



**National  
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Conference  
SCIENCE**

**AND YOUNG  
RESEARCHERS**

**IX edition  
June 07, 2025**

**The Book  
of Abstracts**

**National Scientific Conference**  
**„Science and Young Researchers”**

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# ABSTRACTS OF **PRESENTATIONS**



**MEDICAL  
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## **GAUCHER'S DISEASE – BIOCHEMICAL BASIS, CLINICAL PICTURE AND MODERN TREATMENT METHODS**

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### **A few words about the author(s):**

5<sup>th</sup> year medical students, student scientific society at institute of medical sciences.

### **Abstract:**

Gaucher's disease is a rare, inherited metabolic disease classified as a group of lysosomal storage diseases. Its cause is a deficiency of the enzyme glucocerebrosidase, which is responsible for the breakdown of glucocerebroside, a component of cell membranes. The absence of this enzyme results in the accumulation of the abnormal substrate in macrophages, leading to enlargement of the spleen and liver, bone damage and, in some forms, neurological disorders. The disease occurs in several types, differing in clinical course. The presentation will discuss the biochemical basis of the disease, the mechanism of inheritance, clinical manifestations and available diagnostic and treatment methods, including enzyme therapy. The aim of the presentation is to show the relationship between the molecular defect and clinical manifestations and to emphasize the importance of early diagnosis.

### **Keywords:**

Gaucher disease; glucocerebrosidase; lysosomal storage diseases; enzyme replacement therapy; lipid metabolism

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## **THE ROLE OF NUTRITION IN SUPPORTING MATERNAL AND FETAL HEALTH DURING PREGNANCY**

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### **A few words about the author(s):**

I am a dietetics student who wants to show that taking care of your health through proper nutrition can be simple and effective. My goal is to help people make better food choices to feel better and improve their quality of life.

### **Abstract:**

Pregnancy is a unique period in a woman's life when proper nutrition plays a crucial role in supporting both maternal health and optimal fetal development.

This presentation covers the key aspects of maternal nutrition, including recommended weight gain based on pre-pregnancy BMI, as well as the metabolic and physiological changes that occur during pregnancy. It also addresses energy and macronutrient requirements. Special attention is given to food safety practices and foods that should be avoided or limited due to potential health risks. Furthermore, current recommendations for the supplementation of essential nutrients – such as folic acid, iron, iodine, vitamin D, and calcium – are discussed.

The aim of this presentation is to highlight the importance of a well-balanced, conscious diet during pregnancy as a major determinant of both maternal and neonatal health.

### **Keywords:**

pregnancy; nutrition; maternal and fetal health

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## **THE USE OF ENZYME THERAPY IN THE TREATMENT OF METABOLIC DISEASES**

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### **A few words about the author(s):**

5<sup>th</sup> year medical students, student scientific society at institute of medical sciences.

### **Abstract:**

Enzyme replacement therapy (ERT) is a cornerstone in the treatment of several lysosomal storage disorders and other inherited metabolic diseases. This review summarizes the current understanding of ERT applications in Gaucher disease, Pompe disease, Fabry disease, and mucopolysaccharidoses. It discusses the biochemical mechanisms of ERT action, challenges related to enzyme delivery, immune responses, and limited tissue penetration. Advances in enzyme modification strategies and emerging gene therapy alternatives are also highlighted. A systematic literature review was conducted using databases: PubMed, Elsevier, and Google Scholar. The review emphasizes the need for further research to enhance ERT efficacy and its role in the context of personalized metabolic medicine.

### **Keywords:**

enzyme replacement therapy; lysosomal storage disorders; metabolic diseases; recombinant enzymes; targeted therapy

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## **QUALITY OF LIFE IN ONCOLOGICAL PATIENTS RECEIVING CHEMOTHERAPY**

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### **A few words about the author(s):**

Ilona Korzonek-Szlacheta, MD, DSc, Prof. SUM – research and teaching professor. Mateusz Grajek, MD, DSc – research and teaching assistant lecturer. Marika Wlazło, MSc – doctoral student.

### **Abstract:**

Chemotherapy, despite its beneficial therapeutic effects, is associated with patients experiencing mild and severe side effects that may directly impact quality of life. The aim of this study is to assess the quality of life of oncological patients receiving chemotherapy, taking into account selected individual and clinical variables. The research group comprised 100 patients from day chemotherapy units. The research instrument was the EORTC QLQ-C30 quality of life assessment questionnaire, supplemented with a demographic form containing additional clinical information. The examined group demonstrated varied results across different dimensions of functioning, global health status/quality of life, and symptoms accompanying the disease and treatment. The value of the described work is based on the utilization of a validated questionnaire and the consideration and description, in one place, of multiple variables that may potentially influence quality of life.

### **Keywords:**

quality of life; chemotherapy; oncology patients

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## **PERIPHERAL NEUROPATHIES – CAUSES, DIAGNOSIS, AND CLINICAL MANAGEMENT**

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### **A few words about the author(s):**

Wiktoria Balcerzak MD is a neurology resident who graduated from the Medical University of Silesia in Katowice. She has a strong interest in neurodegenerative diseases, focusing on the latest advancements in diagnosis and treatment.

### **Abstract:**

Peripheral neuropathies represent a diverse group of disorders affecting the peripheral nervous system, characterized by damage to peripheral nerves. The etiologies are varied, including metabolic, autoimmune, infectious, toxic, and genetic factors. The most common causes include diabetes, alcohol abuse, vitamin deficiencies, and autoimmune diseases such as Guillain-Barré syndrome. Clinical manifestations are diverse and may include sensory disturbances, muscle weakness, and neuropathic pain, significantly impacting patients' quality of life.

The diagnostic process for peripheral neuropathies involves a thorough medical history, neurological examination, and additional tests, such as electromyography (EMG), nerve conduction studies (NCS), and laboratory tests assessing glucose levels, vitamin deficiencies, and inflammatory markers. Genetic testing is increasingly utilized, especially for hereditary neuropathies.

Clinical management focuses on treating the underlying cause, symptom relief, and neurological rehabilitation. Neuropathic pain management includes anticonvulsants, antidepressants, and physical therapy. Emerging therapeutic approaches, such as neuromodulation and biological treatments, offer new perspectives for managing complex cases.

### **Keywords:**

peripheral neuropathy; neuropathic pain; neurorehabilitation; diagnosis



## **ELECTROCONVULSIVE THERAPY – USE AND CARE**

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### **A few words about the author(s):**

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

### **Abstract:**

Electroconvulsive therapy (ECT) is a method of treating mental disorders that involves inducing a brief seizure in the brain using an electric impulse. The procedure is performed in a hospital setting under general anesthesia and with the use of muscle relaxants, which significantly increases its safety. ECT is mainly used to treat severe, treatment-resistant depression, catatonia, psychosis, and bipolar affective disorders. It is also occasionally used in cases of schizophrenia when other forms of therapy are ineffective. During the procedure, the patient is put under anesthesia, and electrodes are placed on the scalp – either unilaterally or bilaterally. An electric impulse is delivered to the brain, triggering a seizure that typically lasts between 30 and 60 seconds. Although the therapy may be controversial, it is currently recognized in modern psychiatry as an effective and safe treatment method, especially in urgent cases and when pharmacological treatment fails. Possible side effects include short-term memory issues, post-procedure disorientation, and headaches; however, serious complications are very rare.

### **Keywords:**

electroconvulsive therapy; brain; depression; patient



## CHRONIC ENDOMETRITIS: ARE ANTIBIOTICS THE ONLY TREATMENT OPTION?

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### **A few words about the author(s):**

I am a 5<sup>th</sup> year medical student with a strong interest in gynecology, especially in treating infertility. My passion for this specialty comes from a deep desire to help individuals and couples achieve their dreams of parenthood.

### **Abstract:**

Chronic endometritis (CE) is usually caused by an infection that moves up from the lower genital tract. Sometimes, the cause is unknown. The disease is marked by the presence of plasma cells in the endometrial tissue, which can reduce endometrial receptivity and make embryo implantation harder, leading to infertility.

A 32-year-old woman, treated for unexplained infertility, visited the clinic after an unsuccessful embryo transfer (IVF) for further testing. An endometrial aspiration biopsy (EAB) with CD138 evaluation confirmed chronic endometritis, so first-line antibiotic treatment was started. A follow-up biopsy showed no improvement. Changing the antibiotics and another check still showed no improvement.

Because of her coexisting Sjögren's syndrome, which causes lymphocyte infiltration in glands and other organs, antibiotics were stopped. Instead, anti-inflammatory treatment with hydroxychloroquine was used.

After this treatment, the patient had a successful embryo transfer. Due to SS-A and SS-B antibodies, she was monitored during pregnancy because of the risk of fetal heart block. The pregnancy ended with a natural vaginal birth at term, but was complicated by early postpartum bleeding.

In cases of repeated miscarriages and failed IVF, it is worth considering testing for chronic endometritis. Although CE is most often caused by bacteria, it can also have an autoimmune cause. This means that antibiotics are not the only treatment option.

### **Keywords:**

chronic endometritis; infertility; Sjögren's syndrome

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## **NEUROPROTECTIVE MECHANISMS OF PHYSICAL EXERCISE IN NEURODEGENERATIVE DISEASES**

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### **A few words about the author(s):**

All the authors are medical students at the Faculty of Medicine, University of Opole, Opole, Poland.

### **Abstract:**

Neurodegenerative diseases such as Alzheimer's and Parkinson's disease pose an increasing public health challenge in the context of global population aging. Growing research highlights physical exercise as a powerful non-pharmacological approach that can influence the trajectory of neurodegeneration.

This paper explores the diverse neuroprotective effects triggered by regular physical activity, including regulation of neuroendocrine function, modulation of neurotransmitter systems, enhancement of insulin signaling pathways, and increased expression of neurotrophic factors like BDNF and irisin. Exercise contributes to improved neuroplasticity, elevated cerebral perfusion, and enlargement of hippocampal volume, while also exerting anti-inflammatory, antioxidant, and anti-apoptotic actions. These mechanisms collectively support the preservation of cognitive and motor abilities. Evidence from clinical and experimental studies indicates that appropriate exercise programs can enhance memory, executive function, and motor skills in individuals with neurodegenerative conditions, potentially slowing symptom progression.

Adding physical activity into treatment plans represents a promising complementary strategy alongside pharmacological therapies, with the potential to improve patient outcomes and quality of life.

### **Keywords:**

neurodegenerative diseases; physical exercise; neuroprotection; BDNF (Brain-Derived Neurotrophic Factor); cognitive function

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## **ARTIFICIAL INTELLIGENCE IN GYNECOLOGY**

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### **Abstract:**

Artificial intelligence (AI) has been increasingly applied in medicine in recent years, and its importance is gradually increasing in clinical gynecology as well. The purpose of this paper is to analyze the opportunities, advantages and challenges of introducing AI in gynecology, with a particular focus on its application in gynecologic oncology. The review focuses on the key applications of AI in fetal ultrasound imaging and diagnostic decision support, contrasting it with traditional methods. The article also discusses in detail the limitations of implementing AI, including problems with the quality of the results and the financial challenges associated with its implementation. The final section summarizes and discusses potential directions for the development of artificial intelligence in gynecology.

### **Keywords:**

artificial intelligence; gynecology; machine learning

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## **ULTRAVIOLET RADIATION**

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### **A few words about the author(s):**

My name is Ewelina Kaminska. I am an engineer, but also a cosmetologist. I continue to educate myself in the field of cosmetology and love to share the knowledge I have gained, which can help other people to take care of their own beauty and health.

### **Abstract:**

Ultraviolet radiation and its effects on the skin are still the subject of intense scientific research. Protection from its harmful effects is one of the main topics discussed in cosmetology and dermatology offices.

Although the effects of excessive skin exposure to UV radiation have not changed in recent years, public awareness of the issue has increased. Adequate use of sunlight and properly selected photoprotection can delay photoaging and reduce the risk of skin cancer, while allowing one to reap the health benefits of the sun's rays.

### **Keywords:**

health; cosmetology; ultraviolet radiation; dangers

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## **HPV-RELATED CARCINOGENESIS – PREVENTION AND TREATMENT STRATEGIES**

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### **A few words about the author(s):**

We are members of the clinical oncology research club. Particularly interested in the epidemiology and diagnosis of cancers and the latest therapeutic approaches.

### **Abstract:**

Human papillomavirus (HPV) is one of the main etiological factors of various cancers, including cervical cancer, anal cancer, and head and neck malignancies. The E6 and E7 oncoproteins play a crucial role in oncogenesis by inactivating tumor suppressor proteins p53 and pRb, leading to uncontrolled cell proliferation.

Epidemiological data indicate that infection with high-risk HPV types, particularly HPV-16 and HPV-18, is widespread, with the risk of malignant transformation increasing due to persistent infection, immunosuppression, and environmental factors such as smoking.

Prevention strategies rely on HPV vaccination programs and screening methods, including cytology and HPV-DNA testing. Modern treatment options include immunotherapy (PD-1 checkpoint inhibitors), targeted therapies, and gene-editing techniques such as CRISPR-Cas9, which open new avenues for managing HPV infections and HPV-related cancers.

Early diagnosis and the development of innovative therapies significantly improve patient outcomes, emphasizing the need for further research and preventive measures to combat HPV and its oncogenic effects.

### **Keywords:**

HPV; carcinogenesis; oncoproteins; prevention; immunotherapy



## THE IMPACT OF IDH1 AND IDH2 MUTATIONS ON THE COURSE OF GLIOMAS – THERAPEUTIC IMPLICATIONS

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### Abstract:

Gliomas are a heterogeneous group of central nervous system tumors in which IDH1 and IDH2 mutations play a key role. These mutations occur in approximately 80% of patients with WHO grade II/III gliomas and secondary gliomas, leading to metabolic and epigenetic alterations that promote tumorigenesis. The primary consequence of these mutations is the overproduction of the oncometabolite 2-hydroxyglutarate (2HG), which disrupts cell differentiation, stabilizes the HIF-1 $\alpha$  factor, and influences the tumor microenvironment.

Clinically, IDH-mutant gliomas are associated with a better prognosis compared to IDH-wild type, exhibiting slower growth and an improved response to standard treatments. IDH mutation diagnostics have significant prognostic and therapeutic implications, and their detection enables more precise tumor classification.

Currently, targeted therapies such as IDH inhibitors are being developed to block 2HG production and restore normal cellular metabolism. Additionally, research on epigenetic therapies and immunotherapy suggests potential benefits in the treatment of IDH-mutant gliomas. The personalization of therapy, taking into account the tumor's genetic profile, is a key direction for the future of oncology.

### Keywords:

IDH1 mutations; IDH2 mutations; gliomas; 2-hydroxyglutarate; oncometabolites

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## **THE USE OF PSILOCYBIN IN TREATING DEPRESSION**

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### **Abstract:**

Psilocybin is a natural psychodysleptic substance present in mushrooms of the *Psilocybe* genus, known for its strong influence on perception, mood and cognitive processes. Its psychedelic effects result from the activation of serotonergic receptors, which leads to increased serotonin levels in the brain and increased sensory experiences and changes in consciousness. The effects include euphoria, a sense of unity with the environment and a modified perception of reality. Psilocybin, despite being on the list of prohibited substances (group I-P), is attracting growing scientific interest as a potential therapeutic agent, especially in the treatment of depression. Contemporary studies confirm its antidepressant efficacy and very low toxicity, which may make it an alternative to traditional medicines. After a period of marginalization in the second half of the 20th century, interest in classic psychedelics such as psilocybin is returning in the 21st century, supported by promising scientific research results.

### **Keywords:**

Psilocybin; depression; psychedelics

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## **CURRENT STATE OF KNOWLEDGE ABOUT STARGARDT’S DISEASE**

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### **A few words about the author(s):**

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### **Abstract:**

The eye spot, from Latin macula lutea, is a small area in the eyeball that contains photosensitive cells called cones. They are responsible for central vision and color discrimination. This paper summarizes the current state of knowledge about Stargardt’s disease (STGD), the most common macular dystrophy of adolescence. A systematic review of the available literature was conducted, focusing on the methods used, materials, results obtained and conclusions drawn. The following databases were used in the process: PubMed, Elsevier, Google Scholar, Mendeley and ResearchGate. The review focuses on the pathogenesis, as well as the etiology and epidemiology of the above disease. The genetic scope, diagnostics and treatment procedures were taken into account.

### **Keywords:**

ABCA4; macular dystrophy; Stargardt’s disease; hereditary retinal diseases; retinal dystrophy



## **ASSESSMENT OF PELVIC MRI EFFECTIVENESS IN BRCA MUTATION CARRIERS UNDERGOING RISK-REDUCING SALPINGO-OOPHORECTOMY**

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### **A few words about the author(s):**

Medical students interested in genetics and gynecology involved in a study at Opole Cancer Center aiming to improve ovarian cancer screening methods.

### **Abstract:**

**Introduction:** Women carrying a BRCA1/2 mutation face a significantly increased lifetime risk of developing ovarian cancer (40–45%) and breast cancer (40–85%). Risk-reducing salpingo-oophorectomy (RRSO) remains the most effective preventive measure, reducing ovarian cancer risk by 71–96%. However, this procedure induces premature menopause. Current screening tools, such as CA125 and transvaginal ultrasound (TVUS), have limited sensitivity (28–48%) in early-stage ovarian cancer, highlighting the need for improved detection methods. A potential tool is MRI offering high-resolution pelvic imaging with sensitivity for endometrial cysts at 80%.

**Materials and Methods:** A retrospective data analysis.

**Results:** Pelvic MRI was conducted in 27 BRCA mutation carriers prior to RRSO. Simple ovarian cysts were detected in 8 patients (29.6%). Malignancy was found in 3 patients (11.1%) during RRSO: one case of ovarian cancer (FIGO III), one fallopian tube cancer (FIGO I), and one borderline ovarian tumor (FIGO I). In 19 cases, no lesions were identified. Slightly elevated CA125 (69 U/ml) was noted only in the patient with FIGO III ovarian cancer. TVUS also failed to detect any malignancy preoperatively.

**Conclusion:** In this analysis, pelvic MRI did not improve early detection of ovarian or fallopian tube cancer. Given the limitations of current screening, RRSO should continue to be recommended for BRCA mutation carriers, while more sensitive early detection methods are urgently sought.

### **Keywords:**

BRCA; Risk-Reducing Salpingo-Oophorectomy; RRSO; Ovarian Cancer

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## **FROM CLASSIC ELECTRODES TO SMART TEXTILES: THE EVOLUTION OF ELECTROCARDIOGRAPHY**

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### **Abstract:**

Electrocardiography (ECG) remains a primary tool in non-invasive cardiac diagnostics. While conventional wet electrodes have long been the standard, their propensity to cause skin irritation and their unsuitability for prolonged monitoring present significant limitations.

Recent technological advancements have led to the emergence of alternative electrode designs, including dry and capacitively coupled electrodes, as well as the incorporation of electroactive polymers and smart textiles. These innovations have improved patient comfort and enabled reliable long-term monitoring. Modern wearable ECG devices, utilizing lightweight and flexible materials alongside advanced sensor configurations-such as knitted integrated sensors and planar circuit boards-now facilitate continuous, real-time cardiac surveillance during daily activities. This evolution supports earlier detection and more effective management of cardiovascular diseases, representing a conversion from intermittent assessment to ongoing monitoring.

This paper reviews the progression of ECG sensor technologies, underscoring their clinical advantages and the promising future of wearable cardiac monitoring solutions.

### **Keywords:**

electrocardiography (ECG); smart textiles; dry and capacitive electrodes; cardiac monitoring; wearable devices

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## **CURRENT STATE OF KNOWLEDGE ON THE CONNECTION BETWEEN THE DEVELOPMENT OF MULTIPLE SCLEROSIS (MS) AND COVID-19**

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### **A few words about the author(s):**

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### **Abstract:**

The aim of this paper is to summarize the current state of knowledge regarding the connection between the development of multiple sclerosis (MS), a demyelinating disease of the central nervous system, and COVID-19.

MS is a disease entity whose pathogenesis remains unknown to this day. However, it is inferred that its development results from a combination of genetic predisposition, environmental, and biological factors, with particular emphasis on the role of viruses.

This study specifically focuses on the impact of viral infections, highlighting the role of SARS-CoV-2 in the nervous system and its contribution to the demyelination process leading to the development of multiple sclerosis through damage or loss of the myelin sheath and subsequent disconnection from axons.

### **Keywords:**

COVID-19; multiple sclerosis; nervous system

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## **THE EPIDEMIOLOGY AND PATHOPHYSIOLOGY OF CHRONIC VENOUS INSUFFICIENCY AND VARICOSE VEINS**

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### **A few words about the author(s):**

We are medical students with a strong interest in vascular surgery. During clinical rotations, we observed that venous insufficiency and varicose veins are common, underestimated conditions that can seriously affect quality of life.

### **Abstract:**

Chronic Venous Disease (CVD) is determined by structural and functional disorders of the venous system. It encompasses a range of conditions, including telangiectasias, varicose veins, chronic venous insufficiency (CVI) and chronic venous hypertension. This disease is frequently underdiagnosed and tends to progress gradually, resulting in a significant reduction in quality of life and an increasing burden on healthcare systems. CVI represents an advanced stage of CVD and derives from persistent venous hypertension, valvular dysfunction, and a chronic inflammatory response. Several pathophysiological mechanisms contribute to the development of venous disease, including valvular incompetence, thrombotic or nonthrombotic venous obstruction or external compression of the veins. These factors are often intensified by impaired muscle pump function, particularly within the calf muscles, which play a particular role in venous return. As the disease progresses, incompetence of valves within the deep venous system becomes a major contributor. Structural weakness of the vein wall structure, superficial phlebitis, or venous distention due to hormonal factors can result in dysfunction of superficial venous valves. Risk factors for CVI include increasing age, female sex, a history of pregnancy, obesity, prolonged standing, sedentary lifestyle, and immobility. Early detection and management, such as compression therapy and lifestyle modification, can significantly delay disease progression.

### **Keywords:**

chronic venous insufficiency; varicose veins; Doppler ultrasound technique

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## **NEUROSTIMULATORS IN MODERN MEDICINE: CLINICAL APPLICATIONS OF VAGUS NERVE AND DEEP BRAIN STIMULATION**

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### **Abstract:**

Vagus nerve stimulation (VNS) and deep brain stimulation (DBS) have emerged as critical interventions for neurological and psychiatric conditions refractory to pharmacotherapy. VNS, primarily utilized in medication-refractory epilepsy and treatment-resistant depression, provides a non-resective approach with reduced procedural risk and demonstrates favorable tolerability in long-term use. DBS, initially pioneered for Parkinson's disease management, now addresses diverse movement disorders, severe depressive disorders, and Huntington's disease symptomatology, employing adaptive closed-loop and traditional open-loop systems to modulate pathological neural circuits.

Clinical outcomes from multicenter trials reveal that both modalities achieve significant improvements in motor function, cognitive performance, and psychiatric symptom severity, maintaining acceptable safety profiles with low rates of irreversible adverse events. Current research focuses on refining patient selection criteria, optimizing neurostimulation protocols, and addressing neuroethical implications of device-augmented therapies.

This paper summarizes evidence-based applications, and real-world outcomes for VNS and DBS, underscoring their expanding role as essential components of multimodal treatment strategies in neurology and psychiatry.

### **Keywords:**

Vagus Nerve Stimulation (VNS); Deep Brain Stimulation (DBS); Neurological Disorders; Psychiatric Conditions; Treatment-Resistant Conditions

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## **EVALUATION OF THE IMPACT OF HANDLING AND MUSIC ON ANXIETY-LIKE BEHAVIORS IN LABORATORY RATS USING THE ELEVATED PLUS-MAZE TEST**

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### **A few words about the author(s):**

All three authors work at KUL's new Experimental Research Center: biotech graduates Maja Mikurenda (mouse/rat models, histology) and Damian Oleksiak (zebrafish studies), plus vet Mirosław Łańcut, ethics vice-chair and head of the Center.

### **Abstract:**

Using thirty male Wistar rats, Mikurenda and colleagues evaluated how routine handling and rock music shape anxiety. Animals were assigned to 0, 5, 10 or 15 minutes of gentle daily handling, with or without exposure to moderate-volume Red Hot Chili Peppers (~60 dB), for four weeks. Anxiety was quantified weekly with the elevated-plus-maze. Ten-minute handling without music produced the most stable anxiolysis, rats spending on average 122 s ( $\approx 40\%$ ) in open arms, and 10 min plus music was only slightly less effective (115 s). Music alone modestly reduced anxiety in non-handled controls (95 s versus 60 s), indicating that auditory enrichment can partly substitute human contact. In contrast, the combination of prolonged handling (15 min) and music was the most anxiogenic, limiting open-arm exploration to 42 s. Very short handling showed a delayed benefit, attaining strong anxiolysis only after repeated testing. These findings recommend a predictable 10-min handling regimen as a simple, non-pharmacological refinement to stabilise stress responses, while cautioning that musical enrichment must be genre- and duration-appropriate to avoid counter-productive arousal, thereby improving both welfare and data reliability in behavioral research.

### **Keywords:**

handling; laboratory rats; anxiety-like behavior; elevated plus-maze

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## **ALEXANDER DISEASE – CLINICAL AND GENETIC ASPECTS OF A RARE LEUKODYSTROPHY**

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### **A few words about the author(s):**

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### **Abstract:**

Alexander disease is a rare, genetically determined, progressive, and fatal disorder of the central nervous system, classified among the leukodystrophies. It is caused by mutations in the GFAP gene (glial fibrillary acidic protein), leading to astrocyte dysfunction and secondary degeneration of the brain's white matter. The disease most commonly manifests in infancy and early childhood, presenting with macrocephaly, delayed psychomotor development, seizures, and spasticity.

The presentation will provide an overview of the current state of knowledge regarding the pathogenesis of Alexander disease, its clinical presentation, diagnostic criteria, and potential therapeutic approaches.

### **Keywords:**

Alexander disease; leukodystrophy; neurodegeneration; GFAP

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## **CURRENT STATE OF KNOWLEDGE ABOUT CROHN'S DISEASE**

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### **A few words about the author(s):**

5<sup>th</sup> year medical students, student scientific society at Institute of Medical Sciences.

### **Abstract:**

The aim of this paper is to summarize the current state of knowledge on Crohn's disease. Focusing on the characteristics of the materials and methods used as well as the results obtained and conclusions contained in each article, a systematic literature review was conducted using the following databases: PubMed, Elsevier and Google Scholar. Crohn's disease is a chronic intestinal inflammation with alternating periods of exacerbations and remissions. It is currently believed that the development of this disease is influenced by genetic, microbiological, immunological and environmental factors. A growing number of studies indicate that the intestinal microbiota has a significant influence in the initiation and progression of the disease. In recent years, there has been significant progress in the treatment of Crohn's disease, thanks to the introduction of biological drugs (e.g. antibodies directed against TNF- $\alpha$  and interleukins IL 12, IL 23 or JAK inhibitors) and personalized treatment strategies. The review focuses on the latest scientific data on the pathophysiology, diagnosis and treatment of this disease.

### **Keywords:**

Crohn's disease; treatment; intestinal inflammatory diseases

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## **BEHÇET’S DISEASE – CURRENT STATE OF KNOWLEDGE**

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### **A few words about the author(s):**

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### **Abstract:**

The aim of this paper is to present the current state of knowledge regarding Behçet’s disease – a rare, systemic vasculitis of unknown etiology, classified among rheumatologic disorders. This condition is characterized by a diverse clinical presentation, potentially involving multiple organs and systems, including the skin, mucous membranes, eyes, joints, nervous system, and blood vessels.

A systematic review of the literature was conducted using databases such as PubMed and Google Scholar, focusing on publications addressing the pathophysiology, etiology, clinical manifestations, diagnostic criteria, differential diagnosis, disease course, and current treatment strategies for Behçet’s disease.

### **Keywords:**

Behçet’s disease; vasculitis; uveitis; autoimmunity

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## **ANTAGONISTIC EFFECTS OF SALUSIN A AND B ISOFORMS**

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### **A few words about the author(s):**

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### **Abstract:**

The aim of this study is to review the current state of knowledge on salusin- a bioactive peptide that exists in two isoforms: salusin- $\alpha$  and salusin- $\beta$ . These two forms exhibit opposing effects in the context of atherosclerotic processes: salusin- $\alpha$  has protective and antiinflammatory properties, inhibiting the development of atherosclerosis, while salusin- $\beta$  promotes inflammation and contributes to plaque formation, thus acting proatherogenically. A systematic literature review was conducted using databases such as PubMed, Elsevier, and Google Scholar. The analysis focused on the molecular mechanisms through which the two isoforms of salusin influence inflammatory processes in the vascular wall, foam cell formation, proliferation of fibroblasts and smooth muscle cells, and the progression of atherosclerotic lesions. Numerous studies indicate that elevated plasma levels of salusin- $\beta$  and reduced levels of salusin- $\alpha$  are significantly associated with the severity of atherosclerotic changes, highlighting their potential as biomarkers in cardiovascular diseases.

### **Keywords:**

salusin; salusin alpha; salusin beta; atherosclerosis; foam cells

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## **POLYCYSTIC OVARY SYNDROME – A DIAGNOSTIC CHALLENGE AND A COMPREHENSIVE THERAPEUTIC APPROACH**

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### **A few words about the author(s):**

Student scientific society at Institute of Medical Sciences.

### **Abstract:**

The aim of this study is to summarize the current knowledge on polycystic ovary syndrome (PCOS), one of the most common endocrine disorders in women of reproductive age. A systematic literature review was conducted using PubMed and Google Scholar, focusing on recent studies to present up-to-date diagnostic and therapeutic approaches. PCOS is a heterogeneous condition with clinical features such as irregular menstrual cycles, chronic anovulation, hyperandrogenism, insulin resistance, obesity, and infertility. The most widely accepted diagnostic tool is the Rotterdam criteria, requiring two out of three features: ovulatory dysfunction, hyperandrogenism, and polycystic ovaries on ultrasound. The etiology of PCOS is multifactorial, involving genetic, hormonal, metabolic, and environmental factors. Women with PCOS are at higher risk of type 2 diabetes, dyslipidemia, hypertension, cardiovascular disease, and mental health disorders. Treatment is individualized and includes lifestyle changes, pharmacotherapy, and fertility interventions. Early diagnosis and multidisciplinary care are essential to reduce long-term complications and improve quality of life. This paper provides an overview of PCOS pathogenesis, clinical presentation, diagnosis, and treatment, while also highlighting current challenges and future research directions.

### **Keywords:**

polycystic ovary syndrome; insulin resistance; diabetes, obesity; hyperandrogenism

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## **UNDERSTANDING PHYSIOTHERAPY FROM AN ECOLOGICAL PERSPECTIVE**

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### **A few words about the author(s):**

Physioterapist.

### **Abstract:**

Modern evidence supports the positive effects of non-pharmacological approaches to treating Parkinson's disease symptoms, in particular the effect of exercise on motor and non-motor symptoms. Physical activity can have a protective and stimulating effect, providing better functional performance in higher-level cognitive networks. It can also improve balance and motor function by improving muscle strength. In a study of the preliminary efficacy of yoga in the treatment of moderate to severe depression. The participants rated yoga positively. Many children with brain impairment thrive despite negative risk factors or prognosis. Most follow-up review studies do not show inconclusive effects of specific physiotherapy programs or activations. Evidence is accumulating about the effects of the environment on brain plasticity, but it's unclear what exactly this means for humans. Environmental changes affect human health. The practice of clinical ecology includes practices of environmental sensitivity and its theories. Most methods of diagnosis and treatment have been debunked, and the concepts underlying these theories are not scientific. I believe that physiotherapy in the current world is a very ecological solution for diseases that affect us. However, it requires continued browsing, literature analysis, research in this direction.

### **Keywords:**

physiotherapy; ecology; movement therapy

## AUTOIMMUNE ENCEPHALOPATHIES OF PARANEOPLASTIC AND NON-PARANEOPLASTIC ORIGIN – A SYSTEMATIC REVIEW OF THE ROLE OF ANTINEURONAL AUTOANTIBODIES IN THE PATHOGENESIS AND PROGNOSIS OF THE DISEASE

Jakub Sadowski\*, Tomasz Kludel, Michał Sikorski, Michał Pelczarski, Szymon Wolaniuk

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### A few words about the author(s):

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### Abstract:

#### INTRODUCTION:

Autoimmune encephalopathies (AE) are a group of inflammatory diseases of the CNS associated with the presence of antineuronal autoantibodies. Paraneoplastic and non-paraneoplastic forms are distinguished, differing in immunopathological mechanisms, course and prognosis.

#### OBJECTIVE:

The aim of the study was to analyze available data on the role of antineuronal autoantibodies in the diagnosis, treatment and prognosis of AE, taking into account the differences between paraneoplastic and idiopathic forms.

#### METHODS:

A systematic review of the literature was performed according to PRISMA. PubMed, Embase and Cochrane databases were searched until May 2025, including studies describing cases of AE with detected autoantibodies.

#### RESULTS:

The most frequently detected antibodies were: anti-NMDAR, anti-LGI1 and anti-Hu. Antibodies against surface antigens (e.g. NMDAR, LGI1) were associated with a better response to treatment. Antibodies against intracellular antigens (e.g. Hu) – with a worse prognosis and often coexisting cancer.

#### CONCLUSIONS:

The type of autoantibodies influences the clinical picture, response to therapy and prognosis in AE. Early diagnosis and targeted treatment are crucial to improve the effects of therapy.

### Keywords:

autoimmune encephalitis; antineuronal antibodies; paraneoplastic neurological syndromes (PNS); neuronal surface antibodies; immunotherapy response

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## **CURRENT STATE OF KNOWLEDGE ON EWING SARCOMA**

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### **A few words about the author(s):**

Michał Sikorski, Michał Pelczarski, Tomasz Klaudel, Jakub Sadowski – student scientific society at Institute of Medical Sciences.

### **Abstract:**

The aim of this paper is to summarize the current state of knowledge regarding Ewing sarcoma. Ewing sarcoma is a rare and malignant tumor that primarily affects children and adolescents. It most commonly occurs in long bones, the pelvis, or the ribs. Its etiology is mainly associated with a genetic mutation – translocation t(11;22), which leads to the formation of the EWS-FLI1 fusion protein. Diagnosis involves imaging studies (X-ray, MRI) as well as biopsy with histopathological and molecular analysis. Standard treatment includes chemotherapy, surgery, and radiotherapy, although the prognosis remains poor in cases with metastases. New treatment approaches include immunotherapy, targeted therapies, and research into next-generation drugs, such as naxitamab. Advances in genetics and oncology offer hope for more effective treatment in the future.

### **Keywords:**

Ewing sarcoma; naxitamab; bone cancer; EWS-FLI1



## CHARACTERISTICS OF EXPLODING HEAD SYNDROME

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### A few words about the author(s):

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

### Abstract:

One of the lesser-known parasomnias that does not significantly affect health is exploding head syndrome. It involves the occurrence of auditory hallucinations during waking and falling asleep. These hallucinations, often take the form of loud and short sounds resembling an explosion. Auditory sensations may also be accompanied by such symptoms as visual hallucinations in the form of flashes, hot flashes and symptoms resulting from stimulation of the sympathetic nervous system. The mechanism of parasomnia itself is not fully understood. One hypothesis is that exploding head syndrome is related to dysfunction of the reticular formation. Diagnosis of the condition is difficult, and treatment, in addition to education on sleep hygiene, may include pharmacotherapy with drugs such as SSRIs, carbamazepine, nifedipine, topiramate, flunarizine, methylphenidate.

### Keywords:

EHS; exploding head syndrome; parasomnia

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## **LITERATURE REVIEW – CURRENT STATE OF KNOWLEDGE ON HEPATITIS C (HCV)**

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### **A few words about the author(s):**

5<sup>th</sup> year medical students. We are interested in topics related to infectious diseases.

### **Abstract:**

Hepatitis C (HCV) is one of the most common causes of chronic liver disease worldwide. Despite tremendous advances in treatment, including the introduction of direct-acting antiviral (DAA) drug therapy in recent years, the infection remains a significant global health challenge. HCV, which is an RNA virus of the Flaviviridae family, is characterized by high genetic variability and the ability to evade the host immune response, which promotes the development of chronic infection. An asymptomatic course of infection, delaying its diagnosis, increases the risk of serious complications such as liver fibrosis, cirrhosis and hepatocellular carcinoma. Developing effective screening strategies, increasing the availability of treatment in marginalized groups, and developing a safe and effective vaccine are key elements of a strategy to eliminate HCV as a public health threat. The purpose of this presentation is to review current knowledge of HCV biology, its epidemiology, diagnosis and treatment, and to highlight the importance of efforts to eradicate it.

### **Keywords:**

hepatitis C; HCV; chronic liver disease

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## **THE ROLE OF VIRTUAL REALITY IN MODERN CARDIAC SURGERY**

**Dominik Tenczyński\*, Aleksandra Malinowska, Michał Kostro, Weronika Grzesiak,  
Tomasz Klaudel, Jakub Sadowski**

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### **A few words about the author(s):**

All the authors are medical students at the Faculty of Medicine, University of Opole, Opole, Poland.

### **Abstract:**

Virtual reality (VR) is perceived as a transformative tool in the field of cardiac surgery, providing three-dimensional visualization and interactive simulation capabilities that are reshaping both educational and clinical practices.

Recent advancements in VR technology have made it possible to construct highly realistic, multisensory environments, enhancing the spatial comprehension of complex cardiac structures and supporting the planning of surgical interventions. VR-based educational platforms enable surgeons and multidisciplinary teams to rehearse uncommon or technically demanding procedures in a controlled, risk-free environment, enabling the development of technical proficiency and procedural confidence. Clinically, VR applications extend to preoperative planning, intraoperative guidance, and postoperative rehabilitation, collectively contributing to less invasive procedures, heightened surgical accuracy, and improved patient outcomes.

Although challenges such as significant implementation costs and the necessity for specialized training remain, VR is anticipated to assume an increasingly central role in cardiac surgery. By bridging the divide between theoretical instruction and practical experience, VR stands to advance both patient care and the quality of surgical education.

### **Keywords:**

virtual reality (VR); cardiac surgery; surgical education; preoperative planning; patient outcomes

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## NIGHT EATING SYNDROME – AN INTERDISCIPLINARY DIAGNOSTIC AND THERAPEUTIC CHALLENGE

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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 – 3<sup>rd</sup> year student of nursing.

### Abstract:

Night Eating Syndrome (NES) is a condition situated at the crossroads of psychiatry, dietetics, and sleep medicine. It is characterized by a lack of appetite in the morning (so-called morning anorexia), alongside increased hunger and episodes of eating during the night. Most patients remain conscious during these nocturnal episodes, although some may not remember them the next day. NES leads to a significant shift in eating patterns – more than half of daily caloric intake occurs after 7 p.m. The syndrome is often associated with obesity, type 2 diabetes, and depression. It affects 1–2% of the general population, but its prevalence may rise to as much as 64% in individuals with class III obesity. It is also linked with insomnia (frequent awakenings during the NREM phase), low self-esteem, anxiety, and dysphoria. Patients commonly eat in response to emotional distress, usually without deriving pleasure from it, and often conceal these episodes due to feelings of shame. There is no standardized treatment for NES. Management strategies include pharmacotherapy (e.g., SSRIs, antiepileptic drugs) and psychotherapy. Early diagnosis remains rare, yet stress reduction appears to alleviate symptoms. NES represents a complex clinical issue that requires coordinated care across psychiatry, dietetics, and sleep medicine.

### Keywords:

night eating syndrome; NES; sleep medicine

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## **ALOPECIA AREATA IN CHILDREN – DIAGNOSTIC AND THERAPEUTIC CHALLENGES**

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### **A few words about the author(s):**

The authors of this presentation are 3<sup>rd</sup> year nursing students at the Jan Grodek State University in Sanok, who are also active members of the Student Scientific Circle of Nursing.

### **Abstract:**

Alopecia areata is a chronic autoimmune disease characterized by patchy hair loss on the scalp and other areas of the body. In the pediatric population, it presents particular diagnostic and therapeutic challenges. The clinical presentation may be atypical, and diagnosis is often delayed. Treatment is limited due to the patient's age, the safety of available medications, and the lack of clear guidelines. The disease significantly affects the child's quality of life and psychological functioning. The aim of this presentation is to outline current difficulties in the diagnosis and treatment of alopecia areata in children and to discuss an interdisciplinary approach that includes dermatological treatment, psychological support, and family education.

### **Keywords:**

alopecia areata; pediatric dermatology; autoimmune disorders

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## **CURRENT STATE OF KNOWLEDGE ABOUT KASABACH-MERRITT SYNDROME**

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### **A few words about the author(s):**

Szymon Wolaniuk, Dawid Piekarski, Karolina Tomasiak - 5<sup>th</sup> year medical students, student scientific society at Institute of Medical Sciences.

### **Abstract:**

The aim of this paper is to summarize the current scientific knowledge on Kasabach-Merritt syndrome. It is a rare disease also known as hemangioma-thrombocytopenia syndrome that can lead to life-threatening complications, of which the most serious is disseminated intravascular coagulation syndrome. Kasabach-Merritt syndrome is an unusual complication of vascular tumors, in particular: kaposiform hemangioepithelioma and tufted angioma. Its occurrence is explained by the phenomenon of platelet trapping within the vascular lesion, and subsequent consumptive coagulopathy. Due to the uncertain prognosis, it is important to pay attention to the important role of the interdisciplinary approach in the diagnostic and therapeutic process. A narrative review of the literature was conducted using the PubMed and Google Scholar databases and the ResearchRabbit tool. This review discusses the pathophysiological phenomena in the course of the syndrome, the clinical features, and available therapeutic methods.

### **Keywords:**

Kasabach-Merritt syndrome; hemangioma-thrombocytopenia syndrome; disseminated intravascular coagulation; consumptive coagulopathy

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## **ABUSE, WITH THE ASPECT OF POISONING, OF PSYCHOACTIVE SUBSTANCES IN CHILDREN, ADOLESCENTS AND ADULTS**

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### **A few words about the author(s):**

Weronika Woskowska (3<sup>rd</sup> year) and others (Emilia Lichaj, Sylwia Otulak, Oliwia Rak, Tomasz Klaudel, Jakub Sadowski) – students scientific society at Institute of Medical Sciences.

### **Abstract:**

Abuse and poisoning with psychoactive substances constitute a global problem, not only social, but also diagnostic, therapeutic and preventive. Moreover, the phenomenon of intoxication with over-the-counter (OTC) drugs by young people is a problem present both in Poland and worldwide. The review focuses on the list of psychoactive substances and stimulants containing them, as well as the analysis of the consequences and severity of the course of poisoning. The work also takes into account their diagnostics, treatment methods and prognosis. The review also mentions the topic of currently the newest and least known psychoactive substances. The work mainly addresses the aspect of abuse of psychoactive substances and stimulants containing them by children and adolescents. The review also includes case studies and elements of statistics of intoxication and poisoning.

The summary also concludes on possible methods of dealing with this problem. In order to prepare the above-described systematic review, an analysis of the available literature was carried out using the databases: PubMed, Google Scholar and ResearchGate.

### **Keywords:**

psychoactive substances; stimulants; poisoning; OTC; children and adolescents

# ABSTRACTS OF **POSTERS**



**MEDICAL  
SCIENCES**

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## **CELL-PENETRATING PEPTIDES (CPPS) IN ENHANCING THE DELIVERY EFFICACY OF ANTISENSE PNA MOLECULES.**

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*Department of Internal Medicine and Clinical Pharmacology, Faculty of Medical Science in Katowice,  
Medical University of Silesia, Medykow 18, 40-752 Katowice, Poland*

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### **A few words about the author(s):**

3<sup>rd</sup> year PhD candidate at the Medical University of Silesia in Katowice. Research focuses on peptide nucleic acids (PNAs) in hypercholesterolemia therapy.

### **Abstract:**

Peptide nucleic acids (PNAs) are synthetic molecules with a unique backbone, more stable and resistant to degradation than DNA/RNA. By binding complementarily to DNA/RNA, they form stable hybrids, promising applications in gene therapy and diagnostics. The limited cell membrane penetration of PNAs necessitates delivery strategies, which are aided by cell-penetrating peptides (CPPs) – short, positively charged amino acid sequences. They transport various cargoes, including PNAs, into cells, sometimes with target specificity.

Our study demonstrated the effective crossing of cell membranes in vitro by PNAs delivered via CPPs. We optimized PNA and CPP concentrations, comparing their efficiency and finding TP10 superior to TD2.2 and Tat. Combining CPPs with nuclear localization signals (NLS) on PNAs significantly increased nuclear accumulation, effectively delivering PNAs to their target site.

### **Keywords:**

cell-penetrating peptide (CPP); proprotein convertase subtilisin/kexin 9 (PCSK9); peptide nucleic acids (PNA); cell culture



## **BREATHWORK AND STRESS: INVESTIGATING THE MECHANISMS OF ACTION AND EFFECTIVENESS OF BREATHING INTERVENTIONS IN MODULATING THE PSYCHOPHYSIOLOGICAL RESPONSE TO ACUTE STRESS**

**Adam Siebieszuk\*, Marcin Baranowski**

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### **A few words about the author(s):**

Adam Siebieszuk is a PhD student at the Medical University of Białystok. He holds a Master's degree in Physiotherapy and researches the effectiveness of breathing exercises in reducing stress.

### **Abstract:**

Stress is a major global health challenge. Coherent breathing (CB), a scientifically grounded breathwork method, shows promise for improving mental health. Distinguishing specific mechanisms of CB from non-specific effects requires placebo-controlled studies, which are currently lacking in the field. This pilot study compared 10-min interventions: CB (6 bpm; 5.5 s inh/exh; n=4), placebo breathing (PLA: 15 bpm; 2 s inh/exh; n=3), and control (CON; n=3). Methods were applied both before and after the MAST stress test. Physiological measures (HRV parameters, BP, HR) and psychological (VAMS, STAI-S) were recorded at BASE, PRE, POST, END, FOLLOW. Data were analyzed using ANOVA with Tukey post-hoc tests. CB induced a distinct pattern of change in PNS markers (Time×Group interaction for RMSSD, SD1, PNS Index all  $p < 0.05$ ), characterized by significant within-CB group increases. CB also decreased SNS Index ( $p = 0.02$  BASE–FOLLOW), MeanHR, and SBP ( $p = 0.02$  POST–FOLLOW) compared to CON/PLA. Subjectively, CB and PLA both improved mood over time (Time effect  $p < 0.001$ ), with CB showing more pronounced within-group improvements.

### **CONCLUSIONS:**

Despite small sample, significant effects for CB were observed. CB yielded superior autonomic benefits post-stress vs PLA/CON. Both CB & PLA improved subjective mood, but CB's distinct autonomic signature indicates specific mechanisms beyond non-specific. This pilot study supports CB superior effects over placebo paced at spontaneous breathing frequency.

### **Keywords:**

breathwork; slow breathing; mental health; stress; HRV

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## **UROGYNECOLOGICAL PHYSIOTHERAPY IN THE PERINATAL PERIOD AS A KEY TO BETTER QUALITY OF LIFE FOR WOMEN IN SOUTHWESTERN POLAND**

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### **A few words about the author(s):**

We are members of the Scientific Student Association "Fizjonerzy", whose main goal is to organize "Evenings with Health" – sessions for students, university staff, and others to promote knowledge and awareness of physical and mental well-being.

### **Abstract:**

The aim of this study was to assess the impact of urogynecological physiotherapy on improving the quality of life during the perinatal period among women living in the southwestern region of Poland. The most common ailments, timing of therapy use, and its perceived effectiveness were also analyzed.

The study was conducted using a diagnostic survey method with a proprietary online questionnaire completed by 250 women. Ethical approval was obtained from the Research Ethics Committee of the University of Opole (No. 17/2025). The collected data were analyzed both qualitatively and quantitatively, and the results were presented in the form of percentage-based charts.

The analysis showed that the majority of women (57%) used urogynecological physiotherapy only after childbirth. Only 5% of participants opted for therapy as a form of birth preparation. Importantly, as many as 61% of women who underwent urogynecological physiotherapy reported no longer experiencing any ailments at the time of the study. The therapy's effectiveness was rated highly - 70% of respondents gave it the highest score 5 (on a 0–5 scale).

The high effectiveness ratings and its positive impact on quality of life indicate a need for further promotion of this field of physiotherapy. To better illustrate the issue, large-scale studies including a greater number of women are necessary.

### **Keywords:**

urogynecological physiotherapy; quality of life; perinatal period; pregnancy; perinatal ailments

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## **AI IN MODERN COSMETOLOGY: PERSONALIZATION AND PRECISION FOR THE FUTURE OF SKINCARE**

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### **A few words about the author(s):**

3<sup>rd</sup> year cosmetology student, active member of the scientific club at the Department of Chemistry and Biochemistry.

### **Abstract:**

Artificial intelligence is revolutionizing modern cosmetology by transforming how we analyze skin features, plan treatments, and personalize products-both in clinics and at home. Advanced diagnostic tools powered by AI and complex algorithms can precisely assess skin parameters, supporting the creation of effective post-treatment recommendations and personalized care plans.

Systems like Cetaphil AI Skin Analysis and DERMO SCAN analyze large datasets, detecting changes invisible to the human eye and enabling more effective skincare. AI-driven personalization allows for therapy plans tailored to each client's unique skin and environmental factors.

Despite these benefits, AI in cosmetology brings ethical challenges, including data privacy, ongoing specialist training, and the need for algorithm verification. Additionally, home systems often rely on user-taken photos, which can sometimes mislead AI.

While artificial intelligence raises the standards of personalization and effectiveness in cosmetology, expert verification and ethical standards remain essential.

### **Keywords:**

artificial intelligence; cosmetology; skin care

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## **FROM UNAWARENESS TO STANDARD PRACTICE: UROGYNECOLOGICAL PHYSIOTHERAPY IN SOUTHWESTERN POLAND THROUGH THE EYES OF WOMEN**

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### **A few words about the author(s):**

We are members of the Scientific Student Association "Fizjonerzy", whose main goal is to organize "Evenings with Health" – sessions for students, university staff, and others to promote knowledge and awareness of physical and mental well-being.

### **Abstract:**

The aim of this study was to assess women's awareness and opinions regarding urogynecological physiotherapy, evaluate its availability in healthcare facilities, determine therapy effectiveness from the patients' perspective, and identify the most common barriers to accessing this type of care.

The study was conducted using a diagnostic survey method with a proprietary online questionnaire completed by 250 women. Ethical approval was obtained from the Research Ethics Committee at the University of Opole (No. 17/2025). The collected data were analyzed both qualitatively and quantitatively and presented in the form of pie charts.

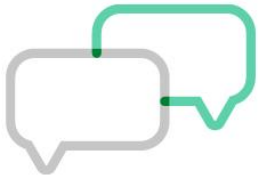
The findings indicate that the availability of urogynecological physiotherapists in maternity wards remains limited. More broadly, women rarely utilize urogynecological physiotherapy services. The main reasons include lack of awareness about this form of therapy, limited availability of specialists, absence of perceived need, and high costs of private consultations.

Further research involving a broader population is recommended to deepen and consolidate knowledge in this area. Current findings highlight the need to raise public awareness of urogynecological physiotherapy and improve its accessibility in public healthcare institutions. The high percentage of women affirming the therapy's effectiveness and positive impact on quality of life underscores the need for systemic support of this discipline.

### **Keywords:**

urogynecological physiotherapy; women's health awareness; healthcare accessibility; perinatal care

# ABSTRACTS OF **PRESENTATIONS**



**TECHNICAL AND  
NATURAL SCIENCES**

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## METHODOLOGY AND IMPORTANCE OF MODERN STRUCTURAL, PHYSICOCHEMICAL AND MOLECULAR MODELING STUDIES ON THE EXAMPLE OF A COMPOUND WITH NOOTROPIC ACTIVITY – NOOPEPT

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### **A few words about the author(s):**

Author of this work is a Pharmacy Student of the Medical University of Warsaw.

### **Abstract:**

Piracetam is a nootropic compound registered in Poland, significant for the treatment of neurological disorders. Nootropic substances are garnering heightened interest in society, both as prospective pharmaceuticals and for non-medical applications. A more potent counterpart of Piracetam, known as Noopept, was developed in Russia in 1996. This substance currently occupies a "grey zone" in Poland, remaining unregistered as either a narcotic or a hazardous material, yet accessible for purchase by any individual in the country. Noopept has been largely unexamined in the realms of chemistry and physics until recently.

Our research concentrated on a comprehensive analysis of the chemical structure of Noopept. We assessed its crystallinity or possible amorphous nature. A preliminary screening was conducted to identify polymorphic variants of this peptide. We conducted the inaugural published physicochemical investigation of Noopept, underpinned by molecular modelling.

Noopept was ultimately recrystallised from nine solvents, yielding three crystals appropriate for SCXRD. SEM, TGA/DSC, SCXRD, PXRD, FT-IR, and NMR analyses verified that all crystals represent a previously unrecorded crystalline form of Noopept, with no evidence of polymorphism detected. The structure was submitted to the CCDC database. DFT calculations (CASTEP) facilitated accurate assignment of FT-IR and NMR signals, demonstrating strong concordance with experimental data ( $R^2 > 0.998$ ).

### **Keywords:**

Noopept; physicochemical analysis; pharmaceutical analysis; crystal structure; structural analysis

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## **ANALYSIS OF LARGE GIS DATASETS AS A KEY TO ADAPTING AND DEVELOPING AGENT-BASED SYSTEMS FOR THE DESIGN AND SITE SELECTION OF ENERGY FACILITIES**

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### **A few words about the author(s):**

Nikodem Bulanda – academic teacher and specialist in computer engineering. PhD (Eng.) Anna Kochanek – assistant professor. Aleksandra Olszańska – computer science student.

### **Abstract:**

Since the large language model ChatGPT was released to the general public, the popularity of conversational bots and agent-based systems has surged, confirming predictions made by researchers in the late 1990s and early 2000s. This development has fundamentally changed how users access information resources: labor-intensive searches are increasingly being replaced by a single, precisely formulated question, posed with the expectation of an immediate and comprehensive answer. Such interaction resembles the declarative query languages used in database systems and has inspired the following research problem: Can land-classification tasks for siting facilities (such as a local biogas plant) be simplified relative to the traditional, time-consuming design process? To address this question, we propose an agent system that, drawing on Big-Data ETL pipelines and the Apache Spark computing platform, produces concise text-and-graphic responses to support designers' decision-making.

### **Keywords:**

large language models (LLM); conversational agents; land classification; GIS; Big Data ETL

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## **ANALYSIS OF METABOLIC CHANGES IN HUMAN COLON CELLS USING RAMAN SPECTROSCOPY AND IMAGING**

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### **A few words about the author(s):**

Monika Kopec is an Assistant Professor in the Institute of Applied Radiation Chemistry, at the Lodz University of Technology. Her research interests are focused on applications of Raman spectroscopy and imaging in cancer diagnostics.

### **Abstract:**

Processes related to metabolism play a key role in maintaining and proper functioning of the human body. It is crucial to notice that the intense uptake of a large amount of glucose typical for cancer cells creates hyperglycemia conditions and simultaneously can lead to accelerated cellular hypoxia even in the presence of abundant oxygen due to increased oxygen consumption in mitochondria. Recently, optical methods including Raman spectroscopy and Raman imaging, have been increasingly used in the diagnosis of cancer.

It has been focused on the impact of unsaturated fatty acids, saturated fatty acid, and glucose on healthy and cancerous colon cells using Raman microspectroscopy. We proved that oxidative metabolism towards glycolysis allows maintaining redox homeostasis and enables the survival and proliferation of cancer cells in hypoxic conditions. The results indicate that the peaks at 750, 1004, 1256, 1444 and 1656  $\text{cm}^{-1}$  can be served as Raman biomarkers to track and understand abnormalities in mitochondria and lipid droplets caused by the external intake of FAs and glucose under hypoxic conditions.

The identified Raman biomarkers have significant practical prospects and may contribute to the effective diagnosis in detecting cancer changes.

This work was supported by the "FU2N-Fund for the Improvement of the Skills of Young Scientists" supporting the scientific excellence of the Lodz University of Technology-grant no. W3/6D/2022, W3/2P/2022.

### **Keywords:**

colon cancer; Raman spectroscopy; Raman imaging; statistical analysis; biomarkers

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## **RECYCLING USED CELLS: FROM WASTE TO RESOURCE**

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### **A few words about the author(s):**

I am a 3<sup>rd</sup> year student majoring in Renewable Energy Sources and Waste Management at the University of Agriculture in Krakow. I am interested in topics related to sustainable development in recycling and efficient resource management.

### **Abstract:**

Used cells pose a significant environmental and technological challenge due to their increasing volume and the presence of valuable raw materials as well as hazardous substances. Effective management of these waste materials involves recycling processes such as sorting, shredding, and chemical separation, enabling the recovery of up to 95% of key components, including lithium, cobalt, and nickel. The repurposing of used cells, for instance, in stationary energy storage systems, extends their lifecycle and supports the development of a circular economy. The primary challenges remain minimizing environmental contamination and reducing risks associated with improper disposal of cells. This analysis highlights the importance of innovation and responsibility in managing used cells as a critical element in strategies for resource conservation and reducing environmental impact.

### **Keywords:**

used cells; raw materials; recovery; resources



## ASSESSMENT OF THE VIABILITY OF BIFIDOBACTERIUM ISOLATES UNDER ACIDIC PH CONDITIONS

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### **A few words about the author(s):**

Aleksandra Saweczko is a student of Biotechnology, working on her thesis, which is part of the project focused on new probiotic strains. Dr. Elwira Komoń-Janczara is the principal investigator of the project and supervisor of the master's thesis.

### **Abstract:**

The ability of bifidobacteria to survive in a low pH environment is a key factor for their effectiveness as probiotics. This is due to their necessity to survive the acidic conditions of the stomach environment during passage through the digestive tract to the intestines. The adaptive mechanisms of bifidobacteria at low pH, such as modification of cell membrane composition, changes in protein expression, and metabolic pathways, are strain-dependent.

In this study, 3 isolates from the human digestive tract and 1 collection strain belonging to the genus *Bifidobacterium* were analyzed. Samples were prepared as cell suspensions at appropriate dilutions in a peptone water solution with a pH of 3.5. The suspension was plated on solid Garchez's medium and then incubated at low pH for 45 minutes. After this time, replating was performed on Garchez's medium. The plates were incubated at 37°C for 48 hours under anaerobic conditions. The survival of the isolates at low pH was determined by comparing the number of colonies on plates plated before and after 45 minutes of incubation.

The results show that *Bifidobacterium* strains are capable of surviving in a low pH environment. This knowledge will allow for the development of more effective probiotic preparations, providing health benefits.

The research was funded by the National Science Center as part of the PRELUDIUM 15 project no. 2018/29/N/NZ9/02421.

### **Keywords:**

*Bifidobacterium*; low pH; probiotics

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## **PATHOGENIC POTENTIAL OF FUSARIUM SPP. IN CEREAL CROPS**

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### **A few words about the author(s):**

A final-year Molecular Biology student with a keen interest in phytopathology, microbiomes, and the ecology of alien and invasive species.

### **Abstract:**

This study analyzes the pathogenicity of *Fusarium* spp. in cereal crops, focusing on symptoms, economic impact, and health threats to humans and animals. *Fusarium* fungi cause diseases like Fusarium head blight (FHB), characterized by spikelet discoloration, stunted growth, grain deformation, and necrotic lesions. These pathogens produce hazardous mycotoxins, such as deoxynivalenol (DON) and zearalenone (ZEA), known for their mutagenic, estrogenic, and immunotoxic effects. *Fusarium* infections are a global agricultural issue, affecting both developed and developing regions. Effective control is critical and requires integrated approaches. This paper discusses management strategies, including resistant cultivars, crop rotation, and seed quality control. Special attention is given to biological methods using *Trichoderma* spp., which combat *Fusarium* through competition, mycoparasitism, and antifungal metabolites. The goal is to present a comprehensive overview of the risks posed by *Fusarium* in cereal cultivation and highlight sustainable protection strategies.

### **Keywords:**

sarium spp.; fusarium head blight; mycotoxins; cereal protection

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## **MATHEMATICAL METHODS OF ATTACKING ASYMMETRIC CRYPTOGRAPHY SYSTEMS**

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### **A few words about the author(s):**

I am doing a course in applied mathematics at the Białystok University of Technology. I'm fascinated into cryptography, and I would like to present some information about cryptography and how easy it is to make a mistake in cryptosystem.

### **Abstract:**

I am a student at Białystok University of Technology, Faculty of Computer Science. This presentation explores mathematical methods of attacking asymmetric cryptographic systems, with a particular emphasis on the RSA algorithm. The talk begins with an introduction to key cryptographic concepts, including the distinction between symmetric and asymmetric encryption, followed by a detailed overview of how RSA works. The core of the presentation focuses on common vulnerabilities arising from poor implementation practices, such as the use of small or closely related prime numbers, and how these mistakes can be exploited using specific factorization techniques. Algorithms like Fermat's factorization and Pollard's  $p-1$  method will be explained and illustrated here with examples. The presentation concludes with a look at attacks involving the discrete logarithm problem, such as the Baby-Step Giant-Step algorithm, which highlight the importance of strong cryptographic parameters. The goal is to raise awareness of the mathematical weaknesses in cryptographic implementations and stress the importance of secure key generation.

### **Keywords:**

cryptography; number theory

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## **ANISAKIS SIMPLEX**

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### **A few words about the author(s):**

My name is Małgorzata, I graduated with a bachelor's degree in veterinary analytics from the University of Life Sciences in Lublin, where I am continuing my education in master's studies.

### **Abstract:**

*Anisakis simplex* – a species of relatively large parasitic nematode. It is a species with a very wide geographical range, covering many climatic and ecological zones.

Its life cycle is a complex process that involves several species of animals at different stages. The parasite passes through different stages in the body of its hosts, with the final host being marine mammals such as seals, dolphins and whales.

Many marine mammals can carry the parasite *Anisakis simplex* in their digestive tracts without any noticeable symptoms. The parasite passes through their bodies to adulthood without causing any serious health complications. If the larvae invade the stomach lining, they can cause inflammation, leading to symptoms such as abdominal pain, nausea, and vomiting. Larvae that migrate outside the digestive tract can lead to more serious complications, including tissue damage and systemic infections. The best diagnostic tool is an endoscopy.

Symptoms of *Anisakis simplex* infection in humans include abdominal pain, nausea, vomiting, diarrhea, and, less commonly, allergic reactions. Infection can lead to inflammation in the gastrointestinal tract and, in rare cases, tissue damage. Diagnosis is based on history and endoscopy, and treatment involves the removal of parasites and symptomatic treatment. The key preventive measure is proper preparation of fish for consumption.

### **Keywords:**

parasite; marine mammals; humans; infection

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## **HEAVY METALS IN THE ENVIRONMENT AND FOOD CHAIN AS A PUBLIC HEALTH RISK FACTOR**

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### **A few words about the author(s):**

An assistant at the Department of Biophysics at the beginning of the development of her scientific activity, wanting to expand her knowledge and also train her practical workshop.

### **Abstract:**

Heavy metals such as lead, cadmium, mercury, and arsenic represent a long-standing yet often underestimated threat to public health. Due to their chemical stability and tendency to bioaccumulate, these elements persist in the environment and easily enter the food chain through contaminated soil, water, and air. As a result, humans are chronically exposed to toxic levels, especially in regions affected by industrial activity or intensive agriculture. Although regulatory efforts exist, they are not always sufficient to prevent contamination or reduce population-level risk.

Recent scientific findings have highlighted the significant health consequences of long-term heavy metal exposure. These include damage to vital organs such as the brain, kidneys, liver, and cardiovascular system. Associations have been observed between heavy metal burden in the body and the development of neurodegenerative diseases, certain cancers, and metabolic disorders. Alarmingly, current systems for monitoring contaminants in food are often inadequate, leading to underestimation of exposure.

To address this issue, more effective regulatory frameworks and public health strategies are urgently needed. Emphasizing safer food choices and preparation methods, along with further research on detoxification and long-term health effects, is essential to mitigate the risks associated with heavy metal accumulation.

### **Keywords:**

heavy metals; public health; toxicity; accumulation

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## **EFFECT OF CALCIUM CHLORIDE ON THE PHYSICAL STABILITY OF COLLAGEN-AGAR EMULSION GELS**

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### **A few words about the author(s):**

Małgorzata Latoszewska is a student of Food Technology and Human Nutrition. She is a member of the Scientific Circle of Food Technologists. Dr Iwona Szymańska is a scientific supervisor of the work.

### **Abstract:**

The gelation of oil-in-water (o/w) emulsions offers a promising technology for developing animal fat substitutes, particularly in the meat industry. Although numerous studies are being conducted on protein-polysaccharide composites, achieving their high stability, which affects the quality of the final product, remains a significant challenge. Exploring the combination of collagen proteins with agar could provide an interesting solution. Additionally, the inclusion of calcium cations can further improve their structural interactions. Therefore, this study aimed to determine the effect of calcium chloride (CaCl<sub>2</sub>) concentration (0.05 M, 0.1 M, 0.15 M, and 0.2 M) on the physical stability of collagen-agar emulsion gels. The systems were analysed in terms of pH level, forced leakage, degree of syneresis, centrifugal stability, and hardness in both primary state (24 hours post-preparation) and the secondary state (re-gelled after heating for 30 min at 75°C). The results showed that the addition of CaCl<sub>2</sub> had an ambiguous effect on the physical properties of emulsion gels. Consequently, utilizing calcium chloride in concentrations ranging from 0.05 to 0.2 M is not technologically justified for these formulations. This finding underscores the necessity for further investigation of alternative sources of calcium ions and/or different concentrations to improve the physical stability of emulsion gels as substitutes for animal fat in heat-treated meat products.

### **Keywords:**

collagen; agar; emulsion gel; calcium chloride; physical stability

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## N-ACYLATION OF THE IMIDAZOLE RING IN THEOBROMINE AND THE PYRIMIDINE RING IN THEOPHYLLINE AND STRUCTURE-ACTIVITY RELATIONSHIP OF THE OBTAINED COMPOUNDS

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### A few words about the author(s):

Arleta Sierakowska, Ph.D., is an assistant professor at the Department of Bioactive Products. Zofia Makoweńska is a student under Arleta Sierakowska's guidance.

### Abstract:

Purine alkaloids are important natural compounds that are interesting for a large number of scientists. They are often subjected to modifications to increase their activity against living organisms. The aim of this work was to synthesize new compounds of theobromine and theophylline, substituted at the N-1 and N-7 position. These compounds were synthesized by N-acylation. The same substrates were used for the synthesis to investigate the differences in their activity depending on the alkaloid derivative. The compounds were purified by gradient column chromatography. Spectroscopic examination of the compounds obtained so far was performed - <sup>1</sup>H NMR, <sup>13</sup>C NMR, EI-MS and FT-IR to confirm the synthesis of these compounds and analyze their structures. The aim of this presentation is to present the results of these studies.

### Keywords:

alkaloids; theobromine; theophylline; N-acylation;  $\alpha$ -bromoketones

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## **DIROFILARIA SPP. – CHARACTERISTICS AND DIAGNOSTIC METHODS**

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### **A few words about the author(s):**

I am a student of veterinary analytics at the Faculty of Veterinary Medicine of the University of Life Sciences in Lublin.

### **Abstract:**

Dirofilariosis is a parasitic disease caused by nematodes of the genus *Dirofilaria*, and primarily by *Dirofilaria immitis*, *Dirofilaria repens*.

The parasite is transmitted by mosquitoes, and its hosts are mainly dogs, but can also be cats and other mammals.

Depending on the species of nematode, it localizes in the heart and pulmonary arteries (*D. immitis*) and in subcutaneous tissue (*D. repens*).

The disease manifests itself through coughing, shortness of breath, exercise intolerance and skin lesions.

Diagnostics range from the most basic methods, such as blood smear and Knott's test, post-mortem examination; serological tests, such as ELISA, immunochromatography; imaging diagnostics (X-ray, cardiac echo) to molecular methods, such as PCR and its variations.

Early diagnosis is of great importance in preventing complications, in the effectiveness of treatment and preventing further transmission of the parasite.

### **Keywords:**

Dirofilariosis; *Dirofilaria* spp.



## **THE HONEY BADGER – FEARLESS PREDATOR AND SURVIVAL MASTER**

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### **A few words about the author(s):**

My name is Karolina Pniaczek, I completed my bachelor's degree in veterinary analytics at the University of Life Sciences in Lublin and I am continuing my master's studies.

### **Abstract:**

The honey badger is the only living representative of the Mellivorinae subfamily within the Mustelidae family. Known for its aggression, courage, and venom resistance, it fascinates scientists from various fields.

Its name comes from its love of honey – it frequently raids bee nests for larvae, wax, and honey. It even cooperates with the greater honeyguide, a bird that leads it to hives. Though similar in appearance to badgers, it diverged from their common ancestor 15–20 million years ago. Honey badgers inhabit various environments across Africa and South Asia – from deserts to tropical forests.

They have thick, loose skin that's hard to pierce, and males weigh 9–14 kg (females 5–10 kg). Their powerful claws help them dig burrows and fight. They can survive bites from venomous snakes like the black mamba, thanks to mutations in neurotoxin and pain receptors.

These opportunistic predators eat anything from insects and rodents to snakes and fruit. Their response to threats is pure aggression – even lions or hyenas tend to avoid adult honey badgers.

They are polygynous, and females give birth to 1–2 blind, helpless young after 60–80 days. The mother protects them fiercely for months. The species is classified as “Least Concern” by the IUCN.

In African cultures, the honey badger symbolizes cunning, strength, and bravery. Its resistance, adaptability, and intelligence make it a fascinating subject for scientific research.

### **Keywords:**

honey badger; black mamba; pure aggression

# ABSTRACTS OF **POSTERS**



**TECHNICAL AND  
NATURAL SCIENCES**

## **ASSESSMENT OF INTER-SPECIES INTERACTIONS BETWEEN LLAMAS (LAMA GLAMA) AND CAPYBARAS (HYDROCHOERUS HYDROCHAERIS) IN THE “SOUTH AMERICA” EXHIBIT AT THE BYDGOSZCZ ZOOLOGICAL GARDEN**

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### **A few words about the author(s):**

All authors are members of the Scientific-Didactic Council Bydgoszcz ZOO., D. Gulda, PhD Eng., animal welfare and behavior researcher; Ungulates zookeepers: A. Lewińska, MSc Eng., Animal Breeding Specialist; M. Pawlikowska, MSc Eng., zoophysiotherapist.

### **Abstract:**

The objective of this behavioral observation was to assess animal welfare based on the dynamics of interactions between a pair of capybaras and four llamas, housed in a mixed-species exhibit representing South American fauna. Evaluation was based on original ethograms aligned with the Mixed Species Enclosure Risk Assessment (EAZA, 2023), focusing on social behaviors, resource competition, voluntary withdrawal, and responses to routine procedures.

Only affiliative or neutral interactions were recorded. Juvenile llamas regularly followed the capybaras to the edge of their restricted area and pond margins – one occasionally stepping slightly into the water. Both species shared basking, sunning, and feeding areas. No signs of aggression, territoriality, or chronic stress were observed.

During husbandry interventions, temporary restraint of one species triggered alarm vocalizations and vigilance in the other, interpreted as interspecies social cohesion and evidence of affiliative bonds across species.

The exhibit meets key EAZA standards: no niche conflicts, accessible retreat zones, and capacity for temporary separation. The presence of a heterospecific partner broadens behavioral repertoires, reduces monotony, and functions as natural enrichment. These findings support the use of zoogeographical mixed-species exhibits to enhance welfare and promote species-typical behavior. Further expansion of the exhibit will enable continued behavioral monitoring and optimization.

### **Keywords:**

mixed-species exhibit; animal welfare; interspecies social behavior; environmental enrichment; South American fauna

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## **POST-PROCESSING AND FILTERING TECHNIQUES FOR THERMAL IMAGES FROM LOW-COST CAMERAS**

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### **A few words about the author(s):**

Michał Kopec was born in Zgierz, Poland. He received a Ph.D. in electronic engineering in 2021 from Lodz University of Technology, Lodz, Poland. He is currently an Assistant Professor at the Institute of Power Engineering, Lodz University of Technology.

### **Abstract:**

This paper presents a method for retrieving temperature from .jpg files taken with low-cost thermal imaging cameras (XInfiRay T2S+ and Doogee S98 Pro) and processing them using developed software. The manufacturers of these thermal cameras provide software for Android-based smartphones, but it is impossible to save the images with radiation data (i.e., temperature information of all pixels). Low-cost cameras are a common topic of scientific research where thermal analysis is required, making the XInfiRay T2S+ and Doogee S98 Pro limitations inconvenient and impractical. Therefore, further computer-based thermal analysis of the images captured by the XInfiRay T2S+ and Doogee S98 is impossible. This problem was solved using the blackbody and developed software on the Windows system. The developed software enables the use of selected functions for analyzing, filtering, and processing the recorded thermal images and displaying temperature charts from different areas of the image. It is also possible to export temperature data from an image to a text file. This work aims to facilitate the analysis of thermal images even after recording. One example application could be monitoring a corn-drying machine for agriculture.

### **Keywords:**

thermography; infrared; image processing; calibration; temperature; thermal camera

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## **NUMERICAL ANALYSIS OF SPRAY ZONE DYNAMICS IN THE TABLET COATING PROCESS USING THE DISCRETE ELEMENT METHOD (DEM): INFLUENCE OF OPERATING PARAMETERS**

**Patryk Leszczak**

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### **A few words about the author(s):**

Patryk Leszczak is a 5<sup>th</sup> year Pharmaceutical Engineering student, specializing in Drug Production Engineering. His interests focus on process design in the pharmaceutical industry, particularly powder material engineering and protein crystallization.

### **Abstract:**

The Discrete Element Method (DEM) enables the modeling of the behavior of powdered materials, including granular structures, in complex dynamic systems. This study analyzes the influence of drum fill level and rotational speed on the coefficient of variation of tablet residence time in the spray zone.

A numerical analysis of the coating process dynamics was conducted to assess the uniformity of tablet exposure to the coating medium, which is crucial for the even application of the coating and the final quality of the pharmaceutical product.

The results obtained provide a better understanding of the relationships between process parameters and the effectiveness of tablet coating. They also serve as a basis for optimizing process conditions to enhance both efficiency and repeatability.

### **Keywords:**

Discrete Element Method (DEM); tablet coating process; tablet residence time; coating uniformity



## REACTIVITY TO AN EXTERNAL STIMULUS (DEMOTIVATOR) OF A RED PANDA IN THE PRESENCE OF A MOTIVATOR – CASE REPORT

Monika Lik (1), Dominika Gulda (1)\*, Beata Gęsińska (2), Katarzyna Jurków (2)

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### A few words about the author(s):

B. Gęsińska – Director of the Zoobotanical Garden in Toruń; K. Jurków – Animal Welfare Inspector Zoobotanical Garden in Toruń; M. Lik and D. Gulda – researchers in zoo animal welfare and members of the Scientific-Didactic Council of Bydgoszcz Zoo.

### Abstract:

This case study aimed to analyze the thermal reactivity of a six-year-old male red panda (*Ailurus fulgens*) housed at the Zoobotanical Garden in Toruń, Poland, during structured behavioral training, in response to both motivating and demotivating stimuli. Real-time infrared thermography was employed, yielding 2,000 readings. Outliers were excluded using Occam’s method, and remaining data were categorized by anatomical region and experimental condition. The study consisted of four phases: I – baseline (pre-exposure), II – presence of both motivator (bamboo) and demotivator (researcher with thermal camera), III – presence of motivator only, and IV – post-exposure resting state. Compared to categories I and IV, thermal surface increases were observed in categories II and III. In category II, surface temperature changes were highly statistically significant for the head, pelvic girdle, and tail, and significant for the shoulder girdle. In category III, significant increases were observed in the head and shoulder girdle, with non-significant increases in the pelvic girdle and tail. No significant decreases in temperature were noted—only a return to baseline levels. These results suggest a high perception of environmental safety and welfare. This preliminary study supports the potential use of surface pyrometry as an objective tool for assessing welfare responses to environmental stimuli and validating enclosure design and enrichment strategies in zoological care.

### Keywords:

red panda; infrared thermography; animal welfare; zoo

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## **VOCAL COMMUNICATION PATTERNS IN CAPTIVE RED-CROWNED CRANES (*GRUS JAPONENSIS*) IN ZOOLOGICAL GARDEN CONDITIONS: PILOT STUDY**

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### **A few words about the author(s):**

All authors are members of the Scientific-Didactic Council Bydgoszcz ZOO., T. Samsonowicz, MSc Eng. – Director of Bydgoszcz Zoological Garden, M. Lik and D. Gulda: PhD Eng., animal welfare and behavior researcher.

### **Abstract:**

The Red-crowned Crane (*Grus japonensis*) is a highly vocal species, with complex and powerful calls that play a key role in social bonding, mate attraction, and territorial signaling. This case report presents preliminary observations conducted at the Bydgoszcz Zoological Garden, where two adult female *G. japonensis* are housed in close proximity to a pair of Eurasian Cranes (*Grus grus*).

Sound level measurements were carried out over five consecutive days using a decibel meter positioned at a distance of 5 meters. Observations were conducted twice daily, during two time intervals: 07:00–08:30 and 17:00–19:00. The highest vocal activity was recorded in the morning hours. Morning calls correlated with the presence of zookeepers and feeding routines, while evening calls appeared to be socially driven. Average sound levels ranged between 87–98 dB, with a maximum of 114 dB recorded.

Evening vocalizations were longer, more structured, and included more reciprocal interactions between the two crane species, likely linked to social behavior rather than environmental triggers. The average intensity was slightly lower (85–94 dB), with a recorded maximum of 101 dB.

This case demonstrates how vocal behavior in *Grus japonensis* may be influenced by zoo management procedures, emphasizing the importance of acoustic monitoring in assessing the welfare of captive animals and highlighting the role of vocal communication in the social dynamics of cranes.

### **Keywords:**

*Grus japonensis*; vocalization; zoo acoustics; behavior; welfare

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## **LIQUID COOLING ANALYSIS OF BLDC MOTORS**

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### **A few words about the author(s):**

I am a 4<sup>th</sup> year PhD student. The title of my dissertation is "A Method for Improving Energy Efficiency and performance of Household Appliances". I work professionally as an R&D engineer designing components for white goods.

### **Abstract:**

This study presents a detailed investigation of liquid cooling in brushless DC (BLDC) motors, where water is directed through channels in the stator to absorb and remove heat generated during operation. Computational fluid dynamics (CFD) simulations are employed to analyze coolant flow patterns, temperature fields, and heat transfer coefficients within the stator. Key design parameters (such as channel geometry, flow rate, and coolant inlet temperature) are optimized to ensure uniform cooling and prevent local hotspots. The results demonstrate that a properly configured water-cooling system can maintain the motor within safe temperature limits under varying load conditions, thereby enhancing reliability and extending service life.

### **Keywords:**

BLDC motors; liquid cooling; CFD; heat transfer

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## **ESTIMATING BATTERY SOH AND SOC ACROSS EXTENDED CYCLING SEQUENCES**

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### **A few words about the author(s):**

Antoni Pawłowicz is a student at Gdańsk University of Technology, engaged in research in applied machine learning.

### **Abstract:**

This work presents a machine learning-based approach for predicting the state of health (SOH) and state of charge (SOC) of lithium-ion batteries. The proposed model combines a Variational Autoencoder (VAE) for sequence dimensionality reduction with a Gated Recurrent Unit (GRU) network to capture temporal dependencies. A cycle counter feature is also incorporated to enhance long-term prediction accuracy. The model achieves promising results, with a mean absolute error of 1.6% for SOC and 2.9% for SOH on test data, demonstrating strong potential for accurate, low-cost battery monitoring in practical applications.

### **Keywords:**

machine learning; state of health (SOH); state of charge (SOC); recurrent neural networks (RNN); battery state prediction

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## **MEASUREMENT OF CRITICAL MICELLE CONCENTRATION: DIRECT AND INDIRECT APPROACHES APPLIED TO TWEEN 20 AND POEOMA**

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### **A few words about the author(s):**

My name is Natalia Swoboda. I am a chemistry student at the Silesian University of Technology. I am interested in polymers, surfactants and bioanalytics.

### **Abstract:**

Micellization is the process by which amphiphilic molecules form into aggregates in solution. Micellization process begins when a specific concentration, known as critical micelle concentration (CMC), is reached. At the moment when CMC is reached, changes in parameters such as surface tension become noticeable. The value of CMC differs between surfactants and can be determined by indirect and direct methods. One of the universal direct methods is fluorescence measurement, which requires the use of a fluorescent probe. A widely used probe is pyrene, which is a polycyclic aromatic hydrocarbon. Direct methods do not rely on the presence of any additional compound, for example the surface tension method. In the experimental part critical micelle concentration of Tween 20 and POEOMA has been determined by both, indirect and direct methods. The aim of this work was to measure the CMC of abovementioned compounds and compare results with results reported in the literature.

### **Keywords:**

CMC; micelles, pyrene; fluorescence; surface tension

# ABSTRACTS OF **PRESENTATIONS**



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## **THE ROLE OF DISASTER DIPLOMACY IN REDUCING TENSIONS IN GREEK-TURKISH RELATIONS**

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### **A few words about the author(s):**

Holder of a master's degree in International Relations from Maria Curie-Skłodowska University in Lublin and a public administration professional.

### **Abstract:**

Whenever a major natural disaster strikes a state, it becomes the focal point of international attention. Governments deploy search and rescue teams, deliver humanitarian aid, and support post-disaster recovery efforts. Sometimes, the recipient and donor may be adversaries, with their bilateral relations long marred by acrimony, tension, or distrust. The study of disaster diplomacy investigates whether, how, and under what conditions disaster-related activities can foster cooperative dynamics between feuding parties. Therefore, it offers a valuable perspective for analysing Greek-Turkish relations, characterised by a historical rivalry and opposing geopolitical interests. Drawing on key findings from disaster diplomacy research, this presentation demonstrates why mutual assistance during crises has proven effective in easing tensions, albeit temporarily, between Greece and Türkiye. To this end, the political developments surrounding the 1999 and 2023 earthquakes are outlined. The study also seeks to identify factors that contributed to the resurgence of heightened tensions within a decade following 1999. By evaluating whether these factors were unique to the 2000s or persist today, the presentation assesses the potential for the latest iteration of disaster diplomacy between Athens and Ankara to produce a lasting positive impact on their relations. Ultimately, it delineates plausible scenarios through which the current thaw in bilateral relations may evolve.

### **Keywords:**

Greek-Turkish relations; disaster diplomacy; earthquake diplomacy

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## **THE ROLE OF CRYPTOGRAPHIC HASH FUNCTIONS IN DIGITAL FORENSICS: EVIDENTIARY RELEVANCE, METHODOLOGICAL RISKS, AND STANDARDS**

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### **A few words about the author(s):**

Participant in a doctoral seminar in the discipline of law. His academic interests focus on the evidentiary use of digital data, forensic methodology, and procedural aspects of digital forensics in criminal proceedings.

### **Abstract:**

Cryptographic hash functions are crucial in digital forensics for verifying the integrity of evidence and maintaining the chain of custody. This abstract explores the evidentiary role of hash algorithms in forensic analysis and identifies risks related to their misapplication. It outlines the differences between MD5, SHA-1, SHA-256, and SHA-3, highlights their use in imaging, file verification, and messenger/email analysis, and emphasizes the need for proper documentation. The paper concludes with practical recommendations aligned with international standards such as ENFSI, NIST and ISO/IEC 27037.

### **Keywords:**

hash functions; digital forensics; data integrity; expert evidence; forensic methodology

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## **THE ROLE OF A DIGITAL FORENSICS EXPERT IN CRIMINAL PROCEEDINGS – BOUNDARIES OF EXPERT OPINION AND ADVERSARIAL SAFEGUARDS**

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### **A few words about the author(s):**

Participant in a doctoral seminar in the discipline of law. His research focuses on digital evidence, the procedural role of expert opinions, and the legal framework of digital forensics in criminal proceedings.

### **Abstract:**

The increasing use of digital evidence in criminal proceedings raises legal and methodological questions regarding the role of digital forensics experts. This abstract explores the procedural boundaries of expert opinion, focusing on situations in which experts exceed their mandate by making normative or factual assessments reserved for the court. It also discusses the principle of adversarial proceedings, the limits of expert influence on evidentiary interpretation, and the procedural safeguards ensuring transparency and methodological neutrality. The paper proposes criteria for distinguishing between technical findings and legal conclusions, with reference to Article 193 of the Polish Code of Criminal Procedure and international best practices.

### **Keywords:**

digital forensics; expert opinion; criminal procedure; evidence law; adversarial process

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## **APPLICATION AND IMPORTANCE OF MEDIATION IN POLISH LAW – SELECTED ISSUES**

**Cezary Slowik**

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Social Sciences and Technology in Olsztyn*

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### **A few words about the author(s):**

graduate of the UWM Faculty of Law and Administration, currently a student of the European Academy of Applied Medical and Social Sciences, Faculty of Humanities, Social Sciences and Technology in Olsztyn at the master's level.

### **Abstract:**

Mediation is a form of dispute resolution that has gained importance in the Polish legal system in recent years. Disputes can be resolved outside the judicial system through a process that involves an impartial facilitator guiding the conflicting parties toward a mutually agreed outcome. Within the Polish legal framework, this procedure is formally established and applicable to a broad spectrum of cases, such as those related to civil, family, criminal, administrative, and commercial law.

The work discusses the most important legal aspects of mediation, such as its voluntary nature, the principles of conducting mediation proceedings, the role of the mediator and the effects of the settlement concluded before the mediator. Attention is also drawn to the benefits of mediation, including time and cost savings, reducing the burden on courts and maintaining the relationship between the parties.

The analysis emphasizes that despite the growing role of mediation, its use in practice still encounters barriers, including insufficient social awareness and limited trust in this form of dispute resolution. Therefore, promoting mediation and further improving the legal provisions in this area remains an important issue.

### **Keywords:**

mediation; legal; Polish; system; law

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## **POLITICAL AND ECONOMIC SITUATION OF GERMANY**

**Joanna Chrzęszcz**

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### **A few words about the author(s):**

I am a student of Economics in Sanok. I am 33 years old. I really enjoy new challenges.

### **Abstract:**

The presentation presents the political and economic situation of Germany. I conducted a macroeconomic analysis. I highlighted important issues that Germany is facing.

### **Keywords:**

political crisis; inflation; industry new government; migration issues

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## **PARTNERSHIP WITHOUT MEMBERSHIP – NORWAY'S RELATIONSHIP WITH THE EUROPEAN UNION**

**Olga Grajek**

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### **A few words about the author(s):**

PhD student at Faculty of Social Science, University of Wrocław. I am interested in international crises and conflicts.

### **Abstract:**

Although Norway has twice (in 1972 and 1994) rejected the possibility of joining the European Union in national referendums, it remains closely linked to the European Union in economic terms. The basis for this relationship is Norway's membership of the European Economic Area (EEA), which provides access to the single market and obliges it to implement parts of the legislation.

The main reason for Norway's non-membership of the European Union is economic. Norway as a rich country would have to pay more than it would gain. Norway is one of the largest exporters of fish, and after accession to the European Union there would be increased controls and additional restrictions. However, there are increasing articles in the Norwegian press about a third referendum on Norway's accession to EU structures. So the main purpose of the presentation is to present whether Norway's accession to the European Union is possible in the near future.

### **Keywords:**

Norway; European Union; integration

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## **BETWEEN EMPATHY AND EFFICIENCY – THE ROLE OF SOCIAL COMPETENCES IN SCIENCE AND WORK**

**Wiktoria Krakowiak**

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### **A few words about the author(s):**

Wiktoria Krakowiak, PhD student in Pedagogy at UMCS (Lublin), former chair of the Pedagogy Scientific Circle, co-organizer of conferences, co-author of scientific publications, two-time UMCS Rector's Scholarship recipient.

### **Abstract:**

The modern scientific world demands that young researchers possess not only substantive knowledge but also well-developed social competencies. The aim of the presentation is to highlight the importance of skills such as empathy, communication, and teamwork in scientific and educational work. Based on literature, it is demonstrated that social competencies significantly influence the effectiveness of research activities and should be fostered already at the stage on education.

### **Keywords:**

social skills; empathy; communication skills; teamwork: academic development

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## **HISTORICAL HERITAGE AND TOURISM DEVELOPMENT, IN THE CONTEXT OF OUTDOOR GAMES**

**Mateusz Żak**

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### **A few words about the author(s):**

A third-year undergraduate student, his research activities focus on areas related to adventure tourism, orienteering and the use of new technologies in the implementation of outdoor projects. He is passionate about history and travel.

### **Abstract:**

The main purpose of the study was to identify opportunities for tourism development by using outdoor games in the area of adventure tourism. The specificity of outdoor forms, their relationship and correlation with historical heritage and the impact on the environment of the destination in which the exemplary games are proposed was taken into account.

During the study, in pursuit of the main purpose, the following research methods were used:

- a) An in-depth interview, in which participants in the example game, were asked questions about their feelings while playing the game.
- b) Direct participatory observation, on the basis of which a SWOT analysis was carried out, presenting strengths, weaknesses, opportunities and threats to the implementation of outdoor games within tourism development.
- c) Desk research, a method involving the analysis of data from existing sources in the context of obtaining information on game development models and the popularity of these forms among selected social groups.

The research involved a group of 16 students, (including 8 women and 8 men), who took part in a sample game: ‘Survive until October’.

The results of the analyses made indicate that outdoor games can be attractive products implemented as part of tourism development. They have the advantage of presenting historical heritage in a way that is accessible to consumers in a sustainable manner.

### **Keywords:**

outdoor games; adventure tourism; historical heritage; tourism development

# ABSTRACTS OF **POSTERS**



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## **SENSORY MARKETING – HOW TO ENGAGE CUSTOMERS' SENSES IN THE PURCHASING PROCESS?**

**Gabriela Krzeczek**

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### **A few words about the author(s):**

Management student at the Cracow University of Economics and SAP Finance Analyst. Interested in ERP systems and their role in finance. Enthusiast of foreign languages and self-development.

### **Abstract:**

The poster presents the concept of sensory marketing - a strategy that engages customers' senses to influence their shopping behaviors. It explores how sensory marketing emerged and explains how sight, sound, smell, taste and touch are used in marketing. It provides real-life examples of how companies apply sensory techniques.

### **Keywords:**

marketing; sensory marketing; marketing strategies

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## **GLOBALIZATION – THE WORLD CLOSER TO US**

**Magdalena Anna Szczerba**

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### **A few words about the author(s):**

My name is Magdalena and I am a first-year Master's student of Finance and Accounting. I love traveling and truly appreciate the opportunities that our globalized world offers for learning, growth, and connecting with others.

### **Abstract:**

The poster explores the positive impact of globalization on various aspects of our lives. It focuses on how globalization enhances access to education and technology, promotes cultural diversity, and increases mobility and international opportunities. The concept of a borderless world is illustrated through elements such as foreign language learning, global job prospects, easier travel and communication, and the spread of ideas and creativity. Globalization is presented as a driving force for personal growth, tolerance, and innovation.

### **Keywords:**

globalization; education; cultural diversity; mobility; international experience



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