



**National
Scientific
Conference**
**SCIENCE
AND YOUNG
RESEARCHERS**

**VII edition
June 03, 2023**

**The Book
of Abstracts**

National Scientific Conference
„Science and Young Researchers”

VII edition

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ABSTRACTS OF **PRESENTATIONS**



**HUMANITIES
SCIENCES**



POWERS OF THE STATE WATER HOLDING POLISH WATERS TO SET TARIFFS FOR COLLECTIVE WATER SUPPLY AND SEWAGE DISPOSAL

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A few words about the author(s):

Adrian Badzio M.A., research assistant in The John Paul II Catholic University of Lublin, Faculty of Law, Canon Law and Administration, Department of Local Government Law and Administrative Science.

Abstract:

The thesis of the presentation provided by the author is the occurrence of the phenomenon of protracted nature of administrative proceedings related to the determination of a new tariff, which is due to the lack of legal regulations enabling the adjustment of already existing tariffs concerning water supply and collective sewage disposal.

The primary objective of the presentation is to analyse the powers of the SWH Polish Waters as a regulator in the field of water and sewage tariffs and to determine whether this entity is implementing the procedural rule of speed of proceedings.

A further objective is to determine the impact of the current legal status on the operations of local government units and the increased costs of providing maintenance of water and sewage infrastructure.

Furthermore, in the course of the paper, an attempt will be made to develop concepts of legal solutions that could contribute to the improvement of proceedings within this field area.

The theoretical and legal, comparative and sociological research methods have been used in the process of the paper.

Keywords:

administrative law, water supply regulations



YOUNG RESEARCHERS IN THE CONTEXT OF OBSTACLES TO PUBLISHING AN ARTICLE

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Natalia Brzezińska – doctoral School of Social Sciences Maria Curie-Skłodowska University in Lublin. Discipline – Management and Quality Sciences. Interests – artificial intelligence, quality management, social welfare units, accounting.

Abstract:

With the development of artificial intelligence, the obstacles to the publication of articles by young scientists have changed. In the present research, young scientists are understood to be doctoral students at doctoral schools. The obligation for them to publish articles stems from resolutions of the disciplinary councils. During the Covid-19 pandemic, the publication of papers was particularly difficult due to limited access to databases and low returns from surveys. It is, therefore, necessary to survey doctoral students based on which it will be possible to list and group the obstacles currently facing doctoral students. The result of the pilot study, which will be carried out on a group of 20 people, will be a catalog of obstacles preventing the publication of texts. A survey questionnaire will then be constructed and sent out via the Internet to 100 doctoral students. The research proper will then analyze the data to examine the correlation between the different results. The research will aim to present the grouped obstacles to the development of the young researcher and to present the occurring correlations between the examined factors in the different scientific fields. The article assumes that factors affecting the frequency of publishing articles slow down the process of article creation and publication. The method used to conduct the research was a survey questionnaire and statistical analysis of the results obtained.

Keywords:

PhD students, obstacles, publication, articles



THE DIDACTIC DIMENSION OF THE CRACOW FORTRESS – A LESSON PROPOSAL FOR PRIMARY SCHOOL PUPILS

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A few words about the author(s):

Paweł Buda is a BA in Biology and German Philology. Member of German Philology Student Association of the Pedagogical University of Kraków. He is interested in history and culture of Cracow in 19th century.

Abstract:

Cracow, as a city with almost a thousand years of history, today has a rich historical and cultural heritage to offer. In times of war and peace, many cultures and nations have gone through it, and each of them has left its mark on this city. Looking at the less distant history of the city, the Cracow Fortress is a sensation on a European scale, which has been preserved to this day in a very good condition, considering the function of battle architecture. As a still unexplored heritage of culture and history of the second half of the 19th century, it is a valuable source of knowledge for researchers, as well as a unique tourist attraction. It can also perform an educational function at all levels of education and be a scientific aid to achieve many objectives of subject classes.

This presentation aims to present a proposal for conducting classes at the primary school level, which will bring them closer to the common history of Cracow and the Austro-Hungarian Empire in an interesting way for students. The classes are interactive and consist of four parts over four days. Each day provides for a visit to one of the historical military facilities, where students would acquire knowledge about the history of a given place. Alternatively, it is possible to conduct language classes and familiarize students with military or architectural vocabulary.

Keywords:

fortress, Cracow, history, heritage, education



SIGNIFICANCE AND EVOLUTION OF UNCERTAINTY IN ECONOMICS

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Second year of bachelor degree in economics at Jagiellonian University. Member of STE UJ.

Abstract:

Contrary to popular belief, uncertainty isn't the same thing as risk. Uncertainty is more common and much more complex than risk. The most known work about uncertainty in economics dates back to work of Frank Knight from 1921. Since then uncertainty came a long way and gained better understanding, first from Keynes then Hayek, Davidson, Shackle and others. Even more important is our understanding of how much fundamental is uncertainty for economy. Idea of economy intertwined by uncertainty first came from J.M. Keynes, M. Kalecki and other Post Keynesian economists, more contemporary version of this idea comes from N. Taleb. Uncertainty can't be easily taken into well behaved models, which is why New Classical and New Keynesian schools abandoned uncertainty for much better behaved risk. This work describes history of how economics tried to understand uncertainty and how we realised about significance of uncertainty for economy.

Keywords:

history of economics thought, uncertainty

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METRICAL BOOKS AS A SOURCE FOR RESEARCH INTO THE HISTORY OF THE JEWISH COMMUNITY IN DOBRZYŃ NAD WISŁĄ (1826–1938)

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PhD student at the Department of Hebrew, Aramaic and Karaim Studies, Adam Mickiewicz University, Poznań.

Abstract:

The aim of this paper is to present the main conclusions on the research potential of Jewish vital records compiled in the nineteenth and twentieth centuries in Dobrzyń nad Wisłą. This collection is now mostly stored in the State Archive in Toruń (the branch in Włocławek) and has not, to date, been the subject of scientific research. The research proceedings included several dozen metrical books, written in Polish and Russian, between 1826 and 1938. Analyses of several hundred birth, marriage and death certificates have shown that this collection is a great source for genealogical, onomastic and historical demographic studies. This paper focuses on the specimens of the surveyed metrics, indicates their research potential, and discusses general issues, including: the estimated natural movement of the Jewish community in Dobrzyń nad Wisłą (1826-1938) and the extent of the Jewish quarter in the period under discussion.

Keywords:

Dobrzyń nad Wisłą, Jewish community, vital Jewish records

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IN WHAT DIRECTION IS E-LEARNING GOING? ANALYSIS OF E-LEARNING TRENDS ON THE BASIS OF STUDENTS' OPINIONS

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A few words about the author(s):

PhD student of Maria Curie Skłodowska University in Lublin, research interests include media education, new media, and innovative technologies in academic education.

Abstract:

The aim of the presentation is to learn about students' experiences in relation to current e-learning trends. In the context of a post-pandemic situation, this topic is particularly important. The presentation examines the preferences regarding the selection of applications used for didactic purposes, methods of communication among students and also analyzes changes in the way of transferring knowledge by lecturers to students. In order to learn about the opinions of the academic youth, surveys were conducted among students from various universities.

Keywords:

e-learning, trends in remote education, higher education

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THE ROLE OF A WILL IN POLISH INHERITANCE LAW

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A few words about the author(s):

The author is a PhD student at the Doctoral School of Social Sciences at the University of Białystok.

Abstract:

Research providing information on the universality of making testamentary dispositions by Polish society gives the false impression that the institution of a will does not play a significant role in Polish inheritance law. Meanwhile, the aforementioned institution provides testators with a wide range of possibilities. First of all, it's the only instrument that allows taking into account various factual circumstances and interpersonal relationships in shaping the succession order by the testator. In addition, it's used to remove legal gaps in the inheritance law and to repair drawbacks of the statutory order of succession. In view of the above arguments, it seems reasonable to say that the role of a will is significant.

Keywords:

inheritance law, will

ABSTRACTS OF **POSTERS**



**HUMANITIES
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EDUCATION? INTO THE WOODS!

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A few words about the author(s):

I am a student of pedagogy at The Maria Grzegorzewska University in Warsaw and a scout with seven years of experience.

Abstract:

Nowadays we spend more and more time online. Virtual reality is becoming closer to us than ever. Does forestry education still make sense in such a situation? Or is it even more necessary?

Keywords:

forest education, education, primary school, preschool

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ADVENTURE – A VALUE IN ITSELF

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A few words about the author(s):

I am a student of pedagogy at The Maria Grzegorzewska University in Warsaw and a scout with seven years of experience.

Abstract:

Are children still going on adventures? Can they do it at school? Why don't we let them explore the world as they naturally do in early childhood, and how do we change that? Adventure education really can help!

Keywords:

adventure, pedagogy, adventure education

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CYBERSECURITY

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A few words about the author(s):

A graduate of economic studies, currently a student of master's studies in internal security.

Abstract:

Cyber constancy is one of the main criteria in an information system because, therefore, it depends on the security of the connection and operating systems. the article focuses on discussing concepts in the field of cybersecurity and threat factors, as well as hacking, computer viruses, ransomware, phishing and botnets. Basic methods of protection against these threats are also described, such as triggering strong passwords, updating systems, using antivirus programs or data encryption.

Keywords:

cybersecurity, internet



CONSEQUENCES OF INJURY AMONG PROFESSIONAL CYCLISTS: THE IMPACT OF POST-TRAUMATIC STRESS DISORDER ON MOTIVATION

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Student of psychology at the SWPS University of Social Sciences and Humanities. My main interest are sport and performance psychology, mental-health related issued amon athletes.

Abstract:

Injuries are an inseparable part of sport, especially at the highest professional level. The consequences of such injuries can vary. From temporary pain to long-term psychological and physical damage. Injury itself for a professional athlete can be a traumatic event. The aim of my study was to find out if injuries may cause PTSD symptoms among elite road-cycling riders and how they may influence their motivation and coping strategies. The results showed a statistically significant, positive and high correlation between amotivation and PTSD symptoms. The main coping strategy among injured riders with PTSD symptoms was problem-focussed coping strategy which is widely used by athletes struggling with injuries. The results obtained shed light on the problem that is the negative psychological consequences of physical injuries among athletes. This is a topic that needs psychologists and sport psychologists attention as well as designing useful tools that will help in their practice.

Keywords:

PTSD, sport psychology, motivation, injury, coping strategies



LEARNING AND WORKING REMOTELY IN THE COVID-19 PANDEMIC. A SURVEY OF STUDENTS' OPINIONS ON THEIR SELF-ASSESSMENT OF THEIR PREPARATION FOR WORK

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Marta Szczerska is a student of BSc in Management at Gdansk University of Technology. As Vice President of the GUT OPTICA Student Chapter, she has organized academic events and is currently a member of the OPTO2023 conference organizing committee.

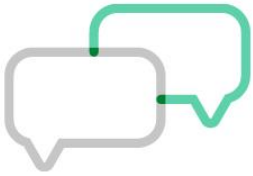
Abstract:

The purpose of the quantitative study was, first, to find out the opinions of students of Technical University in terms of self-assessment of knowledge and competencies after studying in remote/hybrid mode. Second, to determine students' preferences towards stationary and remote forms of education and work. The students after experiencing remote education rated their practical skills slightly higher than their theoretical knowledge. In stationary form, they rated laboratories the highest, and in remote form, they rated lectures the most highly. For most of them, the preferred form of study and work is a hybrid mode (a combination of remote and stationary forms).

Keywords:

remote learning, self-assessment of competencies, student preferences, COVID-19 pandemic, preparation for work

ABSTRACTS OF **PRESENTATIONS**



**MEDICAL
SCIENCES**



FECAL MICROBIOTA TRANSPLANTATION – WHAT DO WE KNOW ABOUT IT?

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A few words about the author(s):

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

Abstract:

Fecal microbiota transplantation (FMT), also known as a stool transplant, is a disruptive therapeutic method with growing popularity. It involves placing fecal matter obtained from a healthy donor into the gastrointestinal tract of a patient. The purpose of this procedure is to alter the composition of the patient's gut microbiota, leading to normalization and various health benefits. FMT has been used in the treatment of numerous medical conditions, including *Clostridioides difficile* infection, inflammatory bowel disease, functional gastrointestinal disorders, autoimmune diseases, obesity and neurological disorders. In this review, we have presented the donor selection process, procedural aspects, and risks associated with FMT. We indicated that in the future, the appropriate selection of personalized donors, known as "super-donors," is likely to be the way forward. This will be associated with increased therapy effectiveness for mentioned diseases and a reduction in their complications.

The aim of the study was to analyze current state of knowledge about FMT, and present it as an effective tool for physicians in selected types of disease treatment.

Keywords:

infection, bacterial resistance, super-donor, microbiome



SONOCHEMICAL SYNTHESIS OF PHTALIMIDE/NAPHTHALIMIDE N-ALKYLPIPERAZINES DERIVATIVES AND EVALUATION OF THEIR ANTICANCER POTENTIAL

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A few words about the author(s):

Patrycja Podobińska Eng. and Wojciech Bachowski Eng. are students, conducting research under the guidance of Jolanta Jaśkowska PhD, Eng. and Anna Drabczyk MSc Eng. Aneta Archęła MSc Eng. and Artur Wnorowski Assoc. Prof., are engaged in in vitro research.

Abstract:

New derivatives belonging to the family of long-chain arylpiperazines (LCAPs) or benzodiazepines were obtained as potential compounds with anticancer activity in two metabolically different breast cancer cell lines MCF-7 and the triple-negative MDA-MB-231. The compounds were synthesized in the presence of ultrasound under phase transfer catalysis (PTC) conditions. The reactions were carried out in a two-stage process, which consisted first in the formation of appropriate N-alkyl derivatives of phthalimide or naphthalimide, and then in the second stage in condensation in piperazine derivatives. The process was carried out at each stage using potassium carbonate, dimethylformamide as a solvent and TBAB (tetrabutylammonium bromide) as a PTC catalyst. The results obtained in in-vitro studies prove that some compounds have a very interesting profile, as they show a clear activity in both tested lines.

Keywords:

sonochemistry, PTC catalyst, breast cancer



COMPETENCE DEVELOPMENT OF GDANSK MEDICAL UNIVERSITY STUDENTS

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A few words about the author(s):

Members of the student research club, dealing with interdisciplinary approaches to the health sector to optimise operations, quality improvement, process management and sustainability.

Abstract:

Students who take up work during their education and combine it with their studies have a unique opportunity to develop their competences: effective time organization, self-discipline, management skills. Identification of areas for competence development, students of the Medical University of Gdańsk. The study included students who were working between 2020 and 2022. The research tool, was a survey questionnaire, distributed via the University's mailing system. To verify competencies, use the Universal Competence Model. The survey included 112 people. There are 96 people aged 18–23 years and 16 people over 24 years. The classification was based on the ISCO-88. The majority of people 78 worked in services or as salespeople; 31 were office workers; 3 respondents worked as professionals. Respondents mainly worked <50 hours (49.1%) per month. The four dimensions were analysed: social, personal, managerial, professional. In terms of social competences, students developed: Ease of relating to others, caring for good relationships. Personal competences: Attention to detail and energy in action. For managerial competences: Firmness, consistency in action and taking responsibility for decisions. Professional competences: Practical knowledge of and adherence to the operating procedures and regulations of the job. The study points to several factors that influence the development of organizational and social competences. It is important to take these factors into account and adapt the education and work environment.

Keywords:

competence development, interdisciplinary education, academic entrepreneurship, self-organisation



BREAST CANCER-DIAGNOSTICS, PREVENTION, TREATMENT AND PHYSIOTHERAPY

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A few words about the author(s):

Monika Dziedzic – master of physiotherapy works with oncological patients after medical surgery in the breast area.

Abstract:

Breast cancer is one of the most common cancers concerning women. It is a huge oncological problem, both in developed and in developing countries. We are currently observing a continuous increase in the number of cases, but thanks to the development of medicine and the use of innovative diagnostics, early detection of breast cancer gives patients a chance for a more efficient recovery. Modern surgical treatment often replaces radical mastectomy with conserving operations, which is aimed at a more efficient return to the state of health before surgery. Instead of lymphadenectomy, sentinel lymph node biopsy is increasingly performed, which reduces the risk of lymphedema. Properly conducted physiotherapy is of great importance in the perioperative management, as it allows to avoid many complications associated with the applied treatment. The basic role in therapy is emphasizing prevention programs which develop health-oriented approach. Except from the prevention programs, the education of oncological patients should concern autotherapy. Regular medical appointments and examinations are the factors that determines sense of responsibility for one's health. However, a lot of patients don't respect the recommendation they have been given before.

Keywords:

mastectomy, lymphedema, prevention, physiotherapy



SUDDEN INFANT DEATH SYNDROME

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A few words about the author(s):

Student of master's studies of the 1st year of nursing at Academy of Applied Sciences in Tarnów.

Abstract:

In my presentation, I would like to present the topic of sudden infant death syndrome. It will include epidemiology, risk factors, principles of prevention and parental education.

Keywords:

sudden infant death syndrome, cot death, sids, baby



HYPERTENSION AND COGNITIVE IMPAIRMENT WITH CONSIDERATION OF NATRIURETIC PEPTIDE EFFECTS

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A few words about the author(s):

Jakub Sadowski, Alicja Sierakowska – student scientific society at institute of medical sciences.
Michał Braczkowski – doctor in biological sciences, assistant in Department of Human Physiology University of Opole.

Abstract:

BACKGROUND: Hypertension is one of the major modifiable risk factors for cardiovascular diseases such as myocardial infarction and hemorrhagic stroke. Cardiovascular disease is the most common cause of death in the population, often significantly reducing the quality of life of patients beforehand.

AIM OF THE STUDY: The aim of this study is to analyze and discuss the available information from the scientific literature considering the possible relationship between hypertension and cognitive impairment, taking into account the effect of natriuretic peptides.

MATERIAL AND METHODS: A systematic literature review was conducted using: Google Scholar, Elsevier and the PubMed database. When searching for materials, key words were used such as: "hypertension", "cognitive impairment", "natriuretic peptides".

RESULTS: A total of 113 articles were included in the study. The analysis focused on the characteristics of materials, methods, results and conclusions of each paper.

CONCLUSIONS: hypertension, not infrequently associated with abnormalities in the levels of natriuretic peptides in the body, is one of the elements that increase the likelihood of hypertension. Moreover, it is a primary modifiable risk factor for cognitive impairment, dementia of vascular origin or dementia. Hypertension also has a negative impact on the microcirculation, richly developed primarily in the brain, which leads to the occurrence of pathological changes.

Keywords:

arterial hypertension, cognitive dysfunction, natriuretic peptides



PASTEURELLOSIS – BACTERIAL DISEASE WITH ZOONOTIC POTENTIAL

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A few words about the author(s):

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

Abstract:

Pasteurellosis is a bacterial disease caused by Gram-negative, nonmotile, facultatively anaerobic coccobacillus from the genus *Pasteurella*: *P. multocida*. This pathogen is widely known in veterinary medicine, where it is causing symptoms like nasal discharge, difficulty in respiration, and hypersalivation. Also, domestic animals can suffer from it and this bacterium can colonize the nasal cavity, throat, or trachea of healthy animals. This creates a potential risk of zoonotic transmission to humans. Human Pasteurellosis typically manifests by soft tissue infection after an animal bite. However, among the elderly, immunocompromised and neonates may occur more serious invasive infections like bacteremia, meningitis, and endocarditis. It is necessary to stay watchful and act fast after skin damage caused by animals. The work aimed to present a characterization of *P. multocida*, its zoonotic potential and demonstrate clinical manifestation in human and laboratory diagnostic procedures.

Keywords:

Pasteurella, infection, zoonosis



ROUTINE X-RAY IMAGING: AN INDISPENSABLE ELEMENT OF PATIENT EXAMINATION

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Abstract:

Panoramic x-ray is an overview picture allowing a visual of all teeth as well as surrounding bone structures which include the jaw, part of the maxillary sinus, the inner palate, both temporomandibular joints. We would like to present how important a routine x-ray is in catching a variety of asymptomatic diagnoses. This being based on the results of examinations of patients who reported to the Clinic of Maxillofacial Surgery, UCK in Gdańsk. There were people aged 20-50 with male prevalence. Annually there are 300 people with this issue, 75% of which are reported being asymptomatic and lesions were noticed during routine x-ray imaging. As a result, in most of these cases the lesions are usually advanced in development in which invasive and extensive surgical treatment (i.e. bone resection) is necessary to remedy the affected area; many times involving multiple risks and side effects. Maxillofacial radiological examinations are capable of detecting these changes at earlier stages resulting in less invasive surgical treatment. In return, we would receive faster healing and smaller loss of bone. Vital for recovery is the patient's involvement in post procedure care; this involves good oral hygiene, routine examinations along with follow-up x-ray imaging. Every patient, including younger patients should have routine radiological examinations to allow for early detection of pathological lesions.

Keywords:

panoramic x-ray, pathological lesions, maxillofacial surgery



THE ROLE OF THE GUT MICROBIOME IN THE PATHOGENESIS OF COLORECTAL CANCER

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A few words about the author(s):

We are fourth-year medical students at the Medical University of Lublin. What interests us the most are the interactions between the human body and the gut microbiome, and how this knowledge can be used to prevent and treat a variety of diseases.

Abstract:

The pathogenesis of colorectal cancer (CRC) is multifocal, with environmental and genetic factors playing a major role. One of the key aspects of environmental influences on intestinal health is the gut microbiome. Dysbiosis of the microbiota induces chronic inflammation, which results in oxidative stress in intestinal tissues. This causes DNA repair systems to malfunction, ultimately leading to carcinogenesis. There are two main triggers of chronic inflammation: abnormal bile acid metabolism and low production of short-chain fatty acids, both of which are heavily influenced by the gut microbiota. Therefore, researchers are looking for ways to influence these processes by modulating the patient's diet and probiotics intake to prevent or inhibit the development of CRC.

Keywords:

colorectal cancer, gut microbiome, bile acids, short-chain fatty acids



PROSPECTS FOR USING MIRNAS IN CANCER DIAGNOSIS AND TREATMENT

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A few words about the author(s):

My name is Justyna Dziedzic. I am a student majoring in medical biotechnology. I am mainly interested in microbiology and genetics. I expand my knowledge by taking part in scientific conferences and following the latest research in scientific fields.

Abstract:

MicroRNAs are short regulatory RNA molecules. They are evolutionarily conserved molecules responsible for post-transcriptional gene silencing. Learning about the action of post-transcriptional modification of target mRNA by miRNA molecules has made it possible to understand the control of expression of genetic information. Since many diseases, including cancer, are caused by overexpression or its inhibition in mutated or undesired genes, the specific mechanism of action of miRNA molecules to silence these genes makes these molecules useful in developing new treatments, diagnostics and drugs. The main mechanism of gene silencing by miRNAs relies on the complementarity of the 3'UTR region of the mRNA and the "seed" region of the miRNA. The miRNA molecules in cancer treatment can be used according to two strategies. The first is so-called "replacement therapies," which involve introducing artificially synthesized suppressor miRNA molecules into the body of a sick patient. These are designed to restore normal levels of suppressor miRNAs whose expression has been inhibited. Another strategy developed is the inhibition of oncogenic miRNAs. The principle behind this method is to introduce miRNA-mimicking structures that will prevent oncogenic miRNAs from fusing with the target mRNA.

Keywords:

miRNA, cancer, treatment, gene silencing

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SELECTED METHODS OF ACCURACY AND SPEED TT SKILLS AND SERVICE IN TABLE TENNIS BY SHENG K WU – LITERATURE REVIEW

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A few words about the author(s):

Szymon Galas doctor in the field of physical culture sciences, lecturer at the Academy of Physical Education E. Piasecki in Poznań and Higher School of Banking in Warsaw, sports expert at the Institute of Sport and Education Development in Warsaw.

Abstract:

Table tennis is a sport in which a high level is determined by many factors. Despite its advantages mobilizing physical activity at various levels of sports advancement, many tests evaluating special fitness have not been developed for this discipline, which would help to better assess the sports level of a competitor, especially at the initial stages of training. Popular tests of special fitness in the world literature are those proposed by Sheng K Wu (2021).

The main purpose of the presentation during the scientific conference was to review the literature in the field of research on individual components of special fitness in table tennis by Sheng K Wu (6 Testing Items in Service, 6 Testing Items in Return Service and 12 Basic Skills & Control Items). Therefore, a detailed characterization of test instruction and scoring.

Keywords:

table tennis, special fitness, TT skills, service, accuracy, speed, literature review



THE INFLUENCE OF DUODENAL-JEJUNAL OMEGA SWITCH SURGERY AND VARIOUS NUTRITIONAL PATTERNS ON SELECTED PARAMETERS OF OXIDATIVE STRESS IN SERUM OF RATS WITH DIET-INDUCED OBESITY

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A few words about the author(s):

I am a doctoral student in the field of medical science. In my research, I focus on cellular metabolism changes after bariatric procedures.

Abstract:

The prevalence of obesity is becoming a global public health problem. Duodenal-jejunal omega switch is a surgical treatment method which reduces body weight and affects cellular mechanisms, including oxidative stress.

The aim of the study was to assess the impact of DJOS surgery and different dietary patterns on the selected oxidative stress markers in plasma of diet-induced obese rats.

48 Sprague-Dawley rats were randomly assigned to 2 groups. The first one was on a high-fat high-sugar diet (CF) for 8 weeks, while the other was fed a normal chow diet (CD). During the surgery a transection was conducted distally to the duodenal bulb and the distal part of the transected duodenum was closed. The second incision was performed in the first half of the total small intestine length and anastomosis was performed. After the procedure all rats were randomly divided into CF group or CD group for next 8 weeks. The animals were then euthanized and the tissues harvested for assays. Selected parameters of oxidative stress were assessed using ELISA kits.

CER concentration and SOD activity were significantly lower after DJOS surgery versus SHAM. Postoperative diet shift is associated with increased concentration of MDA, regardless of the type of operation. The lowest concentration of MDA was observed in groups fed control diet both before and after surgery.

DJOS surgery significantly improves redox processes. Type of diet, irrespective of surgery, crucially affects oxidative stress.

Keywords:

obesity, oxidative stress, bariatric surgery



INFLUENCE OF PTERYGIUM REMOVAL SURGERY ON CORNEAL PARAMETERS CHANGE

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A few words about the author(s):

Monika is a first-year student of the doctoral school at the Pomeranian Medical University in Szczecin. An co-author of scientific publications and the author of congress reports.

Abstract:

Introduction: Pterygium is a common condition that affects about 2% of the Polish population. Surgery is the only effective treatment, but recurrence rates are high. Autologous conjunctival transplant using tissue glue is an innovative surgical method that reduces the recurrence rate, reduces discomfort, and speeds up recovery.

Materials and methods: This study evaluated 18 eyes after pterygium removal surgery. Best corrected visual acuity (BCVA), endothelial cell count (ECC), central corneal thickness (CCT), mean keratometry (MK), mean astigmatism (MA), astigmatism asymmetry (AA), and higher-order aberrations (HOA) were assessed at baseline, 7 days, and 1, 3, and 6 months after surgery using anterior segment swept-source OCT (CASIA2, Tomey, Japan).

Results: The BCVA before surgery was 0.63 ± 0.37 , and 1 and 6 months after surgery it was 0.79 ± 0.33 ($p=0.017$) and 0.87 ± 0.22 ($p=0.039$), respectively. The MA [D], set at 3.12 ± 2.93 , was gradually reduced to 1.75 ± 1.75 ($p=0.004$); 1.50 ± 1.34 ($p=0.039$) and 0.97 ± 0.66 ($p=0.014$) in successive control points with no change in the axis of astigmatism. The CCT [μm] before surgery was 559.33 ± 93.25 , and at 1 and 6 months follow-up, it was 547.94 ± 83.17 ($p=0.001$) and 530 ± 38.52 ($p=0.032$), respectively.

Conclusion: Autologous conjunctival transplantation with tissue glue is an effective method of surgery for pterygium removal, with significant improvements in visual acuity and corneal astigmatism.

Keywords:

cornea, pterygium, surgery, tissue glue



DISINFECTION AND ISOTONIC DRINKS' INFLUENCE ON HARDNESS AND COLOR STABILITY OF ETHYLENE-VINYL- ACETATE COPOLYMER MOUTHGUARDS USED IN MARTIAL ARTS: AN IN VITRO STUDY

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A few words about the author(s):

The authors of this manuscript created an international team from two universities with expertise in research concentrating on sport traumatology and oral cavity health.

Abstract:

This in vitro study aimed to evaluate the hardness and color change of an ethylene-vinyl-acetate copolymer (EVA) material for mouthguards after exposition to different cleaning agent solutions and isotonic drinks. Four hundred samples were prepared and divided into four groups ($n = 100$), in which there were 25 samples from each color of EVA (red, green, blue and white). The hardness, using the digital durometer, and the color coordinates (CIE $L^*a^*b^*$), using the digital colorimeter, were measured before the first exposition and after 3 months of exposition to spray disinfection and incubation in the oral cavity temperature, or immersion in isotonic drinks. Statistically significant changes in color and hardness between the tested groups were demonstrated after the use of agents predestined for disinfecting the surface of mouthguards on the tested samples. There were no statistically significant differences in color and hardness between the groups immersed in isotonic sport drinks. Despite the changes in color and hardness after the use of disinfectants, the deviations were minor and limited to specific colors of the EVA plates. The intake of isotonic drinks practically did not change either the color or the hardness of the samples, regardless of the tested color of the EVA plates.

Keywords:

mouthguards, dental materials, oral hygiene, combat sports



DIMENSIONS OF HYBRID AND NANOHYBRID MOUTHGUARDS FOR MIXED MARTIAL ARTS FIGHTERS–EVALUATION OF A NEW METHOD OF FABRICATION

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A few words about the author(s):

The authors from Department of Prosthodontics, Medical University of Warsaw have expertise in research concentrating on sport traumatology and oral cavity health.

Abstract:

Ethylene vinyl acetate mouthguards are the most often used custom protective intraoral appliances by combat sports practitioners. However, due to the difficulties in maintaining the hygiene of such mouthguards and thinning during fabrication, resulting in difficulty in predicting final dimensions, they may not be the optimal solution. The aim of this research was to evaluate an innovative method of mouthguard formation using intraoral modeling of the mouthguard pattern, hybrid acrylic material, and the addition of ZnO nanoparticles. Seventeen mouthguards patterns and 34 custom mouthguards were evaluated: 17 hybrid and 17 nanohybrid. A total of 1122 measurements were performed: each mouthguard and pattern was measured at 22 points. Statistical analyses were performed with the use of IBM SPSS Statistics 27.0.0 software (IBM, Armonk, NY USA). The mean thickness of the patterns and mouthguards at all labial areas of central incisors were between 4.65 and 4.80 mm. The thickness at the buccal surface of the first molar was between 3.71 and 4 mm, and at the occlusal surface between 3.40 and 3.56 mm in the cusp area. All measurements of hybrid and nanohybrid mouthguards were strongly and highly correlated with the measurements of the mouthguard patterns. Hybrid and nanohybrid mouthguards are an advantageous alternative to thermoformed custom appliances.

Keywords:

injury prevention, nanoparticles, combat sports, prosthodontics, dental materials



NUTRITIONAL MANAGEMENT OF CANCER

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A few words about the author(s):

We are a group of friends with an interest in the medical field of oncology.

Abstract:

Patients affected by cancer experience many difficulties. Their lives change from day to day. The changes are noticeable in the mental area as well as in the external appearance. Patients are often debilitated and emaciated. They experience weight loss and deficiencies in microand macroelements. Adequate nutrition and diet in cancer is extremely important to prevent cachexia. Furthermore, malnutrition in oncology patients directly and indirectly affects the wound healing process and has a negative impact on the patient's psyche and attitude towards treatment.

Keywords:

cancer, nutrition, cachexia, parenteral nutrition



STATES PRE-CANCEROUS OF THE SKIN

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A few words about the author(s):

We are a group of friends with an interest in the medical field of oncology.

Abstract:

Pre-cancerous skin conditions are diseases from which cancer can develop. Pre-cancerous skin conditions include solar keratoses. Solar keratoses are multiple lesions that appear most commonly on the forehead, the hairless head, the earlobes and the temples. It is possible to assess the lesion on the skin using a dermoscope. Other methods of assessing the lesion include biopsy and taking a section and then examining the resulting material under a microscope. Potentially cancer-promoting conditions that are associated with a lower risk are some varieties of burn scars or chronic inflammatory conditions. Burn scars classified as precancerous conditions are primarily scars with associated tissue hypertrophy.

Keywords:

skin, pre-cancerous lesions, radiation



EVALUATION OF QUALITY OF LIFE AND NUTRITION IN PATIENTS WITH ISCHEMIC HEART DISEASE

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A few words about the author(s):

Both physiotherapists graduated on The Jerzy Kukuczka Physical Academy in Katowice. In 2022 Agata Grabowska started a doctoral school at the University of Silesia in Katowice.

Abstract:

Introduction: According to WHO, ischemic heart disease is currently the most common cause of death worldwide. It is characterized by a narrowing, and in some cases complete closure of the coronary arteries, which results in insufficient oxygen supply to the heart, which in the clinical picture may result in e.g. angina and even a heart attack. More and more topics of scientific works raise the issue of responsible nutrition and its impact on the development of cardiovascular diseases. An inseparable element of the treatment of a patient with cardiovascular disease is the development of appropriate eating habits and diet.

Aim: The aim of the study was to evaluate the quality of life and diet in patients with ischemic heart disease. In this study, an attempt was made to answer the questions about the quality of life of patients with ischemic heart disease compared to the national population and what is the diet of these patients.

Methods: The research was carried out on 30 patients diagnosed with ischemic heart disease at the Sanatorium in Goczałkowice-Zdrój. 17 women and 13 men participated in the study. The age range of the respondents ranged from 37 to 60 years. The research was carried out using the SF-36 questionnaire classifying the assessment of the quality of life of patients and the proprietary nutritional questionnaire on the diet.

Keywords:

ischemic heart disease, coronary heart disease, quality of life, diet, nutrition form



THE INFLUENCE OF GOLD NANOPARTICLES ON OXIDATIVE STRESS IN WHOLE BLOOD CELLS

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A few words about the author(s):

The authors are PhDs whose scientific work is related to the study of xenobiotic toxicity.

Abstract:

Gold nanoparticles (AuNPs) are used in the biomedical industry thanks to their active surface and optical properties, e.g., as diagnostic probes for detecting heart diseases or tumor biomarkers and constructing drug delivery systems.

The concentrations of reduced and oxidized glutathione (GSH and GSSG) and their molar ratio are valuable indicators of cell condition and oxidative stress.

In our study, the test material was the whole blood incubated with AuNPs of different shapes (spherical and rod-shaped) at $C=200\text{ }\mu\text{g/mL}$ for 30 and 60 minutes.

The GSH and GSSG concentrations were determined via the colorimetric method, using Glutathione Colorimetric Detection Kit (ELISA).

In a comparative study performed on 18 samples, no differences in GSH and GSSG concentrations were observed between the samples incubated with AuNPs and the control. Therefore, the induction of oxidative stress in blood cells by gold nanoparticles can be excluded.

Keywords:

gold nanoparticles, oxidative stress, reduced glutathione, oxidized glutathione, whole blood cells



METHODS OF TREATING INFLAMMATION IN ALZHEIMER'S DISEASE

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A few words about the author(s):

Authors present available therapies for neuroinflammation in Alzheimer's disease and their application in clinical practice.

Abstract:

The impact of the environment on human health and life is influencing an increasingly aging population. The increased percentage of older people is associated with an increased incidence of many diseases, including neurodegenerative diseases, which include the most common form of senile dementia in the world – Alzheimer's disease.

According to current medical knowledge, Alzheimer's disease is incurable, in many cases leading to the death of patients. One of the reasons leading to the development of this disease is inflammation. Neuroinflammation is the body's response to damage to the brain structures, the function of which is to neutralize the damaging factor, which in the case of Alzheimer's disease can be, for example: β -amyloid deposits, oxidative stress or mitochondrial dysfunction of nerve cells. However, the consequence of this process is several unfavorable changes leading to the loss of neuronal function and to the degeneration of the nervous tissue, which results in the rapid progression of the disease. Delaying the development of inflammation in the course of Alzheimer's disease is possible thanks to the use of appropriate methods of therapy in patients affected by the disease. The use of anti-inflammatory treatment, as well as drugs used in the treatment of Alzheimer's disease, reduces the inflammatory activity of immune cells, which leads to a delay in the onset of disease symptoms and at the same time increases the quality of life of patients.

Keywords:

Alzheimer's disease, toxicology, neuroinflammation, anti-inflammatory therapy, inpatient treatment

ABSTRACTS OF **POSTERS**



**MEDICAL
SCIENCES**



NEW METHOD OF TREATING CONDYLAR FRACTURES ASSISTED BY ENDOSCOPE

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A few words about the author(s):

Implantologist, Resident Surgeon in Department of Maxillofacial Surgery, Medical University of Gdansk.

Abstract:

Bone fractures within the maxillofacial area are among the most common cases reported; approximately 200 patients annually to the Clinic of Maxillofacial Surgery, UCK in Gdańsk. The most common causes of these injuries include: beatings, traffic accidents and work accidents with a prevalence among men of 5:1 within the ages of 30-50. Statistically, more common are fractures of the lower jaw; more specifically condylar fractures than fractures of the maxilla. Treatment of condylar fractures include functional, conservative and orthopedic approaches as well as extraoral and intraoral surgery with the assistance of an endoscope. Extraoral surgeries often come with many risks, most notable of which is transient or complete paresthesia of the facial nerve presenting in up to 48% of patient cases. A salivary fistula, Łucja Frey syndrome and noticeable scarring are among other complications that can occur. Above mentioned complications can be bypassed by way of less invasive intraoral surgeries with the assistance of an endoscope. Patient case; aged 22 with bilateral condylar fracture and anterior mandibular body fracture treated by way of extraoral surgery with the use of an endoscope.

Keywords:

endoscope, paresthesia of the facial nerve, bone fractures



EXOGENOUS LAMPS AND THEIR IMPACT ON HUMAN HEALTH

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A few words about the author(s):

Fifth-year student of the Faculty of Medicine at the Pomeranian Medical University.

Abstract:

LAMPs (Lifestyle-Associated Molecular Patterns) are molecules that interact with PRRs (Pattern Recognition Receptors) presented on immune cells, causing inflammation in the body. They cannot be removed from the macroorganism because strategies for their elimination have not evolved, or are not possible. LAMPs are not clearly associated with either pathogen or damage, instead often linked to 21st century lifestyle. They are divided into two groups: endogenous and exogenous. Endogenous LAMPs include oxidized LDL, cholesterol crystals, prions and prion-like protein danger signals (e.g. β -amyloid), calcium pyrophosphate dihydrate crystals and monosodium urate crystals, while exogenous ones include asbestos and silica particles, and biomaterials. Asbestos and silica particles are well known for their ability to cause lung diseases through toxic effects on lung cells. Biomaterials, used for tissue support and reconstruction, can also lead to an immune response in the body. A group of exogenous LAMPs and their effects on the development of diseases will be presented.

Keywords:

LAMPs, Lifestyle-Associated Molecular Patterns, asbestos particles, silica particles, biomaterials, inflammation



MLPA METHOD – BENEFITS, LIMITATIONS AND APPLICATION IN PEDIATRIC HEMATOLOGY

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A few words about the author(s):

I am a PhD student and a resident in specialization in pediatrics.

Abstract:

Early and precise genetic diagnosis of neoplastic cells significantly increases the prospects of therapeutic success among patients with hematopoietic disorders.

Launched in 2002, the MLPA (Multiplex Ligation-dependent Probe Amplification) method, now receives wide recognition among scientists as evidenced by the increasing number of publications using this methodology. The undeniable advantages of this method include the relatively low cost of the reaction (86% less than FISH), the ability to perform the test using equipment commonly available in any laboratory. This assay allows the analysis of multiple sequences during a single reaction and detection of small aberrations involving a single gene, undetectable by other methods. Another aspect in its favor advantage is the small amount of genetic material (50 ng of DNA) required to perform the reaction. In addition, the procedure is not relatively time-consuming. So far studies conducted show the comparability of the results obtained using the MLPA compared to other molecular diagnostic methods (for example FISH), which are characterized by time-consumption and high financial expenditure. The above data demonstrate the significant diagnostic potential and broad applicability of MLPA as a screening method in patients and a diagnostic method for research purposes in identifying in cancer cells of deletions, gene duplications. This technique has limitations, therefore should be applied as a first screening test.

Keywords:

MLPA, pediatrics, hematology



STEM CELLS IN THE TREATMENT OF INFERTILITY

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I am a student of Medical Biotechnology and a member of the Student Scientific Circle at the Department of Molecular Biology, Department of Molecular Biology, Faculty of Pharmaceutical Sciences in Sosnowiec.

Abstract:

The problem of infertility is affecting an increasing number of people around the world. It is estimated that about 10-15% of couples struggle with infertility. Interestingly, the percentage of each type of infertility, male and female, as well as idiopathic, is almost identical, at about 30% in each case. The causes of infertility are diverse and complex, so treatment of this condition requires specialized knowledge and solutions.

There is growing interest among scientists in stem cells as promising alternative treatments in translational regenerative medicine research. Recently, tremendous progress has been made in understanding the biology and function of stem cells, opening up new possibilities for treating infertility. In preclinical and clinical experimental models, it has been shown that induced pluripotent stem cells can provide haploid-specific gametes. Similarly, mesenchymal stem cells derived from a variety of readily available resources, such as bone marrow, adipose tissue, menstrual blood, amniotic fluid and placenta, are gaining popularity for applications in reproductive medicine.

However, further large-scale clinical trials are needed to obtain full evidence of the efficacy and safety of stem cell therapy. It is worth taking an interest in this topic, as developing technologies in the field of regenerative medicine can realistically help solve infertility problems.

Keywords:

infertility, stem cells, mesenchymal stem cells, induced pluripotent stem cells



ENDOMORPHIN ANALOGS AS SUBSTANCES WITH NEUROPROTECTIVE ACTIVITY

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A few words about the author(s):

MSc, Cosmetologist, PhD student at the Medical University of Lodz. She studies opioid peptides in terms of their neuroprotective properties.

Abstract:

The extension of human life has increased the risk of developing age-related diseases, especially neurodegenerative disorders, that carry some weight due to their irreversibility, lack of effective therapies and economic burden on society. Furthermore, commonly used synthetic drugs do not significantly change the course of the disease and either cause side effects or their effectiveness decreases over time. Therefore natural compounds with antioxidant properties may be a suitable alternative in neuroprotection therapy. The term neuroprotection means any possible action of preserving brain function and structure. Endomorphins (endomorphin-1, Tyr-Pro-Trp-Phe-NH₂ and endomorphin-2, Tyr-Pro-Phe-Phe-NH₂) are short, linear well-known peptides that have been isolated from bovine brain or human cortex. These peptides possess antidepressant, anxiolytic and antinociceptive effects due to their strong and selective interaction with opioid receptors. The research results indicate that opioid peptides affect the migration and proliferation of neurons and stimulate their survival during the development of the nervous system. They are also seen as neurotrophic factors. Preliminary studies have shown that endomorphins are non-toxic to the SH-SY5Y cell line and counteract the physiological changes induced by corticosterone (CORT). Therefore, the new opioid peptide analogs based on the structure of endomorphins seem to be good candidates to prevent neuronal degeneration and loss of function.

Keywords:

neuroprotection, bioactive peptides, opioid peptides, SH-SY5Y cells, corticosterone



MOLECULAR ASPECTS OF BIPOLAR DISORDER: AKAP11 CONTRIBUTION TO THE DEVELOPMENT OF THE DISORDER

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Abstract:

Bipolar disorder (BD) is a complex psychiatric illness characterized by episodes of mania and depression. Its molecular basis remains poorly understood, but recent studies have shed light on several key pathways and genetic factors involved in the disorder's pathogenesis. Particularly, the AKAP11 (A-Kinase Anchoring Protein 11) gene, which interacts with the GSK3B (glycogen synthase kinase 3 beta) gene, which, in turn, may be involved in the regulation of mood and behaviour and is a presumed target of lithium therapy widely used for the treatment of BD. AKAP11 gene is also known to be highly expressed in the brain, namely in cerebellar hemisphere and frontal cortex. AKAP11 potentially contributes to the development of BD via its modifications, provoked by variations in the DNA sequence of the gene or epigenetic changes. There may be a functional interaction between AKAP11 and GSK3B. Specifically, AKAP11 has been shown to regulate the activity of GSK3B through its association with protein phosphatase 2A (PP2A), which is a negative regulator of GSK3B. Lithium has been shown to inhibit the activity of GSK3B by promoting its phosphorylation at specific residues. Phosphorylation of GSK3B at these residues inactivates the kinase, leading to downstream effects on intracellular signalling pathways. Moreover, lithium appears to regulate the expression of GSK3B. Further research is required, however, it is clear that molecular interaction affected by AKAP11 plays a major role in BD.

Keywords:

bipolar disorder, genetic factors, AKAP11 expression, Lithium treatment



CORRELATION BETWEEN ANTIDYSRHYTHMIC DRUGS AN OSTEOARTHRITIS IN SILICO RESEARCH

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The authors' scientific interests focus on medical science and pharmaceutical science in pharmacometrics and molecular modeling. They include predictive modeling of detailed mechanisms of action and pharmacological efficacy of drugs.

Abstract:

Osteoarthritis (OA) is a condition caused by degenerative processes of diverse etiologies that cause damage to the articular tissues. There is a large group of people suffer from cardiovascular disease (CVD) treated with the medication, such as antidysrhythmic drugs. A large range of cardiovascular medicines work through different ion channels and alter ion balance, affecting cell metabolism, osmotic responses, cartilage extracellular matrix turnover, and inflammation. However, it is becoming more plausible that certain cardiovascular medicines will influence articular tissues in OA.

This research analyzes the bioavailability of antidysrhythmic medications that may have an effect on skeletal tissue regeneration. According to new research, medicines used to treat heart malfunction may have a favorable influence on the process of tissue regeneration in the musculoskeletal system. Given the potential impact of antidysrhythmic medicines on the chondrocyte channelome, it is critical to know whether these agents might influence tissue regeneration and what their attributes are.

This study evaluated the bioavailability of 14 antidysrhythmic drugs. Using the pkCSM, SwissADME, and AdmetSAR software, in silico method was used to retain critical pharmacokinetic and pharmacodynamic characteristics, and a comparison of the pharmacokinetic values of the tested medications in a specific activity model was effectively carried out. The collected results are represented graphically.

Keywords:

antidysrhythmic drugs, osteoarthritis, bioavailability

ABSTRACTS OF **PRESENTATIONS**



**TECHNICAL AND
NATURAL SCIENCES**



THE USE OF AMBIDENT LIGANDS IN THE FORMATION OF METALLOLIGANDS

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A few words about the author(s):

Agnieszka Bajer is a 5th year chemistry student at Adam Mickiewicz University in Poznań.

Abstract:

Metalloligands are coordination compounds that contain metal atoms or ions and ligands that have at least two binding sites able to coordinate with secondary metal ions to build supramolecular architectures. A metalloligand is the smallest building block that enables the formation of a more complex architecture, a supramolecular structure. From an application point of view, the resulting superstructure exhibits new structural, physical, and chemical properties that are unique to the superstructure and often architecture-dependent. The aim of the project was to use functionalized organic ligands to create a new coordination platform. We focused on a β -diketone ligands containing terminally located pyridine units to achieve a metalloligand. Such obtained metalloligand is a significant material, offering not only unique coordination architectures, but also worthy applications. Due to the additional, terminally located binding site, obtained metalloligand can undergo further reaction with second metal ions leading to the formation of sophisticated porous architectures with very often specific properties. The choice of the metal ion allows control over the stoichiometry and geometry of the resulting structure, making it possible to obtain materials with unsaturated metal centers.

Keywords:

metalloligands, ambidentate ligands, β -diketonate complexes



PVP-BASED HYDROGELS CONTAINING ROYAL JELLY FOR BIOMEDICAL APPLICATIONS

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Abstract:

Nowadays, the development of multifunctional dressing materials with beneficial properties for wound healing has become the subject of much research. Numerous studies are underway to incorporate active substances into dressings that positively influence wound healing processes. Researchers have investigated various natural additives, including plant extracts and apiproducs such as royal jelly, to improve the properties of dressings. In this study, polyvinylpyrrolidone (PVP)-based hydrogel dressings modified with royal jelly were developed and analysed for their sorption capacity, wettability, surface morphology, degradation and mechanical properties. The results showed that the content of royal jelly and crosslinking agent influenced the physicochemical properties of the hydrogels and the possibility of using them as innovative dressing materials. The study investigated the swelling behaviour, surface morphology and mechanical properties of hydrogel materials containing royal jelly. Most of the tested materials showed a gradual increase in swelling index with time. The pH of the incubated fluids varied depending on the type of fluid used. The hydrogel samples had a relatively homogeneous surface and no discrepancies were observed between composition and surface morphology. These results suggest possible future applications in various fields requiring high elasticity and resilience.

Keywords:

hydrogels, royal jelly, wound dressings



FERROPTOSIS – NEWLY DISCOVERED CELL DEATH

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I am a master's student in "Biology" of the second degree with specialization in "Biochemistry and molecular biology" at Faculty of Biology and Environmental Protection, University of Lodz.

Abstract:

Ferroptosis is a novel type of regulated cell death discovered in 2012. It is based on the presence of large amounts of available iron with redox activity, oxidation of membrane phospholipids containing polyunsaturated fatty acids and accumulation of toxic lipid peroxides (LOOH). One of the morphological features of ferroptotic cells are damaged mitochondria, where reactive oxygen species (ROS) generating processes take place. In addition, mitochondria are involved in iron homeostasis. Inducers of ferroptosis can be divided into two main categories: the first type acts via the cysteine-glutamate transporter, such as erastin and sulfasalazine and the second type inhibits glutathione peroxidase activity and induces the RAS-selective factor (RSL3). Ferroptosis can be inhibited by activation of multiple antioxidant pathways, as well as by iron chelators, lipophilic antioxidants and inhibitors of lipid peroxidation. Recent studies indicate that ferroptosis plays an important role in the development of many human diseases and may be a promising target for new therapies for these diseases.

Keywords:

ferroptosis, iron, cell death, mitochondria



THE OPTIMIZATION OF THE SURFACE ACTIVATION PROCESS FOR 3D PRINTED WORKING ELECTRODES

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A few words about the author(s):

I am a member of the E@SI research team at the Department of Electrochemistry and Electroanalysis. My interest in this area and broadly defined chemistry has been confirmed by multiple performances at scientific conferences.

Abstract:

3D printing technology is used in everyday life, but also helps to accelerate scientific progress by helping to prototype complex tools used in the laboratory. The most popular 3D printing technology is Fused Deposition Modelling, in which material is layered onto a 3D printer platform. The process involves a thin layer of material that is heated and shaped using a heating nozzle. Several materials are used in this technology, the most popular of which is polylactide, including those with conductive properties, which have found wide application in electrochemistry [1].

The properties of carbon electrodes printed from conductive filaments can approach the performance of commercially available electrodes after appropriate treatment, namely activation of the print surface. This process can be carried out in several ways, such as electrolysis, polishing, and immersion in solvents [2]. The basic idea of the experiments was to activate the 3D electrodes using organic solvents. Extensive characterization of the activated surfaces was carried out using electrochemical techniques, optical tensiometer, and scanning electron microscopy. The applicability of these electrodes in the electroanalysis of salicylic acid was investigated.

The research was financed from the funds of the 7th edition of Student Research Grants of the University of Lodz.

[1] P. L. dos Santos et al., Sens. Actuators B Chem., 2019, 281, 837–848.

[2] R. Gusmão et al., Electrochem. Commun., 2019, 102, 83–88.

Keywords:

electrochemistry, print 3D, printed electrodes, surface activation, electroanalysis



CHEMICAL COMPOSITION AND THERAPEUTIC EFFECT OF PLANTAGO MAJOR L. EXTRACTS

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A few words about the author(s):

Angelika Banaszak graduated the University of Wrocław, Faculty of Biological Sciences. She is interested in biochemistry, molecular biology and genetics.

Abstract:

The main aim of the work was to review the literature on in vitro and in vivo studies on the use of plantain extracts (*Plantago major* L.) in the treatment of various diseases. The work was conducted using the PubMed NCBI database and other sources and materials related to the subject of the work.

Plantain (*Plantago major* L.), belonging to the Plantaginaceae family, has been used in herbal medicine for centuries in many places around the world. Nowadays, after qualitative analysis of extracts prepared from various plant organs (leaves and roots), researchers agree that *Plantago major* L. has exciting potential in modern medicine. It owes its medical properties to the presence of bioactive compounds, which include e.g., flavonoids, terpenes, caffeic acid derivatives, chlorogenic acid derivatives or phenolic compounds. Plant extracts prepared from plantain organs show several bioactive properties, including anti-inflammatory, analgesic, antioxidant, antibacterial and anti-diabetic properties. The presentation discussed "in vivo" studies investigating the effect of plantain extracts on lowering blood glucose levels in mice with streptozotocin-induced diabetes (Huong et al.) and the therapeutic efficacy of *Plantago major* L. in the treatment of second-degree burn wounds (Keshavarzi et al., 2022)

In conclusion, *Plantago major* L. is a potential plant for modern medicine.

Keywords:

Plantago major, bioactive compounds, medical properties



ALTERNATIVE GENOTYPES OF BARLEY AS A SOURCE OF HEALTH-PROMOTING SUBSTANCES

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A few words about the author(s):

Master engineer of agriculture. Currently assistant researcher and lecturer in University of Science and Technology. Nowadays, have been working on PhD thesis in the agriculture and horticulture science. Member of few scientific grants.

Abstract:

Barley (*Hordeum vulgare*) is a popular cereal and source of carbohydrates, proteins, fiber but also important biochemicals. Amidst the genotypes of barley we could distinguished common or alternative genotypes. One of the differentia is colour of grains, which could be standard as well as colourful. The key feature are also awns, that could be fully developed or hooded (spikes without awns).

In our work we focused on black awned – *H. v. nigricans* and black hooded *H. v. rimpai*, that had been developed in our University. Nowadays, we are doing many researches to check the nutritional value and growing potential and few parameteres going to be presented in this paper.

In that experiment composition of carotenoids, polyphenols and free fatty acids were evaluated. The effect of aplication of amino acid biostimulant and the reaction of barley on different farming system was also checked.

We observed that alternative barley had more health–promoting substances. Biostimulant in *H. v. nigricans* and *H. v. rimpai* contributed to higher concentration of anthocyanidins, flavonoids, phenolic acids, lutein and B-carotene. Implementation of amino acid on *H. v. vulgare* increased volume of SFA. In the contrary, black barley forms without biostimulant, had more PUFA that are important for human health. Common barley in all combinations achieved the highest amount of zeaxanthin, the yellow pigment of plants. Within black barley *H. rimpai* treated with biostimulant, contained more polyphenols.

Keywords:

alternative barley, biostimulants, farming system, nutritional value, health-promoting substances

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APPLICATION OF COGNITIVE NEUROSCIENCE TECHNIQUES IN THE STUDY OF STRESS AMONG MARITIME NAVIGATORS

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A few words about the author(s):

I am an assistant research and teaching staff member at the Department of Computer Science at the Maritime University of Szczecin. I am interested in cognitive neuroscience applied in research on stress among seafarers.

Abstract:

The present work presents the application of cognitive neuroscience techniques in the study of stress. Stress is a common phenomenon among people working at sea, and its impact on the health and safety of the crew can be significant. In order to understand the mechanisms of stress and develop effective methods of managing it, studies were conducted using cognitive neuroscience techniques. The application of cognitive neuroscience techniques allows for precise examination of the brain's response to stress and the identification of brain areas responsible for processes related to stress management. The results of the studies may contribute to the development of effective methods of managing stress among maritime navigators and other workers performing their duties in difficult conditions.

Keywords:

EEG, stress, blinking



THE EFFECT OF SEED DRESSING ON THE HEALTH STATUS OF DURUM WHEAT KERNELS

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A few words about the author(s):

Weronika Giedrojc – PhD student in agriculture and horticulture at the University of Warmia and Mazury in Olsztyn and a graduate of Animal Science and Agriculture. In her scientific research she deals with diseases and pests of cereals.

Abstract:

Durum wheat (*Triticum turgidum* spp. *durum*) is an annual grass species classified as a cereal, with loose spikes. This tetraploid species, which evolved from emmer wheat (*Triticum turgidum* spp. *dicoccum*), has 28 chromosomes in AABB genomes, unlike bread wheat that has 42 chromosomes. Both spring and winter durum wheat is grown. Durum wheat has been selected mostly for its high gluten content of grain. The aim of this study was to evaluate the health status of several durum wheat cultivars whose seeds were dressed with chemical and biological agents, and to identify pathogens infecting wheat grain. A total of 17.86% – 33.33% of kernels of the analyzed wheat cultivars exhibited symptoms of infections caused by fungal pathogens. The average effectiveness of chemical seed dressing in reducing the severity of kernel infection was 24.27%, whereas biological seed dressing had no significant effect on improving the health status of kernels. During germination, durum wheat was most severely infected by *Alternaria alternata* and species of the genus *Fusarium*. Seed dressing agents had no significant influence on the abundance of pathogens colonizing wheat grain. In integrated crop protection, the most important factor is the selection of appropriate cultivars, followed by seed dressing that protects cereals against pathogenic fungi in early plant growth stages.

Keywords:

chemical and biological seed treatment, diseases, durum wheat, grain, fusarium



APPLICATION OF MICROBIAL BIOPOLYMERS IN VARIOUS INDUSTRIES

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I am a fourth year biotechnology student at the Maria-Curie Skłodowska University in Lublin. I am a member of the Student Scientific Club of Biochemists where I build up my passion for science.

Abstract:

Microbes have accompanied humans since time immemorial. The needs and acquired knowledge accompanying the development of civilization have led not only to the development of methods to combat pathogens, but also to the exploitation of their productive potential such as synthesis of microbial polymers. These natural compounds are usually biodegradable and produced by various species of microorganisms. Bacterial polymers are characterized by high chemical purity and exhibit many useful properties not found in their natural counterparts of plant or animal origin. There are a number of different microbial biopolymers. The most common ones are: bacterial cellulose, dextran, curdlan, polyhydroxyalkanoates, alginate, gellan and xanthan. Such materials are widely used in the medical, pharmaceutical and packaging industries but also in everyday life. Microorganisms can become our allies in the development of industry, medicine and pharmaceuticals. It is estimated that so far about 10% of the bacteria found on Earth have been identified, so it can be assumed that many polymers are still waiting to be discovered.

The aim of this paper is to familiarize with the application of microbial biopolymers in various industries.

Keywords:

microbial biopolymers, bacterial cellulose, dextran, curdlan, polyhydroxyalkanoates



STUDY OF CHANGES IN ATMOSPHERIC CARBON DIOXIDE CONCENTRATION IN TEACHING ROOMS DURING UNIVERSITY CLASSES

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A few words about the author(s):

Student of the first year of the second degree of geography at the Maria Curie-Skłodowska University.

Abstract:

An important problem in educational institutions is the low level of concentration of students during classes due to the long duration of the classes or the lack of classroom ventilation between them. In order for the air quality to be favourable for learning, it is necessary to reduce CO₂ through, among other things, continuous classroom ventilation. The higher the concentration of carbon dioxide in the air is, the more it leads to drowsiness and reduced concentration.

The aim of the study was to assess the impact of exhaled air on the carbon dioxide content of classrooms and thus on students' wellbeing and productivity. Measurements were taken during 20 classes at the Maria Curie-Skłodowska University, using a CO₂ air parameter meter AZ 77535.

The results prove that the concentration of carbon dioxide in the air increased each time, influenced mainly by the length of the classes, but also by the size of the classroom and the number of people.

Keywords:

carbon dioxide, university classes, impact of exhaled air



INTERACTIONS OF SELECTED GENES AND RESISTANCE TO MASTITIS IN BLACK AND WHITE HOLSTEIN COWS

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A few words about the author(s):

The authors of the paper conduct research on various polymorphisms of selected mastitis-related genes. Interactions of the selected genes are analyzed in relation to various milk performance traits.

Abstract:

Mastitis is an infection that has a huge impact on animal welfare. Dairy cattle are the most vulnerable to the disease due to increased interference in the zone of the mammary gland. Animals suffering from mastitis generate huge losses for breeders, which translates globally into the entire economy.

Mastitis is an inflammatory condition, therefore in response to the ongoing inflammation consists in the activation of individual cells of the immune system and other components including the complement system. Activation of the proteins of the complement system occurs in a cascade and leads to increased opsonization of the pathogen cell, recognition, or direct elimination of the pathogenic microorganism. The complement system can be activated through three major pathways: classical, lectin, and alternative. The C2 and C9 genes encode the complement elements of the same name. C2 and C9 are involved in classical activation of the complement system. In addition, C9 is a common element for each of the three pathways of complement activation.

The aim of the study was to determine whether there are associations between polymorphisms of selected genes and mastitis resistance in Polish Holstein-Friesian Black-and-White cattle. The association analysis was performed considering udder health class, subsequent lactation, and stage of lactation.

Keywords:

mastitis, polymorphism, selected

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APPLICATION OF ARTIFICIAL INTELLIGENCE IN MEDICINE

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I am a student of the second year of IT at the Maritime University in Szczecin. I am the coordinator of the Faculty of IT and Telecommunications on behalf of the student parliament. I am also involved in the university's scientific activities.

Abstract:

In recent years, the application of artificial intelligence (AI) in medicine has rapidly expanded, offering new opportunities for improving patient care. AI can be utilized for various tasks such as disease diagnosis, drug discovery, personalized treatment, and monitoring patient health. Machine learning algorithms can analyze large datasets to identify patterns and make predictions, aiding in early detection of diseases and treatment planning. The integration of AI in medical devices has also enabled remote monitoring and real-time decision-making. While AI has great potential to improve healthcare, there are also challenges to overcome such as data privacy, bias, and ethical considerations. This paper discusses the current state of AI in medicine and its potential to transform the field, as well as the challenges and opportunities that lie ahead.

Keywords:

artificial intelligence, medicine, machine learning, diagnosis, treatment



7-AMINO-4-(TRIFLUOROMETHYL)COUMARIN DERIVATIVES AS FLUORESCENT BEVERAGES ADDITIVES AND THEIR EFFECT ON MICROBIOLOGICAL STABILITY

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Abstract:

Color largely determines consumers' choices. Over the years, the way food is perceived only as a means of meeting the basic human physiological requirements has changed. More and more often, it is a factor serving to meet the hedonistic needs of the recipient. Fun food is gaining considerable interest in this matter, distinguishing itself from typical food products with innovation and creativity. In this context, fluorescent dyes may play an important role in the future. This presentation describes preliminary studies of a selected 7-amino-4-trifluoromethylcoumarin derivative, which is a potential fluorescent dye for food. The obtained results indicate the significant potential of the selected derivative in terms of food additives. The fluorescence excitation covers the region of electromagnetic radiation emitted by incandescent lamps characteristic of night clubs, the so-called black bulbs. The concentration for which the fluorescence intensity of the dye is highest is within the limits of the allowed concentrations of synthetic dyes allowed to come into contact with food in accordance with the current law. The fluorescence intensity only slightly reduces the water content and various compounds found in alcoholic beverages (such as polyphenols). An additional benefit is the dye's ability to inhibit mold growth (antimicrobial properties) and resistance to atmospheric oxygen oxidation in the environment characteristic of alcoholic beverages.

Keywords:

fluorescence, coumarin, alcoholic drinks



THE INFLUENCE OF ARTIFICIAL INTELLIGENCE ON EDUCATION BASED ON CHATGPT

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Computer science student, who is passionate about programming and artificial intelligence tools on a daily basis.

Abstract:

ChatGPT, an AI-based language model, has revolutionized human-machine interaction, ushering in a new era of AI-based communication. Tech giants such as Microsoft and Google are developing increasingly advanced AI tools, suggesting that ChatGPT and similar systems will be increasingly integrated into society. This study focuses on analyzing the influence of ChatGPT on the education system, identifying potential benefits and threats arising from this application. The study preparation involved a review of literature on the impact of AI on education and conducting a survey among students. The survey reveals that students frequently use ChatGPT, and their responses indicate diverse usage objectives, potential applications for teachers, as well as possible unethical use of ChatGPT and its impact on educational achievements. The survey results suggest that ChatGPT may have a significant impact on the future of education.

Keywords:

artificial intelligence, ChatGPT, education



EFFECT OF SINGLE NUCLEOTIDE POLYMORPHISMS IN THE SLC35A2 GENE ON MASTITIS RESISTANCE IN POLISH HOLSTEIN-FRIESIAN CATTLE

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The authors of the abstract are associated with the West Pomeranian University of Technology in Szczecin and are engaged in research into identification of the most important SNPs that could be used for the selection of marker assisted dairy cattle.

Abstract:

Genetic selection of individuals is the most important stage of breeding work. Understanding the lactose synthesis mechanism is crucial for the improvement of milk quantity and quality. It may also play a role of indicator of udder health in breeding programs aimed to enhance cows' resistance to mastitis.

The SLC35A2 encodes the X-linked UDP-galactose transporter 2 which is involved in glucose transport and regulation of lactose synthesis. The objective of this study was to investigate associations between genotypes of polymorphisms in exon 4 of the SLC35A2 gene and somatic cells count (SCC) in Polish Holstein-Friesian cattle. In this study were analyzed six polymorphisms (rs437633966, rs477238079, rs460343714, rs452180575, rs471192683 and rs132920701) responsible for missense mutations. Single nucleotide polymorphisms were identified using the PCR-RFLP method. Statistical analysis was aimed at estimating the effect of individual genotypes on SCC. Significant associations ($p < 0.05$ and $p < 0.01$) were found between five SNPs and SCC.

This study is a prelude for deeper investigations into the linkage with milk production traits and inflammatory responses in dairy cattle. The obtained results may contribute to the state of knowledge regarding the identification of the most important SNPs that could be used for the selection of marker-assisted dairy cattle, not only to improve milk production traits but also to increase resistance to mastitis.

Keywords:

SLC35A2, lactation, single nucleotide polymorphisms, mastitis resistance, Polish Holstein-Friesian cattle

ABSTRACTS OF **POSTERS**



**TECHNICAL AND
NATURAL SCIENCES**



APPLICATION OF AMBIDENT LIGANDS AND Pd²⁺ METAL IONS IN THE FORMATION OF NEW COORDINATION CAGES

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Agnieszka Bajer is a 5th year chemistry student at Adam Mickiewicz University in Poznań.

Abstract:

Ambidentate ligands are organic structures consisting of two different types of coordination unit within single molecule. These features enables coordination of two different metal ions, which can directly affect the properties of obtained complexes as well as is further application. The aim of the project was to use appropriately functionalized organic ligands to create a new coordination platforms. We focused on a β -diketone ligand containing terminally located pyridine units in order to assemble cage-like architectures. This will be possible due to the peculiar geometry of the proposed ligands, called "banana-shape", widely used in the synthesis of sophisticated metallocupramolecular architectures. Each of the coordination units play an important role in cage assembly. Pyridine units enables coordination of square-planar metal ions (Pd²⁺, Pt²⁺), forming positively charged cage. On the other hand the β -diketone group provides the possibility of post-modification, including the introduction of additional functional groups with specific properties (sensing, catalytic etc.). Such obtained cages are of great interest due to their application potential, including storage or transport of guest molecules, selective detection/separation of analytes as well as efficient catalytic processes.

Keywords:

ambidentate ligands, β -diketonate complexes, coordination cage



AN ATTEMPT OF Mg_2FeH_6 HYDRIDE SYNTHESIS BY THE HIGH TEMPERATURE HIGH PRESSURE REACTIVE BALL MILLING

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Agata Baran is a researcher, techning assistant and PhD Student working at Military University of Technology. Her main field of study is focused on hydrogen storage materials, including synthesis and further characterization.

Abstract:

reactive planetary ball milling (HTPRM). As a result, Mg + Fe with the molar ratio of 2:1 were prepared in order to obtain ternary hydride Mg_2FeH_6 . The technique allows for mechanosynthesis at fully controlled conditions (temperature up to 450 °C and pressure up to 100 bar of hydrogen). The synthesis was performed in a temperature range of RT - 400 °C while milling in a planetary ball mill under 50 bar of starting hydrogen pressure. The phase composition, reaction yield, particle size, and morphology of obtained materials were measured and analyzed by X-ray diffraction (XRD), differential scanning calorimetry (DSC), infrared particle sizer (IPS), and scanning electron microscopy (SEM) techniques. The obtained results proved that increasing the process temperature influences the rate of hydrogen absorption by magnesium. However, unexpectedly, only a tiny amount of ternary hydride were found in the products, so the transition metal (iron in that case) acted as a catalyst not reaction substrate. The experiment suggests that the HTPRM technique has considerable potential for the mechanochemical synthesis of materials, but it was observed that increasing the temperature resulted in increasing the ductility of the materials and by that lowered the grinding efficiency.

Keywords:

magnesium-based hydrides, ternary hydrides, mechanochemical synthesis, solid state hydrogen storage



ADAPTIVE MECHANISMS OF EXTREMOPHILES

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Abstract:

Organisms that have the ability to survive and thrive in extremes of environmental factors, or even require their presence to function properly, are referred to as extremophile organisms. Over the course of many years of evolution, extremophiles have developed a number of traits that enable them to survive in extreme conditions, such as high or low temperature, salt concentration in the environment, extremes of atmospheric pressure, pH, or in the presence of heavy metal ions. Adaptive mechanisms of extremophiles include the occurrence of differences in the structure and composition of nucleic acids, proteins and the cell membrane to increase the stability of cellular components. Extremophilic organisms also produce proteins whose function is to capture and bind denatured proteins preventing their aggregation and deposition. Adaptation to extreme conditions is also influenced by changes in metabolism resulting in increased activity of certain enzymes and reduced importance of aerobic metabolism.

Keywords:

extremophiles, adaptive mechanisms, environmental factors



INVESTIGATING THE PROPERTIES OF PVP-BASED HYDROGELS WITH ADDED ROYAL JELLY

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Abstract:

Hydrogel materials are currently the most advanced group of dressings. They are defined as at least two-component materials consisting of a polymer network and water. Hydrogel synthesis involves the formation of cross-links between polymer chains, resulting in a three-dimensional structure whose spaces are filled with water. This process takes place in a UV field and is called photopolymerisation. Hydrogel materials fulfil many of the characteristics of an ideal medical dressing, i.e. maintaining a moist environment around the wound, permeability to oxygen and, which is extremely important in modern drug delivery systems, ensuring controlled release of the active substance. Thanks to their structure, hydrogels can absorb aqueous solutions in a reversible manner, a feature that is highly desirable in terms of absorbing potential wound exudate and releasing the active substance. The hydrogel matrix can be extensively enriched with substances such as royal jelly. Royal jelly has properties that promote wound healing and thus enhance the therapeutic effect of the hydrogel dressing. Hydrogel materials enriched with royal jelly have application potential in the treatment of many skin conditions, as well as supporting the treatment of burn wounds. Analysis of the results obtained allows the conclusion that the developed materials have application potential for use as modern dressing materials with controlled delivery of the therapeutic substance.

Keywords:

hydrogels, royal jelly, wound dressings



CHARACTERIZATION OF THE ORGANISM THERMOMYCES LANUGINOSUS AND PROSPECTS FOR ITS INDUSTRIAL USE

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I am a fourth-year student of general biotechnology at Maria Curie-Skłodowska University in Lublin. I am an active member of science clubs and am interested in biotechnology in general, especially in the field of molecular biology and microbiology.

Abstract:

Thermomyces lanuginosus was first isolated in 1899 by Tsiklinskaya. It is a thermophilic fungus, so the temperature range in which it grows is from 20 to 60 degrees Celsius, with the optimum temperature being around 50 degrees. It is mainly found on organic-rich substrates such as composts and manures, but also in watery sediments and clayey soil. In the initial stages of growth, the colonies are white and felty, but quickly become green-gray and then purplish-brown secreting a pink pigment into the substrate. A characteristic feature of thermophiles very high thermal stability of the enzymes they produce. The organism in question produces many enzymes with high industrial potential, such as lipase, chitinase, hemicellulase and xylanase. These enzymes can be widely used in various industries. Lipase is being studied for its use as a biocatalyst in the biodiesel production process, among others, while xylanase is being investigated for use in the food and pulp and paper industries. Chitinase, on the other hand, appears to be a potential food preservative, shows antifungal properties and breaks down chitin waste, so it could be used in the environmental field. The work presented here aims to provide a literature review on the characterization of *Thermomyces lanuginosus* and present its potential industrial applications.

Keywords:

Thermomyces lanuginosus, thermophilic, enzymes, industrial properties



EFFECTS OF MICROPLASTICS ON AQUATIC ORGANISMS

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I am a student at the Faculty of Biology and Biotechnology, Maria Curie-Skłodowska University in Lublin. I am interested in biotechnology especially microbiology.

Abstract:

The purpose of this paper is to review the recent literature on the effects of microplastics on aquatic organisms. The accumulation of microplastic in the seas and oceans is attributed to human activities. It usually comes from industrial production, agriculture or municipal solid waste. Plastics, as a result of cleavage and wrinkling due to mechanical and phytochemical processes, break down into smaller forms such as microplastics and then nanoplastics. These microplastics are usually polyethylene, polypropylene, polyvinyl chloride, polystyrene, polyester or polyamide. Due to their composition, they differ in color and density. Polyethylene and polypropylene have the lowest density, which makes them float on the surface of the water, compared to higher-density microplastics, which sink to the bottom of the seas and oceans. These microplastics are absorbed by aquatic organisms, disrupting their physiological functions. They cause reduced food intake, behavioral and developmental changes thus contributing to population declines.

Keywords:

microplastics, aquatic organisms



ELECTROCHEMICAL PROPERTIES OF AN ELECTRODE MODIFIED WITH MULTI-WALLED CARBON NANOTUBES AND AN IRON-METALATED SULFANYLPORPHYRAZINE DERIVATIVE

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Abstract:

The unaltered porphrazines (Pzs) ring has a limited range of applications since it is strongly nonpolar and susceptible to π - π stacking. In order to change Pzs, there are two basic ways to do so: either by peripheral substitution at the β -positions or by changing the element complexed in the coordinating center, which is typically a metal cation. The macrocycle's physicochemical characteristics can then be adjusted to fit a particular application in this way. Due to their high solubility and good biological, photocatalytic, electrical, and optical capabilities, sulfanyl Pzs have attracted attention among Pzs. Strong noncovalent π - π stacking interactions between multi-walled carbon nanotubes (MWCNTs) and hydrophobic porphyrinoid molecules make it simple to alter the surface of MWCNTs. A method like this enhanced the transport of electrons from the electrode surface to the redox-active compounds.

A sulfanyl porphyrine derivative with peripheral phthalimide moieties was metalized with iron(II) metal ions as part of the investigation. Novel porphyrines were combined with multi-walled carbon nanotubes to create hybrid electroactive materials. The obtained GC/MWCNTs/Pzs hybrid system was subjected to thorough electrochemical characterization. It has been shown that the material has interesting electrochemical properties and can be used to construct a sensor of analytes commonly found in the environment.

Keywords:

cyclic voltammetry, porphyrines, iron(II), multi-walled carbon nanotubes, electrochemical properties



THE UTILITY OF X-RAY FLUORESCENCE SPECTROSCOPY AS A TOOL FOR MONITORING RASTER ROLLER DAMAGE

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PhD in forest sciences at SGGW. Author of numerous publications in reputable scientific journals. Specialist in the field of pulp and paper technology, and wood panels. She combines practical knowledge with didactic activity as an academic lecturer.

Abstract:

In flexographic printing, the most important element of the printing machine is the anilox cylinder. If the surface of the anilox roll is even slightly damaged, it affects the print quality. Therefore, special handling of anilox rolls is extremely important, especially because the purchase cost is very high. Anilox rollers can be damaged easily during both the operation process and cleaning before reuse. Therefore, regular diagnosis is needed. In the wake of this, in the present work, the authors verified the usefulness of X-ray fluorescence (XRF) spectroscopy for assessing the condition of anilox rolls. Due to layered composition of anilox roll, where Cr_2O_3 coating is applied on iron core, this analysis made it possible to detect damage by determining the contents of specific elements in the anilox roll coating. Thus, it was proved that evaluation of the elemental composition of roll surface by XRF technique can be a preliminary, rapid method for assessing the technical condition of an anilox cylinder.

Keywords:

anilox roll, flexography, ink duct, raster mesh, XRF spectroscopy



INVERTEBRATE ASSEMBLAGES IN MOSS MICROHABITATS IN A NATURAL LOWLAND RIVER

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Tymoteusz Matera – second-year student of Biology on Faculty of Biology and Environmental Protection at the University of Łódź. His interests lie in hydrobiology, especially invertebrate habitation within rivers and riverbeds.

Abstract:

Freshwater biodiversity depends on the aquatic vegetation' microhabitats quality. Unfortunately, due to the river regulation and water pollution, the diversity of macrophytes in European lowland streams decreases. This also concerns aquatic mosses. Hence, detailed studies on invertebrate communities of water-borne moss (*Fontinalis antipyretica*), microhabitats in Rawka river were carried out in September 2022 and April 2023. Rawka is protected as a nature reserve, being one of the last natural rivers of the Polish Lowlands. Its benthic assemblages have not been studied extensively. As the riverbed of the Rawka is not regulated or dredged, it exhibits a variety of moss microhabitats.

The material was collected from 22 sites, including samples of moss-dwelling invertebrate periphyton, as well as benthos from the river bottom. The physico-chemical conditions have also been examined. As the diatoms are the main component of periphytic invertebrates' diet, their species composition and richness was also analysed.

The preliminary results indicate that Chironomidae, Simuliidae and Ephemeroptera are the main aquatic moss dwellers in the studied stream, however abundance of insects is not high. The new data contribute to the knowledge concerning the aquatic fauna of Rawka Nature Reserve and shed a new light on aquatic moss as an important habitat for macroinvertebrates. My studies in Rawka river are funded by Student Research Grants at the University of Łódź.

Keywords:

macroinvertebrates, microhabitats, hydrobiology



HEAT BALANCE IMPROVMENT ANALYSIS FOR DISHWASHERS

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A few words about the author(s):

PhD student at the Silesian University of Technology. Works as a constructor engineer in the R&D department at Aweco Company. Designs parts for dishwashers.

Abstract:

This paper presents a study on the analysis of a heat recovery system for a dishwasher. The main focus is on the technical and economic aspects of the proposed system, which aims to use the heat coming from the wastewater of the dishwasher to heat the fresh water entering the dishwasher. The objective of the study is to analyze the potential of energy recovery and evaluate the economic feasibility of the system.

The proposed heat recovery system is based on a heat exchanger, which is designed to recover heat from the dishwasher's wastewater and transfer it to fresh water. To evaluate the potential of energy recovery, a prototype of the system is built, and experiments are conducted to measure its thermal potential. In addition to experimental validation, were also used CFD simulations to analyze the heat transfer behavior of the proposed system. The study concludes that the proposed heat recovery system is a viable and effective solution for reducing energy consumption in dishwashers.

Keywords:

household appliances , energy efficiency, performance, simulation methods



BIOREMEDIATION OF HEAVY METALS USING IMMOBILIZED YEAST CELLS

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Abstract:

The purpose of the research conducted in this study was to compare the sorption and bioremediation abilities of *Phaffia rhodozyma* microorganisms immobilized in calcium alginate spheres. The tests performed allowed the removal of chromium and lead metal ions from different concentrations of aqueous solutions. Which confirms that immobilized yeast cells of the genus *Phaffia rhodozyma* in calcium alginate in the form of spheres fulfilled their role in carrying out the sorption process. The performed analyses of each of the obtained heavy metal solutions were subjected to analyses to determine the concentration of chromium or lead in the test sample.

The analyses performed included atomic absorption analysis (AAS), Fourier transform infrared spectroscopy (FT-IR), Ultraviolet-visible spectroscopy (UV-Vis), and scanning electron microscopy (SEM) with EDS.

Performed calculations of sorption processes in the form of isotherms (Langmuir, Freundlich and Temkin) and kinetics (pseudo-first-order, pseudo-second-order, as well as Weber-Moriss model) provided information on the efficiency of the sorption process carried out. The thesis that concentration is one of the parameters that have a significant effect on the rate of the adsorption process was confirmed.

By using isotherm calculations, it was possible to determine the best fit for the sorbent used, in the form of yeast cells.

Keywords:

Phaffia rhodozyma, yeast cells, heavy metals, bioremediation



CYTOTOXICITY OF PEROVSKITE QUANTUM DOTS

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Abstract:

Over the past few years, in the world of nanomaterials, quantum dots (QDs) have been devoted to a wide range of research and scientific publications, due to the possibility of their numerous applications in medical diagnostics, drug transport, and the study of physiological processes occurring in living organisms. This curiosity is not accidental and finds its source in the peculiarities of QDs' interaction with light, the mechanism of which resembles that observed among atoms - which is why quantum dots are colloquially referred to as artificial atoms. The purpose of the research was to obtain inorganic perovskite-based quantum dots and to study their cytotoxicity. The work included the synthesis of inorganic perovskite-based quantum dots in an organic medium by the hot-injection method, carrying out their physicochemical analysis and cytotoxicity studies on *Danio rerio* embryos, human malignant melanoma cells, and a rat cardiomyocyte cell line. Nanoparticles were obtained with small sizes, close to 20 nm. The incidence of morphological abnormalities in embryos was highest at a concentration of 150 $\mu\text{g/mL}$, and the recording of embryonic abnormalities was for those study groups in which perovskite concentrations exceeded 100 $\mu\text{g/mL}$. The LC50 value, determined in an *in vivo* study on *Danio rerio* embryos takes the value of 109.9 $\mu\text{g/mL}$. The ability of human malignant melanoma cells to metabolize tetrazolium salt was highest among cells exposed to nanoparticles at 50 $\mu\text{g/mL}$.

Keywords:

nanomaterials, lead perovskite quantum dots, cytotoxicity



THE EFFECT OF MICROPLASTICS ON THE SORPTION OF SELECTED IONIC LIQUIDS IN THE ENVIRONMENT

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Maria Simpson is a Poznan-born South African who spent over 18 years living Africa. Currently, she is studying Chemical Engineering in Poznan and has grown involved in scientific research regarding greener, more sustainable agricultural practices.

Abstract:

Ionic Liquids (ILs) displaying herbicidal activity are a seriously investigated example of more ecologically sustainable substitutes of harmful herbicides. Due to their ionic nature, one can select cations and anions, altering the substance's properties such as hydrophobicity or toxicity. Another advantage is the ability to limit the mobility of the herbicidal anions, thus affecting the sorption processes in the soil. Notably, it has been suggested that microplastics can potentially enhance the herbicidal sorption thereof. Therefore, this undertaken research analysed the sorption ability of 2,4-D (common herbicidal anion) in standard OECD soil samples containing polystyrene microplastics (PS). Hence, the influence of the cations on the herbicidal anion's mobility was closely examined. The ILs used consisted of a common 2,4-D anion and different cations, chiefly: hydrophobic [C12Chol] and hydrophilic [Chol]. The results indicated that the sorption capacity of the IL increased by 18-23% when a 1-10% (w/w) PS was present in the soil. The sorption ability of the cations depended primarily on their chemical characteristics and hence varied. Yet, the 2,4-D anion barely underwent sorption. Thus, the presence of microplastics did not noticeably enhance the sorption of these ions in the soil environment thereof. These findings will undoubtedly widen the present spectrum of scientific knowledge, requiring further investigation.

Keywords:

sorption, microplastics, ionic liquids, environmental risk, emerging contaminants



PRINTING OF METALLIC NANOPARTICLES-APPLICATION POSSIBILITIES

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Author's research topics focuses on issues related to the preparation and characterization of functional nanomaterials of controlled composition and size, as well as their potential application in photocatalysis and optoelectronics, among others.

Abstract:

Flexible printed electronics based on the use of nanotechnology solutions allows for the continuous development of inkjet technology and provides the opportunity to create new, cost-effective solutions that are environmentally friendly. Due to a range of chemical and physical properties, conductive inks prepared on the basis of metallic nanoparticles are of great interest. Among the well-known and studied nanoparticles are silver nanoparticles.

The key elements that researchers are grappling with are improving the efficiency of synthesis of metallic nanoparticles, preventing their oxidation, agglomeration and improving their conductivity. The main objective of the study was to synthesize silver nanoparticles by chemical reduction and to characterize them by DLS, electrokinetic potential, UV-VIS, FTIR and TEM methods. Then the ink based on the obtained nanoparticles was prepared and its viscosity and density were measured. As a result, stable silver nanoparticles with a positive electrokinetic potential and a size distribution not exceeding 10 nm were obtained and used as a substrate for the development of printing ink with a specific viscosity and density. The next stage of research involves printing tests.

Keywords:

nanotechnology, metallic nanoparticles, inkjet printing



SYNTHESIS, THERMAL AND PHOTOPHYSICAL PROPERTIES OF INNOVATIVE DERIVATIVES OF BENZO[GHI]PERYLENE TRIIMIDE

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My name is Angelika. I am chemistry student persuing a Master's degree. My passion is chemistry and what I want to do as young scientist is to continue to pursue my ideas to improve current technologies.

Abstract:

The main idea of these studies are benzo[ghi]perylene triimides (BPTIs) as organic molecular materials with significant delocalization of π electrons, containing three imide units in the structure, which give this group a range of unique physicochemical properties. BPTIs are characterized by high photochemical and thermal sobility, absorb radiation in a wide UV-VIS range. What is more, they have high electron affinity energy and relatively good mobility of negative charges in solid state, which makes this group of compounds perceived as a class of stable, n type organic semiconductors¹.

BPTIs are most commonly obtained from perylene diimides (PDis) via Diels-Alder cycloaddition of maleic anhydride to the PDI cavity. This introduces an additional anhydride group of the target material, which can undergo imidization reaction to form a five-membered imide group, enabling wider range of structural modifications and thus more core effectively correlating structure-property relationships with respect to the target compounds including improvement in solubility and processability.

Four new molecular materials were obtained as part of the study. The chemical structure of the intermediates and target compounds was confirmed based on ¹H and ¹³C NMR spectra. The absorption properties were determined for the obtained target compounds. Their thermal stability was evaluated using thermogravimetric analysis and phase transition temperatures with the use of differential scanning calorimetry.

Keywords:

benzo[ghi]perylene triimides, perylene diiimides, imidization, Diels-Alder cycloaddiction



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