life processes of bladder cancer cells, including viability, apoptosis, necrosis cell death, cell cycle distribution progression, and migration.

Materials and methods: The human bladder cancer cell line T24 was used. The effects of flozins on cell viability (MTT assay), apoptosis and necrosis levels (Annexin V/PI staining), cell cycle distribution (flow cytometry), and cell migration capacity were evaluated. Fluorescence staining was also performed to visualize cytoskeletal alterations.

Results: SGLT2 inhibitors reduced the viability of T24 cells in a dose-dependent manner. No significant increase in apoptosis or necrosis was observed, suggesting alternative mechanisms of cell death. Preliminary results suggest that SGLT2 inhibitors may also affect the migratory capacity of bladder cancer cells..

Conclusions: Flozins may represent a promising target for further research in the context of drug repurposing for oncology.

Keywords: SGLT2 inhibitors, bladder cancer, cell lines, drug repurposing

Protein-mediated modulation of cationic DMAEMA star polymer cytotoxicity and membrane interactions

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Background: Cationic nano-polymers are a promising, non-viral vectors for delivering nucleic acids to cells. Their positive charge enables complexation with DNA/RNA and promotes endocytosis, but also causes strong, non-specific membrane interactions with high cytotoxicity. In biological environments, these polymers bind to proteins, creating a protein corona that may alter their physicochemical and biological properties, potentially affecting their delivery efficiency.

The aim: This study aimed to analyze how serum proteins influence the cytotoxicity and membrane interactions of DMAEMA star polymers, and to assess the formation and properties of polymer-protein complexes.

Materials and methods: HT-1080 cells were incubated with fluorescently labeled DMAEMA polymer in media with varying serum content. Cell viability (AlamarBlue), membrane integrity (FDA/PI), and cell death pathways (AO/EtBr) were assessed. Polymer-membrane interactions were analyzed by flow cytometry and fluorescence microscopy after trypsin, PFA, and Triton X-100 treatment. Polymer-protein complexes were characterized using UV-vis, DLS, ζ potential, and TEM imaging.

Results: DMAEMA star showed strong cytotoxicity in serum-free conditions, inducing necrosis via membrane disruption. Serum proteins decreased polymer toxicity, adhesion to the cell surface, membrane permeability, and shifted cell death toward apoptosis. Trypsin digestion did not remove surface-bound polymer, suggesting interactions with lipids rather than membrane proteins, which confirmed Triton X-100 treatment. Moreover, after 24h incubation, intracellular polymer aggregates suggested endocytosis. DLS and TEM confirmed the formation of large polymer-protein complexes with lower ζ potential.

Conclusions: Serum proteins significantly reduced DMAEMA polymer cytotoxicity by limiting its membrane interactions, and promoting the formation of lower-charge complexes. These findings highlight the relevance of protein-polymer interactions for nanocarrier behavior and their potential impact on delivery efficiency.

Keywords: cationic polymer, nanocarrier, protein corona, cytotoxicity, membrane interactions

Differential Airway Remodeling-Related Changes Across Experimental Asthma Inflammatory Phenotypes

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Background: Asthma is a chronic respiratory disease affecting approximately 300 million people worldwide. Notably, current treatment options remain ineffective in managing low- or non-type 2 (T2) inflammatory asthma phenotypes. Persistent inflammation may lead to structural changes in the lungs, known as airway remodeling. Unfortunately, the insufficient advancement of experimental models mimicking airway remodeling has left the underlying mechanisms unclear.

The aim: Therefore, we aimed to characterize airway remodeling-related changes in house dust mite (HDM) extract-induced experimental asthma models reflecting low- and non-T2-driven airway inflammation.

Materials and methods: To induce different airway inflammation phenotypes, C57BL6 mice were challenged with varying HDM doses (10 or 100 Ҝg) for 2 or 12 weeks. The lungs were subjected to histological analysis, transcriptomic profiling, and targeted protein analysis.

Results: All examined models showed enhanced airway inflammation, mucus secretion, and collagen deposition. Moreover, we noted an increased frequency in interleukin (IL)-4+ and IL-10+ T cells in the 2-week model, whereas the 12-week model represented an exclusive increase in the frequency of IL-17+ T cells. Transcriptomic analysis showed dysregulation in the expression of genes, clustered in collagens (Col), matrix metalloproteinases (MMPs), and their tissue inhibitors. Immunohistochemistry staining revealed increased deposition of Col3a1 and Col4a1 in all analyzed models. Interestingly, MMP-8 and MMP-9 levels in bronchoalveolar lavage were increased uniquely in the 12-week model. Finally, we observed the activation of various programmed cell death pathways across investigated models.

Conclusions: To summarize, we confirmed the induction of distinct asthma inflammatory phenotypes by challenge with varying HDM extract doses and exposition time. Our results may contribute to a better understanding of the processes underlying airway remodeling and the role of cell death in low- and non-T2 asthma.

Keywords: asthma, remodeling, inflammation

Induction of Ferroptosis in CRISPR/Cas9-Modified Cells

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Background: CRISPR/Cas9 is one of the groundbreaking advances in genetic engineering, enabling precise and targeted DNA modifications. Its effectiveness and simplicity have made it a key tool in biological research, gene therapy, and cell engineering.

The aim: This study aimed to induce ferroptosis — a form of programmed cell death associated with lipid peroxidation and iron metabolism disruption — using the CRISPR/Cas9 system. The primary goal was to identify and implement genetic modifications that trigger ferroptosis in specific cell lines naturally resistant to this form of cell death, by activating relevant molecular pathways.

Materials and methods: In the experiment, the role of selected genes key to ferroptosis, such as GPX4, ACSL4, TFRC, SLC40A1, and PROM2, was investigated. The GPX4 gene was intentionally deactivated using the CRISPR/Cas9 technology. The analyses included evaluating cell function using biochemical methods, including measurements of mitochondrial activity, reactive oxygen species (ROS) levels, and gene expression.

Results: The obtained results confirm the effectiveness of precise modifications in inducing ferroptosis in resistant cells, which may have significant implications for cancer therapy and the elimination of unwanted cells.

Conclusions: Ultimately, the study demonstrates the potential of CRISPR/Cas9 technology as a tool for analyzing ferroptosis mechanisms and its applications in cell biology and medicine.

Keywords: CRISPR-Cas9, Ferroptosis, GPX4, Programmed cell death, Gene modification