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OF ABSTRACTS**

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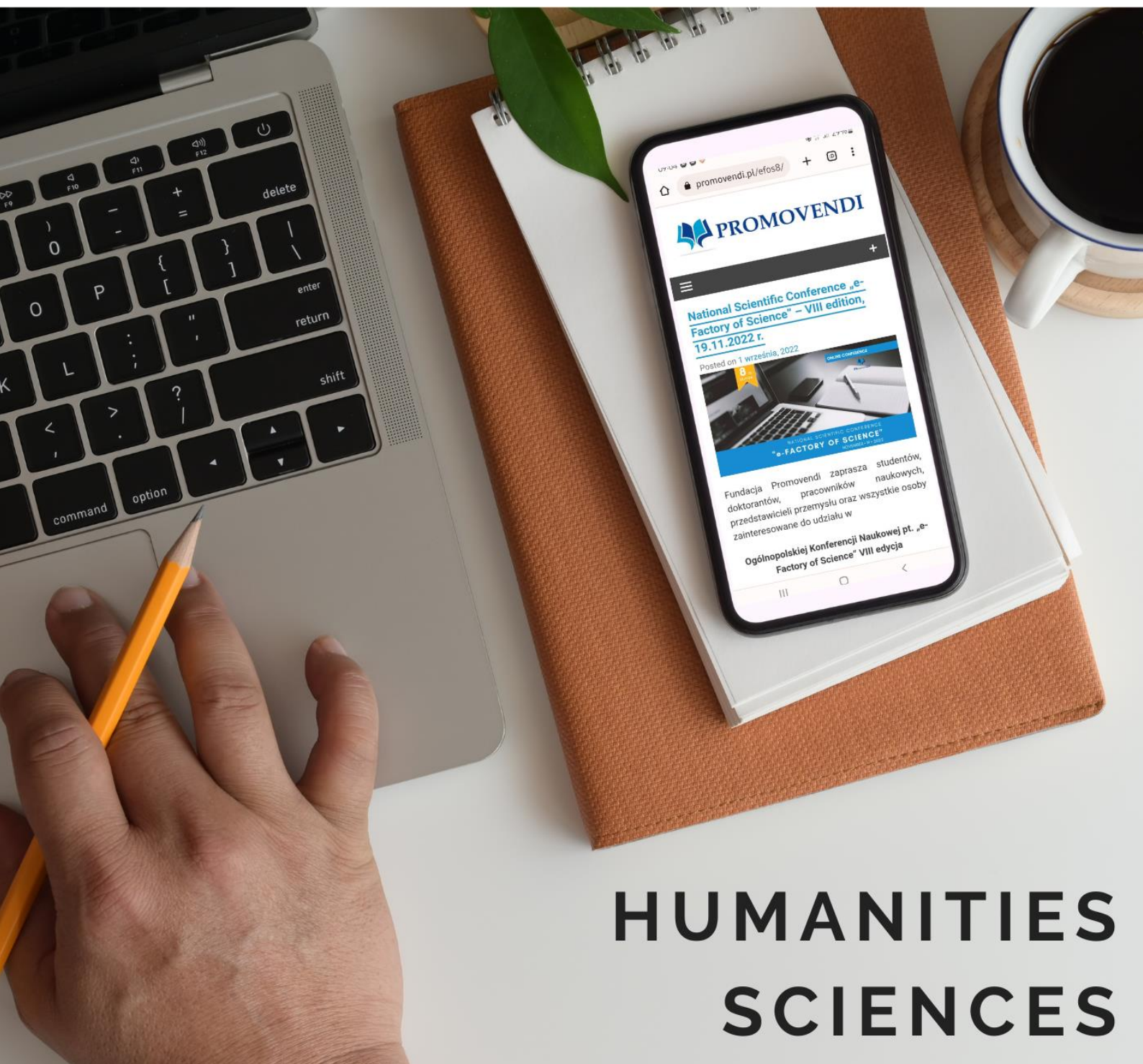
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ABSTRACTS OF PRESENTATIONS



HUMANITIES SCIENCES



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GLOBALIZATION AND ITS IMPACT ON THE MARKET

Joanna Chrzęszcz

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A few words about the author(s):

I am 33 years old. I study economics. I like gardening.

Abstract:

The presentation describes globalization and its impact on the market. Causes and areas. Positive and negative effects of globalization.

Keywords:

globalisation; labour market; trade; poverty; economy



PROPERTY, AGRICULTURAL, FORESTRY TAX

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A few words about the author(s):

My name is Aleksandra Krzywda, and I am an economics student. I expand my knowledge both in classes and at national scientific conferences. Outside of my studies, I am passionate about sports and train regularly. I love spending time in nature.

Abstract:

The property tax, agricultural tax, and forest tax are three different forms of land and building taxation in Poland. Property tax applies to land, buildings, and structures related to business activities. Its rates are determined by the municipality within the limits set by law. Agricultural tax covers agricultural land and depends on the price of rye, announced by the Central Statistical Office. Exemptions apply to, among others, organic farms and scientific institutions. Forest tax is levied on forest land and calculated based on the average selling price of wood. Exemptions include protected forests and national parks. Each of these taxes has different calculation rules and exemptions, and the revenue from them goes to municipal budgets.

Keywords:

tax; land; buildings; commune; documents



THE ROLE OF QUALITY IN GLOBAL MARKETS EXPANSION

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A few words about the author(s):

Currently, I am in my sixth term of Business and Production Engineering at PUEB. My research focus on Sustainability, ESG, Aviation Industry and International Quality Management.

Abstract:

In today's global economy, where multinational corporations (MNCs) seek to expand internationally, success depends on adapting to varying quality standards and consumer preferences. This study examines how four major MNCs - Toyota, Apple, McDonald's, and Coca-Cola – modify their products and practices quality to meet the needs of local markets. The case study approach explores how these companies adjust to local regulations, cultural expectations, and market demands, providing insights into their strategies for success in diverse regions.

The findings indicate that Toyota has adjusted its vehicle emission standards to comply with Chinese regulations, forming local partnerships to meet requirements. Apple has altered its product designs to align with EU environmental standards. In India, McDonald's has adapted its menu to include more vegetarian and chicken-based options, reflecting local dietary preferences and religious practices. Coca-Cola has reformulated its beverages to reduce sugar content in response to health policies in Europe.

The study finds that the quality is the key to success on global markets. This is crucial not only for meeting regulatory requirements but also for maintaining a competitive edge and securing long-term growth in foreign markets. This approach enhances operational efficiency, strengthens market position, and fosters resilience in the face of regional challenges and evolving consumer demands.

Keywords:

quality; global markets; market challenges; market expansion



MENTAL HEALTH, IDENTITY, AND SOCIAL CHALLENGES AMONG DEAF INDIVIDUALS: A LITERATURE REVIEW

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A few words about the author(s):

Zuzanna Rajtar – a master’s student in Psychology at the University of Silesia in Katowice. Main interests in the field include clinical psychology and health psychology.

Abstract:

Deaf individuals face unique psychological, social, and educational challenges. This review examines studies on mental health, identity, and social inclusion within the Deaf community. Research highlights the severe impact of isolation on mental health, with those living alone experiencing higher anxiety and depression. Gender disparities are also evident. Childhood maltreatment among Deaf adolescents is linked to higher depression and anxiety rates.

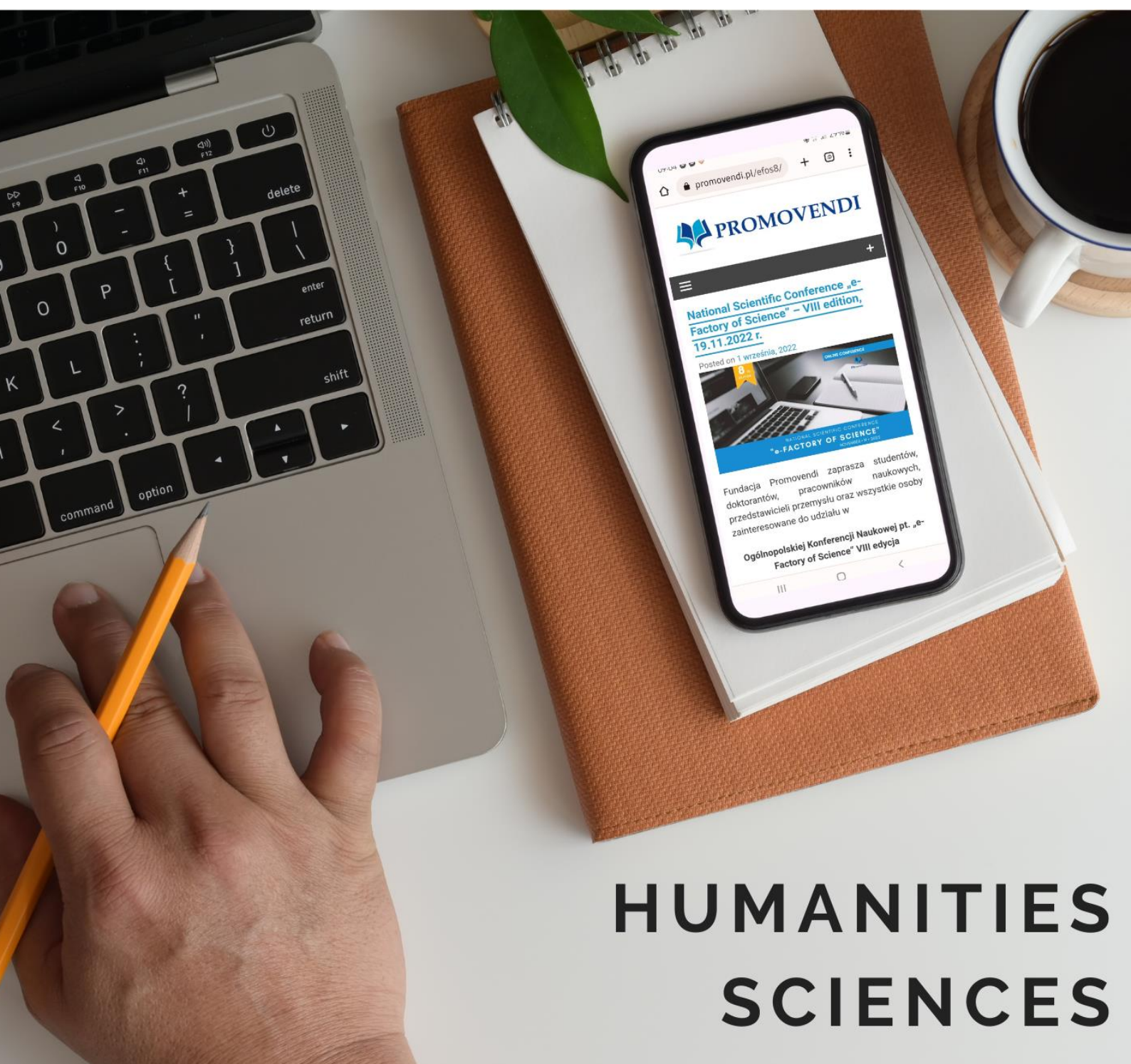
Socially, discrimination negatively affects well-being, though a strong Deaf identity can mitigate some effects. Acculturative stress is a key issue, with Deaf individuals facing pressure to conform to hearing norms. In education, Deaf college students report high stress, affecting academic engagement, but positive emotions act as a buffer. Literacy development remains challenging, requiring tailored interventions.

Family support is crucial, as parental stress is high, particularly when communication barriers exist. Addressing these challenges requires reforms in mental health services, education, and policy to ensure accessibility and inclusion.

Keywords:

deaf community; mental health; identity; discrimination; education

ABSTRACTS OF POSTERS



HUMANITIES SCIENCES



DIGITAL TRANSFORMATION OF THE ECONOMY – THE IMPACT OF AUTOMATION AND ARTIFICIAL INTELLIGENCE ON THE LABOR MARKET

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A few words about the author(s):

My name is Klaudia Bala. I am a student of Finance and Accounting at the University of Economics in Krakow.

Abstract:

Digital transformation, driven by AI, automation, IoT, and Big Data, is shaping the modern economy and impacting key sectors such as industry, trade, finance, and public administration. Automation increases efficiency but reduces employment in routine jobs, requiring new digital skills and continuous learning.

Changes in the labor market lead to polarization and the risk of social inequalities, making institutional support and investments in digital education essential.

Keywords:

digital transformation; automation; artificial intelligence (AI); labor market; Big Data



UNDERSTANDING AUTISM

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A few words about the author(s):

I am a 2nd year student of care and educational pedagogy with pedagogical therapy. I work as a nanny. I am interested in confectionery and gardening. In the future, I would like to work as a vocational teacher.

Abstract:

Autism spectrum disorder is a developmental disorder, associated with specific and applied forms of child functioning. Autism presenting problems in establishing connections with others, in communication, and also available in development, cognitive. Children with autism are characterized by behaviors and behaviors that are obvious or specific in the context of the socio-cultural context. It is difficult to solve the definition, because we do not know its cause. Autistic children can have characteristics characteristic of autism spectrum disorders, but take into account the great diversity in their symptoms. An important case in the case of the development of a young person is the mother's role. Raising a child with autism is a great challenge for caregivers. They must be multitasking members, because they are not subject to the obligation of the autism spectrum, including numerous visits to doctors, psychological consultations, meetings with therapists, dieticians and rehabilitation. Parents do not only have communication between autistic children, but also reshape their marital one. The Ministry of Education and Science reports that by the end of September 2022, 82,199 children and adolescents in Poland had been assessed for the need for special education with comments on moderate autism spectrum disorders. Data from the National Health Fund show that in 2021, there were nearly 74,000 people in Poland diagnosed with autism and Asperger syndrome up to the age of 17.

Keywords:

autism; family functioning; statistics of autistic disorders in Poland; characteristics of autism; problems of autistic children



FAKE NEWS AND DISINFORMATION AS A THREAT TO NATIONAL SECURITY

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A few words about the author(s):

Bachelor's student in internal security. Chairwoman of the internal security science club.

Abstract:

Fake news and disinformation pose a significant threat to national security by manipulating public opinion, undermining trust in institutions, and destabilizing societies. The rapid spread of misleading information, facilitated by digital platforms and social media, creates vulnerabilities that can be exploited by both domestic and foreign actors. This paper explores the mechanisms of disinformation, its impact on democratic processes, and its role in hybrid warfare. By analyzing real-world examples, it highlights how misinformation campaigns influence elections, policy decisions, and public discourse. The study also examines strategies to counteract disinformation, emphasizing the importance of media literacy, fact-checking initiatives, and government policies. Understanding the nature of fake news is crucial for developing effective countermeasures and ensuring national stability in an era of information warfare.

Keywords:

fake news; disinformation; national security; hybrid warfare



CYBERSECURITY AS THE BASIS OF INTERNAL SECURITY

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A few words about the author(s):

Internal security student. Member of the internal security science club.

Abstract:

Cybersecurity is a key element of a country's internal security, protecting both public institutions and the private sector from threats posed by cybercriminal activities, hacking attacks, and acts of cyber warfare. In an era of advancing digitalization and globalization, cyberspace has become one of the main areas of competition and threats to state stability. This article discusses the importance of cybersecurity in protecting critical infrastructure, citizens' data, and public administration IT systems. It also presents the most significant challenges and threats, such as ransomware, phishing, and disinformation, while highlighting the need to develop effective cyber defense strategies, including international cooperation, legal regulations, and education on cyber hygiene. Adopting a comprehensive approach to cybersecurity not only minimizes the impact of cyberattacks but also strengthens a state's resilience to emerging threats in the digital world.

Keywords:

cybersecurity; internal security; cyber threats; critical infrastructure



THE USE OF ARTIFICIAL INTELLIGENCE IN INCREASING INTERNAL SECURITY

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A few words about the author(s):

Bachelor's student in internal security. Member of the internal security science club.

Abstract:

Artificial intelligence (AI) plays an increasingly significant role in ensuring internal security, supporting law enforcement, emergency services, and state institutions. The use of advanced AI algorithms enables effective analysis of large datasets, threat identification, and prediction of potential incidents. Technologies such as image and sound analysis, facial recognition systems, crime forecasting, and automated cyber threat detection significantly enhance the efficiency of preventive and operational activities. At the same time, the implementation of AI-based solutions presents ethical and legal challenges, such as privacy protection and accountability for algorithm-driven decisions. This article explores key AI applications in internal security and examines the potential benefits and risks associated with its deployment.

Keywords:

artificial intelligence; technology; internal security; safety



CENTRAL BANKS AND DIGITAL CURRENCIES (CBDC) – WILL CENTRAL BANK DIGITAL CURRENCIES (CBDCS) REPLACE CASH?

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1st year student of master's degree in Finance and Accounting at Cracow University of Economics.

Abstract:

Central Bank Digital Currencies (CBDCs) are emerging as a potential replacement for traditional cash, reshaping the global financial system. This study explores the motivations behind CBDC development, including financial inclusion, transaction efficiency, and monetary policy control. It examines the potential benefits, such as reduced transaction costs and enhanced security, as well as the challenges, including privacy concerns and the impact on commercial banks. By analyzing case studies of digital euro and digital yuan, this research assesses the feasibility of a cashless future and the implications of CBDC adoption for economies worldwide.

Keywords:

CBDCs; central banks; cash; financial system; digital transformation; security



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BANK COVENANTS

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Abstract:

Bank covenants, especially financial ones, are essential for managing credit risk by setting specific obligations for borrowers. They allow lenders to monitor financial health and mitigate excessive risk, typically through limits on debt, liquidity, and profitability.

This poster shows the classification, purpose, and impact of bank covenants on credit risk management. While they protect lenders by reducing default risk, they can restrict a company's operational flexibility. Breaching covenants can lead to renegotiations or financial penalties, causing strain on businesses.

The poster highlights the importance of balancing risk management with business growth, advocating for well-structured covenants that serve both lender security and borrower needs. Understanding these mechanisms is crucial for effective financial decision-making and long-term stability.

Keywords:

banking; risk management; covenants



NETWORK SECURITY

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My name is Krzysztof. I study at the university in Sanok, majoring in internal security. I am interested in new technologies that surround us. I belong to a scientific group at our university related to my field of study.

Abstract:

Online security. The Internet is a modern means of communication, sending information and even money. It is used by millions of people around the world, but not everyone knows how to use it safely. Users often make mistakes and become victims of hacker attacks, which can result in them losing their bank accounts, identity and valuable data. One of the basic safeguards that you can have on your electronics is a proven antivirus that will effectively protect your data and prevent dangerous software from entering the device's system. The basic principles of careful use of the Internet include setting strong passwords for accounts, enabling two-step login; do not provide your personal data, e.g. PESEL. The websites you visit should be verified to see if the address does not differ in character, letter or number from the correct address of the website you will be trying to log in to. In places such as bus stations, airports or restaurants, they provide public Wi-Fi networks that are vulnerable to hacker attacks. VPN should be used in such networks. Spam and phishing are among the most common fraud attempts. These are emails that resemble emails from mobile operators, banks and companies that send, for example, bills. Such messages should always be checked before opening. Never click on suspicious links or download attachments. If you are not sure whether it was a real company that sent the bill, you can always call the hotline with a question.

Keywords:

security; hacker; network; cheaters; internet



BEHAVIORAL ECONOMICS AND NEW TECHNOLOGIES – HOW DO ALGORITHMS INFLUENCE CONSUMER DECISIONS?

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A few words about the author(s):

I am a student of the University of Economics in Krakow. I am currently studying a master's degree in finance and accounting.

Abstract:

The presentation examines how behavioral economics and new technologies influence consumer decision-making. Behavioral economics combines psychology with economics, examining actual decision-making mechanisms, including emotions, heuristics and cognitive biases.

Modern algorithms, such as recommendation systems, personalized ads and big data analytics, use these mechanisms to shape user behavior.

Examples are:

Manipulating behavior – algorithms personalize content based on the history of user actions, creating an "information bubble" effect and using "nudging" techniques, e.g. messages suggesting the urgency of a purchase.

Cognitive biases and algorithms – using the anchoring effect, loss aversion, status quo effect or choice overload to influence decisions.

Examples of applications – from shopping applications (Amazon, Allegro) to investment platforms (eToro) and banking, where algorithms suggest actions based on heuristics and social proof.

Keywords:

algorithms; cognitive biases; behavioral economics; personalization; consumer decisions



INFLATION – THE ECONOMY’S NUMBER ONE ENEMY?

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A few words about the author(s):

1st year student of Master degree at Finance and accounting.

Abstract:

Inflation is one of the most crucial economic phenomena, affecting both consumers and businesses worldwide. This poster explores the causes, consequences, and management of inflation, providing a comprehensive overview of its role in the economy. The main drivers of inflation, including demand-pull, cost-push, and excessive money supply, are analyzed to understand their impact on prices and purchasing power. The effects of inflation, such as reduced consumer spending power and economic instability, are examined alongside the measures taken by central banks to control it, including interest rate adjustments and monetary policies. While inflation is often perceived negatively, this study also highlights its potential benefits when kept at moderate levels. The poster concludes with key insights into the importance of inflation control for long-term economic stability.

Keywords:

inflation; emonetary policy; central banks; interest rates; price stability



DIGITAL FIGHT FOR THE CONSUMER

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A few words about the author(s):

I am studying finance and accounting.

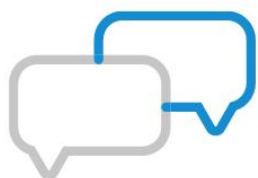
Abstract:

1. Dynamic Pricing – Real-time price adjustments, examples (Amazon, airlines), and ethical concerns.
2. Personalization & Recommendations – AI-driven customization, benefits, risks, and case studies.
3. Behavioral Advertising – User tracking, privacy concerns, and legal regulations (GDPR, cookies).
4. Economic & Social Impact – Market competition, job market shifts, and regulatory needs.

Keywords:

digital economy; dynamic pricing; personalization; behavioral advertising; AI in marketing

ABSTRACTS OF PRESENTATIONS



MEDICAL SCIENCES



PHYTOCHEMICAL COMPOSITION AND IN VITRO STUDIES OF HELIOTROPIUM RAMOSISSIMUM SIEBER EX DC.: FOCUS ON SKIN-RELATED PROBLEMS

**Izabela Bielecka (1)*, Katarzyna Klimek (2), Arlindo Rodrigues Fortes (3),
Małgorzata Miazga-Karska (2), Wioleta Dołomisiewicz (1),
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A few words about the author(s):

The authors study plant extracts and active compounds isolated from them for their antioxidant, antibacterial, anti-inflammatory, anticancer, and other effects. They have many publications and patents to their credit.

Abstract:

The Boraginaceae family is one of the largest families, comprising hundreds of genera and almost a thousand species, found in both tropical and temperate climates. Heliotropium, a genus belonging to this family, is used to treat many ailments, such as gingivitis, rheumatism, breast abscesses, burns, menstrual disorders, and skin diseases. The leaves of the species for our research were collected on the island of Santo Antao, Cape Verde. Hexane, ethanol (70%), methanol-acetone-water (3:1:1, v/v/v) and water extracts were subjected to chromatographic analysis using LC-MS method and in vitro biological activity assessment. The total phenolic content was measured using the Folin–Ciocalteu reagent, with the results expressed as gallic acid equivalents (GAE) per gram of dry extract (DE), The total flavonoid content (TFC) was determined using the colorimetric method and the data were expressed as quercetin equivalents (QE) per g of dry extracts (DE). The results of spectrophotometric assays showed that the total content of polyphenols, phenolic acids and flavonoids was at an average level. All H. ramosissimum extracts demonstrated a moderate capacity to neutralize ABTS•+ and DPPH• radicals. All extracts had a moderate activity against microaerobic strains - causing acne and seborrheic skin diseases, in the range of 15 mm - 6 mm. The cell culture experiments in vitro showed that most of the H. ramosissimum extracts can be considered non-cytotoxic in the tested concentration ranges.

Keywords:

Heliotropium (Boraginaceae); LC-MS, antioxidant activity; antimicrobial activity; cytotoxicity



COMPARISON OF THE EFFICACY OF IMPLANTACION MICRO-SHUNT PRESERFLO AND TRABECULECTOMY IN PATIENT WITH GLAUCOMA

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A few words about the author(s):

Malgorzata Chilmonczyk is resident physician at the Department of Ophthalmology at the Medical University of Bialystok, is also a PhD student. Joanna Konopinska, MD, is head of the Department of Ophthalmology at the Medical University of Bialystok.

Abstract:

INTRODUCTION: Glaucoma is a major cause of irreversible blindness. This study compares the efficacy and safety of Preserflo and trabeculectomy regarding intraocular pressure (IOP) control and postoperative complications.

METHODS: A retrospective analysis was conducted on 99 patients (Preserflo: n=39; Trabeculectomy: n=43). Statistical tests included Shapiro-Wilk, Pearson's chi-square, Student's t-test, and Mann-Whitney U. A p-value <0.05 was considered significant.

RESULTS: Mean age: Preserflo: 68 years vs. Trabeculectomy: 73 years (p=0.006); Preoperative IOP: Preserflo: 20.6±4.2 mmHg vs. Trabeculectomy: 25.3±5.1 mmHg (p=0.005); IOP 1 day post-op: Preserflo: 12.0±3.5 mmHg vs. Trabeculectomy: 15.0±4.8 mmHg (p<0.001); IOP 90 days post-op: Preserflo: 14.0±3.9 mmHg vs. Trabeculectomy: 13.0±4.2 mmHg (p=0.032); Endothelial cell count (CD) 90 days post-op: Preserflo: 1949.07±504.16 vs. Trabeculectomy: 1599.71±506.45 (p=0.002); Complications: No significant differences (p>0.05); Postoperative interventions: 5-FU: Preserflo: 68% vs. Trabeculectomy: 39.6% (p=0.009).

CONCLUSIONS: Preserflo provided better early IOP control and preserved more endothelial cells. Trabeculectomy required more frequent postoperative interventions. Both procedures had comparable complication profiles. The choice should consider patient age, corneal health, and individual risk factors.

Keywords:

Glaucoma; Preserflo; Trabeculectomy; intraocular pressure; Endothelial Cells; postoperative complications; Micro-Shunt; surgical outcomes



SEVERITY AND FREQUENCY OF CLIMACTERIC SYMPTOMS AMONG WOMEN IN MENOPAUSAL STAGE

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A few words about the author(s):

Graduate of the Medical University of Silesia. My main areas of interest are women health and sexology.

Abstract:

The aim of the study was to analyze the severity and frequency of climacteric symptoms among women in menopausal stage.

The study included 100 women aged 45-55 years. The research tool was a questionnaire consisting of a section containing questions on the author's interview regarding sociodemographic data, gynecological care and lifestyle, and the Kupperman index.

Women taking menopausal hormone therapy scored medium to low on the Kupperman Index, in contrast to women not taking hormone therapy. The most bothersome menopausal symptoms were hot flashes and excessive sweating.

Women's use of hormonal menopausal therapy reduced the frequency and severity of menopausal symptoms compared to women not using HTM. Women with higher education, living in urban areas and with very good and good material conditions were more likely to use hormone therapy.

Keywords:

menopause; menopausal symptoms; climacteric symptoms



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THE USE OF ANTIBACTERIAL AGENTS IN ANIMAL FARMING THE GROWING PROBLEM OF BACTERIAL ANTIBIOTIC RESISTANCE

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A few words about the author(s):

Authors of this work are students attending 3rd year of medical faculty. We conduct a great deal of science work in Medical Microbiology Students Research Group supervised by Małgorzata Kozioł, PhD in microbiology.

Abstract:

The use of antibiotics is an important measure to protect animals from the development of diseases in intensive farming conditions; however, their excessive use promotes the development of bacterial resistance, which affects the effectiveness of future therapeutic processes for many diseases. Regulations introduced by the EU contribute to maintaining a balance between the benefits and risks of this practice. According to data from the European Medicines Agency, between 2011 and 2022, Poland saw an upward trend in the use of antibiotics in animal farming (in 2022, an increase of ~55% compared to 2011). In 2022, for every 1,000 tons of animals intended for food, 196.0 mg/PCU of active antibiotic ingredients was used, placing Poland in second place in the EU. The most common groups of antibiotics detected in these products in Poland in 2022 were penicillins, tetracyclines, and macrolides. The aim of this study was to present the growing problem of antibiotic overuse in Polish animal farms.

Keywords:

veterinary medicine; susceptibility; antibiotics



DIAGNOSTIC METHODS IN TUBERCULOSIS – COMPARISON OF TWO CASES

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Ewelina Wawryk-Gawda (4)**

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A few words about the author(s):

The Authors of this work is student attending 4th and 5th year of medical faculty. The study was conducted under the supervision of Małgorzata Koziół, MSc, PhD in microbiology and Ewelina Wawryk-Gawda, MD, PhD in pulmonology.

Abstract:

Tuberculosis (TB) is an infectious disease caused by acid-fast mycobacteria of the *Mycobacterium tuberculosis* complex, and the most common clinical manifestation is pulmonary form. In 2023, 4436 cases of TB were reported in Poland, and now this number even increased.

Case report: (1) A 17-year-old male, reported chronic cough, fever, night sweats, weight loss and fatigue for about 5 months. Chest X-rays revealed changes indicative of inflammatory lobular thickening and focal decay. Molecular testing of sputum and microscopic slide revealed positive results and the culture was started. A preliminary diagnosis of pulmonary TB was made on this basis. (2) A 17-year-old female patient presented with a chronic cough, shortness of breath, and fever after an URTI. She had contact with a patient diagnosed with TB. Imaging studies revealed right-sided pneumonia with abscess and pleuritis. Only culture after 55 days was positive, but microscopic slide in the beginning was negative. Pulmonary TB patient was transferred to surgical treatment.

The preferably TB diagnosis is made by cultureµscopy, another option is add molecular testing and from clinical point of view presence of granulomas in a histopathological examination. WHO recommends use of rapid and automated molecular tests NAATs as important part of preliminary diagnostic procedure. Although less accurate than culture they allow results to be obtained in a shorter period of time, enabling faster implementation of treatment.

Keywords:

M.tuberculosis; PCR; bacterial culture



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THE POTENTIAL OF SELECTED ESSENTIAL OILS IN COMBATING ENTEROCOCCUS FAECALIS

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A few words about the author(s):

My name is Sebastian Such, and I am passionate about research in chemistry, pharmacy, herbalism, and medicine. I study the effects of substances on the human body and share my knowledge on my Facebook blog "Zielarska Alchemia." I invite you to visit!

Abstract:

Enterococcus faecalis is an opportunistic pathogen that poses a significant challenge in infection therapy, especially given its increasing resistance to antibiotics. This study evaluated the antibacterial properties of selected essential oils: marjoram, eucalyptus Cananga, Ylang-Ylang, caraway, clementine, and Petitgrain.

The results indicate that marjoram, Cananga, and Petitgrain essential oils exhibited the highest effectiveness against *E. faecalis*. These oils produced the largest inhibition zones, suggesting strong antibacterial activity. The remaining essential oils showed lower efficacy, possibly due to differences in their chemical composition and the mechanisms of action of their bioactive components.

These findings highlight the potential of essential oils as alternative or complementary agents in combating resistant pathogens such as *E. faecalis*. Further research on their mechanisms of action and optimal applications could contribute to the development of new therapeutic strategies.

Keywords:

essential oils; *Enterococcus faecalis*; antibacterial activity; bacterial resistance; alternative therapies



CURRENT EPIDEMICAL SITUATION OF FOOD POISONING CAUSED BY BACTERIAL TOXINS IN POLAND

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A few words about the author(s):

Authors of this work are students attending 3rd year of medical faculty. We conduct a great deal of science work in Medical Microbiology Students Research Group supervised by Małgorzata Kozioł, PhD in microbiology.

Abstract:

Bacterial intoxication is a disease caused by consumption of food contaminated with bacterial toxins, such as those from *Staphylococcus aureus*, *Bacillus cereus*, or *Escherichia coli*. Symptoms include nausea, vomiting, abdominal pain, and diarrhea, which can lead to severe dehydration. Monitoring statistics on intoxications and analyzing data is the foundation of food safety policies. In Poland, from 2005 to 2009, there was a significant decline in food poisoning cases following Poland's accession to the EU and the adoption of food regulations. From 2010 to 2023, the number of cases remained stable (~10,000 illnesses). In 2023, 10,141 cases were reported, with 6,030 individuals requiring hospitalization. The majority of cases affected children (37.1%-20.8%) and people over the age of 55. Intoxications occurred during warmer months, which may indicate a problem with improper food storage. The aim of this study was to present the current epidemiological situation of bacterial intoxications in Poland and analyze potential causes.

Keywords:

intoxication; diarrhea; food safety



BACILLUS CEREUS AS AN ETIOLOGICAL AGENT OF FOOD POISONING – CHARACTERISTICS, OCCURRENCE, AND PREVENTION

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A few words about the author(s):

Authors of this work are students attending 3rd year of medical faculty. We conduct a great deal of science work in Medical Microbiology Students Research Group supervised by Małgorzata Kozioł, PhD in microbiology.

Abstract:

Bacillus cereus is a Gram-positive, spore-forming, bacilli and one of the most common etiological agents of food poisoning worldwide, accounting for approximately 1.4%–12% of all foodborne illnesses. Its toxins—the emetic toxin and diarrheal enterotoxin—were the most frequent cause of bacterial intoxications in EU, with 4,665 reported cases in 2023. *B. cereus* is often isolated from products such as rice, pasta, dairy products, meat, and cereals. Numerous regulations and food contamination control methods exist (including ISO standards and the HACCP system). However, due to the specific nature of the emetic toxin (which exhibits exceptional resistance to high temperatures and digestive enzymes) and the production of spores that withstand standard food processing methods, *B. cereus* poses a significant epidemiological problem, particularly when food is stored under inadequate conditions after cooking. The aim of this study was to analyze current situation about *B. cereus*-induced food poisoning and possible prevention strategies against intoxication by this pathogen.

Keywords:

intoxication; food storage; emetic toxin



ACUTE TRAUMATIC INJURY OF THE THORACIC AORTA: IMAGING DIAGNOSTICS AND CLASSIFICATION

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A few words about the author(s):

My name is Katarzyna Bazylewicz-Zakrzewska. Currently pursuing specialization training in Radiology at the Department of Imaging Diagnostics and Interventional Radiology.

Abstract:

Acute traumatic injury of the thoracic aorta is a life-threatening condition, often resulting from high-energy trauma such as motor vehicle collisions. The aortic bulb and isthmus are the most common sites of injury due to the shearing forces and interactions with bony structures such as the sternum and spine. This presentation explores the various imaging modalities used for diagnosis, including chest radiography, computed tomography (CT), transesophageal echocardiography, intravascular ultrasound, and magnetic resonance angiography. These techniques are critical for detecting key features such as focal endothelial damage, intramural hematomas, pseudoaneurysms, and complete aortic rupture. The differentiation between physiological bulging of the ductus arteriosus and pathological findings is essential for accurate diagnosis and treatment planning. Management strategies depend on the severity of the injury. Conservative treatment is often sufficient for minor injuries, while more severe cases require endovascular repair or open surgery. This presentation provides an in-depth review of diagnostic and therapeutic approaches, with a focus on improving patient outcomes through timely intervention.

Keywords:

acute traumatic injury of the thoracic aorta; thoracic aorta; pseudoaneurysm; aortic rupture



CHOLESTEATOMA – DIAGNOSTIC AND THERAPEUTIC MANAGEMENT IN A 15-YEAR-OLD PATIENT WITH CHRONIC OTITIS MEDIA

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A few words about the author(s):

My name is Katarzyna Bazylewicz-Zakrzewska. Currently pursuing specialization training in Radiology at the Department of Imaging Diagnostics and Interventional Radiology.

Abstract:

Cholesteatoma, a destructive lesion of the middle ear, often leads to significant complications if left untreated. This case report presents the diagnostic and therapeutic management of a 15-year-old patient with chronic cholesteatomatous otitis media in the left ear. The patient's history includes recurrent ear infections, hearing loss, and surgical interventions spanning over a decade. Diagnostic imaging, such as computed tomography (CT) and audiometry, confirmed the presence of an expanding cholesteatoma, which led to progressive hearing impairment.

The surgical approach included a closed tympanoplasty, posterior tympanotomy, and myringoplasty to repair the tympanic membrane and restore auditory function. Additionally, cholesteatoma removal was performed, targeting affected areas around the ossicular chain and facial recess. Postoperative recovery was closely monitored to assess any recurrence of the cholesteatoma and evaluate the need for ossiculoplasty to further improve hearing.

This case highlights the importance of early diagnosis and regular follow-up in managing cholesteatoma, particularly in pediatric patients, as cholesteatomas in children tend to grow rapidly and have a higher recurrence rate. The surgical outcomes emphasize the effectiveness of tympanoplasty and cholesteatoma removal in preserving middle ear function and preventing further complications.

Keywords:

cholesteatoma; tympanoplasty; otitis media



UROGYNECOLOGICAL PHYSIOTHERAPY AS A KEY ELEMENT OF ENDOMETRIOSIS THERAPY – NEW PERSPECTIVES IN IMPROVING WOMEN'S HEALTH AND QUALITY OF LIFE

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A few words about the author(s):

2nd year physiotherapy student. Enthusiast of human anatomy.

Abstract:

Endometriosis is a chronic, estrogen-dependent inflammatory disease affecting millions of women worldwide, often remaining undiagnosed for a long time. Due to non-specific symptoms and the lack of unambiguous biomarkers, the diagnosis of endometriosis is significantly hampered, which delays the implementation of effective treatment and negatively affects the quality of life of patients.

The purpose of this paper is to analyze the magnitude of the problem in the health and social context, with a particular focus on the need to implement more effective diagnostic methods and a multidisciplinary therapeutic approach. In particular, physiotherapy is an important part of therapeutic management, contributing to the reduction of muscle tension, the alleviation of pain and the improvement of motor function, which directly improves the patients' quality of life.

Increasing public awareness and implementing coordinated interdisciplinary care can reduce the time needed for proper diagnosis and increase the effectiveness of treatment, which is a key aspect of improving the quality of life of women affected by endometriosis.

A review of available scientific publications on endometriosis and urogynecologic physiotherapy in peer-reviewed journals using PubMed, NCBI, PMC, ScienceDirect, Oxford Academic Journals and MDPI databases was used for the study.

Keywords:

endometriosis; endometriosis diagnosis; physiotherapy; women's quality of life



TREATMENT AND CARE OF PRESSURE BEDSORES

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A few words about the author(s):

Weronika Witek, Ewa Staszak – medical student society at institute of medical sciences.
Karolina Bugno – 3rd year student nursing.

Abstract:

Pressure ulcers, also known as bedsores, are the damage to the skin and deeper tissues, typically developed on bony prominences due to ischemia caused by pressure. Individuals who are immobile for long periods of time, such as the elderly, disabled, and chronically ill, are particularly vulnerable to their development. The classification of pressure ulcers is based on the 4-stage EPUAP/NPUAP scale or the 5-stage Torrance scale. The assessment of tissue damage allows for the adjustment of appropriate wound treatment. It is crucial to assess risk factors, especially in the case of immobile patients, to prevent the development of pressure ulcers. The most commonly used scales for this purpose are the Norton, Douglas, and Braden scales. For patients at high risk, preventive actions should be immediately initiated to avoid the formation of pressure ulcers. Effective prevention and treatment require systematic observation of the patient, regular repositioning, maintaining hygiene, and the use of specialized mattresses and dressings. Appropriate care plays a vital role in preventing the development of pressure ulcers and in their treatment because proper actions and regular health monitoring help in the early detection of problems and taking appropriate steps to reduce the risk of complications, ultimately improving patient's comfort.

Keywords:

care; bedsores; treatment



APIGENIN – STRUCTURE AND USE IN MEDICINE AND PHARMACY

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A few words about the author(s):

Anna Glinkowska is PhD Student in Doctoral School in discipline of Medical Sciences. Her research based on experimental medicine and polymers. Privately, she's interested in microbiology, toxicology and history of medicine.

Abstract:

Apigenin is flavonoid belonging to the flavones group. It can be found in camomile, thyme, celery, lemon, parsley, red pepper, beer and red wine. There are many scientific studies proving the use of apigenin in medicine and pharmacy.

Apigenin can reduce appetite. Scientists from Seoul isolated it and studied its effect on the amount of food consumed in C57BL/6J mice. Reduced food intake was observed.

It also has antiviral and laxative properties, regulates the concentration of low-density lipoproteins in the plasma, inhibits platelet aggregation and reduces cell proliferation.

Apigenin promotes metal chelation, reduces free radicals and induces apoptosis in many cancer cells. It is a strong inhibitor of ornithine decarboxylase, an enzyme that plays an important role in inhibiting progressing of cancer.

In addition, it is a strong activator of the TRPV4 ion channel. This channel is a potential target for new therapies for osteoarthritis, and cartilage regeneration.

It also affects the increase in intracellular glutathione concentration, which is an endogenous defense factor against oxidative stress.

Scientists are also interested in flavonoids, including apigenin, in the context of treating burn and pressure sore wounds. The antibacterial and anti-inflammatory properties of apigenin may result in faster and uncomplicated treatment of this type of wound.

Compounds of natural origin are not yet fully discovered by humans, which gives us unlimited possibilities.

Keywords:

Apigenin; flavonoids; flavones; treatment



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INVESTIGATION OF A PROTEOLYSIS-TARGETING CHIMERA WITH POTENTIAL APPLICATION IN HIV TREATMENT

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A few words about the author(s):

PhD student at the Doctoral School of Collegium Medicum, Nicolaus Copernicus University.

Abstract:

Proteolysis-targeting chimeras (PROTACs) offer an innovative approach to HIV treatment by impacting key viral replication mechanisms through selective inhibition of essential viral proteins. Additionally, PROTAC technology, which enables precise degradation of proteins, presents a promising method in the fight against HIV. The combination of proteolysis-targeting chimeras and PROTACs opens new possibilities for HIV therapy, enhancing treatment efficacy and reducing the risk of resistance to current drugs.

The research focused on a PROTAC chimera with antiviral activity against HIV. The studies were conducted using *in silico* methods, employing tools such as admetSAR and OSIRIS DataWarrior. The probability of binding to plasma proteins was 87%, and to the UGT substrate, it was 79%.

Keywords:

PROTAC; HIV; degradation



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STROKE CASE STAGE

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A few words about the author(s):

My name is Katarzyna Kuchta. I am a physiotherapist by passion and education. I believe that "a person is what they are passionate about". Physiotherapy, which is my passion, allows me to combine academic knowledge with my altruistic nature.

Abstract:

OBJECTIVE: To examine the effects of age, time from stroke onset, gender and side of paresis in gait re-education with the use of treadmill with biofeedback, in patients with chronic stroke.

METHODS: The study was performed with a group of 50 patients. 10-metre walk test, 2-minute walk test, "Up and Go" test, the number of steps performed with the paretic lower limb at a distance of 10 metres, Barthel index and FIM scale were used to assess the effects of rehabilitation.

RESULTS: The study shows that the subjects' abilities and fitness prior to the rehabilitation were not related to age, sex or side of paresis. Analysis of the impact of age, time from stroke and sex on rehabilitation outcomes showed no statistically significant correlations. On the other hand, analysis of rehabilitation results relative to the side of paresis showed that the latter factor significantly differentiates rehabilitation outcomes measured with gait velocity test - $p= 0.045$.

CONCLUSION: Age, duration of time from stroke onset, and sex do not affect outcomes of gait re-education based on treadmill training in patients at a chronic stage post-stroke and Brunnstrom recovery stage 3-4. Side of paresis significantly differentiates rehabilitation outcomes measured with speed test. The best scores in all the performance measures before rehabilitation were identified in the group 3-6 years after stroke.

Keywords:

stroke; age; gait; sex; side of paresis; treadmill



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THE ROLE OF MCAM+ CELLS DURING SKELETAL MUSCLE REGENERATION OF WILD-TYPE AND DUCHENNE MUSCULAR DYSTROPHY MOUSE MODEL

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A few words about the author(s):

Dominika Kulma, a Biotechnology student at the University of Warsaw, is conducting her master's thesis on MCAM+ cells in mouse skeletal muscles under Dr. Bartosz Mierzejewski's supervision, as part of a project funded by the National Science Center.

Abstract:

Skeletal muscle regeneration is driven by satellite cells, which activate, proliferate, and differentiate into myoblasts that fuse to form new muscle fibers after injury. However, other cell types, such as pericytes, also contribute to this process. While pericytes' vascular function is well known, their role in muscle repair remains unclear. Available data suggests that MCAM+ pericytes can undergo myogenic differentiation both in vitro and after engraftment into injured muscle. Muscle regeneration is essential for maintaining tissue function but is impaired in diseases such as Duchenne muscular dystrophy (DMD). DMD is caused by lack of dystrophin, a protein responsible for muscle fiber stabilization. The lack of dystrophin leads to ineffective tissue repair and progressive muscle degeneration. My study focused on the role of MCAM+ pericytes in muscle regeneration of wild-type (WT) and mdx mice. The mdx mouse lacks functional dystrophin like DMD patients and is widely used to study the DMD. I isolated chemically injured skeletal muscles at various regeneration stages, analyzed mRNA expression of key muscle resident cell markers via qPCR, and performed histological and immunohistochemical staining. Obtained results revealed the differences in muscle morphology and cell markers expression between WT and mdx mice but also similarities in MCAM+ cell localization. These findings improve our understanding of muscle regeneration and the role of MCAM+ pericytes in this process.

Keywords:

skeletal muscles; Duchenne muscular dystrophy; pericytes; MCAM; regeneration



EFFECTIVENESS OR POSTURING? MODERN TECHNOLOGIES IN HEALTHCARE

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A few words about the author(s):

She graduated from Physiotherapy at the Silesian Medical University in Katowice, with a master's degree. She is currently studying at the ŚUM Doctoral School, pursuing a doctorate in Health Sciences.

Abstract:

The aim of the presentation is to encourage a critical assessment of new technologies emerging in healthcare. The modern medical market is abundant with innovative technologies that are often advertised as effective in therapy and treatment. However, many of these devices have not been properly verified for their effectiveness and safety, and the market is already flooded with more "breakthrough inventions." Some of these technologies, despite statements from scientific associations regarding their effectiveness, still appear in private practices and centers.

The presentation will focus on identifying key factors that may lead to a misleading belief in the effectiveness of such devices, as well as discussing potential risks. It should also encourage critical analysis and a responsible approach to innovation in healthcare.

Keywords:

new technologies; safety; healthcare; effective therapies; scientific evidence



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DMEK WITH THE USE OF A SMALL-DIAMETER GRAFT– LONG-TERM OBSERVATION OF POSTOPERATIVE OUTCOMES IN PATIENTS WITH FUCHS' DYSTROPHY

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Co-author of scientific publications in international journals (IF 6.938), conference reports, recipient of a Student Grant for a Scientific Project, and author of an award-winning paper at the Conference of Medical University Students (3rd place).

Abstract:

PURPOSE: This study aimed to evaluate long-term postoperative outcomes following the use of small-diameter grafts in DMEK procedures.

METHODS: Thirty-four eyes were evaluated after DMEK surgery. Best corrected visual acuity (BCVA), endothelial cell count (ECC), endothelial cell loss (ECL), central corneal thickness (CCT), mean keratometry (MK), mean astigmatism (MA), astigmatism asymmetry (AA), and higher-order aberrations (HOA) were assessed at baseline and 12, 24 and 36 months after surgery using anterior segment swept-source OCT (CASIA2, Tomey, Japan).

RESULTS: BCVA improved gradually during the 12-month follow-up, after which the stabilisation of this parameter was documented. Compared with the donor values, the cumulative median ECL reached approximately 63.95% over 36 months. No significant changes in total keratometry between baseline recordings and 36-month data were observed. Total astigmatism power significantly decreased between baseline and the 12th month and subsequently between the 12th and 24th month, with consecutive stabilisation of astigmatism power from the 24th month to the 36th month of follow-up. Significant reductions in HOA were observed until the 12th month, followed by the stabilisation of these parameters.

CONCLUSION: The use of smaller grafts in DMEK demonstrates high effectiveness in maintaining high visual and refractive quality while offering potential advantages in tissue.

Keywords:

Fuchs Corneal Dystrophy; Descemet Membrane Endothelial Keratoplasty (DMEK); Small-Diameter Grafts; Long-Term Follow-Up



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FUNCTIONAL AND ESTHETIC DENTAL METAMORPHOSIS, CASE REPORT

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Abstract:

Metamorphosis is the description of a total prosthetic reconstruction of all teeth. Usually, patients ask for such a treatment due to esthetic requirements, not being aware of their functional needs. Our presentation describes metamorphosis of the patient with aggressive teeth abrasion, caries and dark discoloration.

Patient was treated in 2-stages procedure. At the beginning, after appropriate set of occlusion, the wax-up and subsequent mock-up was provided to the patient for a 2 month adjustment. The control appointments were set every 2 weeks for correction of the occlusion and check of the overall oral health.

After 2 month, the second phase of treatment was conducted. Firstly, the current, mock-up occlusion was preserved with impressions of both dental arches and a allu-wax stripes. Next, the upper and lower teeth were cut with the diamond grind, After, immediate dentin sealing, the silicone impressions were taken. Finally, the zirconia, permanent crowns, bridges and overlays were cemented with the adhesive cement.

The restoration works perfectly for 3 years, which has been notified during every year follow up hygiene appointments. Patient is satisfied with his teeth and he claims their reconstruction improved the quality of his life.

Keywords:

dental metamorphosis; zirconia; fixed prosthesis



TAKOTSUBO SYNDROME

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Abstract:

Takotsubo syndrome, also known as "broken heart syndrome," is a type of cardiomyopathy first described in 1990, with clinical manifestations often resembling ACS. The left ventricle exhibits a characteristic shape, resembling apical ballooning. The condition predominantly affects postmenopausal women and is often preceded by emotional and physical stress. The exact pathogenesis of Takotsubo syndrome remains unclear; however, several pathophysiological mechanisms have been proposed, including myocardial ischemia, left ventricular outflow tract obstruction, and autonomic nervous system dysfunction. In the acute phase of the disease, many patients may experience severe complications such as arrhythmias, heart failure, pulmonary edema, pulmonary embolism, cardiogenic shock, cardiac arrest, and myocardial rupture. Treatment focuses on managing triggering factors, addressing predisposing conditions, and treating complications arising during the acute phase of the disease.

Keywords:

Takotsubo; cardiomyopathy; Broken Heart Syndrome



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THE PROBLEM OF HIV INFECTION AND THE EFFECTS OF ANTIRETROVIRAL THERAPY IN PREGNANT WOMEN

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Authors of this work are students attending 3rd year of medical faculty. We conduct a great deal of science work in Medical Microbiology Students Research Group supervised by Małgorzata Koziół, PhD in microbiology.

Abstract:

Human immunodeficiency virus (HIV) is an enveloped RNA virus, with a unique developmental cycle. Untreated infection leads to a high viral load, which may lead to the development of AIDS. Despite medical advances and prevention, the number of infected people is increasing yearly. Infection in pregnant women is notably important because untreated infection leads to vertical transmission. Therefore, a universal testing program for pregnant women has been introduced in developed countries.

In total, there are about 35,000 people living with confirmed HIV infection in Poland. According to the latest guidelines, in order to reduce the viral load during pregnancy and thus limit the transmission of the virus to the fetus, combination therapy (CART) has been announced. Used drugs are integrase inhibitors (dolutegravir) and also nucleoside reverse transcriptase inhibitors (NRTIs), i.e. abacavir, emtricitabine, lamivudine. CART is a combination of dolutegravir, abacavir and lamivudine.

Nevertheless, the therapy itself can multi directionally affect the condition of mother and child. The aim of this study was to present and draw attention to the problem of HIV infection during pregnancy, the importance of the ordered diagnosis of pregnant women, the adopted therapeutic management of the infection and the consequences of antiretroviral therapy.

Keywords:

pregnant; congenital infection; therapy



ELPENOR'S SYNDROME – CHARACTERISTICS

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Abstract:

Elpenor syndrome also known as Confusional arousal is a parasomnia associated with the NREM phase of sleep. (Often co-occurring sleep drunkenness may be a co-occurring element with the mentioned above disorder, or may occur as a symptom of other sleep disorders. Nevertheless, the terms confusional arousal and sleep drunkenness are often regarded as synonymous.) It manifests as a brief qualitative disturbance of consciousness occurring immediately after waking, in predisposed individuals. Predisposing factors include: states of exhaustion resulting from sleep deprivation or deficiency, alcohol and other consciousness affecting substances, and individual variability. Confusional arousal can also be triggered by deep-sleep-awakening factors, such as obstructive sleep apnea, narcolepsy, abnormal circadian rhythms of sleep, excessively long sleep, and triggers (e.g., bright light, a ringing phone during sleep, or the need to use the restroom). Symptoms of Elpenor syndrome include: sudden awakening without full consciousness, unfamiliar gaze, sometimes vocalization along with amnesia of the event. Parasomnias lead to a decrease in the quality of rest, and can result in significant reduction of the level of well-being during the day. Diagnosis is based on observation of symptoms characteristic of Elpenor syndrome and the results of polysomnography. Treatment consists primarily of ensuring sleep hygiene and minimizing stress.

Keywords:

Parasomnia; Elpenor syndrome; confusional arousal



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THE USE OF HIPPO THERAPY IN THE REHABILITATION OF CHILDREN WITH CEREBRAL PALSY

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A few words about the author(s):

A physiotherapist specializing in pediatric rehabilitation. She holds a Master's degree in Physiotherapy as well as a degree in Emergency Medical Services. A long-time member of the Volunteer Fire Department. Participant in scientific conferences and author of scientific articles. Currently a PhD student at the Doctoral School of the Medical University of Silesia in Katowice, Faculty of Health Sciences.

Abstract:

Hippotherapy is one of the rehabilitation methods for children with cerebral palsy, utilizing the natural movements of a horse to stimulate the patient's nervous and muscular systems. The aim of this presentation is to discuss the mechanisms of hippotherapy and its impact on improving motor functions, coordination, and balance in children with cerebral palsy (CP). The presentation will include research findings confirming the effectiveness of this method, as well as practical aspects of therapy, such as patient qualification criteria and the role of therapists. As a supportive therapy, hippotherapy not only enhances children's physical abilities but also fosters their emotional and social development.

Keywords:

hippotherapy; cerebral palsy; therapy



APPLICATION OF CRISPR/CAS9 TECHNOLOGY IN THE MODULATION OF ALZHEIMER'S DISEASE PATHOMECHANISMS – THERAPEUTIC POTENTIAL AND CLINICAL LIMITATIONS

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Graduate of the Medical University of Lublin, laboratory diagnostician, 2nd year doctoral student at the Doctoral School of the MUL. Affiliated with St. John of Dukla Oncology Center of Lublin Region. He studies mechanisms of mitochondrial dysfunction in neurodegenerative diseases.

Abstract:

Alzheimer's disease (AD) is the most common cause of dementia, characterized by progressive neuronal degeneration and loss of cognitive function. Current therapies only alleviate symptoms without significantly affecting the progression of the disease. CRISPR/Cas9 gene-editing technology is opening up new possibilities in research and potential treatment of AD. This presentation discusses the use of CRISPR/Cas9 in modulating the pathogenetic mechanisms of AD. Particular attention was given to the modification of pathogenesis-related genes such as APP, PSEN1 and PSEN2, whose mutations lead to overproduction of beta-amyloid. Studies on silencing genes responsible for the accumulation of toxic beta-amyloid and tau proteins have also been presented, which may help to slow disease progression. Despite the promising results of preclinical studies, there are significant clinical challenges. These include the difficulty of efficiently delivering the CRISPR/Cas9 system to nerve cells, the risk of unintended genome modifications, and ethical issues related to genetic modification in humans. CRISPR/Cas9 technology has significant therapeutic potential in the context of Alzheimer's disease, but further research is needed to overcome current limitations to enable its safe and effective clinical application.

Keywords:

neurodegeneration; Alzheimer's disease; therapy; genetics



OBSTRUCTIVE SLEEP APNEA AND ITS IMPACT ON THE CARDIOVASCULAR SYSTEM

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Weronika Witek, Ewa Staszak, Adrian Mrozik – medical student society at institute of medical sciences. Karolina Bugno – 3rd year student of nursing.

Abstract:

Obstructive sleep apnea (OSA) is a common sleep disorder that, as research suggests, increases the risk of cardiovascular diseases. Recurrent episodes of hypoxia and activation of the sympathetic nervous system may lead to elevated blood pressure, arrhythmias, and the development of coronary artery disease. OSA contributes to chronic inflammation and oxidative stress, impairing endothelial function and promoting the progression of atherosclerosis. Continuous positive airway pressure (CPAP) therapy is an effective treatment that improves hemodynamic parameters; however, its impact on reducing cardiovascular risk requires further investigation. The presentation discusses the impact of OSA on the cardiovascular system and therapeutic strategies.

Keywords:

sleep apnea; cardiovascular system; CPAP



THE USE OF EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO): TECHNICAL CONFIGURATIONS, CLINICAL INDICATIONS AND POSSIBLE COMPLICATIONS - AN OVERVIEW OF THE METHOD

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A few words about the author(s):

Physician during specialty training in cardiology. Doctoral student at the doctoral school of the Pomeranian Medical University in Szczecin.

Abstract:

Extracorporeal Membrane Oxygenation (ECMO) represents an advanced life support technology that temporarily substitutes cardiopulmonary function in critically ill patients with potentially reversible cardiac and/or respiratory failure refractory to conventional management. This presentation systematically reviews the two primary ECMO configurations: veno-venous (VV) ECMO, which provides respiratory support while relying on native cardiac function, and veno-arterial (VA) ECMO, which offers both cardiac and respiratory support by bypassing the heart and lungs. The discussion encompasses evidence-based indications for VV-ECMO including severe pulmonary edema, acute respiratory distress syndrome, and refractory pneumonia. For VA-ECMO, applications include refractory cardiogenic shock, post-myocardial infarction heart failure, bridge to transplantation. The presentation addresses contraindications including irreversible disease processes, significant immunosuppression, intracranial hemorrhage, and prolonged mechanical ventilation. Technical aspects covering components (pump, oxygenator, heat exchanger) and common complications—both technical (circuit failures, oxygenator thrombosis) and patient-related (bleeding, thrombosis, hemolysis, renal failure) – will be discussed.

Keywords:

Extracorporeal Membrane Oxygenation; ECMO



ECOTOXICITY ASSESSMENT OF CEFAZOLIN PHOTOTRANSFORMATION PRODUCTS USING BIOINDICATION ASSAYS

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A few words about the author(s):

I am a student of Ph.D. school at the Jagiellonian University. The other authors are employees of the Department of Inorganic Chemistry and Pharmaceutical Analytics also focus on the subject of antibiotics and their impact on the environment.

Abstract:

Antibiotics are widely used in human and veterinary medicine, which leads to their increasing presence in the environment. Their wide consumption and improper disposal contribute to the contamination of water bodies, where they can persist and undergo various transformation processes, such as photodegradation. This process may seem beneficial in terms of reducing their direct impact on the environment, but the transformation products formed during these processes may show either reduced or increased toxicity compared to the parent compounds. The aim of this study was to assess the ecotoxicity of cefazolin phototransformation products, providing insight into their impact on key biological systems. Initially, standard cefazolin solutions at varying concentrations were subjected to UV–Vis irradiation. Cefazolin solutions and mixtures of its photodegradation products were assessed for their potential toxicity using Microbiotests. Three bioindication tests were employed, each utilizing test organisms from different trophic levels: Thamnotoxkit F, Daphtoxkit F, and LumiMARA. Lower EC50 values obtained in the Thamnotoxkit F and Daphtoxkit F tests for irradiated solutions indicate increased toxicity. In the LumiMARA test, all analyzed samples were classified as toxic. The analyses demonstrated that exposure to light leads to the formation of new compounds with higher toxicity compared to the parent substance.

Keywords:

cefazolin; photodegradation; ecotoxicity analysis



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SUZETRIGINE AS A NEW NON-OPIOID ANALGESIC

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A few words about the author(s):

My name is Katarzyna Żandarek. I am a nurse and a master's student at the University of Bielsko-Biała.

Abstract:

The WHO analgesic ladder is a key model for pain management, based on the gradual escalation of drug strength depending on symptom severity. It comprises three levels of therapy: non-opioid drugs, weak opioids, and strong opioids, administered according to specific principles such as fixed dosing intervals and individualized treatment. Opioids are associated with the risk of adverse effects, including addiction, highlighting the need for alternatives. One promising new drug is suzetrigine, a non-opioid analgesic approved by the FDA. Suzetrigine is a selective inhibitor of Nav1.7 sodium channels, which play a key role in pain signal transmission. By blocking these channels, it inhibits pain signaling without affecting opioid receptors, thereby eliminating the risk of addiction and opioid-related adverse effects. Clinical studies have demonstrated its high efficacy in treating neuropathic and inflammatory pain while maintaining a favorable safety profile. Suzetrigine has the potential to revolutionize pain management by providing an effective and safe alternative to opioids, which is particularly important given the rising incidence of addiction and adverse effects associated with traditional painkillers.

Keywords:

Suzetrigine; VX-548, non-opioid analgesic; sodium channels

ABSTRACTS OF POSTERS



MEDICAL SCIENCES



IS CREATININE ENOUGH? ASSESSMENT OF KIDNEY FUNCTION IN HIGH-RISK AKI PEDIATRIC PATIENTS HOSPITALIZED AT THE UNIVERSITY CHILDREN'S TEACHING HOSPITAL IN BIALYSTOK (2020-2024)

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A few words about the author(s):

The authors are researchers and clinicians specializing in pediatric nephrology and AKI. Their work focuses on improving early diagnosis and treatment, with an emphasis on novel biomarkers and their clinical applications in pediatric patients.

Abstract:

BACKGROUND: Acute kidney injury (AKI) is a serious pediatric health issue, affecting ~0.8 per 100,000 children annually. The leading cause is prerenal factors, mainly dehydration from gastrointestinal infections. Early diagnosis is crucial to prevent chronic kidney disease (CKD). Although creatinine is widely used as a kidney function biomarker, its accuracy in AKI detection is debated due to its dependence on muscle mass, delayed response, and age-related variability.

METHODS: This retrospective study analyzed 1,000 children hospitalized at the University Children's Teaching Hospital in Bialystok (2020–2024) for dehydration. Those with CKD or prior AKI were excluded. Creatinine levels and GFR (Schwartz formula) were assessed, and creatinine thresholds were adjusted for age. 107 patients (10.71%) were excluded due to missing data.

RESULTS: 6.39% had both elevated creatinine and decreased GFR. 9.08% had normal creatinine but reduced GFR. Elevated creatinine was more common in boys (10.28%) than girls (8.51%). Reduced GFR was most frequent in children aged 0–4 years (10.09%).

DISCUSSION & CONCLUSIONS: Many children with reduced GFR had normal creatinine, highlighting its limitations in AKI diagnosis. Additional biomarkers like NGAL, Cystatin C, KIM-1, IL-18, and TIMP-2/IGFBP7 detect kidney injury earlier, improving diagnostic accuracy. Expanding AKI diagnostics beyond creatinine could enhance early detection and intervention, reducing CKD progression risk.

Keywords:

AKI; biomarkers; children



NEUROPSYCHOLOGICAL EVALUATION IN NEWLY DIAGNOSED EPILEPSY: UNRAVELING HETEROGENEITY IN ATTENTION AND AUDITORY-VERBAL LEARNING

Mateusz Bargielski*, Edyta Adamska-Patruno, Jan Kochanowicz, Alina Kulakowska, Dorota Maria Halicka, Adam Krętowski, Monika Chorąży

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A few words about the author(s):

Mateusz Bargielski, a 3rd year neurology resident at the Neurology Clinic of the Clinical Hospital in Białystok and a second-year doctoral student.

Abstract:

OBJECTIVE: Epilepsy affects over 50 million people worldwide. Neuropsychological diagnostics help identify cognitive impairments accompanying the condition. This study aimed to assess cognitive profiles in newly diagnosed epilepsy patients, focusing on attention and auditory-verbal learning.

METHODS: Nine patients with newly diagnosed epilepsy were recruited from the Neurology Clinic of the University Clinical Hospital in Białystok. They underwent neuropsychological assessments, including the California/Auditory Verbal Learning Test, Trail Making Test, Symbol Digit Modalities Test, and d2 Test of Attention (one patient).

RESULTS: Verbal Learning: 56% (5/9) had deficits, with slow learning and reduced recall. Attention: 67% (6/9) showed impairments in divided and sustained attention. Processing Speed: Deficits were noted in 12.5% (1/8). Selective Attention: One patient exhibited notable deficits. Some patients had normal cognitive profiles, highlighting heterogeneity in epilepsy-related cognitive effects.

CONCLUSIONS: Newly diagnosed epilepsy exhibits a heterogeneous cognitive profile. Deficits in divided and sustained attention appear to impair auditory-verbal learning, underscoring the need for individualized neuropsychological assessments to detect subtle impairments early and guide tailored rehabilitation strategies.

Keywords:

epilepsy; neuropsychology; heterogeneity



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A NEW APPROACH TO TEETH WHITENING

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Abstract:

Tooth whitening involves the removal of stains on teeth by oxidation. Hydrogen peroxide and carbamide peroxide have typically been used for this process. Doctors usually recommend a so-called white diet for seven days, i.e. eating foods that do not cause discolouration of the teeth. This literature review provides information on new whitening methods and dispels the myth of the 'white diet'.

Keywords:

teeth whitening; bleaching; white diet



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IMPROVING THE AESTHETICS OF THE ANTERIOR SEGMENT OF THE UPPER DENTAL ARCH WITH THE INJECTION FLOW METHOD

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Abstract:

Patients are increasingly flocking to dental offices to improve the aesthetics of their anterior oral teeth. Among them are patients with malocclusion or dental disorders, such as diastema. This is the space between the upper central incisors. Among the treatment methods available are composite restoration, prosthetic, and orthodontic methods with the help of periodontal surgery. Which approach is correct remains an open question and depends on the clinical conditions, as well as the economic status of the patient. The patient was offered various treatment options and together they decided on the least invasive procedure – closing the space with flow injection composite. Before the treatment itself, the required preparatory procedures – hygienization and teeth whitening – were carried out. Digital dentistry was used for the treatment. Scans were taken for a wax-up, based on which, a template was made for the injection procedure. The patient was satisfied with the result obtained by flow injection restoration. This method can be successfully used as an alternative to veneers or ceramic crowns in selected clinical cases.

Keywords:

diastema; flow injection; composite



ERADICATION OF HELICOBACTER PYLORI – DIETARY RECOMMENDATIONS AND SUPPLEMENTATION

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Abstract:

Helicobacter pylori is a gram-negative bacterium that resides in the gastric mucosa. This pathogen is well-adapted to the pH conditions of the stomach due to its ability to produce urease, which protects it from the acidic environment. It is estimated that currently around 4 billion people worldwide are infected. About 80% of infected individuals may not experience symptoms, while 10-20% may show symptoms such as bloating, heartburn, indigestion, bowel issues (constipation, diarrhea), and loss of appetite. However, most infections remain asymptomatic. The recommended treatment regimen is antibiotic therapy, though it does not always yield the desired result due to antibiotic resistance in this bacterium. Therefore, in addition to pharmacological treatment, non-pharmacological support is also crucial, involving appropriate nutritional management and supplementation.

Currently, there is no single recommended diet for individuals infected with H. pylori. Given the potential damage to the gastric mucosa, a light diet and adherence to healthy eating principles are advised. It is recommended to eliminate fried, smoked foods, spicy seasonings, and alcohol from the diet. Some food components have been shown to exhibit bactericidal and bacteriostatic effects on H. pylori, which has been confirmed in both laboratory studies and studies involving humans.

Keywords:

light diet; nutritional support; infection; antibiotic therapy



THERAPEUTIC POTENTIAL OF AZD5582

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Graduates of the Faculty of Pharmaceutical Sciences at the Silesian Medical University in Sosnowiec, currently doctoral students. They specialize in molecular biology techniques, with particular emphasis on flow cytometry.

Abstract:

AZD5582 is a small-molecule agonist of the Inhibitor of Apoptosis Proteins (IAP) family, designed as a synthetic mimetic of the second mitochondria-derived activator of caspases (Smac-mimetic). It functions by degrading cIAP1 and cIAP2 proteins and inhibiting XIAP, leading to the activation of TNF α -dependent signaling pathways and the induction of cancer cell death. Its ability to modulate the tumor microenvironment and sensitize cells to pro-apoptotic cytokines suggests that it may enhance therapeutic effects when combined with immune checkpoint inhibitors or chemotherapeutic agents, leading to more effective cancer cell eradication.

Beyond oncology, preclinical studies have shown that it effectively activates NF- κ B pathways in HIV-1-infected T lymphocytes, which may contribute to the reactivation of latent viral reservoirs. This property makes AZD5582 a potential candidate for the "shock and kill" strategy aimed at eliminating viral reservoirs in the body.

Future research on AZD5582 should focus on optimizing its dosing, determining its long-term safety profile, and identifying the most effective therapeutic strategies in combination with other drugs. Further studies may also explore novel therapeutic indications and its impact on the immune system. AZD5582 holds promise as a key component of combination therapies for both cancer and infectious diseases.

Keywords:

AZD5582; Apoptosis; IAP; cancer; combination therapy



STROKE

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Fizjo-area Katarzyna Kuchta

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A few words about the author(s):

My name is Katarzyna Kuchta. I am a physiotherapist by passion and education. I believe that "a person is what they are passionate about". Privately, I am a mountain hiking enthusiast.

Abstract:

OBJECTIVE: To examine the effects of age, time from stroke onset, gender and side of paresis in gait re-education with the use of treadmill with biofeedback, in patients with chronic stroke.

METHODS: The study was performed with a group of 50 patients. 10-metre walk test, 2-minute walk test, "Up and Go" test, the number of steps performed with the paretic lower limb at a distance of 10 metres, Barthel index and FIM scale were used to assess the effects of rehabilitation.

RESULTS: The study shows that the subjects' abilities and fitness prior to the rehabilitation were not related to age, sex or side of paresis. Analysis of the impact of age, time from stroke and sex on rehabilitation outcomes showed no statistically significant correlations. On the other hand, analysis of rehabilitation results relative to the side of paresis showed that the latter factor significantly differentiates rehabilitation outcomes measured with gait velocity test - $p= 0.045$.

CONCLUSION: Age, duration of time from stroke onset, and sex do not affect outcomes of gait re-education based on treadmill training in patients at a chronic stage post-stroke and Brunnstrom recovery stage 3-4. Side of paresis significantly differentiates rehabilitation outcomes measured with speed test. The best scores in all the performance measures before rehabilitation were identified in the group 3-6 years after stroke.

Keywords:

age; gait; sex; side of paresis; treadmill



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**SYSTEMIC SCLERODERMA – EARLY SYMPTOMS
TO LOOK OUT FOR**

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A few words about the author(s):

Doctoral student at the Silesian Medical University in Katowice, PhD school Professionally, Master of Science in Nursing, specialist in internal medicine nursing, working in the Internal Medicine and Rheumatology Department.

Abstract:

Poster describing early symptoms of systemic sclerosis.

Keywords:

Systemic Scleroderma; Raynaud's symptoms



PHYSIOTHERAPY IN THE CIRCULATORY

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A few words about the author(s):

Janina Danuta Rzeszot physiotherapist in Poland.

Abstract:

In acute heart failure with pulmonary edema, rest is a useful adjunct to pharmacological treatment. From the article Exercise Rehabilitation in Chronic Heart Failure, exercise training was introduced as part of post-infarction rehabilitation in the 1960s, but it was not tested in patients with heart failure until the 1980s. Several reports have shown significant improvement in exercise capacity after exercise training in patients with stable chronic non-edematous heart failure. Whether this improves prognosis is unknown. Patients with diagnosed heart failure, regardless of the cause, show impaired functional capacity. An innovative bilateral leg training device was equipped with an electronic system for measuring current training activity using the device. A single parameter reflecting training intensity was monitored using several modern telecommunications technologies. Implementation of this model may facilitate the availability of personalized telerehabilitation services using exercise. Moderate aerobic exercise can reduce oxidative stress and inflammation, thereby reducing cardiovascular risk factors, while improving endothelial homeostasis, mood, and cognitive function.

Keywords:

exercise; hart failure; cardiovascular risk



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POCKET LABORATORY, OR THE LAB-ON-CHIP METHOD

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A few words about the author(s):

Robert Sarna studies anticancer substances and their mechanisms of action in head and neck tumors. His interests include molecular biology, the analysis of cancer biomarkers, and viral vectors.

Abstract:

OBJECTIVE: To review and present the current knowledge on the strategy of microfluidic systems for conducting in vitro studies.

The Lab-on-a-Chip (LOC) strategy for conducting in vitro studies, also known as a microfluidic platform, involves creating complex constructs using cells and microchannels that enable the distribution of the medium. These systems integrate functional single-task units into complex multifunctional platforms, providing a more comprehensive understanding of the analyzed system's functioning than simple single-line cell cultures. LOC, due to its minimal reagent and media requirements, allows for a significant reduction in the volume of chemicals and culture media used. These systems are effectively applied in cancer research, new drug development, and disease diagnostics. Their main advantage is the flexibility in designing systems that combine the benefits of different types of cell cultures. Thanks to its versatility, the LOC strategy can significantly accelerate research on new therapies and diagnostics, as well as facilitate personalized treatment for cancer patients.

Keywords:

Lab-on-Chip; microfluidic platforms; cancer; LOC



SERUM CONCENTRATIONS OF SELECTED ANTIOXIDANT ELEMENTS IN PATIENTS WITH CERVICAL DYSTONIA

Magdalena Sarnowska (1)*, Robert Pogorzelski (1), Katarzyna Socha (2), Katarzyna Snarska (3), Alina Kułakowska (1), Jan Kochanowicz (1), Dominika Jakubowicz-Lachowska (1), Monika Chorąży (1)

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Abstract:

Cervical dystonia (CD) is a focal movement disorder characterized by involuntary muscle contractions leading to abnormal postures and repetitive movements of the neck. Antioxidants may play a vital role in modulating chronic inflammatory processes. This study aimed to evaluate the relationship between the concentrations of selected trace elements – selenium (Se), copper (Cu), and zinc (Zn) in the of patients with CD. The study group consisted of 24 patients with CD, aged 26 to 86 years, compared to the reference values of the analyzed element concentrations. Se, Zn, and Cu concentration in serum samples were determined by atomic absorption spectrometry method, with the Zeeman background correction (Hitachi, Z-2000). The mean content of Se and Zn in the serum of patients with CD ($78.87 \pm 14.94 \mu\text{g/L}$ and $0.896 \pm 0.200 \text{ mg/L}$, respectively) falls within the reference ranges ($66\text{-}104 \mu\text{g/L}$ for Se and $0.7\text{-}1.3 \text{ mg/L}$ for Zn). The mean serum concentration of Cu in patients with CD ($1.085 \pm 0.21 \text{ mg/L}$) is also within the reference range ($0.7\text{-}1.6 \text{ mg/L}$). However, the Zn level is closer to the lower limit of the reference range. The findings highlight the importance of trace element balance in maintaining antioxidant status and possibly influencing the pathophysiology of cervical dystonia.

Keywords:

dystonia; zinc; copper; selenium

ABSTRACTS OF PRESENTATIONS



TECHNICAL AND NATURAL SCIENCES



DEVELOPMENT OF TECHNOLOGY AND INTRODUCTION OF RIGID LVT PANELS TO THE MARKET

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A few words about the author(s):

Marek Adamik – Tarkett Polska sp. z o.o.

Abstract:

Tarkett Polska (Jasło) developed and implemented Rigid LVT (SPC) flooring panels with high dimensional stability, water resistance, and acoustic insulation for residential and commercial applications. Co-extrusion technology enabled the production of a multi-layer panel with enhanced mechanical and thermal properties while maintaining full recyclability.

The core layer, essential for structural integrity, is made from PVC resin, calcium carbonate fillers, and additives. This formulation ensures high rigidity, low thermal expansion, and resistance to deformation at temperatures up to 60°C. Up to 17% of the core consists of recycled PVC, supporting circular economy principles.

The production process includes raw material mixing and granulation, core extrusion, calendaring, cooling, and decorative layer lamination. A UV-cured polyurethane coating enhances scratch and stain resistance, while an IXPE foam layer provides up to 19 dB sound attenuation without compromising recyclability.

Optimized process parameters, such as extrusion temperature and calendaring pressure, ensure high product quality and durability, validated by laboratory tests (ISO 23999, ISO 24345, ISO 4918). The panels meet strict VOC emission standards (<5 mg/m³) and hold FloorScore® and A+ certifications.

Tarkett Jasło has combined advanced material engineering with sustainable manufacturing, delivering high-performance flooring solutions that meet modern environmental and acoustic requirements.

Keywords:

SPC; vinyl panels; manufacturing; co-extrusion



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POTENTIAL OF BACTERIOCINS IN TERMS OF THEIR DIVERSE APPLICATIONS

**Paulina Brzęcka (1), Magdalena Lewandowska (1), Katarzyna Dembińska (2),
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A few words about the author(s):

Paulina Brzęcka is a student on third year of biotechnology on Faculty of Biology and Veterinary Science on Nicolaus Copernicus University in Toruń.

Abstract:

Bacteriocins are compounds with great potential for applications in various industries, including food and, in a biological context, are protein molecules produced by the ribosomes of both Gram-positive and Gram-negative bacteria. Their most important feature is that they can kill or drastically reduce the growth of pathogens. The concentration of these molecules can also affect their bactericidal and fungicidal activity. As a rule, as their concentration increases, their antimicrobial efficacy increases.

In addition, bacteriocins are easily broken down by proteolytic enzymes, which means that they do not pose a threat to the health and safety of the human body, as such enzymes are found naturally in the pancreas and stomach of humans. One of the more thoroughly studied bacteriocins is nisin, which effectively inhibits the growth process of pathogens. However, current research is not sufficient to introduce a significant amount of bacteriocins into the food industry. Regulations are also pushing hard for the improvement of materials containing natural bactericidal agents.

This research was funded by the “Excellence Initiative - Research University”, BIO-degradable PACKaging materials research group (Nicolaus Copernicus University in Toruń, Poland).

Keywords:

bacteriocins; applications; antibacterial properties



PROPERTIES AND APPLICATIONS OF POLYLACTIDE

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A few words about the author(s):

Beata Felska graduated environmental health on Medical University of Gdańsk. Now she is the student of molecular diagnostics on Faculty of Biology and Veterinary Science on Nicolaus Copernicus University in Toruń.

Abstract:

Poly lactide is an aliphatic polyester with high transparency and gloss, high rigidity and easy to mould using the typical processing equipment used for conventional polymers. Its good mechanical and thermal properties make the performance qualities of this polymer similar to those of traditional thermoplastics. The disadvantage of PLA is its high water absorption due to the ester groups present in the main chain. The more atactic the polymer is, the greater its water absorption capacity. PLA is a completely biodegradable polymer under industrial composting conditions and is completely assimilable by living organisms.

The properties of PLA create the possibility to use it as a material for various applications. The two main areas of application for PLA include common-use products and medical devices. Common-use products are containers and packaging films, including agricultural and horticultural. Medical devices, on the other hand, include bioresorbable implants, surgical sutures, medical garments and hygienic materials and dressings.

This research was funded by the “Excellence Initiative – Research University”, BIO-degradable PACKaging materials research group (Nicolaus Copernicus University in Toruń, Poland).

Keywords:

PLA; application; biodegradation



SULFORAPHANE APPLICATIONS MEANS WHAT? HOW? WHY?

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Alicja Forc is the student of biotechnology on Faculty of Biology and Veterinary Science on Nicolaus Copernicus University in Toruń.

Abstract:

Sulforaphane [SFN] belongs to biologically active glucosinolate derivatives [GSLs], which are most abundant in cruciferous vegetables (Brassicaceae) such as broccoli, Brussels sprouts, cauliflower and kale.

SFN is of growing interest to researchers due to its wide range of potential health benefits, which include antioxidant and anti-inflammatory properties and its ability to stimulate detoxification enzymes. One of the key aspects of SFN is its activity against both Gram-negative and Gram-positive bacteria. Particular attention has been given to the action against enteric pathogens such as *Escherichia coli*, *Helicobacter pylori* and *Salmonella enterica*.

The antimicrobial activity has been used as a natural, harmless plant protection agent. Studies on *Arabidopsis thaliana* pathogens have shown increased resistance of the model plant to *P. syringae* and *H. arabidopsidis*, however, the mechanism of action against various pathogens in plant crops requires further investigation.

Despite many promising results, further research is needed to fully understand its mechanisms of action and to develop methods for effective and safe use in clinical and agricultural practice.

This research was funded by the “Excellence Initiative – Research University”, BIO-degradable PACKaging materials research group (Nicolaus Copernicus University in Toruń, Poland).

Keywords:

sulforaphane; applications; plants



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CHARACTERISTICS AND APPLICATIONS OF AZELAIC ACID

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Natalia Hejda is a PhD student in Department of Genetics on Faculty of Biology and Veterinary Science on Nicolaus Copernicus University in Toruń.

Abstract:

Azelaic acid is an organic chemical compound belonging to the dicarboxylic fatty acid group. It occurs naturally in cereal grains such as wheat, barley and rye, and is also synthesised on an industrial scale. Its chemical properties make it used in many fields, including the cosmetic, pharmaceutical and chemical industries.

Due to its structure, azelaic acid exhibits antioxidant and anti-inflammatory effects. It can inhibit the activity of certain enzymes and affect the metabolic processes of micro-organisms, which is why it is sometimes used in antimicrobial preparations. It also shows the ability to chelate metal ions, which may be important in various technological processes.

In addition to dermatological applications, azelaic acid is used in the chemical industry as a raw material for the production of polymers and lubricants. Its derivatives can be used as plasticisers and ingredients in protective coatings. Thanks to its biodegradability and non-toxicity, it is an environmentally friendly alternative to certain synthetic substances used in industry.

This research was funded by the "Excellence Initiative - Research University", BIO-degradable PACKaging materials research group (Nicolaus Copernicus University in Toruń, Poland).

Keywords:

azelaic acid; application; properties



MODELING CONTINUOUS PARTICLE GROWTH PROCESSES USING POPULATION BALANCE EQUATIONS IN MATLAB® ENVIRONMENT

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A few words about the author(s):

Eng. Patryk Leszczak is a master's student in Pharmaceutical Engineering. My scientific interests focus on powder engineering and technology, the Discrete Element Method (DEM), Computational Fluid Mechanics (CFD), and bulk protein crystallization.

Abstract:

Particle growth processes have broad applications in industries like pharmaceuticals and food production. Specifically, continuous processes are becoming more attractive in industry, and their automation requires an advanced mathematical description.

In this presentation, I will focus on the mathematical approach to modeling particle growth in continuous processes using population balance equations (PBE). I will explain how these models describe the dynamics of processes by accounting for changes in particle size distribution over time. Additionally, I will discuss how operational parameters, such as the initial particle size distribution and process duration, influence particle growth. I will also cover kernel functions that model agglomeration and their impact on process stability and particle quality. To assess this, numerical simulations were performed to evaluate the effectiveness of various parameters in shaping the final particle size distribution.

For the numerical calculations, the Cell Average (CA) method was applied, which is a commonly used numerical technique in particle growth process analysis. The method involves discretizing space into grid cells, within which the average particle size is computed. The CA method allows for efficient calculations with low computational costs while maintaining accuracy.

Finally, I will discuss how this approach can be applied in industry, showing how particle growth modeling helps optimize processes and product quality.

Keywords:

particle growth processes; population balance equations (PBE); numerical simulations



APPLICATION OF NATURAL BIOMATERIALS FROM Γ -PGA ENRICHED IN VITRO CULTURES OF PLEUROTUS SPP. MUSHROOMS AS SORBENTS FOR CADMIUM AND LEAD POLLUTION

**Dominik Müller (1)*, Natalia Grabowska (1), Joanna Zontek-Wilkowska (2),
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A few words about the author(s):

The interdisciplinary research team consists of scientists from varied fields of biotechnical, biomaterial and analytical sciences. Over years we've have been successfully working on extracting natural sorbents that can accumulate toxic metals.

Abstract:

The inert ability of mushrooms (*Pleurotus* spp. included) to act as absorbent materials for a myriad of chemical substances present in their immediate environment has been a source of inspiration for thorough scientific research and multitude of papers. Fruiting bodies of mushrooms have been recognized colloquially for years as a great indicators of environmental pollution and the presence of both organic and inorganic toxic substances. Some of these substances may include dangerous heavy metal ions like cadmium and lead. A naturally occurring elements in the Earth's crust, cadmium and lead have been a subject of numerous studies due to their detrimental effects on living organisms, causing multitude of serious health issues. A natural biomaterial fashioned from in vitro cultures of mushrooms of the genus *P. ostreatus*, enriched with γ -PGA obtained from *Bacillus* spp. was investigated from an angle of lead and cadmium absorbency. γ -PGA, cadmium and lead were added to the culture media. The assay of absorbency of heavy metals was conducted using atomic absorption spectrometry (AAS) method, comparing both their presence in fruiting body of the mushroom and the leftover concentration in its cultivation environment. Results show that the addition of heavy metal ions to the culture media decreases the efficiency of biomass growth whereas in vitro cultures enriched with PGA show a negligible accumulation of toxic metals as compared to the control group.

Keywords:

sorption, accumulation, biomaterial, toxic/heavy metals



PHYSICOCHEMICAL STUDIES ON THE FORMATION OF DEFECTS IN CANDLES USING DIFFERENTIAL SCANNING CALORIMETRY (DSC)

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A few words about the author(s):

PhD student of the University of Lodz, has worked in the R&D department of one of the world's largest candle manufacturing groups for 10 years.

Abstract:

This study presents the results of research on the impact of dyes and fragrances on the thermal stability of candles using differential scanning calorimetry (DSC). The analysis focused on candles made from a combination of eight dyes and eight fragrance compounds in a fixed oil-based formulation. The candles were produced under laboratory conditions and subsequently examined using DSC immediately after production and after storage at temperatures of 15°C, 25°C and 40°C.

The purpose of the study was to determine how storage time and temperature affect the thermal structure and stability of the components of the candle. DSC analysis enabled identification of changes occurring within the system, including changes in phase transition temperatures and the appearance of additional thermal effects, which may indicate component degradation or heterogeneous distribution. Special attention was given to the interactions between dyes, fragrances, and the oil base, which may lead to defect formation.

The results obtained indicate that both the type of dye and the fragrance composition influence the thermal stability of the candles. Storage at elevated temperatures accelerated degradation processes, which was reflected in changes in the DSC characteristics. Conclusions from this study contribute to a better understanding of the mechanisms underlying defect formation in candles and may aid in optimising their composition to enhance quality and durability.

Keywords:

Differential Scanning Calorimetry (DSC); thermal stability of candles; dyes and fragrances; degradation processes; component interactions



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MOLECULAR STRATEGIES OF PARASITES IN MODULATING THE HOST IMMUNE RESPONSE

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A few words about the author(s):

A 3rd year student of biology at the University of Warmia and Mazury in Olsztyn. The leader of the Student Scientific Association of Biochemistry and Molecular Biology in Parasitology "Paradise".

Abstract:

Parasites have developed a number of sophisticated mechanisms that enable them to successfully colonise host organisms and evade their immune system. Many of these organisms are not only able to inhibit immune responses that lead to their elimination, but also actively manipulate and direct them in ways that are favourable to themselves. These processes include both direct interaction with immune cells and the secretion of bioactive substances that can modulate inflammatory and immune responses.

Parasites affect the host at different levels – from local tissue changes to systemic effects, which in some cases can lead to long-term health consequences. Of particular interest are zoonotic organisms such as the nematodes of the genus *Anisakis*, which, when they invade the human gastrointestinal tract, can trigger not only acute inflammatory reactions but also various immune responses, including allergies.

Understanding the molecular strategies that parasites use to modulate the immune system could provide valuable insights into their evolutionary adaptations and at the same time open up new perspectives for medicine. Research into these mechanisms could contribute to the development of innovative therapies and expand our knowledge of the interactions between the immune system and the organism.

Keywords:

parasites; immune response; parasite-host relationship



RESPONSIBLE PAPER PRODUCTION: CAN WASTEPAPER SAVE OUR FORESTS?

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A few words about the author(s):

Dr. Edyta Małachowska received a Ph.D. in Forest Sciences, specializing in Wood Technology. Research primarily involves virgin and secondary papermaking pulps, advanced paper production technologies and eco-friendly material solutions.

Abstract:

The production of paper from recycled waste paper represents a crucial strategy in addressing the global challenges of deforestation and the degradation of forest resources. This presentation highlights the significant potential of utilizing secondary fiber sources to reduce the industry's dependence on virgin wood pulp, thereby protecting forests and promoting sustainable resource management. The discussion covers current problems and challenges within waste paper recycling processes, and evaluates their environmental impact. Emphasis is placed on analyzing how effectively recycled paper production contributes to forest conservation and sustainable development objectives.

Keywords:

wastepaper; paper recycling; deforestation; sustainable development



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EVALUATION OF THE PROPERTIES OF POLYMERIC INCLUSION MEMBRANES USING HANSEN SOLUBILITY PARAMETERS

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A few words about the author(s):

Piotr Michałowski is a doctoral student in the chemical sciences. His interests focus on organic synthesis of programmable prodrugs, fluorescent molecular probes and inclusive polymeric membranes for microextraction of secondary metabolites.

Abstract:

The problem of the presence of heavy metals, complex organic and inorganic compounds that can adversely affect water quality and the health of organisms continues to grow. Traditional methods of recovery, such as biosorption or solvent extraction, have their drawbacks, including high costs and negative environmental impacts due to high exploitation. A modern and more efficient method is the use of polymer inclusion membranes (PIMs), which offer high selectivity, ease of application and low energy consumption. The current state of research on PIMs is based on modifying the composition and design of the membrane components, i.e. the supports, plasticisers and base polymers, and identifying as many potential interactions with external factors as possible.

The Hansen Solubility Parameter (HSP) can help in this prediction, allowing to predict whether one material/component has the potential to dissolve in another. The index is calculated from the energy of dispersion forces, dipole forces and hydrogen forces. These parameters form the Hansen space and the similarity between molecules is determined by calculating the distance in this space. HSP is therefore widely used in controlling stress cracking of polymers, dispersion of pigments/dyes (e.g. activated carbon), studies of molecular solubility properties, adhesion to polymers, solvent permeation for safety assessment and interactions with DNA in cytotoxicity studies.

Keywords:

polymer inclusion membranes; PIMs; Hansen Solubility Parameter; HSP



THE IMPACT OF CONTACT LENSES USAGE ON THEIR PHYSICOCHEMICAL PROPERTIES

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A few words about the author(s):

Zuzanna Pytlik, Master of Science, physicist. Karolina Adrjanowicz, Professor Engineer, physicist, Faculty of Science and Technology of the University of Silesia in Katowice, August Chelkowski Institute of Physics.

Abstract:

Contact lenses degrade just like any other polymer material. The aim of the work is to investigate changes in the physicochemical parameters that occurred during the use of silicone-hydrogel contact lenses on Comfilcon A (CooperVision) polymer. Measurements were made on unused lenses and on lenses after a month of use. They were worn by one person during the day. The experiment was repeated twice. The polymer was examined using Broadband Dielectric Spectroscopy (BDS). This work allows for the assessment of the usefulness of BDS in the study of physicochemical properties on the aging of polymeric materials. The test results showed that the parameters of contact lenses change due to material degradation. In a contact lens, ionic conduction is much stronger than the relaxation of polymer chains alone, so it is worth examining it in the context of ion transport from the tear film to the cornea. The BDS spectrum shows a reduced ion flow in a lens used for a month compared to an unused lens, so less essential nutrients, especially water, reach the eye. This causes a depletion of the sublensal film, and further causes a feeling of dryness. Seeds of crystallization of the material also appear in the worn lens. As the material crystallizes, its stiffness rises, which increases discomfort. This work encourages further understanding of changes occurring in contact lenses used. Deeper knowledge of the material opens the way to design, e.g. polymer improvements.

Keywords:

contact lens; Comfilcon A; aging of polymer materials; broadband dielectric spectroscopy



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ACTIONS OF THE POLISH FASHION INDUSTRY FOR SUSTAINABLE DEVELOPMENT AND CIRCULAR ECONOMY

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A few words about the author(s):

I am management and production engineering student and I have been a member of the Qualitas student research club. I am interested in the topic of the closed loop economy in the clothing industry.

Abstract:

The fashion industry has a significant environmental impact, contributing to pollution, CO₂ emissions, and waste. Fast fashion accelerates these issues, promoting mass consumption and unethical labor practices. This research show how the Polish clothing industry is implementing sustainability and circular economy principles in production, sales, and post-sales activities. Efforts include increasing the use of eco-friendly materials, promoting product rentals and resale, and reducing unsold stock waste. Some companies aim to eliminate textile waste and engage in community initiatives, while others encourage employees to save water and energy. However, challenges remain, such as the lack of clear long-term sustainability goals and carbon footprint monitoring. Expanding circular economy strategies is essential for a more responsible future in Polish fashion.

Keywords:

circular economy; sustainable development; environment

ABSTRACTS OF POSTERS



TECHNICAL AND NATURAL SCIENCES



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AI IN QUALITY ASSURANCE – SOFTWARE TESTING AUTOMATION

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A few words about the author(s):

I am a student interested about software development and automation. My main interests include software testing and programming. Currently, I am expanding my knowledge in Quality Assurance. I enjoy learning new technologies that improve software.

Abstract:

Modern software development is evolving at a fast pace, making software quality and reliability more critical than ever. Traditional software testing methods are often time-consuming and prone to human error. Integrating artificial intelligence into the testing process enables automation of various tasks, such as test case generation, error detection, and regression test optimization. There exist a moderate number of techniques used in Quality Assurance. These methods are Machine Learning, Model-Based Testing and Image Recognition. Machine Learning is used for analyzing code and identifying potential errors based on patterns. Model-Based Testing automatically generates test scenarios based on application structure. Image Recognition is an UI testing and system log analysis for error detection. Automating software testing not only accelerates software delivery but also enhances reliability by eliminating human errors and optimizing tests based on real-world usage patterns.

Keywords:

automation; Quality Assurance; Machine Learning; testing; error detection



INCREASING THE SCALE OF R&D WORKS CONDUCTED BY ZPE ZAPEL SA THROUGH THE DEVELOPMENT OF INNOVATIVE CERAMIC BUSHING TECHNOLOGY FOR ULTRA-HIGH VOLTAGE UHV

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A few words about the author(s):

Employees of the “ZPE ZAPEL S.A.” company from the Technology, IT and R&D Division.

Abstract:

The result of the work under the project is the development of technology for the production of multi-segment porcelain bushings, with maximum dimensions $\varnothing=800$ mm x H=10000 mm, for maximum voltages of 1100 kV. The research and development work included three tasks: improvement of the properties of the previously used C130-type material (increase in bending strength while minimizing its tendency to pyroplastic deformation), optimization of special processes (implementation of a specialized dryer with drying curves dedicated to UHV bushings and two precision grinders for smaller and larger size conical segments), research work on the parameters of semi-finished products and the final product (launch of a precision bonding station for UHV columns with metering, modernization of the bending test station for UHV columns, and R&D work on measurement techniques for shape and position deviations). The obtained results allow to expand the assortment offered by ZPE ZAPEL SA and provide the basis for further improvement of the production technology of the most advanced insulation bushings.

The project was co-financed by the European Regional Development Fund under the Regional Operational Programme of the Podkarpackie Voivodeship for 2014-2020 No. RPPK.01.02.00-18-0020/18.

Keywords:

ultra-high-voltage; porcelain; insulators



APPLICATION OF CHEMOINFORMATICS TOOLS FOR PREDICTING ANTIFUNGAL PROPERTIES OF SECONDARY METABOLITES

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A few words about the author(s):

Piotr Michałowski is a doctoral student in the chemical sciences. His interests focus on organic synthesis of programmable prodrugs, fluorescent molecular probes and inclusive polymeric membranes for microextraction of secondary metabolites.

Abstract:

Natural products (NPs) are chemical compounds produced by living organisms, such as plants and micro-organisms, as a result of ongoing biochemical processes. In recent years, their pharmaceutical and ecological importance has increased, as has their use in the synthesis of biopolymers and biopesticides.

The discovery of natural products, particularly since the mid-20th century, based on phenotypic studies, has allowed the classification of secondary metabolites with antimicrobial, antioxidant and anticancer properties. Rubellins, secondary metabolites of the fungus *Ramularia collo-cygni*, are an example. Studies suggest that Rubellins have photodynamic, cytotoxic and antiproliferative properties. They also inhibit tau protein aggregation, which may be important in the treatment of neurodegenerative diseases such as Alzheimer's. The analysis of Rubellin biosynthesis and the identification of genetic pathways for its production may contribute to the development of new therapies, particularly in oncology and neuroscience.

Despite the complex bioactive potential of rubellins, their physicochemical, pharmacokinetic and pharmacodynamic properties have not been thoroughly investigated and compared. Therefore, in order to improve our knowledge of them, a chemoinformatics toolkit was used to simulate and evaluate their properties, providing a basis for further screening.

Keywords:

Rubellins; secondary metabolites; chemoinformatics tools; fungal metabolites



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BIOMASS FROM IN VITRO MUSHROOM CULTURES AS A NATURAL CARRIER FOR SILVER NANOPARTICLES

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The interdisciplinary research team consists of scientists from varied fields of biotechnical, biomaterial and analytical sciences. Over years we've have been successfully working on finding natural biomaterials for pharmaceutical applications.

Abstract:

Edible mushrooms for millennia found extensive use in human diet due to their inherent health benefits like being a source of essential vitamins as well as being a potent and easy to cultivate food source. A growing interest in finding biocompatible and biodegradable materials for medical and pharmaceutical applications had made mushroom biomass an interesting solution in pair with materials like metal nanoparticles which include antimicrobial silver nanoparticles (AgNPs). An attempt was made to obtain natural biomass from in vitro cultures of edible mushrooms cultivated in laboratory environment and enriched with AgNPs through the liquid cultivation medium. The choice of AgNPs in the study was due to qualities like scientifically documented antimicrobial properties and a compatibility with use in the liquid medium. The AgNPs were synthesized using silver precursors reduced with ascorbic acid, the cultivation of in vitro cultures was conducted over the course of 14 days and consequently obtained biomass was freeze dried and homogenized. This allowed for repeatable production of a dry material with confirmed antibacterial properties as tested against the Escherichia coli strains in a lab environment. This development shows a possibility materials akin to AgNPs enriched edible mushroom biomass could have a lasting impact on future generation of antimicrobial materials in the fields like wound dressings or as alternatives for common antibiotics.

Keywords:

silver nanoparticles; biocarriers; biomaterial; mushroom biomass



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SYNTHESIS AND PROPERTIES OF COUMARIN-BASED PHOTOINITIATORS

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A few words about the author(s):

A graduate of chemical technology and chemistry. My research interests focus on polymerization processes, with particular emphasis on photopolymerization and controlled polymerization.

Abstract:

Due to increasing regulatory restrictions on the use of mercury in the chemical industry, there is a growing trend to replace conventional mercury vapour lamps with LED lights. In addition to being mercury-free, LEDs offer energy efficiency, minimal heat dissipation and long life. However, the spectral range of commercially available LEDs does not match that of obsolete mercury lamps, creating a need for new photoinitiators active at longer LED wavelengths (365, 385, 395, 405 nm). Coumarins, organic polycyclic compounds (2H-1-benzopyran-2-one), are promising candidates for the next generation of photoinitiators. As lactones and benzopyran derivatives, they contain groups that enable electromagnetic radiation absorption, allowing them to absorb the long wavelength UV light characteristic of LED emission. Over 1,300 coumarin derivatives have been reported in the literature. Their structural diversity and ease of modification make them a relevant research topic despite existing publications and patents. This study focused on the selection, synthesis and analysis of novel coumarin-based compounds for photoinitiation. In addition, optimal synthesis conditions and analytical methods for compound identification were established.

Keywords:

photopolymerization; photoinitiators; coumarin; photochemistry



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HUMIC SUBSTANCES AS NATURAL CHELATORS IN AGRICULTURE

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MSc Magdalena Tymoszewicz and Dr. Ewelina Klem-Marciniak research microelement chelates for fertilizer production. Dr. hab. Marta Huculak-Mączka focuses on natural substances in fertilizer production. Dr. hab. Tomasz Olszewski specializes in organic chemistry.

Abstract:

Humic substances (HS) are complex organic compounds formed through the decomposition of plant and animal matter in soil. They are vital for soil health, as they enhance soil structure and fertility, help maintain proper pH levels, and improve both water retention and aeration. This makes them one of the most crucial components of the soil environment.

Thanks to their structure, which contains carboxyl and hydroxyl groups, humic substances can effectively chelate micronutrient ions. This chelation process enhances the bioavailability of essential micronutrients to plants and boosting overall plant vitality. By incorporating humic substances into fertilizers, it is possible to optimize micronutrient efficiency, promoting more sustainable agricultural practices.

The aim of this research was to evaluate the chelating properties of humic substances and their ability to bind micronutrient ions (Zn, Cu, and Mn). The results suggest that humic substances exhibit chelating properties for various micronutrient ions, making them beneficial for use in micronutrient fertilizers. However, due to their varied structure and inconsistent results, they cannot fully replace the aminopolycarboxylate chelators currently used in agriculture but can serve as a complementary, eco-friendly alternative.

Keywords:

humic substances; agriculture; micronutrients; chelates



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