



**National
Scientific
Conference**

SCIENCE AND YOUNG RESEARCHERS

III edition

**June 15, 2019
Łódź**

The Book of Abstracts

National Scientific Conference
„Science and Young Researchers”
III edition

The Book of Abstracts

Łódź, June 15, 2019



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Promovendi Foundation

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Promovendi Foundation Publishing

Address:

17/19/28 Kamińskiego st.
90-229 Łódź, Poland

KRS: 0000628361

The papers included in this Book of Abstracts have been printed in accordance with the submitted texts.
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www.promovendi.pl

ISBN: 978-83-952839-6-3

Circulation: 140 copies



CONFERENCE INFORMATION

The National Scientific Conference „Science and Young Researchers” is organized especially for you.

The Conference has an interdisciplinary character. It is addressed to young scientists, starting with first and second degree students, through Ph.D. students, to people who have obtained a doctoral promotion in the last 3 years.

Our initiative aims to create opportunities for exchange of experiences and good scientific practices by representatives of the scientific community. Additionally, it aims to underline the important role of young researchers in the development of Polish science.

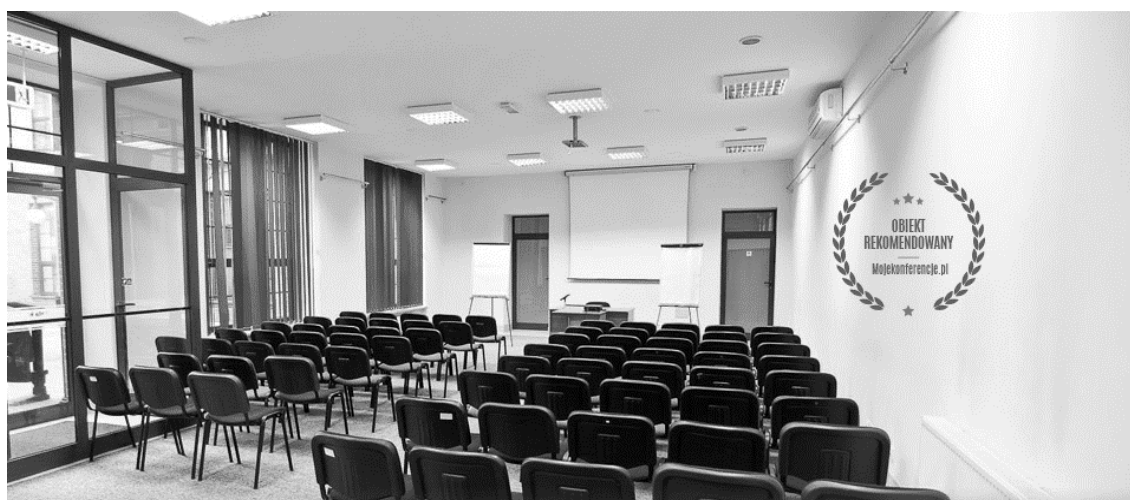
In the Conference, two types of participation are possible: passive or active, with active participation giving the opportunity to choose an oral presentation or poster. The conference materials will be published in the form of the Book of Abstracts and Book of Conference Articles with assigned ISBN numbers.

Scientific part of the Conference is supervised by Scientific Committee which contains of doctors and independent research workers from various Polish and foreign universities and industry representatives.



CONFERENCE PLACE

Business Center ‘Faktoria’ is a Łódź-based business and conference complex with a unique character. The facility providing 3,300 m² of office space, was created in 2002 on the basis of the existing architecture of the manufacturer from 100 years ago. Thanks to its history, Faktoria perfectly fits into the post-exhibition image of Łódź, creating at the same time offices that favor pleasant and effective work. In addition, the complex includes well-equipped training and conference rooms, as well as a restaurant providing catering services according to customer requirements. Due to the central location in the city and high standard, Faktoria stands out on the map of Łódź office buildings. Focusing on continuous development, in the near future our center will be expanded with further office buildings, also referring with its architecture to the factory tradition of Łódź.





CONFERENCE SCHEDULE

Business Center FAKTORIA

25 Dowborczyków st., Łódź

June 15, 2019 (Saturday)

08:00 – 15:00	Registration (<i>Reception</i>)	
08:45 – 09:00	Opening of the Conference (<i>Hall 1</i>)	
09:00 – 11:15	Poster Session (<i>Hall 1</i>)	
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P-02	Gębicka Magdalena	POOR IMMUNOGENICITY OF PURIFIED PROTEINS MAY BE MAINLY CAUSED BY AN INSUFFICIENT UPTAKE BY ANTIGEN PRESENTING CELLS, RATHER THAN BY THE LACK OF CO-STIMULATION
P-03	Jackowska Aleksandra, Sztuba Sabina	EVALUATION OF THE TUMOR CELLS SENSITIVITY TO EXTERNAL STIMULI
P-04	Jaworska Aleksandra	THE MIRNAS LEVELS IN MOST COMMON OSTEOSARCOMA CELL LINES DETERMINED USING QUANTITATIVE REVERSE TRANSCRIPTION PCR (RT-QPCR)
P-05	Kanarek Kamila	THE EFFECT OF REDUCED GRAPHENE OXIDE AND CORIOLUS VERSICOLOR EXTRACT ON THE VIABILITY OF L929 FIBROBLASTS AND MCF-7 HUMAN BREAST CANCER CELLS
P-06	Kucharczyk Katarzyna	THE IMPACT OF MVS DERIVED FROM ADIPOSE DERIVED STEM CELLS (ASC) REJUVENATED WITH RESVERATROL AND 5-AZACYTYDINE (AZA/RES) COMBINATION ON INSULIN SENSIVITY IN HORSES SUFFERING FROM EQUINE METABOLIC SYNDROME (EMS)
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Hall 1		
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13:30 – 13:40	Feć-Sfora Katarzyna	PRESENTING THE IMPACT OF PHYSICAL AND CHEMICAL RESEARCH ON CARRYING OUT OF CONSERVATION WORKS USING EXAMPLES OF SELECTED SCULPTURES BY ROMAN TARKOWSKI



13:40 – 13:50	Gałat Wioleta	CHANGES IN THE PERCEPTION OF UNIVERSITY MISSIONS
13:50 – 14:00	Sobczyk Marcin	2018 POLISH LOCAL ELECTIONS – ANALYSIS OF SELECTED WEEKLY OPINION MAGAZINES
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14:10 – 14:20	Pilch Szymon	CONTEMPORARY (AND FUTURE) CONDITION OF WORK OF IT SPECIALISTS IN THE CONTEXT OF THE TECHNOLOGICAL DIGITALIZATION
14:20 – 14:30	Chmielecki Przemysław	YOUTH LIMITATIONS IN SCIENTIFIC DEVELOPMENT
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15:50 – 16:00	Snopkiewicz Konrad	A REAL PROBLEM IN THE MODERN WORLD - THREATS IN CYBERSPACE IN THE LIGHT OF RESEARCH
16:00 – 16:10	Symonides Mariola	THE SELECTED EPISTEMIC AND COMPARISONS PARTICLES IN SPEECH AT THE AGE FROM 4 TO 6
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16:20 – 16:30	Grzybowska Magda	THEORY OF TEACHING LANGUAGES FOR SPECIAL PURPOSES
16:30 – 16:40	Michel Daria	JOHN BURIDAN - QUESTIONS ABOUT QUALITATIVE CHANGE
16:40 – 16:50	Pietrzak Agnieszka	CHARACTERISTICS OF THE PROFESSION OF A SWORN TRANSLATOR IN POLAND
16:50 – 17:00	Siniarska-Tuszyńska Angelika	RELATIONSHIP BETWEEN POETICS AND CULTURAL PRAGMATICS ON THE EXAMPLE OF JOANNA BATOR'S WORKS
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09:10 – 09:20	Piekarska Lidia	ANTAGONISTIC ACTIVITY OF LACTIC ACID BACTERIA
09:20 – 09:30	Pobiega Katarzyna	ANTIMICROBIAL ACTIVITY OF PULLULAN FILMS WITH PROPOLIS
09:30 – 09:40	Pobiega Katarzyna	ANTIMICROBIAL ACTIVITY OF PULLULAN FILMS WITH THE ADDITION OF POTASSIUM SORBATE
09:40 – 09:50	Rudziak Anna	APPLICATION OF THERMOGRAPHIC METHOD IN MODEL RESEARCH ON MICROBIOLOGICAL CONTAMINATION
09:50 – 10:00	Berbec Ewelina	HERBAL EXTRACTS IN NOSEMOSIS TREATMENT IN HONEYBEE (APIS MELLIFERA L.)
10:00 – 10:10	Peczyk Klaudia	THE ENDOSYMBIOTIC THEORY AND ORIGIN OF CELLULAR ORGANELLES
10:10 – 10:20	Franczyk Marcin	TOURISM AND ITS BENEFITS ON THE EXAMPLE OF SELECTED SPA HABITATS OF THE PODKARPACKIE REGION



10:20 – 10:30	Pałatyńska Kinga, Wysoczański Bartłomiej	ANALYSIS OF MOLECULAR MARKERS OF WAX INHIBITOR IN RYE (SECALE CEREALE L.)
10:30 – 10:40	Burchardt Sebastian	THE FUNCTIONING OF ROOT NODULES IN YELLOW LUPINE DEPENDS ON DROUGHT STRESS
10:40 – 10:50	Florkiewicz Aleksandra	THE EFFECT OF THE EPIP PEPTIDE ON THE FLOWER SEPARATION PROCESSES
10:50 – 11:00	Przywieczerski Tomasz	CELLULAR AND MOLECULAR CHANGES OCCURRING IN THE FLOWER ABSCISSION ZONE IN YELLOW LUPINE UNDER DROUGHT
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11:10 – 11:20	Werner Klaudia	MYCOVIRUSES - AN EFFECTIVE WEAPON IN THE FIGHT AGAINST FUNGAL PLANT AND HUMAN DISEASES
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16:10 – 16:20	Tobiasz Michał	THE PULMONARY MASK OF MEDIASTINAL TUMORS IN CHILDREN
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16:40 – 16:50	Pieklarz Katarzyna	MULTIDIRECTIONAL ACTION OF VITAMIN D ON THE HUMAN BODY
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HUMANITIES SCIENCES



**PRESENTING THE IMPACT OF PHYSICAL AND CHEMICAL
RESEARCH ON CARRYING OUT OF CONSERVATION WORKS
USING EXAMPLES OF SELECTED SCULPTURES
BY ROMAN TARKOWSKI**

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A few words about the author:

I am a student of the fifth year at the Academy of Fine Arts and I am doing my master's thesis in the area of conservation and restoration of stone sculptures. I am dealing with issues connected with reconstruction of patinated reinforced concrete.

Abstract:

Physical and chemical experiments are one of the very first steps undertaken during conservation procedure. Outcomes of these studies have significant influence on further actions and decision made in the process of preservation and maintenance of the work. It might seem that some works of art are very similar and because of that, that we could use and apply a previously tested scheme. However, we should be extremely cautious about such actions as not all of the works are built in an obvious and predictable way based on the technology that we already know from historical sources. The sensation in terms of technical and technological construction are sculptures by Roman Tarkowski. They have been created in an experimental way and in this case, research does not show a clear conservation solution as no one in history has investigated the issue of patina sculptures from reinforced concrete before. The work presents outcomes of conducted experiments and ideas for dealing with surprising and unusual difficulties encountered along the way.

Keywords:

reinforced concrete, sculptures, patina, conservation



CHANGES IN THE PERCEPTION OF UNIVERSITY MISSIONS

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PhD student at the Faculty of Economics and International Relations at the Cracow University of Economics. Scientific interests: university social responsibility, sustainable development and human resources management.

Abstract:

Understanding the mission of the university requires looking at the university's historical concepts. We distinguish among them the medieval, liberal and contemporary university. Along with the establishment of the university, its first mission was also formed, focusing on searching for the truth and transferring knowledge. The enlightenment currents brought about the emergence of new university concepts. Other types of universities are trying to cope with the changes taking place in the socio-economic environment, adding further components to two traditionally formed missions. An example of such considerations is the concept of an entrepreneurial university, liberal-entrepreneurial, subordinate knowledge, as well as socially responsible.

The medieval university was an innovation on a global scale that has impacted the entire world to this day. In spite of many historical events, the University has survived and will continue through its universal mission. In addition, the university stores and develops its own tradition and idea, despite the evolutionary changes. Universities to some extent adapt to external expectations, but the basic university assumptions remain unchanged and constitute a value in itself that has been cultivated for centuries. The purpose of this presentation is to show the way of the mission's evolution and possible directions of its future change. Potential threats resulting from university stagnation will also be presented.

Keywords:

mission, university, tasks



2018 POLISH LOCAL ELECTIONS – ANALYSIS OF SELECTED WEEKLY OPINION MAGAZINES

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A few words about the author:

Marcin Sobczyk - PhD candidate of the Jagiellonian University.

Abstract:

The aim of the presentation is to take a closer look at the results of the author's own research, regarding the 2018 Polish local elections, which took place on October 21st, 2018 and November 4th, 2018. The analysis includes selected weekly magazines on nationwide reviews. The research was carried out on issues that had been published from September 24th, 2018 to November 18th, 2018.

Keywords:

Polish local elections, content analysis, press analysis



LEMKO CULTURE AS AN ELEMENT OF THE REGION'S PROMOTION

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We are students of tourism and recreation on University of Rzeszów. Moreover, we are members of the student scientific club of travelers.

Abstract:

For over twenty years, Lemko culture has been at the center of interest. We learn about the culture of an interesting ethnographic group not only from written narratives, but also from verbal narratives. The basic source of information at work was a query of the subject literature and available archival sources, as well as verbal relations.

The aim of this work is to present the Lemko culture as one of the elements of the region's promotion including the Lower Beskids and Beskid Sądecki. The main problem was the statement: How does the Lemko culture affect the contemporary promotion of the region? The aim was to get answers to the following research questions: Are there any monuments that testify to the existence of this culture? Are the elements of the material culture of the group used in everyday life? The work presents the material and immaterial culture of the Lemkos, as well as monuments incorporated into the rural landscape of selected areas on which the Lemkos settled.

Keywords:

culture, Lemkos, promotion of the region, Lemko culture



CONTEMPORARY (AND FUTURE) CONDITION OF WORK OF IT SPECIALISTS IN THE CONTEXT OF THE TECHNOLOGICAL DIGITALIZATION

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Abstract:

Main goal of the presentation will be to highlight the debate on the social conditions of work of the IT specialists in the IT sector of economy. The relation binding the technological development and the social position of IT specialists, will be the crucial argument. Dynamically driven development of the digitalization of technology defined as process of hardware as well as software improvement in various sectors of economy for the sake of enhancement of performance and output of the companies, will lead (in the near future) to the systematic implementation of the Robotic Process Automation in the IT sector, thus implying increase in the technological unemployment rate in economy on general. Moreover, the amount of salary of IT Specialists decrease simultaneously as the financial profits and performance of services of the companies grows. One of the key factors of faster development of the digitalization is the Internet of Things. Artificial Intelligence will soon perform more effectively and economically than humans in the same occupations, thus AI will overtake those occupations. On the other hand, there are pros for implementing the processes of technological development in the economy, but taking into account the interest of IT specialists is the prerequisite. Nonetheless, the digital revolution in a short term will lead to a substantial layoff in the IT sector.

Keywords:

digitalization, economy, technology, labour, work



YOUTH LIMITATIONS IN SCIENTIFIC DEVELOPMENT

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Abstract:

The fact is that the management structure of the university does not always coincide with the hierarchy of scholars arranged according to competences. Those who exercise formal authority often lose their awareness of their own scientific development because they focus all their energy on protecting their own privileges and positions. Piotr Nowak warns that the low mobility of employees and the weak inflow of fresh blood to the university body will cause its dying out. Already, we are dealing with the phenomenon of an „inverted triangle”, where the entrance to the system for a young assistant leads through the top of this triangle, and at the opposite end there is a large group of academic staff with a long history. A young assistant finding employment at a university often works her whole life until retirement. Often, dependent employees („expired doctors”) block jobs for young people for whom there is no work. There are also voices of young people who do not want to work at the university, because rigid mechanisms and blockages of the university world are unacceptable to them.

The purpose of the proposed speech is to attempt to bring the difficult situation of young scientists closer to us, who with difficulty and uncertainty are moving in an intricate academic world and an attempt to point to the factors slowing their development, as well as a proposal to deal constructively with selected problems of the contemporary academy.

Keywords:

academic rigidity, substitutability, young employees, university



SCIENCE (LAW) - DRIVER OF ECONOMIC GROWTH

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A few words about the author:

Young scientist, lawyer, PhD student, developer and businessman.

Abstract:

Author believes that science especially law is driver of economic growth. Science and new technologies are very important for development industry. Science (inter alia law) gives possibility to create new ideas and also new rights for entrepreneurs. Entrepreneurs' rights protect not only their ideas. They protect their interests. Sometimes science, new technology, safety regulations even save human life. All of this has impact in economy. Good example could be building houses where every week somebody is injured, even deadly. This results in the need to pay compensation. Only science and new technology can change this for better.

Keywords:

science, law, economy, development



LINKING: COPYRIGHTS VS. HUMAN RIGHTS. ANALYSIS OF THE CJEU AND THE ECTHR CASE LAW

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A few words about the author:

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Abstract:

On the one hand, copyright to protect the legitimate interests of authors on the Internet, on the other, freedom of expression provided for in many acts of international and domestic law.

The case law of the Court of Justice of the European Union centered around the correct interpretation of the concept of "communication to the public" used in Article 3 (1) of Directive 2001/29 (Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society (OJ L 167, 22.6.2001, p. 10–19)) from the perspective of the rightholder. This refers to the judgments of: Svensson (C- 466/12; EU:C:2014:76), GS Media (C- 160/15; EU:C:2016:644), Filmspeler (C- 527/15; EU:C:2017:300), The Pirate Bay (C- 610/15; EU:C:2017:456), Renckhoff (C- 161/17; EU:C:2018:634).

However, on 4 December 2018 a judgment was issued by the European Court of Human Rights in case of *MAGYAR JETI ZRT v. HUNGARY* (no. 11257/16). In this judgment attention was paid to the essence of hyperlinks (new content on the Internet?) and freedom of expression in this field (Article 10 of the Convention for the Protection of Human Rights and Fundamental Freedoms).

The speech will concern the correlation between case law of the CJEU and the ECtHR and their implications for the creation of a European optimal linking model. During the presentation, an original functional interpretation will be proposed and put to the test.

Keywords:

linking, sharing, cyber law, european judicial dialogue, human rights



A REAL PROBLEM IN THE MODERN WORLD - THREATS IN CYBERSPACE IN THE LIGHT OF RESEARCH

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A few words about the author:

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Abstract:

We are now living in parallel in two different realities: real and virtual. They enable establishing interpersonal relations, developing interests, acquiring knowledge and expressing one's own views. The use of cyberspace resources nowadays is not only a need related to professional and school activity, but it becomes almost indispensable in almost all dimensions of human activity. Pointing to the positive dimensions of cyberspace, we must also point out that it not only strengthens cognitive and educational opportunities and enables rapid civilization development, but also determines (not always positive) model of human life and activity, and often becomes a source of many threats, including disadvantages for the process of socialization and upbringing. The aim of this work was to present cyber threats in the light of their own research and to put forward the thesis that people are extremely exposed to threats in cyberspace. People are more and more often starting to transfer their activity from the real world to cyberspace, which has changed the functioning of man at every stage of his life. The rapid development of interactive and mobile information technologies, as well as the impact of mass media and mobile media, led to the creation of a new area of social communication and the functioning of a man called cyberspace.

Keywords:

cyberspace, cyber security, security, cyberthreats, study



THE SELECTED EPISTEMIC AND COMPARISONS PARTICLES IN SPEECH AT THE AGE FROM 4 TO 6

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A few words about the author:

Polish philologist, speech therapist, PhD student at The Institute of Applied Polish Studies (IPS) at The University of Warsaw.

Abstract:

Particles are metatext operators that comment a one part of statement. They are difficult to learn because they require a certain metatext knowledge from the user. Are children 4-6 years old, which according to L. Kaczmarek's periodization are still at the stage of speech development, already understand such expressions? Do they use them in spontaneous speech? In order to answer those questions the test consisting of three parts (the interview, the spontaneous conversation with child and the questionnaire survey) was designed. The study included a group of children at age from 4 to 6. The results collected during the questionnaire part were confronted with language material collected during the spontaneous conversation with child. The main aim of this paper is to present the analysis of the collected language material and to indicate the level of ability to understand the selected epistemic and comparisons particles and use them by children.

Keywords:

particle, metatext, children speech development



NEW ECONOMY AND IT'S RELATION TO BUSINESS MANAGEMENT

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A few words about the author:

Graduate of Financial and Insurance Mathematics (I cycle). Student of Management (II cycle). His hobby are history and German language.

Abstract:

Progressive digitization increasingly influences science and contributes to many changes taking place in the economy as well. As a result, the idea of the New Economy was introduced. The initial aim of this concept was to revolutionize the global market and break with principles established by the existing traditional economics. During a speech, there will be presented determinants of the New Economy. Next, the modern economical concept will be compared with the traditional one. A description of digital forms of business activity will take place at the end of the presentation.

Keywords:

New Economy, digitization, management, economics



THEORY OF TEACHING LANGUAGES FOR SPECIAL PURPOSES

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A few words about the author:

PhD Student at the University of Lodz, Faculty of Philology.

Abstract:

The aim of this presentation is to show the main idea and the fundamental assumptions of my dissertation. The presentation includes the theory of teaching languages for special purposes at the academic level and planned activities during preparation time.

Keywords:

business German/ German for Specific Purposes/ theory of teaching



JOHN BURIDAN - QUESTIONS ABOUT QUALITATIVE CHANGE

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A few words about the author:

A student of philosophy at the University of Lodz. She is particularly interested in the philosophy of nature. She enjoys reading books, especially those recommended by friends, so that she can talk about their content with them.

Abstract:

The fourteenth century is the time of individualists among whom John Buridan - the French logician and philosopher of nature was one of the best known. Today we remember him because of his famous tale of donkey, which, however, was never found in his works. The main purpose of my speech is to focus on Buridan's solutions, one of the most frequently discussed fourteenth century problems in the philosophy of nature, namely qualitative changes. The problem has its roots, like many others, in Aristotelian natural philosophy. Buridan discusses this issue in his commentary on the Book IV of the Physics of Aristotle, which recently appeared in 2015 in the critical edition from Latin manuscripts. In his second question about the problem of qualitative changes, Buridan asks whether only two factors participate in the qualitative change: active and passive power or whether there is the need for something else that flows, and then asks whether the part that has been already gained remains with the next part that will be gained. This article is a commentary on Buridan's solutions regarding the problem of change. This is part of my BA thesis.

Keywords:

John Buridan, motion, forma fluens, fluxus formae, qualitative change



CHARACTERISTICS OF THE PROFESSION OF A SWORN TRANSLATOR IN POLAND

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A few words about the author:

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Abstract:

The paper presents the specifics of the profession of a sworn translator in Poland. The issues of the examination for a sworn translator are also discussed. In addition, the pragmatic aspects of producing a certified translation are presented.

Keywords:

sworn translator, certified translation



RELATIONSHIP BETWEEN POETICS AND CULTURAL PRAGMATICS ON THE EXAMPLE OF JOANNA BATOR'S WORKS

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A few words about the author:

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Abstract:

The concept of poetics of culture has been widely commented on. In this perspective literary works are seen as intertextual creations grown out of the cultural context. Critics noticed also that vice versa, literature became actively involved in the creation of history. This mutual relationship has been mainly discussed in the light of the theory of culture and literature; less often in the framework of pragmatics. However, cultural practices make an important part of Stephen Greenblatt's reflections. Therefore, one of the aims of my work will be to define what cultural pragmatics is, by focusing more on the techniques of text construction used by creator, whom New Historicists treated rather as a natural data carrier. Mark Turner, co-author of the theory of conceptual integration, has observed that every human being thinks in a literary language – often unconsciously. Turner points out, however, that intuitive thinking can turn into conscious action. The author is then not only a carrier, but also an active filter of the transferred content. Today, the concept of conceptual integration is used not only in analysis, but also in creation of cultural texts. Therefore, I will also examine the relationship between poetics and cultural pragmatics and the theory of conceptual integration on the example of Joanna Bator's works. This author uses New Historicism as the main method of critical interpretation and has a workshop-based and conscious approach to the creative process.

Keywords:

cultural practices, cultural poetics and practises in the works of Polish writers, conceptual integration as a cultural practice

NATURAL SCIENCES



THE BIODEGRADATION PROCESS OF NATURAL AND STYRENE-BUTADIENE RUBBERS WITH THE HELP OF LACTOBACILLUS PLANTARUM

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A few words about the author:

I'm looking for a new methods of decomposing wastes. I'm interested in new technologies and I'm keen on solving scientific problems.

Abstract:

One of the global environmental problems is the storage and utilization of waste from the automotive industry - used cars that contain rubber elements – end-of-life tires. According to GUS data from 2017 in Poland, about 3.5 million tones of used car tires are accumulated on special landfills, and their number is constantly growing.

The storage of rubber waste requires large areas and their spontaneous distribution lasts several dozen years. The basic process of utilization of rubber waste is thermal method, which requires an installation of expensive equipment.

The use of biological methods to decompose toxic compounds is the most environmentally friendly, although it takes a long time.

Due to the current problem concerning the retention and increase of the amount of rubber waste, in my research work, I focused on developing an effective method of utilization of natural rubber and butadiene-styrene rubbers, which are the basic element of rubber constructions.

The aim of my PhD thesis is to develop an effective process of degradation of various types of rubber and rubber waste using a *Lactobacillus plantarum* bacterial strain, along with determining the kinetics of the process.

After the degradation process of selected rubber waste on a laboratory scale, I conclude that bacterial strain, *Lactobacillus plantarum* is able to obtain the elements that are needed for them from rubber materials and thus it is able to partially degrade them.

Keywords:

natural rubbers, styrene-butadiene rubbers, bacterial cellulose, degradation process, *Lactobacillus plantarum*



ANTAGONISTIC ACTIVITY OF LACTIC ACID BACTERIA

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A few words about the author:

Lidia Piekarska is a PhD student at Institute of Fermentation Technology and Microbiology, Lodz University of Technology. Her scientific interest include issues related to lactic acid bacteria and their action towards pathogenic bacteria.

Abstract:

Lactic acid bacteria (LAB) are microorganisms commonly found in the environment. The ability to synthesize biologically active compounds caused their use in many branches of industry.

Lactic acid bacteria are characterized by the ability to synthesize many biologically active compounds. Among them are organic acids: lactic, acetic and propionic acids; diacetyl; carbon monoxide; hydrogen peroxide and bacteriocins. In addition, lactic acid bacteria are able to synthesize specific compounds such as reuterin and reutericycline.

LAB metabolites influence microorganisms present in the environment in various ways. Their indirect or direct influence may, among others, inhibit the multiplication of microflora considered pathogenic and contaminating food.

The effect of LAB metabolites on pathogenic microflora is primarily the permabilization of cell membranes of pathogenic bacteria and the condensation of DNA molecules. The increase in cell membrane permeability usually leads to the leakage of cellular components such as proteins and ATP, and the loss of many cytoplasmic ions. In turn, the change in the structure of genetic material induces serious metabolic changes in bacterial cells. Incorrect replication process favors the occurrence of disorders in the synthesis of intracellular proteins.

Keywords:

lactic acid bacteria, antimicrobial properties, Lactobacillus



ANTIMICROBIAL ACTIVITY OF PULLULAN FILMS WITH PROPOLIS

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A few words about the author:

PhD student at the Department of Biotechnology, Microbiology and Food Evaluation at the Faculty of Food Sciences at SGGW. She attempted to produce edible films and edible coatings with antimicrobial activity.

Abstract:

Propolis is a resinous substance with variable color (green, red, yellow, and brown) that is collected and processed by western honey bees from leaves, flower buds, stems, and cracks in the bark of numerous tree species, including poplar, alder, birch, eucalyptus, acacia, and clusia. The health-promoting properties of propolis stem from its chemical composition, which determines its versatile pharmacological effects – including antimicrobial and antiviral properties.

The aim of the study was to investigate the antimicrobial effect of pullulan films with 3, 5 and 10% concentration of ethanol extract of propolis against bacteria (*Staphylococcus aureus* ATCC 25923, *Escherichia coli* ATCC 25922) and fungi (*Candida krusei* ATCC 14243, *Aspergillus niger* ATCC 9142, *Penicillium expansum* ATCC 7861). The studied edible films showed antimicrobial activity both against bacteria and fungi.

Keywords:

propolis, pullulan, edible film



ANTIMICROBIAL ACTIVITY OF PULLULAN FILMS WITH THE ADDITION OF POTASSIUM SORBATE

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A few words about the author:

PhD student at the Department of Biotechnology, Microbiology and Food Evaluation at the Faculty of Food Sciences at SGGW. She attempted to produce edible films and edible coatings with antimicrobial activity.

Abstract:

Consumers' growing interest in convenience and functional food has led producers to seek innovative solutions in technological processes and food packaging methods. Producers want to produce microbiologically safe and slowly perishable food. Such methods include the coating of raw materials and food products with edible coatings based on pullulan with the addition of potassium sorbate.

The aim of this study was to research the antimicrobial effect of pullulan films containing potassium sorbate in concentrations of 1, 3, 5 and 10%. The inhibitory effects of films edible against test microorganisms (*Staphylococcus aureus*, *Escherichia coli*, *Fusarium solani*, *Botrytis cinerea*, *Penicillium chrysogenum* and *Aspergillus niger*) were determined by the disk-diffusion method.

The presented studies confirm the antimicrobial activity of pullulan films potassium sorbate. Molds are characterized by the highest growth inhibition. Therefore, the obtained results are very promising, indicate that pullulan films with added potassium sorbate may guarantee a higher microbiological safety of food and prevent the development of some strains of microorganisms.

Keywords:

pullulan, potassium sorbate, edible film



APPLICATION OF THERMOGRAPHIC METHOD IN MODEL RESEARCH ON MICROBIOLOGICAL CONTAMINATION

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Abstract:

The diagnostic methods in microbiology used in the field of testing the degree of pollution and identifying microorganisms are costly, multistage and time-consuming. There is a need to develop new methods to detect harmful microflora. During the experiment, measurements from a thermovision camera were used to monitor the presence of microorganisms. In the future, this will enable the development of a faster method for testing the microbiological quality of food. The research involved the use of a thermovision camera to record the growth of yeast *Saccharomyces cerevisiae* and mold *Aspergillus niger* and *Penicillium roqueforti* E91 in model conditions. Upon examination, the different colonies of microorganisms exhibited temperatures that varied from that of the substrate. This observation may prove to be crucial in the development of diagnostic methods aimed at detecting microbial food contamination.

Keywords:

thermography, detection, microbiological quality



HERBAL EXTRACTS IN NOSEMOSIS TREATMENT IN HONEYBEE (APIS MELLIFERA L.)

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A few words about the authors:

Ewelina Berbeć - biology student. Interested in bees biology and nosemosis research.

Dr inż. Paweł Migdał - researcher on environmental risks influence on bee colonies condition. Beekeeper, keeps his own apiary.

Abstract:

Nosemosis is a microsporidian honeybee (*Apis mellifera* L.) disease, highly common nowadays. For the reason of lack of any both effective and safe drug in the treatment of this disease, it is still searched. Herbal extracts which include natural compounds and have not a negative influence on human health could potentially solve this problem. In recent years some plant extracts in nosemosis treatment was studied, and several of them had a positive effect on bees and negative on nosemosis. It obligated authors to gather knowledge of the influence of herbal extracts on bees, especially *Nosema* spp. spore load per bee after inoculation and bees mortality, which are main factors showing if tested substance qualify to be used in *Nosema* disease treatment.

Keywords:

nosemosis, honeybee, *Apis mellifera*, herbal extracts



THE ENDOSYMBIOTIC THEORY AND ORIGIN OF CELLULAR ORGANELLES

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A few words about the author:

I am a student at the University of Silesia at the Faculty of Biology and Environmental Protection. I am interested in biotechnology of microorganisms and I am studying interactions between them in the Department of Microbiology.

Abstract:

The endosymbiotic theory (Symbiogenesis) was introduced by the Russian botanist Konstantin Mieriezkowski in 1905. In 1927 Ivan Wallin enriched the theory by the idea on the endosymbiotic origin of mitochondria. Initially, the Endosymbiotic Theory was ignored and rejected. It has been accepted by the scientific community from 1967 when Lynn Margulis refreshed it, developed and popularized.

Now it is widely accepted that some organelles (mitochondria and chloroplasts) arose by endosymbionts of prokaryotic organisms. The origins of the nucleus and other organelles are still unknown. However, there are a few theories about their origins (e. g. autogenous origins or endosymbiosis), the available data do not give the straight answer to that question. Could endosymbiosis play a major role in the formation of these organelles or not? It is a question worth considering.

Keywords:

Eukaryogenesis, symbiogenesis, Endosymbiotic Theory, organelles



TOURISM AND ITS BENEFITS ON THE EXAMPLE OF SELECTED SPA HABITATS OF THE PODKARPACKIE REGION

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Jesteśmy studentami turystyki i rekreacji na wydziale wychowania fizycznego na Uniwersytecie Rzeszowskim oraz należymy do Studenckiego Koła Naukowego Podróżników.

Abstract:

Villages with healing properties are in line with the tendency of changes taking place in society. When discussing the problems of health resorts, it is worth noting that the potential of these places has not been fully used up to now. Spas can be places that go beyond the classic, medical orientation. Modern realities allow the use of such centers in the form of a definitely commercial center: leisure, recreational and tourist centers.

The subject of this study is the present state and development opportunities of the Podkarpackie health resorts and the spa tourism taking place in their areas. The aim of the work is to analyze spas in Iwonicz Zdrój and Rymanów Zdrój. The tool used was a questionnaire independently prepared by the authors of this work. The survey technique used in the work was a questionnaire. The questionnaire was completely anonymous. 100 respondents took part in the study.

On the basis of the conducted research, it can be stated that tourist traffic in the studied health resorts is generated at a high level. The time of stay of patients in the spas studied is approximate and ranges from 15-30 days. Spa tourism is more popular among people between 51-60, because these people are the most in the spa. The condition of health resorts is conducive to the development of spa tourism.

Keywords:

Podkarpacie, health resorts, spa tourism



ANALYSIS OF MOLECULAR MARKERS OF WAX INHIBITOR IN RYE (*SECALE CEREALE* L.)

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A few words about the author:

2nd year student of Biotechnology who loves to develop a knowledge about world from the biological side. Molecular biology and genetics are my main interests because of growing significancy in the science world.

Abstract:

The leaf and stem surfaces of many plants are covered with cuticular wax, which confers a glaucous phenotype. Cuticular wax consists mainly of saturated very long-chain fatty acids (VLCFAs), alkanes, primary and secondary alcohols, aldehydes, ketones, esters and sterols (Kunst and Samuels 2003). Wax coating protects plants against ultraviolet radiation, reduces water retention on the plant surface and plays an important role in plant defense against pathogens. The genetic background of wax production in rye is poorly understood. One gene controlling wax formation on leaves, stems and ears (*wal*), which mutant allele determined waxless plant was mapped on chromosome 7R.

The aim of this work was the analysis of molecular markers joined with a wax inhibitor. With the F2 mapping population derived from the wax line S32N and the waxless line Rx110 (BSR population), the gene for the formation of the wax cover on the chromosome 7R was located. Based on literature data, molecular markers related to the wax inhibitor gene in wheat were tested. The obtained amplicons in parental lines were sequenced. The sequences were compared to scaffolds published by a team of German scientists. Scaffolds selected in this way were used to design primers and identify polymorphisms correlating with a gene that disturbs wax production within the BSR population.

The research was financed from the NCN project no. UMO-2015/17/B / NZ9 /01694.

Keywords:

rye, wax inhibitor, molecular markers, plant genetics



THE FUNCTIONING OF ROOT NODULES IN YELLOW LUPINE DEPENDS ON DROUGHT STRESS

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A few words about the authors:

The authors are involved as researchers in a research project exploring the physiological and genetic control of generative organ development in leguminous plants, which is financed by the Ministry of Agricultural and Rural Development.

Abstract:

Nowadays, environment protection is becoming a priority. Its importance is reflected by modern agriculture, which is seeking to obtain as much as possible product of high quality with the least possible influence on environmental conditions. To meet these requirements, it is necessary to increase the area of species critical to maintaining global food and supply, e.g. legumes, like yellow lupine. This species is characterized by high protein content in seeds and ability to symbiosis with *Rhizobium* bacteria, which increase soil fertility and reduce the necessity of using chemical fertilizers. However, the reason, why it is not used on a large scale is relatively high sensitivity to drought stress. This factor causes disorders in the development and functioning of root nodules, which significantly changes their structure and leads to tissues and whole symbiosomes degradation. It is accompanied by changes in endogenous stress phytohormones, mainly ethylene and abscisic acid. Characterization of molecular and hormonal markers that contribute to the response on soil drought stress will improve the state of knowledge on the nodules functioning and will help to select lupine varieties with higher resistance to drought stress.

Keywords:

drought stress, nodules, yellow lupine



THE EFFECT OF THE EPIP PEPTIDE ON THE FLOWER SEPARATION PROCESSES

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A few words about the authors:

The authors are involved as researchers in a research project exploring the physiological and genetic control of generative organ development in leguminous plants, which is financed by the Ministry of Agricultural and Rural Development

Abstract:

Yellow lupine belonging to the Fabaceae L. is a valuable protein source. It is used as raw material for feed production for monogastric animals. One of the main disadvantages of lupines is early abscission of generative organs and as a consequence of that reduction of yielding and generation of serious economic losses. Separation of flowers is preceded by activation of the abscission zone (AZ). In *Lupinus luteus* this process is connected with an accumulation of mRNA of LIIDL gene. Interestingly, the application of a synthetic EPIP peptide - obtained on the basis of the expected amino-acid sequence of LIIDL - increases the number of abscised flowers. What is more, exogenous EPIP results in significant alterations of AZ histology. The results of microscopic examination show that the application of EPIP led to many cell divisions and degradation changes that activate AZ. Reorganizations observed at the cellular level are correlated with an accumulation of abscisic acid (ABA), and 1-aminocyclopropane-1-carboxylic acid (ACC) – ethylene (ET) precursor. Both are strong, hormonal stimulators of flower abscission in examined species.

Keywords:

EPIP, abscission zone, yellow lupine, flower separation



CELLULAR AND MOLECULAR CHANGES OCCURRING IN THE FLOWER ABSCISSION ZONE IN YELLOW LUPINE UNDER DROUGHT

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A few words about the authors:

The authors are involved as researchers in a research project exploring the physiological and genetic control of generative organ development in leguminous plants, which is financed by the Ministry of Agricultural and Rural Development.

Abstract:

Yellow lupine has a large number of economic, proecological and agronomical advantages, which make it interesting among farmers. However, an undoubted disadvantage of this species is excessive abscission of flowers caused by soil drought stress. The action of stressor leads to activation of cell layers called abscission zone (AZ). This structure is located at the base of flower pedicels. Intensive degradation processes accompanied by a high rate of cell divisions, condensed aggregates presence, and middle lamellae dissolution are the changes that are a consequence of AZ activation. After that, the integrity of tissue is disrupted and the flower is aborted. We revealed that all these changes are correlated with increased activity of catalase and changed enzyme localization. Moreover, drought stress accelerated the transcriptional activity of INFLORESCENCE DEFICIENT IN ABSCISSION-like gene (LIIDL), RECEPTOR-LIKE PROTEIN KINASE HSL gene (LIHSL) and MITOGEN-ACTIVATED PROTEIN KINASE6 gene (LIMPK6) the elements of a pathway that activates flower abscission zone. The acquired knowledge will allow to counteracting the negative effects of drought stress and may contribute to the legumes yielding improvement.

Keywords:

yellow lupine, abscission zone, drought stress



THE MIGRATION OF POTATO VIRUS Y (PVY) THROUGH THE FLOEM OF POTATO PLANTS

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A few words about the author:

A first-year student of second-cycle studies in biotechnology. My research work is focused on arbuscular mycorrhizal fungi and their potential to transport plant viruses.

Abstract:

Potato virus Y (PVY) is one of the most economically damaging virus of potato that substantially lower the quantity and quality of the yield. The main track of spreading this pathogen are aphids that transmitted it in non-persistent manner on their stylets. When the plant gets infected, the virus propagate and then goes along with the phloem to the tubers. In the case of young plants, the rate of movement of the virus is much faster than in old plants, which is related to the reduction of the transport potential of the virus from cell to cell.

Several factors such as plant age, virus strain or plant resistance affect the transport of the virus inside the plant. The research demonstrate that the virus, after transporting from leaves to the mother tuber, can be transferred by vascular bundles to new shoots produced by a mother tuber.

Keywords:

PVY, potato, plant viruses



MYCOVIRUSES - AN EFFECTIVE WEAPON IN THE FIGHT AGAINST FUNGAL PLANT AND HUMAN DISEASES

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A few words about the author:

A student of the first year of second-cycle studies in biotechnology. The main subject of my research are arbuscular mycorrhizal fungi and their impact on the transport of plant viruses.

Abstract:

Mykoviruses are viruses that infect fungi. Their occurrence in the world of fungi that are pathogens is a very common phenomenon. The spread of viruses inside fungi comes through cell divisions, sporogenesis or anastomosis. Many viruses have a positive effect on their host by increasing its virulence or by producing killer toxins in some yeast strains. However, most viruses cause decrease of growth, sporulation and virulence of fungi. Having knowledge about pathogenic fungi and their natural enemies, we can use them in the fight against widespread plant and human fungal infections.

Keywords:

mycoviruses, fungi, viruses

MEDICAL SCIENCES



PREVENTION OF SPINAL PAIN

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Piotr Jaworski - fizjoterapeuta i doktorant Wydziału Lekarskiego i Nauk o Zdrowiu Uniwersytetu Jana Kochanowskiego w Kielcach.

Abstract:

Nowadays around 80% of the population suffers from the pain of the spine. More and more of it spends a lot of time in a sitting position (working, watching TV, playing on the computer) forgetting about spine prevention and putting it at risk of overloading every day. Physical activity is neglected, which may result in an increase in BMI.

Keywords:

pain, spine, physiotherapy



PREVENTION OF POSTURE DEFECTS

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Abstract:

Early diagnosis of postural defects is a very important element of fast and effective physiotherapy. The paper presents the method of vertical examination of the spine in the sagittal and frontal planes. The proposed diagnostic method can be successfully used by parents to monitor the proper development of their child's posture and the possible implementation of early physiotherapy.

Keywords:

physiotherapy, posture defects, prevention



ADJUNCTIVE THERAPY IN MALIGNANT SKIN CANCER - A NEW FACE OF ASCORBIC ACID

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A few words about the author:

I am a final year student of a master's degree in Biotechnology. He is interested in the modification of conventional cancer treatment using natural substances and the subject of antioxidation in carcinogenesis.

Abstract:

Background: Melanoma is a skin cancer derived from melanocytes. One of the most frequently used treatment of melanoma after surgical intervention is chemotherapy. In spite of its high effectiveness, it is a method that needs to be modified in order to increase the cytotoxicity towards cancer cells, and to lower for the normal cells.

Aim of study: The studies carried out were aimed at comparing a chemotherapy drug conventionally used with ascorbic acid-assisted therapy.

Materials and Methods: Two cell lines were the material in the conducted studies. The first one called A-375 was isolated from the primary tumor, while the second cell line, RPMI-7951, was isolated from local lymph nodes. The conducted research was based on the cytotoxicity assessment of the chemotherapeutic agent in monotherapy and in the therapy with vitamin C (MTT test, clonogenicity test). The cell cycle of the treated cells of both lines was also examined, as well as the type of cell death occurring by means of cytometric analysis. Fluorescent staining allowed for the expression of epithelial-mesenchymal transition markers (EMT).

Results: The use of vitamin C in sufficiently high concentrations allows to stop the process of cancer. In supportive therapy, vitamin C may affect the increased induction of programmed cell death in relation to conventional therapy, which may be important in the modification of cancer treatment.

Keywords:

cancer, antioxidant, ascorbic acid



NON-CANONICAL FUNCTIONS OF CYCLINS

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A few words about the author:

I graduated with a degree in biotechnology. Currently Ph.D. student at the Department of Histology and Embryology at Collegium Medicum in Bydgoszcz. I am interested in the molecular basis of cancer.

Abstract:

Background: Cell cycle control is based on two protein families: cyclins and cyclin-dependent kinases. Cyclins are a family of proteins that control the progression of cells in the cell cycle by activating cyclin-dependent kinases (Cdk). Although the canonical role of cyclins and CDKs as essential drivers of cell cycle entry and progression has been firmly established, research carried out over the past two decades provides increasing evidence for additional functions of these proteins insuch as the regulation of transcription, DNA damage repair, the control of cell death, differentiation, the immune response and metabolism.

Aim of the study: This work presents current knowledge on the potential use of cyclins in the cell processes.

Conclusion: The analysis of the literature data indicates the cyclins in addition to participating in the cell life cycle control, perform important functions in other cell life processes. Dysregulation of cyclins is commonly found in few pathological conditions including such as cancer diseases, neurodegeneration and cardiac disease, however, the relevance of non-canonical functions of cyclins in controlling processes other than cell proliferation — such as the control of transcription, cell death, differentiation and metabolism — remains to be fully explored.

Keywords:

cyclins, transcription, DNA damage repair, cell differentiation, migration



THE ENDOCRINE FUNCTION OF ADIPOSE TISSUE IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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A few words about the authors:

We share a common passion and desire to deepen our knowledge.

Abstract:

It is widely believed that the main cause of type 2 diabetes is obesity. Abnormal accumulation of fat, especially excessive visceral deposit and its disturbed endocrine function (release of adipocytokines) affects the development of metabolic diseases, and contributes to the reduction of tissue insulin sensitivity.

The aim of the study was to analyze selected endocrine markers of adipose tissue in patients with type 2 diabetes.

The study group consisted of 25 patients with type 2 diabetes treated with insulin or metformin. Inclusion criteria include compensated glycemia and no complications of diabetes. The control group consisted of 20 people with simple obesity with comparable parameters - age, BMI.

There was a statistically significant increase in the release of leptin, visfatin and adiponectin in type 2 diabetes. On the other hand, there were no significant differences in the function of adipose tissue in the release of kallistatin and irisin.

Disturbed endocrine function of adipose tissue in patients with type 2 diabetes may be conducive to the development of metabolic complications. Therefore, further research is needed on the influence of the pro-inflammatory adipocytokines (leptin and visfatin) and anti-inflammatory (adiponectin, kallistatin and irisin) on the disease.

Keywords:

adipokines, adipose tissue, type 2 diabetes mellitus, obesity



MELATONIN AND CARDIOVASCULAR RISK FACTORS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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I am a doctor in the middle of a specialization in cardiology. PhD student, Department of Biology and Biochemistry, Nicolaus Copernicus University in Toruń L. Rydygier Collegium Medicum in Bydgoszcz Poland.

Abstract:

Introduction: Diabetes mellitus (DM) is a group of metabolic diseases characterized by chronic hyperglycaemia resulting from abnormal secretion and/or insulin action. Cardiovascular disease is the main cause of death in diabetic patients.

Objective: The aim of the study was to estimate selected parameters related to cardiovascular risk in patients with DM2 and obesity without complications.

Methods: The study was conducted on 25 patients with DM2 and 20 patients (with comparable parameters) with obesity, which were the control group. Melatonin level, oxidized low-density lipoprotein (ox-LDL), interleukin 6 (IL-6) and resistin, which are predictors of cardiovascular disease, were measured in all patients.

Results: In obese patients, the level of melatonin in blood plasma was statistically lower than in DM2. In diabetic patients the concentration of IL-6 and resistin were statistically higher and the concentration of ox-LDL lower than in patients with simple obesity.

Conclusions: The results show that in patients with DM2, inflammation is more severe than in those with simple obesity. Lower level of melatonin and higher oxLDL in patients with untreated obesity indicates increased level of oxidative stress in this group of patients compared to patients with diabetes mellitus. Both DM2 and simple obesity are associated with specific cardiovascular risk factors.

Keywords:

cardiovascular diseases, type 2 diabetes mellitus, melatonin, obesity



DISTURBANCE OF GLYMPHATIC SYSTEM'S FUNCTIONING AS A RESULT OF THE WAY OF FEEDING

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A few words about the author:

I am a clinical dietitian and masters student of psycho-dietetics. I passionate about nutrition therapy of elderly people, especially in neurodegenerative diseases.

Abstract:

Specified nutritional habits and preferences could negatively affect glymphatic system, mainly highly processed food, delivered: refined sugars, salt, saturated fatty acids, poor in fiber and rich in caffeine products and also products containing substances with preservatives, stabilizing and emulsifying action or other – improving taste, look, smell and protecting food from putridity. Food like that, as well as frequent reduction diets, irregular eating meals, may induce perturbations of circadian secretion of cortisol.

Long-drawn described way of feeding causes an increase of cortisol concentration. It is unfavourable in reference to amount and quality of sleep and glymphatic system functioning. When sleep is unsettled, the glymphatic system also. Then comes to accumulation of metabolites and amyloid in the brain. Neuron's inflammation brings oxidative stress and DNA's damage, which leads to overproduction of reactive form of oxygen. Damaged glial cells gradually generate great amounts of inflammatory mediators, which entail „microglia aging”. Mentioned pathomechanism can be linked with cognitive impairment, leading to dementia or even Alzheimer's disease.

Further human clinical researches into connection of way of feeding and the glymphatic system (it's structure and functions) are needed. Presented approaches about pathophysiology and modulation of microglia has innovative character and, without a doubt, requires follow-up science's exploration.

Keywords:

microglia, nourishment, cortisol, sleep



IMMUNOLOGICAL INFERTILITY- WHAT'S THE BIG DEAL?

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A few words about the author:

We are fourth year students of the Medical Analytics at the Medical University of Silesia in Katowice. Our primary interests in research are focused on immunology, autoimmune diseases and laboratory diagnostics.

Abstract:

Infertility is defined as the inability of couples to achieve pregnancy, despite having regular unprotected sexual intercourse with partner with an average frequency of 3-4 times per week. Insufficient knowledge of factors, which have influence on infertility can lead to behaviors, which will increase a risk of occurrence this ailment.

This study was designed to investigate the problem of men's infertility influenced by the presence of antisperm antibodies (ASA). In this thesis authors elaborate on definition of ASA, location and mechanisms. In this academic work infertility mechanism of antisperm antibodies is presented – main function of antisperm antibodies is connected with dysfunction of spermatozoa and that is the reason of disruption the particular steps of fertilization. Authors decided to discuss reasons and effects of presence of antisperm antibodies – there are more important effects than only decreasing male fertility by inhibiting sperm functions. In addition, diagnosis and treatments for immune-mediated infertility caused by ASA is discussed.

Summarizing gathered informations about ASA, authors deduce that men's infertility can be caused by immunological factors. Likewise, men can be responsible for inability of having children. Fortunately, a presence of antisperm antibodies do not determine permanent infertility - appropriate diagnosis and treatment strategy of infertile males with ASA give a chance for fertilization.

Keywords:

infertility, antisperm antibodies, sperm, immunology



NEUROBLASTOMA - ENIGMATIC CANCER

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Abstract:

Neuroblastoma is one of the most common extracranial tumours occurring in children. It arises from neural crest that usually gives rise to adrenal glands and parts of sympathetic nervous system. Although some important genetic markers of poor prognosis are already known, the treatment still causes problems, especially in a high risk group. Precise insight into genetic factors and treatment options can give a sense of what this illness is and what are the new ways of fighting with 'molecular enigma', as neuroblastoma is called.

Keywords:

neuroblastoma, genetics, molecular factors



THE IMPORTANCE OF PNEUMOCOCCAL VACCINATION IN THE PEDIATRIC POPULATION

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I am a student of the 5th year of medicine at the Medical University of Lublin and an active member of the Student Scientific Group at the Department of Pulmonary Disease.

Abstract:

Pneumococcal infections are one of the main causes of morbidity and mortality among children in the world. *Streptococcus pneumoniae* causes among others: pneumonia and invasive pneumococcal disease (IPD)

Medical documentation of children aged 0-18 treated in the Clinic in Lublin during 2012-2019 was subjected to retrospective analysis. The study included patients that were diagnosed as having pneumonia or sepsis of *S. pneumoniae* etiology and whose status of pneumococcal vaccination was known. A comparative analysis of the infection's course was performed depending on the status of vaccination. As statistically significant, $p < 0.05$ was assumed

Of the 1668 patients hospitalized in the analyzed period, 97 patients were qualified for the study, including 44 vaccinated patients. The average age of the children was 5.35 ± 3.99 years and 56.7% were boys. The most numerous group was comprised of children < 5 years (67%). Pneumonia was diagnosed in 97.7% of vaccinated children and 98.1% of those unvaccinated and sepsis in 2.3% and 1.9% respectively. The average time of hospitalization was 7.8 ± 6.8 days (vaccinated) vs 7.11 ± 3.55 days (unvaccinated) ($p = 0.96$). There were no significant differences in the severity of the course of the infection ($p = 0.79$), as well as the differences in the number of registered complications (2 vs 2).

Data analysis didn't show statistically significant differences in the course of *S. pneumoniae* infections in the vaccinated and unvaccinated children.

Keywords:

children, pneumococcus, vaccinations



THE PULMONARY MASK OF MEDIASTINAL TUMORS IN CHILDREN

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I am a student of the 5th year of medicine at the Medical University of Lublin and an active member of the Student Scientific Group at the Department of Pulmonary Disease.

Abstract:

Mediastinal tumors are a heterogeneous group of diseases including: lymphomas, neuroblastomas and cysts. Malignant tumors developing rapidly, recognized at an advanced stage, are a serious problem in children. In this group of tumors, clinical symptoms appear late, are nonspecific and may suggest the beginning of pneumonia.

Based on a retrospective analysis of medical records, 6 cases of children aged 2-16, were referred to the Clinic due to ineffective treatment of pneumonia. At admission the children were in a quite good or medium condition with symptoms of dyspnoea. All patients had a cough, increased body temperature (3), and chest pain (1). In most cases, diminished vesicular sound, rhonchi and wheezing were found over the lungs.

Laboratory tests indicated that inflammatory parameters were elevated in half of the cases. All the patients had chest X-ray (mediastinal widening), chest CT which revealed a tumor mass in the posterior (3) or anterior (2) mediastinum. Additional diagnostic tests allowed to confirm HL, T-NHL, neuroblastoma, cyst and pseudotumour. Depending on the diagnosis - chemotherapy, chemo-radiotherapy or surgical procedures were implemented for treatment, thus stabilizing the general condition of the patient.

An important role in the differentiation of clinical symptoms of mediastinal tumors is played by medical imaging, mainly chest CTs. Special oncological alertness may allow to diagnose a neoplastic disease earlier and implement appropriate treatment.

Keywords:

mediastinal tumor, pneumonia, thorax, children



THE ROLE OF VITAMIN C IN THE HUMAN BODY

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MSc. Eng. Katarzyna Pieklarz – PhD student at the Lodz University of Technology at the Faculty of Process and Environmental Engineering. Her research interests focus on issues related to biomedical engineering and nanotechnology.

Abstract:

Vitamin C (ascorbic acid) is the most widespread vitamin with multidirectional effects on the human body. It was first isolated from pepper by the Hungarian biochemist Albert Szent-Görgyi in 1928, for which he was awarded the Nobel Prize. The daily minimum requirement for vitamin C is the highest of all vitamins. It is 1 mg/kg body weight in an adult, and 2 mg/kg body weight in infants and children. This demand increases in pregnant and lactating women (1.5 mg/kg body weight) and in various disease states. The wide action of vitamin C has made it the most popular drug. It is a water-soluble antioxidant that effectively combats free radicals. In addition, many publications prove that consumption of vegetables and fruits rich in vitamin C is inversely correlated with the risk of cancer. The role of ascorbic acid in the prevention of ischemic heart disease and ensuring the proper functioning of the immune system is also important.

Keywords:

Vitamin C, antioxidant, cancers, ischemic heart disease



MULTIDIRECTIONAL ACTION OF VITAMIN D ON THE HUMAN BODY

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Abstract:

Of the many types of vitamin D, the most important are vitamin D2 (ergocalciferol found in plants) and vitamin D3 (cholecalciferol). The concentration of vitamin D in the range of 20-60 ng/ml in children and 30-80 ng/ml in adults is optimal. However, over the last decade, numerous scientific sources point to a pandemic deficiency of this vitamin in society. This is mainly due to its abnormal metabolism in bone tissue, which results in progressive rickets in children and osteoporosis among the elderly. In addition, vitamin D is associated with the metabolic pathways of lipogenesis and adipogenesis. As is clear from the literature data, these mechanisms are not fully explained and therefore research in this field is a priority. Considering the growing problem of obesity, this issue is even more important.

Keywords:

Vitamin D, bone diseases, metabolic diseases



SHEAR-INDUCED DRUG DELIVERY SYSTEMS AS A POTENTIAL TREATMENT METHOD FOR ATHEROSCLEROSIS: REVIEW

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A few words about the author:

PhD student of chemical engineering. The author's research area includes biomaterial characterization for biomedical applications, complex fluid rheology and CFD simulations.

Abstract:

According to available statistical data, cardiovascular diseases account for half of premature deaths, with nearly every fifth of them caused by atherosclerosis and its consequences. The complex process of atherosclerosis generally consists in depositing cholesterol crystals in the arterial wall, which may cause stiffening of the blood walls, narrowing their cross-section or completely blocking the flow. Consequently, sudden narrowing of the blood vessel lumen will lead to an increase in shear stress. This phenomenon has been used to design a new group of intelligent drug systems induced by the presence of shear forces. In particular, the wall shear stress at critically stenosed arteries is at least an order of magnitude higher than in healthy situations. This can lead to the reversible deformation or disaggregation of drug carriers, which will be delivered precisely in the narrowing place. The aim of the work will be to discuss the mechanisms of the occurring phenomenon, both in terms of medical as well as mechanical. Moreover, the discussions about potential future applications and challenges in the shear-induced drug delivery systems will be given.

Keywords:

mechanoresponsive polymers, smart drug delivery systems, coronary diseases



EFFECTS OF VENLAFAXINE ON THE EXPRESSION LEVELS AND METHYLATION STATUS OF GPX4, NOS1 AND NOS2 GENES IN RATS EXPOSED TO A CHRONIC MILD STRESS MODEL OF DEPRESSION

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A few words about the author:

I am a PhD student at the Faculty of Biology and Environmental Protection at the University of Lodz. As part of my scientific work, I research the molecular basis of the development of a various civilizational disease, including depression.

Abstract:

Depression is the most common of all mental disorders. Despite intensive research, a pathogenesis of depression remain unclear. However, a growing number of recent human and animal findings point to a role of oxidative and nitrosative stress in the pathogenesis of the disease. Thus, our study was therefore design to evaluate effects of a chronic administration of venlafaxine, on the expression levels and methylation status of GPx4, NOS1 and NOS2 genes, which are known to be involved in the brain and peripheral mechanisms of chronic mild stress (CMS) model of depression. Our study was carried out on 30 male Wistar Han rats, which were subjected to the CMS procedure for two weeks and venlafaxine was administered to CMS rats for 5 weeks. We found that, the venlafaxine significantly further decreased the Gpx4 and NOS1 expression in nucleus basal ganglia and midbrain while CMS significantly further increased the expression of Gpx4 and NOS1 in these structures. Additionally, we observed that the CMS procedure significantly further increased the level of the methylation promoter two of Gpx4 in midbrain and nucleus basal ganglia. Moreover, in the hippocampus and cerebral cortex, the post-antidepressant group was characterized by an increased protein level of Gpx4, compared to the stressed animals. Concluding, our findings show that in the course of CMS we observed an intensification of oxidative and nitrosative imbalance while reducing the effectiveness of antioxidant defence.

Keywords:

depression, CMS, oxidative stress, venlafaxine therapy

TECHNICAL SCIENCES



MECHANICAL DESIGN OF AN ELECTRIC MOTORCYCLE'S REAR AXLE

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PhD students of Faculty of Mechanical Engineering at the Wrocław University of Science and Technology and members of scientific association that designs and builds electric motorcycles.

Abstract:

Electric vehicles are constantly growing in popularity, therefore there is need to design new parts and joints for building unique vehicles and adapting electric drives to solutions known from conventional vehicles.

Article presents the idea of joint of standard motorcycle wheel and unique swingarm designed to Light Electric Motorcycle Thunder. Rear wheel axle made by students from Wrocław University of Science and Technology proved its strength during difficult rides at competitions. Moreover, special chain tensioner, made for mentioned motorcycle was described in the paper. It connects rear wheel axle to the swingarm and allows to maintain the right chain tension.

Keywords:

motorcycle, chain, swingarm, axle, chain tensioner



AN ALGORITHM FOR DETECTING GAIT EVENTS BASED ON A VIDEO SEQUENCE ANALYSIS CONTAINING THE REGISTERED GAIT OF THE DOMESTIC CAT IN THE SAGITTAL PLANE

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Katarzyna Gospodarek, a Ph.D. student at the Department of Multimedia, Computers Modeling and Simulation at the Institute of Computer and Information Science. The main research interests include robot programming methods and using computer vision.

Abstract:

This study is an introduction to the subject of obtaining information on the gait of four-legged animals based on the analysis of video recordings. The paper discusses the scheme of the algorithm responsible for detecting in subsequent frames of video sequences of specific events during movement, such as the moment of foot contact with the ground or the moment of its lifting. In the proposed solution, kinematic measurements of gait are largely on the determination of displacement vectors for individual reference points of the limbs. Visual Studio 2015 C++ environment with implemented OpenCV library was used to build the proprietary application.

The research was carried out as part of BS/MN-1-112-303/2018.

Keywords:

image processing, gait analysis, cat's gait, detecting reference points



THE USE OF KINOVEA SOFTWARE TO ESTIMATE THE RELATIVE LENGTH OF BONES OF THE DOMESTIC CAT'S LIMBS

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Abstract:

In most cases, obtaining information on the dimensions of individual bones (e. g. those belonging to the limbs) of a specific animal species requires access to appropriate X-rays or prepared bones. In this paper, it was proposed to extend the process by using Kinovea software. This allowed obtaining information on the metric dimensions of individual bone segments of a domestic cat based on the analysis of digital images. Particular emphasis was placed on obtaining information about the proportions between selected bones within the limbs. All data can be obtained using non-invasive measurement techniques, which allows the use of research materials from public databases containing both images and video sequences. The research was carried out as part of BS/MN-1-112-303/2018.

Keywords:

image processing, kinovea, cat's limbs, measurement techniques



USING THE MOVIDIUS NEURAL COMPUTE STICK FOR IMAGE CLASSIFICATION

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Joanna Kulawik - MSc. computer science, currently a PhD student at the Czestochowa University of Technology. Academic work in the field of computer science, he conducts in the field of analysis and processing of digital images.

Abstract:

Image classification is usually performed by using an artificial intelligence. The learning and testing of neural networks requires the utilization of large amount of computing resources. Therefore, the development and usage of such networks usually require applying programming environments with sufficiently strong parameters. As a result, it forces necessity to work in stationary conditions.

In this study, a novel AI hardware accelerator called Intel Movidius Neural Compute Stick is used. This device provides the libraries that allow using of previously pre-learned artificial neural network. The utilization of Movidius allows you to conduct study in mobile conditions. The research was carried out using the proprietary research stand financed from funds obtained under grant no. BS/MN-1-112-302/2018.

Keywords:

Movidius Stick, image classification, neural networks, hardware accelerator



COMPONENTS OF OPERATION SYSTEM FOR THE TECHNICAL FACILITY

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PhD Student on Mechanical Engineering Faculty at the University of Science and Technology in Bydgoszcz. Specialization in terms of the electricity generation, diagnosing and operation of the ESP. Currently she works in IT company, as Product Manager.

Abstract:

The operation phase begins when the finished product, object or machine is handed over to a specific user. The period of service and use of the facility lasts until the liquidation. The operation is perceived as one of the key stages in the life cycle of the machine, due to the fact that during the course of the object operation process, the correctness of the machine completing the objectives is verified, also the degree of fulfillment the goals and needs of potential users is checked during this process. Every human action causing the launch and use of certain forces and means, manifesting in the creation of new facility, is called the process of operation. Maintaining a complex technical facility in continuous readiness and efficiency state, requires its appropriate operation. As a result of incorrect use of the machine by the user, damages can be appeared, which, moreover may generate high costs of repairing a technical facility even threaten the health and life of the potential recipient.

Keywords:

an operation stage, the use of technical machines, diagnostics of machines technical state, operation strategies



MAINTENANCE OF MACHINES IN THE USEFULNESS IN ENERGY SECTOR

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Abstract:

Maintenance of high level the electrostatic precipitator efficiency is important, because an electrostatic precipitator can be assigned to a group of critical machines, which the investment cost for their purchase is relatively high. The operation of critical machines significantly influences the achievement of an appropriate threshold of the economic result for an enterprise. Reliability of critical objects is enforced by maintaining the continuity of the production process. Diagnosis of the technical condition of critical machines should be carried out in order to maintain the full efficiency of the facility and not allowing frequent failures leading to the device being taken out of operation. It is important to use appropriate techniques and methods for continuous supervision and monitoring the technical condition of critical machines, to locate the initial phase of failure of subassemblies, assemblies or elements of the electrostatic precipitator (ESP). Diagnostic activities (including preventive activities) should aim at establishing and controlling the current condition of the device based on the key parameters of its work. The efficiency of the electrostatic precipitator depends mainly on the gas flow velocity through the collecting and discharge electrodes located in the object chamber. The efficiency of the electrostatic precipitator is extremely important due to the role of this critical machines in the exhaust purification process.

Keywords:

the electrostatic precipitator (ESP), an efficiency, critical machines, key parameters of operation ESP



PREPARATION OF BIOPOLYAMIDE COMPOSITES AND THEIR APPLICATION

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My name is Mieczysław Zaczek, I graduated from the Cracow University of Technology as a Master of Science in Chemical Technology specialization in Polymer Technology and a Master in Project Management at the University of Economics in Krakow. Currently I am a PhD student at the University of Economics at the Faculty of Commodity Science and Quality Management. I also work at Grupa Azoty S.A. as a Chemical Laboratory.

Abstract:

The article presents data on the properties of polyamides, including biopolyamides, as well as information from recent years on composites based (mainly) on biodegradable polymers, supported by information from the biopolymer market, conclusions from research related to biodegradation under natural conditions, alone, allowing for the formulation of certain conclusions, as well as forecasting the future in the use of composites in various areas of life and industry.

Keywords:

polyamides, biopolyamide composites, biocomposites, biodegradability



EVALUATION OF IMPLANT SURFACE POROSITY USING IT TOOLS

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Abstract:

The main objective of the study was to develop, using IT tools, a method for assessing open pore geometry of a biomaterial surface, which would enable to determine its porosity degree. Measurements with the LEXT OLS4000 confocal laser scanning microscope were made in order to obtain confocal microphotographs of several areas of a biomaterial surface. The research material was a coating of aluminium oxide, which is widely used in implants and drug carriers. Image analysis was carried out using the Mountains Surf software from Digital Surf and the SPIP software from Image Metrology. An image processing method was developed, which enabled to segment even interconnected pores. Then the parameters characterizing surface pores were determined and surface porosity was calculated.

Keywords:

surface porosity, pore geometry, image processing, SPIP, MountainsMap



DEVICES SUPPORTING GAIT REEDUCATION

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The authors are employees of the Department of Computerized Biomedical Systems. The subjects of research are related to the application of computer science, electronics, imaging, biomaterials analysis and software in the field of biomedical engineering.

Abstract:

Emerging reports in recent years concerning mainly neurological diseases and broadly understood diseases present their negative impact on patients' walk. The realisation of research in this direction brings a number of important advantages influencing the planning of the patient's convalescence process. It also turns out that the additional support obtained through the use of mechanical and semi-automated rehabilitation devices (including robots) is often a key role in the success of therapy and its duration. This article is about the availability of current technological solutions supporting the process of walking reeducation or restoring its regularity in case of pathology. There is a discussion on the appropriateness of using individual robotic solutions in the process of rehabilitation and the direction of development in this field.

Keywords:

gait, walking reeducation, rehabilitation, robotics in rehabilitation



APPLICATIONS OF HYDROGEL MATERIALS IN MEDICINE

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A few words about the author:

PhD student in material engineering. Research interests: hydrogel materials, mainly contact lenses.

Abstract:

Hydrogels are widely used in medicine. This is determined by their properties, such as the ease of keeping the material clean, biocompatibility, biodegradability, the ability to adapt the material to its function, sensitivity to factors such as temperature and pH.

The applicability in many separate fields of medicine makes hydrogels universal. The simplicity of synthesis, the possibility of obtaining both physical and chemical gels, the use of natural as well as synthetic substances allows to obtain materials with specific action and as cheap as possible and therefore available. It can therefore be concluded that these materials already play an important role in biomedical materials

Keywords:

hydrogels, contact lenses, biomaterials



POLYMER MATRICES AS CONTROLLED RELEASE DRUG SYSTEMS

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PhD student in material engineering.

Abstract:

The administration of ophthalmic drugs directly to the eyeball in the form of eye drops is a method used to treat diseases of the anterior segment of the eyeball. It is estimated that this method of dosing the drug is about 90%. Usually, however, only a small fraction of the dose administered to the patient (1-7%) is absorbed due to drug leakage along with the tear fluid.

The problem of eye diseases is a threat to the growing intensity conditioned by aging processes. Accordingly, there is a need to design a drug delivery system that effectively and for a long period provides the patient with a therapeutic dose of the substance. Attempts have been made to use contact lenses as controlled ophthalmic drug dispensing systems.

Keywords:

contact lenses, drugs, controlled dosing



COMPARATIVE STUDY ON TRIBOLOGICAL PROPERTIES OF A GREASE CONTAINING GRAPHENE OXIDE OR HEXAGONAL BORON NITRIDE

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A few words about the author:

PhD student of Military University of Technology, Faculty of Mechanical Engineering.

Abstract:

The purpose of this publication is to present the results of tests of the grease base with consistency class 2 according to the NLGI classification contained various concentrations of graphene oxide GO or hexagonal boron nitride h-BN. The first part of the paper presents basic information about graphene and its applications, especially in the field of tribology. The second part of the article presents the results of tests of tribological properties of samples contained 0.05%, 0.1%, 0.5%, 1% and 2% (w/w) of GO or h-BN. In addition, the tribological properties of the "Graphene paste", have also investigated. The measurements were carried out using the T-02 four-ball apparatus and the UNMT universal nanomicro tribotester. The results obtained have shown the beneficial effect of adding additives into the base grease in the form of GO or h-BN for its tribological properties. The "Graphene paste" turned out to be "just as effective" as a grease containing a significant concentration of GO.

Keywords:

tribology, grease, graphene oxide, hexagonal boron nitride



FUEL INFRASTRUCTURE IN POLAND

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A few words about the author:

I am a graduate and a PhD student at the Military University of Technology at the Faculty of Mechanical Engineering.

Abstract:

The liquid fuel infrastructure in Poland consists of many elements and objects that together form a network of interconnected cells as part of the operation of one liquid fuel supply chain. Currently, the liquid fuel infrastructure in Poland consists of refineries, fuel bases and terminals as well as fuel stations, both public and company ones. Transport is connection between all elements of infrastructure. The displacement of fuels from refineries to fuel bases takes place via long-distance pipelines and rail transport. Transport from petrol bases and terminals to petrol stations is performed using road tankers. Fuels intended for consumption in the country may come from own production, i.e. from refineries and from imports. Fuel imports in Poland are carried out by means of rail and sea transport. The aim of the article is to present what the liquid fuel infrastructure in Poland looks like and whether its condition is sufficient in relation to the needs of the country.

Keywords:

liquid fuels, fuel infrastructure, transport, fuel base



TRIBOLOGICAL PROPERTIES OF OIL CONTAINING GRAPHENE OXIDE OR HEXAGONAL BORON NITRIDE

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A few words about the author:

Employee faculty at Military University of Technology.

Abstract:

The aim of this publication is to present the results of studies on the SN-650 oil base with various concentrations of graphene oxide (GO), reduced graphene oxide (rGO) produced by the Institute of Electronic Materials Technology in Warsaw and hexagonal boron nitride (h-BN) produced according to technology developed at Military University of Technology. Basic information about graphene and the possibilities of its application, in particular in the field of tribology, are presented. The second part of the publication presents the results of tests of tribological properties of samples with the addition of 0.05%, 0.1%, 0.5%, 1% and 2% of graphene oxide, reduced graphene oxide or hexagonal boron nitride. The measurements were carried out using the UNMT universal nano/microtester tester. The results obtained have shown the beneficial effect of adding additives in the form of graphene oxide or hexagonal boron nitride to the oil tribological properties to the SN-650 oil base.

Keywords:

graphene, hexagonal boron nitride, tribology



INVESTIGATION OF CHANGES IN THE OXIDATION RESISTANCE OF ENGINE OIL DURING OPERATION

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A few words about the author:

PhD student and employee of the mechanical faculty at the Military University of Technology.

Abstract:

The oxidation resistance test can give knowledge about the remaining antioxidant additives, which small amount in the oil could lead to rapid changes in the oil parameters and could damage the engine. The article describes the entire oxidation reaction process and presents the results of oxidation resistance tests together with formulated conclusions. The tests were carried out according to our own methodology based on the PN-EN 16091 standard and the PetroOXY instruction manual. It was found that the pressure change curves during the oxidation resistance test of most samples are linear, which may mean that the antioxidant additives are not exhausted. In the case of several samples, however, they have curvilinear character and can only be described by means of a polynomial, in these samples the additives have probably been degraded.

Keywords:

PetroOXY, oxidation, engine oil



**QUANTUM CHEMICAL STUDY ON THE COMPLEXES
OF 1,10-N,N'-BIS-(B-D-UREIDOGUCOPYRANOSYL)-4,7,13-TRIOXA-
1,10-DIAZACYCLOPENTADECANE WITH ASPIRIN,
PARACETAMOL AND BUSULFAN**

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A few words about the author:

I am a PhD student and my doctoral thesis, I am doing on the Theoretical and Structural Group in Faculty of Chemistry at University of Lodz. My scientific interests mainly focus on theoretical analysis of properties of host-guest type complexes.

Abstract:

The rapid increase of cancer incidence is one of the biggest challenges for the public health. Every year c.a. 155 000 new cases of cancer are diagnosed in Poland, many of which are incurable. The causes of many types of cancer have not been sufficiently recognized, thus one of the important tasks of modern science is to find effective methods of cancer treatment. An important role in the therapy may play drug carriers, which can facilitate the transport of the drug to the diseased tissue.

One of such drug carrier can be the sugar derivative of azacrown ether namely 1,10-N,N'-Bis-(β -D-ureidoglucopyranosyl)-4,7,13-trioxa-1,10-diazacyclopentadecane (molecule L), recently synthesized in University of Lodz. Experimentally it was established that this new macrocycle is able to form stable complexes with three drugs: aspirin, paracetamol and busulfan. Aspirin and paracetamol are very popular, safe, analgesic, drugs, which appear to exhibit some antitumor properties with respect to selected cancers, while busulfan is an anticancer agent used in treatment of chronic myelogenous leukemia.

In the presentation will be shown results of quantum chemical study on the complexes of molecule L with aspirin, paracetamol and busulfan in stoichiometry 1:1, such as their most stable structures and the corresponding complexation energies. In these calculations an effect of solvent (water) was taken into account by using the polarizable continuum model (PCM)

Keywords:

host-guest complexes, calculations, aspirin, paracetamol, busulfan



BASALT FABRIC SURFACE MODIFICATION WITH AEROGEL FOR IMPROVEMENT OF PROTECTIVE PROPERTIES IN HOT WORK ENVIRONMENT

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A few words about the authors:

Pamela Miśkiewicz is a Ph.D. student in the Institute of Textile Architecture at TUL (Poland). Prof. Iwona Frydrych, a member of different scientific societies, and Dr. Magdalena Tokarska, a member of CEN, are researchers in the Institute.

Abstract:

Silicate aerogels have drawn a lot of interest both in science and technology because of their low bulk density, hydrophobicity, low thermal conductivity, high surface area, and optical transparency. The layer of aerogel was applied to the surface of basalt fabric due to the possibility of improving a fabric protecting against the influence of hot environmental factors. Work in exposure to hot agents is associated with the occurrence of hot microclimate, when the air temperature is in the range of 25-60°C, with a relative humidity of 10% to 80%. Gloves used in conditions of hot microclimate in a particular workplace are primarily to protect the user's hands against heat and fire. The obtained sample of the basalt fabric with the applied aerogel layer was tested in the field of protective properties such as resistance to contact heat and resistance to radiation heat. In addition, the thermal conductivity, thermal resistance, thermal diffusion and thermal absorption were determined. Analysis unevenness of aerogel on sample surface was conducted using CIELAB system. The obtained results indicate the use of aerogel on the surface of the basalt fabric improve protective properties of the material. It was noticed the unevenness of aerogel application on the surface of basalt fabric therefore, work in this area will be continued. It is possible to use a modified basalt fabric in the protective gloves, however, the protective properties should be extended.

Keywords:

aerogel, basalt fabric, protective gloves, hot work environment, CIELAB system



APPLICATION OF THE MAGNETRON SPUTTERING TECHNIQUE TO CREATE A BASALT COMPOSITE INTENDED FOR USE IN A HOT WORK ENVIRONMENT

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A few words about the authors:

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Abstract:

A composite based on basalt fabric was produced because of its good thermal and mechanical properties. Because basalt fibers show high resistance to low and high temperatures and non-flammability the composite could find application in personal protective measures protecting against the effects of flame and hot factors. Long-term work in a hot environment causes a noticeable thermal stress and fatigue. Hence, in these working conditions should be devoted to ensuring safety, the selection of personal protective equipment that guarantees protection at the appropriate level and the highest possible level of thermal comfort. As a result of the reactive magnetron sputtering technique, a layer of aluminum and zirconium oxide, 200 nanometers thick, was deposited on the Mylar film, which was glued onto the surface of the basalt fabric through the use of glue and silicone. Prepared variants of composites were subjected to contact resistance tests for contact temperature of 100°C and 250°C and resistance to thermal radiation. The research shows that the basalt composites produced show an improvement in resistance to contact heat for the contact temperature of 100°C and 250°C and resistance to thermal radiation. Obtaining resistance to contact heat at a contact temperature of 250°C would allow the use of a basalt based composite in the palm part of protective gloves. The disadvantage of the composites produced is their stiffness resulting from used the thickness of the Mylar film.

Keywords:

magnetron sputtering, basalt fibers, thermal properties, hot work environment, physical vapor deposition



EVALUATION OF SELECTED ASSORTMENTS OF WORKWEAR WITH REGARD TO THE BARRIER PROPERTIES AGAINST SOLAR RADIATION

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A few words about the author:

I am a student of work safety engineering. I'm interested in many things. For example, protecting people from harmful factors.

Abstract:

The work will present the characteristics of solar radiation and its impact on health. The quality of workwear used by employees determines their safety and effectiveness during work. Therefore, it is important to provide them with the best possible working conditions by choosing the right class of clothing. This clothing should meet certain requirements, among others, tear resistance, mechanical strength, protection against weather conditions, including UV radiation in the spectrum of solar radiation. The study will investigate a dozen selected samples of clothing products in terms of the effectiveness of the worker's skin protection against ultraviolet (UV) radiation. As a result, the factors determining the barrier properties of workwear in relation to UV radiation will be known, which will enable proper selection of clothing that ensures effective protection of employees exposed to excessive solar radiation.

Keywords:

ultraviolet radiation, workwear, barrier properties



TWO HANDED GESTURE RECOGNITION SYSTEM FOR PERSONAL APPLIANCES

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A few words about the author:

Master degree in Automatic Control and Robotics. Currently PhD student of Lodz University of Technology, field: Automatic Control and Robotics.

Abstract:

Currently, in order to enable image processing based human robot interaction, methods such as machine learning are frequently used. They provide satisfactory results but often require substantial computing power which could elevate the cost of smaller appliances. This paper discusses the computationally cheap method of sending commands to a robot via two-handed gestures. Presented method utilizes classical image processing approach based on contour analysis and HU invariant moments derived from a small set of rapidly created test data. Contour extraction is color based and mechanism of probing skin color via the means of Haar Cascade has been implemented. Initial face recognition and color probing is performed only once during an initialization phase. Low computation cost makes proposed approach feasible especially for cheaper and simpler mobile robots. Additionally, this method enables the user to define own gesture set, which can extend system usability by enabling rapid personalization. Minor anatomical differences between users could have also been overcome.

Keywords:

Image, processing, gestures, interaction

ENGLISH SESSION



DIMENSIONAL GREITZER MODEL. STEP TOWARDS BETTER UNDERSTANDING OF THE MEANING OF MODEL PARAMETERS

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A few words about the author:

PhD student at the Institute of Turbomachinery, Lodz University of Technology. His scientific interests are numerical analysis of flow structures, unstable phenomena in compressors and aerodynamic shape optimization.

Abstract:

Compressors are used in the wide range of industries. Very often they are the core of installations, such as production lines or transport engines. Therefore, their failure can generate significant financial losses. Surge phenomenon is one of the most infamous causes of failures of compressors.

Surge prevention is indispensable to assure safe operation of compressor. Therefore there is a need for robust mathematical model of the surge phenomenon. Greitzer model created in 70' is still the one most commonly used but its parameters have vague physical meaning.

Dimensional Greitzer model discussed in this talk is equivalent to original model but it provides more clear meaning to model parameters. The cost to pay for that is the lack of generality characteristic for dimensionless models.

This talk presents the theoretical background of the dimensional Greitzer model, its sensitivity study and discussion about the physical meaning of extracted parameters.

Keywords:

turbomachinery, compressors, surge phenomenon, greitzer model, mathematical modeling



ALGORITHM FOR DIMENSIONAL GREITZER MODEL PARAMETER IDENTIFICATION

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Abstract:

Surge phenomenon can cause total failure of a compressor within seconds. This can generate significant financial losses and, in extreme situations put people in danger. Adding to that a wide range of industries in which compressor play crucial role it is obvious why the effective surge prevention is in focus of many scientists and engineers worldwide.

To efficiently investigate a phenomenon in the era of computer simulations there is a need for robust mathematical model of that phenomenon. Greitzer model created in 70' is still the one most commonly used mathematical surge models but its parameters have vague physical meaning. Its dimensional counterpart gives a better understanding of the meaning of its parameters but their accurate determination is still not a trivial task.

This talk briefly presents the theoretical background behind the dimensional Greitzer model and focuses on an algorithm for efficient determination of model parameters for investigated machine.

Keywords:

turbomachinery, compressors, surge phenomenon, greitzer model, mathematical modeling



A NON-STANDARD ANALYSIS OF THE SYLVESTER-GALLAI THEOREM

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A few words about the author:

Mariusz Swornóg defended his master's thesis at Pedagogical University of Cracow in 2018. From 2018 he participates in doctoral studies at this university (theoretical mathematics). He is interested in algebraic geometry and non-standard analysis.

Abstract:

We know that every arrangement of lines at projective plane can be found as a solution of some specific Diophantine equation, but not every solution can be realized geometrically over given field. It is still an open problem in mathematics to find a necessary and sufficient condition for arrangement of lines existence over fixed field. There exists a number of necessary conditions for arrangement of lines existence for some fields. One of this conditions is Sylvester-Gallai theorem for real projective plane. This theorem was suggested by James Sylvester in 1893 and proved by Tibor Gallai in 1933 and it says that every arrangement of lines which is not a pencil, gives an ordinary point. There are well-known counterexamples for this thesis over complex projective planes (dual Hesse configuration with 12 triple-points and no ordinary points) and finite projective planes (Fano configuration with 7 triple-points and no ordinary points). Therefore it is natural to ask at which projective planes this theorem is also true and why. Using Euler-Poincare characteristic this theorem can be generalised for projective planes over ordered fields, that means algebraic fields with total order that is compatible with addition and multiplication.

Keywords:

algebraic geometry, non-standard analysis, arrangements of lines



THE APPLICATION OF MAGNETIC SURVEYS IN FORENSIC GEOPHYSICS STUDIES

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A few words about the author:

I am a first-year Master's student of Geophysics Studies at the University of Silesia. My interest are: application of geophysical methods in environmental surveys and natural radioactivity.

Abstract:

Geophysical methods are used in various parts of forensic science. They measure variations in Earth's properties. These surveys could be applied to either criminal or civil investigations. The Earth's magnetic field is generated at its iron-nickel core and has varied in location, polarity and intensity through time. The variation between this global and local magnetic field is generated where objects of different susceptibility occur. That is the basis of magnetic surveys. These techniques allow to discover buried materials and are used both in land and water-based researches. They have important value in different activities such as surface survey tests, localization of illegal landfill, hidden weapons or as a monitoring of simulated graves. The development of the geophysical research application in forensic science may bring profitable effects, but they require the involvement and experience of scientists.

Keywords:

forensic science, forensic geophysics, magnetic surveys, magnetic susceptibility



ANALYSIS OF THE ACTIVITY OF THE REGULATORY PROTEIN CJOSR OF CAMPYLOBACTER JEJUNI

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A few words about the author:

I am student, fascinated with molecular biology of microorganism, especially *Helicobacter pylori* and *Campylobacter jejuni*.

Abstract:

Campylobacter jejuni is a pathogenic bacterial species causing foodborne infections worldwide. Infected water, animals or people can be sources of infection. A better understanding of molecular biology of the pathogen is crucial to develop new strategies of campylobacteriosis treatment. The aim of the study was to examine the activity of the *Campylobacter jejuni* CjOsr protein. CjOsr is one of the *C. jejuni* regulatory proteins that might be involved in control of the bacterial cell cycle. The mechanism that controls CjOsr protein is unknown. We used electrophoretic mobility shift assay (EMSA) and surface plasmon resonance (SPR) to analyse DNA binding activity of the protein under several conditions. We found that reduction of the protein by DTT increases its affinity to DNA, thus CjOsr might play a regulatory role in response to oxidative stress.

Keywords:

Campylobacter jejuni, molecular biology, regulatory protein



MECHANICAL DESIGN AND FEM ANALYSIS OF ELECTRIC MOTORCYCLE'S SWING ARM

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A few words about the author:

Wojciech Pawlak - PhD student, mechanical engineer and project manager of Light Electric Motorcycle projects. Main interest of study: electric vehicles, Li-Ion batteries, tribology, 3D printing materials.

Abstract:

Growing requisition for quick and ecological delivery in food industry requires new approach to the problem of transportation. Electric vehicles are both a solution and a new design issue. What was already designed and used throughout decades, now needs to be changed. Following article presents both mechanical design and FEM analysis of a small electric motorcycle's swing arm designed for food delivery industry. FEM analysis was conducted on couple of different driving conditions, such as: 1G, 1.9G, longitudinal stiffness, torsional stiffness, turning conditions and fatigue. Motorcycle was designed by students for international competitions of SmartMoto Challenge in Barcelona.

Keywords:

electric motorcycle, swing arm, shock arm, FEM analysis



BITCOIN – THE CURRENCY OF THE FUTURE

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A few words about the author:

I study economics – postgraduate study. I am interested in finance and the global market.

Abstract:

In the modern world, people depend on digital transactions rather than cold, hard cash to make the world go round, leaving us to wonder what the currency of the future might look like. Many specialists claim that Bitcoin can be the currency of the future. Bitcoin is completely decentralized, offering the form of anonymized transparency thanks to a digital, publicly available ledger of transactions known as a blockchain. Whenever a bitcoin is generated or used in a transaction, it is validated and recorded on the blockchain. The blockchain does not record any personal information, but it prevents fraud by making it virtually impossible to manipulate an entry, and any transaction can be quickly looked up. Bitcoins are generated by users running a special computer program, in a process called “mining.” Each new bitcoin that is “mined” requires exponentially more processing power to create. The system has a top limit of 21 million bitcoins, but it is estimated that it will take at least a century to mine every available bitcoin, due to the exponential increase in effort required to mine each new bitcoin. Bitcoins are not regulated or tied to any one country, which means it is easy to make international payments immediately. Most governments and central banks consider bitcoin a legitimate means of exchange, although a few countries have banned it.

Keywords:

bitcoin, currency, future, blockchain cryptocurrency



ECONOMIC CHALLENGES OF THE EUROPEAN UNION

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A few words about the author:

I study economics – postgraduate study. I am interested in finance and the global market.

Abstract:

The European Union is considered to be the cornerstone of European prosperity and stability. Nevertheless, many EU countries have faced significant economic difficulties. Despite an improved economic situation in the EU for the last years, economic pressures and societal changes have contributed to the rise of populist and anti-establishment political parties. Such trends have complicated the European Union's ability to deal with multiple internal and external challenges, especially political and financial ones. The European Union is not facing the same types of immediate threats that it did during the height of the financial crisis earlier this decade, when the economic situation of Greece, Ireland, Portugal and others put the continuity of the European Union in question. The threats facing the EU today are more structural in nature, including shortcomings in the eurozone's setup, the lingering social and political repercussions of the recent financial and migration crises, and the ongoing competition among the global superpowers. This might mean that Europe's problems are not as urgent as they were a few years ago, but that doesn't make them any less dangerous for the European Union.

Keywords:

challenges, EU, European Union, economy, economics



THE ULTRASOUND ASSESSMENT OF THYROID DISEASES IN THE PEDIATRIC POPULATION

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A few words about the authors:

We are second-year medical students, members of Scientific Society at Department of Pediatric Radiology. We try to combine two areas of science that we are interested in, such as radiology and endocrinology.

Abstract:

Background: Accurate treatment of thyroid dysfunction requires an appropriate diagnosis. Ultrasonography is the first imaging modality performed in children to confirm changes of the thyroid gland.

Purpose: The assessment of the thyroid abnormalities in children in ultrasonography.

Materials and methods: The study included 100 consecutive patients examined in the Department of Pediatric Radiology, medical University of Lublin, who underwent ultrasound examinations in the period from November 2018 to February 2019. The study was carried out with Philips EPIQ 5G and Siemens Acuson S3000 ultrasound scanners with linear transducers of the frequency of 8-14 MHz. The examined group included 56 girls and 44 boys in the age from 2 to 18 years, who were examined due to primary thyroid disease (n=48) and other health problems (n=52). Echogenicity, presence of focal lesions, vascularisation, presence of fibrotic changes, contours and total volume of the gland were evaluated.

Results: The most frequently diagnosed pathology among the group of patients was hypothyroidism (28 cases). Whereas hyperthyroidism occurred only in 8 patients. Ultrasonography of the thyroid gland has shown abnormal echogenicity in 28 patients, 29 patients presented focal lesions, 4 irregular contours, 6 fibrotic changes and 29 of them had abnormal vascularity.

Conclusion: Ultrasonography is diagnostic tool which is helpful to complete the whole process of thyroid dysfunction diagnosis.

Keywords:

ultrasonography, thyroid dysfunction, diagnosis, children



GRAPHITIC CARBON NITRIDE BASED MATERIALS FOR PHOTOCATALYTIC APPLICATION

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A few words about the author:

Martyna Baca is a Ph.D. student at the Nanomaterials Physicochemistry Department, West Pomeranian University of Technology, Szczecin. Her research interests include synthesis of novel photocatalytic materials for energy and environmental application.

Abstract:

Layered compounds belong to intriguing class of materials due to their unique physicochemical properties such as strong interlayer chemical bonding correlated to weak interlayer interactions. They were explored both as homogeneous unit and as components of composites for various applications especially in photocatalytic reactions. In the recent decades, graphitic carbon nitride (GCN) has received huge scientific interest as a metal-free layered material with many distinct features, including non-toxicity, high chemical/thermal stability and moderate band gap. This promising structure may be used in photocatalysis wastewater decomposition as well as hydrogen production and thus contribute to a breakthrough in large scale development of green technologies. However, the main disadvantages limiting its widespread use still have to be overcome. Up to now, to facilitate the properties of GCN, different strategies have been investigated: metal/non-metal doping, structure modification or sensitization with narrow band gap semiconductor. The present study aims to brief presentation of recent progress in the design of novel materials based on GCN in various photocatalytic realms such as hydrogen evolution, degradation of dyes and acetaldehyde. Apart from exploring the possibility of using obtained materials in mentioned fields, it is also crucial to examine their physicochemical properties. Finally, the presentation will be rounded up with major concluding remarks.

Keywords:

graphitic carbon nitride, photocatalysis, hydrogen production, layered compounds



MCFA IN THE DIAGNOSIS OF METABOLIC DISEASES IN PHF COWS

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A few words about the author:

PhD student at the Faculty of Animal Sciences, scientific interests: cattle breeding.

Abstract:

Milk production for many years has been the main purpose of selection and improvement of dairy cattle. This type of activity has led to an increase in milk yield, but also the lowering of the value of low-heritable functional traits, which include first of all health. These problems are particularly noticeable in the so-called transitional period, i.e. in the perinatal period. Then, very often the concentration of energy in the feed is insufficient to cover the living and production needs. Then, the animals compensate for this deficiency by activating the reserves of fat, which leads to the creation of a negative energy balance, which is the cause of diseases with a metabolic basis. The aim of the experiment was to improve the welfare of dairy cows by introducing the analysis of the level of MCFA in milk as markers for the diagnosis of high levels of NEFA and BHBA in blood in the early stages of lactation in cows of the PHF breed. Milk and blood samples were collected from 120 cows (multiparous) for laboratory analyzes at weekly intervals (7 samplings). The material collected was analyzed and the results were statistically evaluated. There were negative, statistically significant correlations between NEFA and C12:0 (-0,271; $p \leq 0,01$) and C14:0 (-0,177; $p \leq 0,05$). MCFAs can be used as a marker for early diagnosis of excessive NEFA levels in the initial phase of lactation in PHF (Polish Holstein Friesian) cows.

Keywords:

MCFA, NEFA, BHBA, negative energy balance



SFA IN THE DIAGNOSIS OF METABOLIC DISEASES IN HIGH-YIELDING PHF COWS

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Abstract:

Achieving record high yields for many years was a priority in dairy farms. Intensive selection of cattle for this purpose influenced the increase in productivity of cows (exceeding 10 000 kg for lactation), but also led to a reduction in the level of low-heritable functional traits, among which the most important is health. These problems are noticeable especially in the perinatal period. Then very often the concentration of energy in the feed is insufficient to cover the living and production needs. Then, the animals compensate for this deficiency by activating the reserves of fat, which leads to the creation of a negative energy balance, which is the cause of diseases with a metabolic basis. The aim of the experiment was to improve the welfare of dairy cows by introducing the analysis of the level of selected saturated fatty acids (SFA) in milk as markers for the diagnosis of high levels of NEFA and BHBA in blood in the early stages of lactation in PHF cows. Milk and blood samples were collected from 120 cows (multiparous) for laboratory analyzes at weekly intervals (7 samplings). The material collected was analyzed and the results were statistically evaluated. There were negative, statistically significant correlations between NEFA and C12:0 (-0,271; $p \leq 0,01$) and C14:0 (-0,177; $p \leq 0,05$). C12: 0 and C14: 0 can be used as markers for early diagnosis of excessive NEFA levels in the initial lactation period in PHF cows.

Keywords:

SFA, NEFA, BHBA, negative energy balance



CHARACTERISTICS OF THE MULTIMAMMATE MOUSE (MASTOMYS SP.) SPECIES AS A FOOD ANIMAL - REPRODUCTION BEHAVIOUR AND GROWTH RATE OF YOUNG ANIMALS

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Maciej Miąsko PhD student in Department of Genetic and Animal Breeding, Faculty of Animal Science, Warsaw University of Life Sciences, Warsaw, Poland.

Abstract:

The genus *Mastomys* belongs to the family Muridae (subfamily Murinae) and is a phylogenetic relative of mouse and rat. It contains eight species known as multimammate mice or multimammate rats (also known as African soft-haired rats or African common rats) that occur throughout sub-Saharan Africa. These animals have brown eyes and are usually covered with a dense, colourful coat of agouti (a lighter grey colour on the abdomen), although there are other colour variants in domestic breeding and *Mastomys* laboratory strains, such as white and brown with pink eyes. With a typical head and body length of 6 to 17 cm and a tail length of 6 to 15 cm, the *Mastomys* body weight varies from 20 to 100 g depending on the sex and age of the animal. In *M. couch* breeding (especially males) individuals can reach a body weight of more than 160 g. The aim of the study was to describe the reproductive behaviour of mastomysh rodent especially taking into account aggressive behaviour of animals. An analysis of the growth rate of young people from birth to the time of their separation from their mother was made. Behavioural observations, description of conformation traits and results of reproduction analysis will be used to determine the usefulness of using the genus *Mastomys* as a food animal.

Keywords:

multimammate mouse, reproduction behaviour, growth rate of young



A VACCINE AGAINST AFRICAN SWINE FEVER (ASF) – A REVIEW OF PREVIOUS STUDIES

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Paweł Kołomyja - PhD student at the Department of Genetics and Animal Breeding. My main areas of interest are forestry, hunting, economics and horses.

Abstract:

The constant spread of ASF in the wild boar population shows that the mechanisms currently in place to control this disease are ineffective. Past experience such as, the control of Classical Swine Fever (CSF) and rabies has shown that vaccination is the only effective way to control an epidemic in wildlife. Currently, no suitable vaccine against ASF has been approved for use. The main reason for this is insufficient knowledge of the different ASFV strains and the antigens they produce. In recent years, the development of an effective ASFV vaccine has been the goal of many researchers that have tried to develop different vaccine types, including vaccines containing inactivated forms of ASFV, subunit vaccines or vaccines with attenuated ASF strains, i.e. strains without pathogenic properties, while maintaining their immunological properties. Due to the complex structure of the virus and the diversity of its different strains, previous attempts to develop an effective vaccine have not led to any product being placed on the market.

This challenge, due to the rapid spread of ASF, is crucial, but at the same time very difficult, and the main basis for success will be a full understanding of the virus and its strains. At the same time, attention should be paid to the ability of viruses to change their genome through numerous mechanisms, including genetic drift, which, as in the case of the influenza virus may not allow for the development of one fully effective vaccine.

Keywords:

vaccine, ASF, wild boar



METABOLIC DISEASES CAUSED BY MUTATIONS IN THE MITOCHONDRIAL GENOME

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Abstract:

Metabolic diseases are a large group of metabolic disorders, the major part of which are mitochondrial diseases, i.e. diseases caused by mutations in mitochondrial DNA (mtDNA). Mitochondria are cell organelles which the most important function is the production of ATP. Therefore, the consequence of most mitochondrial diseases is limited oxidative phosphorylation efficiency and consequently deficiency of ATP, which is an intracellular energy transporter. Apart from ATP, genes located in the mtDNA also code 11 proteins that are subunits of respiratory chain complexes, 22 types of tRNAs and 2 types of rRNAs. The mitochondrial genome is inherited from the mother line. The main cause of these diseases are point mutations and the most common are mutations 3243A->G and 8344A->G, which occur in the area of genes encoding leucine and lysine respectively in the tRNA molecule. These mutations cause diabetes mellitus and hearing loss and Myoclonic Epilepsy with Ragged Red Fibers (MERRF), respectively. The best known point mutations in the mtDNA are 1555A->G and 1494 T->C, which cause hearing loss and myopathies respectively. Despite extensive knowledge of the background, inheritance and consequences of mitochondrial diseases, there are currently no effective methods of their treatment. Gene therapy seems to be an opportunity, however, in the case of mitochondrial diseases, its application is hampered by the lack of possibility of stable transfer of mammalian cells' mitochondrial genome.

Keywords:

metabolic diseases, mitochondrial diseases

POSTER SESSION



RELATIONSHIP BETWEEN OBESITY AND DEPRESSION IN SUBJECTS OVER 54 YEARS OF AGE, RESIDENTS OF WEST POMERANIAN PROVINCE

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A few words about the author:

Aleksandra Jeckowska and Norbert Bajerski, Students - Faculty of Medicine and Biotechnology and Laboratory Medicine. In Students' Scientific Group since 2017 y. GA, Professor, head of Department. The expert for the National Centre for Research and Development, PL.

Abstract:

Both, obesity and depression have multifactorial and overlapping pathogenesis, which include dysfunction of the hypothalamic-pituitary-adrenal axis, excretion of neurotransmitters, proinflammatory activation and stimulation of the sympathetic nervous system. Depression may precede obesity, be its consequence or develop parallel to it.

The aim of the study was to determine the association between obesity and depression in people over 54 y/o.

In total, 418 subjects were included: 308 women and 110 men. The diagnosis of obesity was based on BMI (Body Mass Index). To assess the severity of depressive symptoms in the study group, the original 30-item version of the Geriatric Depression Scale by Yesavage et al. was used. Data were analyzed with Statistica v13 software.

According to BMI, 42.3% subjects were classified as obese, and 57.7% were not. Among obese and non-obese subjects the incidence of severe and mild depression was: 9.0% and 24.3%, 2.1% and 26.1%, respectively. In obese subjects, deep depression was significantly higher compared to non-obese subjects ($p=0.006$). The incidence of depression in obese women was higher than in non-obese women ($p=0.003$). While, the frequency of incidence of depression in group of obese men compared to non-obese men was not significant ($p=0.798$).

The obtained results confirm an association between the occurrence of depression and obesity in women over 54 y/o. The incidence of depression was higher in obese women compared to obese men.

Keywords:

Body Mass Index, obesity, depression



POOR IMMUNOGENICITY OF PURIFIED PROTEINS MAY BE MAINLY CAUSED BY AN INSUFFICIENT UPTAKE BY ANTIGEN PRESENTING CELLS, RATHER THAN BY THE LACK OF CO-STIMULATION

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A few words about the author:

Magdalena Gębicka is a PhD student in the Department of Immunology at the Jagiellonian University. She is a member of a research group along with S. Józefowski, PhD and R. Biedroń, PhD and is concerned with a research on adaptive immune response.

Abstract:

In accordance with Janeway's hypothesis, naive T lymphocytes require the signal provided by antigen presenting cells (APC) through costimulatory proteins after detecting specific microbial products through APCs pattern recognition receptors (second signal). However, purified proteins are often weakly immunogenic, despite the fact that adaptive immune responses are mainly directed against foreign proteins. This theory is also divergent with many observations that immune responses are induced in the absence of PRRs' ligands. Our previous research indicates that the induction of immune response to purified proteins is caused by insufficient uptake by APCs.

In our experiments we have proven that several proteins became strongly immunogenic and gained ability to bind to different ERs on APCs after oxidation by neutrophil-derived hypochlorous acid (HOCl). We also demonstrated that in the absence of any adjuvants proteins binding to ERs in their native forms are able to induce a strong humoral immune response in mice. We also observed that a high antibody production was stimulated by a small dose of endotoxin-free ovalbumin (OVA) in wild-type mice, but practically absent in mice deficient with mannose receptor (MR^{-/-}).

In the abovementioned and many other experiments we have noticed the possibility that improving antigen uptake by APCs is a major, shared mechanism of immune-enhancing effects of different adjuvants.

Keywords:

adaptive immune response, immunogenicity, antigen uptake



EVALUATION OF THE TUMOR CELLS SENSITIVITY TO EXTERNAL STIMULI

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Abstract:

The MTT test consists in assessing the ability to reduce bromide to violet anoint. This transformation is only possible if the mitochondrial enzymes are active, which is directly related to the number of viable cells. As a result, it is possible to determine the number of living cells [1-4]. The studies examined the response of various cancer cell lines to given conditions. It turned out that the cell viability depending on the type of cancer and conditions is different.

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Keywords:

cancer, test MTT, cell culture, cell lines



THE MIRNAS LEVELS IN MOST COMMON OSTEOSARCOMA CELL LINES DETERMINED USING QUANTITATIVE REVERSE TRANSCRIPTION PCR (RT-QPCR)

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Aleksandra Jaworska - biology student. Dr. hab. Krzysztof Marycz prof. nadzw.- does research on materials engineering and biomedical engineering. Dr. Agnieszka Śmieszek-does research on regenerative medicine and biomaterials.

Abstract:

Osteosarcoma is the most common cancer of bones, presenting in the first or second decade of life. Tumor develops on long bones of the extremities. Survival rate is poor and the prognosis weak despite the multi – drug chemotherapy.

Hence there is an urgent need to develop a diagnostic and prognostic tool. MiRNAs are non-coding RNA involved both in physiological and pathological processes. Dysregulated expression of miRNAs in tissues is associated with cancers, thus they can serve as biomarkers found in blood, urine and saliva (liquid biopsies) and within tumor tissue.

In this study levels of several miRNAs was established in most common osteosarcoma cell lines (U2OS, Saos-2, MG63 and D17) and compared to the levels noted in HeLa cell line. RT – q PCR technique was used to analyze the expression of miR– 21 – 5p, – 124 – 3p, 223 – 3p, 320a – 3p. Our results showed that all osteosarcoma lines show increased expression of tested miRNAs indicating their role as a potential markers osteosarcoma development.

This project is financed in the framework of grant entitled “New, two-stage scaffolds based on calcium nanoapatite (nHAP) incorporated with iron nanotoxides (Fe₂O₃/Fe₃O₄) with the function of controlled release of miRNA in a static magnetic field for the regeneration of bone fractures in osteoporotic patients” (Grant No. UMO 2017/26/M/NZ5/01184) financed by The National Science Centre in Poland.

Keywords:

biomarker, osteosarcoma, miRNA expression levels



THE EFFECT OF REDUCED GRAPHENE OXIDE AND CORIOLUS VERSICOLOR EXTRACT ON THE VIABILITY OF L929 FIBROBLASTS AND MCF-7 HUMAN BREAST CANCER CELLS

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A few words about the author:

Kamila Kanarek received a bachelor's degree in biology in 2017 at the Nicolaus Copernicus University in Toruń. Currently, she is continuing her master's studies in biology and biotechnology.

Abstract:

Demonstrating unique physicochemical properties, reduced graphene oxide (rGO) is a nanomaterial with a potential broad application in medicine. The cytotoxic properties of rGO can be potentially used in anti-cancer therapies, however this type of nanomaterial has also toxic effect on immunocompetent cells. On the other hand, protein-bound polysaccharides (PBP) isolated from *Coriolus versicolor* fungus have the capacity to induce cytotoxicity in the certain cancer cells, while demonstrating a mitogenic effect on immunocompetent cells. Therefore, in the present study we investigated the viability of L929 fibroblasts and MCF-7 human breast cancer cells, which were co-stimulated with rGO and PBP. The both cell lines were stimulated with PBP solution at concentration of 100 µg/ml and rGO at the final concentrations of: 5-, 10-, 25-, 50- and 100 µg/ml for 24-, 48- and 72h. After stimulation, the viability of cells was determined using the MTT assay. We also evaluated the generation of reactive oxygen species (ROS) in MCF-7 cells. The results showed that the co-stimulation of MCF-7 cancer cells with PBP and rGO induced greater cytotoxicity in comparison to the effect on L929 cells. Moreover, MCF-7 cells co-stimulated with PBP and rGO released significantly larger amounts of ROS after 72h of stimulation compared to the cells stimulated only with rGO. We concluded, that the simultaneous use of rGO and PBP can be a promising new approach in anticancer therapies.

Keywords:

Coriolus versicolor, reduced graphene oxide (rGO), MCF-7, L929



THE IMPACT OF MVS DERIVED FROM ADIPOSE DERIVED STEM CELLS (ASC) REJUVENATED WITH RESVERATROL AND 5-AZACYTYDINE (AZA/RES) COMBINATION ON INSULIN SENSIVITY IN HORSES SUFFERING FROM EQUINE METABOLIC SYNDROME (EMS)

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Molecular biology is our passion and we find it very inspiring that our work may contribute to the development of regenerative medicine.

Abstract:

Horses suffering from EMS (ang. Equine Metabolic Syndrome) are characterized by: (i) occurrence of obesity, (ii) insulin resistance (IR) and (iii) chronic inflammation. It was shown also that EMS negatively affects cytophysiological properties of adipose derived stem cells (ASC). In presented study we investigated the properties of microvesicles (MVs) derived from EMS horses ASC cells rejuvenated in resveratrol and 5-azacytidine solution (AZA/RES). First, we tested how AZA/RES affects ASCEMS proliferation and morphology. Next we isolated MVs from AZA/RES treated cells and evaluated their effects on ASCEMS. Prior to the experiment MVs were added directly to ASCEMS culture medium for 24 hours. Next, cells were subjected for gene expression and microRNA (mir) expression: mir 21-5p and mir 16-5p as the markers for insulin resistance (IR) using the qPCR. Obtained data revealed that expression of PERK, Atf-6, Ire-1, and eif2 which are responsible for ER stress and genes involved in autophagy such as Beclin, Lamp-2 and Pi3K was decreased in ASCEMS treated with MVs. Expression of genes responsible for IR such as IR, IRS and GLUT-4 was increased in EMS horses and decreased after AZA/RES. We hypothesize this can be a result of compensatory mechanism in which IR causes increase expression of those genes as mir 21-5p marker for IR was increased in ASCEMS. Our study proves that MVs derived from ASCEMS treated with AZA/RES can be applied to EMS horses as a therapy targeting IR.

Keywords:

Equine Metabolic Syndrome, microvesicles, adipose derived stem cells, insulin resistance



FORENSIC IDENTIFICATION OF LIPSTICKS USING THIN-LAYER CHROMATOGRAPHY

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A few words about the author:

I am a fifth year student at the university of Lodz. I carry out this project under the care of employees from the department of Instrumental Analysis. The project was supported by the University of Lodz under Student Research Grant.

Abstract:

Colorful lipsticks are one of the most commonly used color cosmetics. For the color of lipstick is responsible natural dyes, eg. plant flavonoids, as well as synthetic dyes such as azo or triphenylmethane pigments. The oils and waxes contained in the lipsticks cause that these cosmetics easily transfer to various types of surfaces, leaving colorful traces which found at the crime scene are valuable forensic evidence. Colored traces can bind the suspect with the victim and thus require a lot of attention. For this reason it is important to develop simple but effective methods for distinguishing and identifying of protected samples with minimal damage. Thin Layer Chromatography (TLC) gives such opportunities, it is used to separate mixtures into individual components. This technique allows to distinguish small amounts of collected material, does not require large financial outlays with a small amount of work.

Thin layer chromatography allows to specify different values of the retardation factor (R_f), for each of the ingredients contained in the lipsticks, so that we are able to compare the material taken from the place of the event with the standards.

Keywords:

thin-layer chromatography, forensic identification



THE LEVEL OF PSYCHOPATHY OF CONVICTED CRIMINALS IN RESPECT TO THEIR ABILITY OF AFFECT RECOGNITION ON THE BASIS OF FACIAL EXPRESSIONS AND STYLE OF MORAL DECISIONS MAKING

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Abstract:

The etiology of psychopathy remains largely an unresolved issue. Many previous studies shows deficits in affective empathy. The aim of the study was to show differences in the level of cognitive and affective empathy, the types of moral decision making and the level of intensity of psychopathic traits. 40 incarcerated males (19 was classified as psychopaths), and 18 males students (non psychopath) were studied. To assessed the level of intensity of psychopathic traits used the Psychopathy Checklist-Revised. Moral decision in moral dilemma situations were measured by the method of dissociation of processes. Questionnaire „Skala Inteligencji Emocjonalnej – Twarze“ was used to measure affective empathy and the ability to recognize emotional expressions.

Keywords:

psychopaths, empathy, moral dilemmas



HEALTH PROPERTIES OF MUSHROOMS

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Mirosław Malec - pharmacist, traveler, blogger. Currently Ph.D. student at the Department of Clinical Pharmacy and Biopharmacy and the Department of Anaesthesiology and Intensive Pediatric Care at Poznan University of Medical Sciences.

Abstract:

Nutritional value of fungi results from the content of high-assimilable proteins, polysaccharides, essential unsaturated fatty acids as well as minerals and vitamins. Many cultivated and wild growing species also show pro-health properties. They are related to the presence of bioactive components, mainly polysaccharides, triterpenoids, and phenolic compounds. The nutritional value of mushrooms varies and depends on the species or origin. They contain vitamins A, C, D, PP, and B, as well as mineral salts of potassium, phosphorus, calcium, sodium, and iron. Also, thanks to the high water content (80-90%) and fiber, the dishes prepared from them are recommended to people struggling with overweight. The immunostimulatory, antibacterial, antiviral, anti-inflammatory, anti-cancer, anti-diabetic and antiallergic effects of various fungal species have been documented. Substances obtained from fungi also can lower cholesterol and triacylglycerols in the blood, normalize the pressure, and also protect the liver. Currently, fungi are considered functional foods. A positive effect on health can be obtained by direct consumption of fruiting bodies or the use of dietary supplements in the form of preparations containing fungal extracts.

Keywords:

mushrooms, health value, functional food, pharmacy



THE IMPORTANCE OF OBESITY AND ENDOCRINE FUNCTION OF ADIPOSE TISSUE IN CARCINOGENESIS

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We want to gain knowledge and to share it.

Abstract:

Adipose tissue is the largest endocrine organ in the body. It releases bioactive substances that regulate inflammatory, metabolic processes as well as cell proliferation and growth. Adipocytes secrete substances, including proinflammatory leptin, visfatin, resistin, ghrelin, tumor necrosis factor α (TNF- α), sex hormones, and anti-inflammatory adiponectin. Obesity causes disturbances in the release and interaction of various adipokines and sex steroids, which contributes to systemic chronic low-grade inflammation, and over time can result in DNA damage and cancer development. Excessive estrogen release promotes the development of breast and ovarian cancer. In obesity, a high concentration of insulin and insulin-like growth factor-1 (IGF-1) is also observed, which predisposes to the development of colon, kidney or prostate cancer. Lack of control over the production of adipokines may lead to local hypoxia and reactive angiogenesis, and disturb cell growth, which promotes cancer. These processes are also associated with a modified immune response or an increase in oxidative stress. Excessive adipose tissue predisposes to the development of cancer, worsens the patient condition, affects oncological treatment, increases the risk of metastasis and the degree of cancer malignancy. Research on the molecular mechanisms of the influence of obesity on the risk of cancer is still ongoing.

Keywords:

adipokines, adipose tissue, carcinogenesis, obesity



OPTIMIZATION OF THE PRODUCTION PROCESS ON THE EXAMPLE OF BAKERY USING ARENA SOFTWARE

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A few words about the author:

Ewelina Masiarz - first year PhD student at the Warsaw University of Life Sciences (SGGW), Department of Food Sciences; worked on the risk and hazard analyses in the case of bakery products and simulations/optimizations of the production processes.

Abstract:

The aim of this work was a development of the methodology of the production process optimization in a small production plant, based on data collected during its operation and information available in the literature. These authors analyzed the current production cycle of bakery products and the consumption of electricity. A key element was the simulation of the production process in the ARENA program, including reconstruction of the production line as a block diagram. As a final result demonstrating the usability of the constructed model suggestions for optimizing the bakery were proposed, including eliminating machine downtimes and more fully harmonizing the working time of employees.

Keywords:

bakery, optimization, ARENA simulation tool, AutoCAD



HEAT SHOCK PROTEINS AS AN INDICATOR OF THE ENVIRONMENTAL STRESS IN YEAST *SACCHAROMYCES CEREVISIAE*

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A few words about the author:

Aleksandra Menka - an employee of the Department of Biotechnology, Institute of Experimental Biology and a student of third degree studies in biology.

Abstract:

Yeast *Saccharomyces cerevisiae*, as single-celled organisms, is constantly exposed to the impact of various environmental factors. Unstable ambient conditions have a negative effect on the biological activity of the cell, thus limiting its chance of survival. To survive, yeast cells have developed defense strategies that allow them to adapt to different environmental conditions, maintain homeostasis, and increase cell tolerance to specific stressors. Such mechanisms are based mainly on the targeted expression of genes, leading to the synthesis of molecules, such as, for example, trehalose, glycerol, ergosterol, which protect cellular structures and biopolymers from damage under stress conditions. The characteristic defense response of yeast to environmental stress is the increased synthesis of specific proteins, referred to as HSP (heat shock protein). The family of these proteins is a very large and strongly diverse group, whose individual representatives perform a number of important functions not only under stress conditions but also under physiological conditions.

Keywords:

heat shock proteins, HSP, environmental stress, yeast *Saccharomyces cerevisiae*, alcoholic fermentation



PREDICTORS OF DEVELOPMENT OF THE SOCIAL AND EMOTIONAL SKILLS IN DEAF CHILDREN

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A few words about the author:

Teacher of the deaf and hearing-impaired, psychologist, speech therapist.

Abstract:

A hearing defect has various consequences in linguistic, cognitive, emotional and social functioning. The inadequacy of identifying emotions and the insufficient social and emotional knowledge demonstrated by the deaf may significantly affect their interpersonal relationships and the ability to cope with difficult situations in life. A limited auditory perception considerably limits language development. However, does it also affect the social and emotional development of deaf children? How should one support the development of the social and emotional intelligence of the deaf to promote their living in a fully effective manner amongst us? Those questions initiated the considerations of conducting research in this area. The information included in the poster concerns the research plans aimed at describing the structure and level of development of the social and emotional skills in deaf children as well as categorizing the factors influencing the development of those skills and creating a practical model of supporting the development of those skills among the deaf. From a teacher's point of view, it is also very important that social and emotional skills promote achievements at school, easier and faster adaptation to the school environment, a higher sociometric position and the use of more effective learning strategies by the pupils. Those interrelationships indicate the need for supporting the social and emotional skills already in the early years of a child's life.

Keywords:

deaf children, social-emotional development



STRUCTURE AND LEVEL OF EMOTIONAL INTELLIGENCE IN DEAF YOUNG PEOPLE

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Teacher of the deaf and hearing-impaired, psychologist, speech therapist.

Abstract:

The ability to identify and regulate emotions as well as apply them appropriately in life enables the human to satisfy the fundamental needs. Those skills are also crucial during realizing the development potential of an individual according to social norms and with simultaneous maintenance of positive relationships with other people.

The information presented on the poster concerns the results of research into the emotional intelligence of deaf young people and their ability to identify emotions based on facial expressions. The research results were gathered using two tools: the self-report INTE questionnaire and the Emotional Intelligence Scale – Faces (SIE-T). The study covered 80 secondary school students, including 40 persons with normal hearing and 40 deaf persons using the sign language. The significance of the results was analyzed using a quantitative method: Student's t-test for independent samples.

The study has shown that deaf persons achieve lower scores than do persons with normal hearing concerning the emotional intelligence level and the level of the individual skills forming its structure (identification of emotions, using emotions to support thinking and acting as well as identification of facial expressions). Moreover, deaf persons coming from deaf families where the sign language is the primary means of communication achieved better scores for the ability to identify facial expressions than did deaf persons coming from families with normal hearing.

Keywords:

emotional intelligence, deafness



SELECTED POSSIBILITIES FOR THE UTILISATION OF FRUIT AND VEGETABLE POMACE IN THE CIRCULAR ECONOMY MODEL

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A few words about the author:

I am a PhD student at the 1st year of doctoral studies at the Faculty of Food Sciences at the Warsaw University of Life Sciences. I am mainly interested in recyclable, biodegradable and compostable food contact materials.

Abstract:

Circular economy (CE) is one of the priorities of the European Commission's economic policy. This is a new model of the economy assuming that the value of products, materials, raw materials and resources should remain in the economy for as long as possible, in order to reduce the production of waste to a minimum. The scarce of resources, the increase in their prices, the constantly increasing environment pollution caused a deviate from the current approach based on a linear economy to a circular economy. An important element of this new concept is the management of waste arising in the food processing, including organic vegetable by-products - pomace.

The pomace is the main waste mass in the production of juices, beverages and wines. So far, their main development direction was the production of animal feeds, otherwise they were treated as worthless waste. However, recent studies indicate that pomaces are a rich source of polysaccharides, pectins, cellulose and hemicelluloses. Due to their physicochemical properties can be successfully used as additive or component to increase nutritional value of food, in the production of ethanol and biogas or as a component of biodegradable polymers in packaging materials. The circular economy concept is to lead to a sustainable, resource-efficient and low-carbon economy.

Keywords:

pomace, by-products, vegetable waste, circular economy



ACTIVATION OF THE NLRP3 INFLAMMASOME BY TiO₂ NANOPARTICLES AND THEIR EFFECT ON THE RESPIRATORY SYSTEM

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A few words about the author:

Daria Owczarek received a bachelor's degree in biology in 2018 at the Nicolaus Copernicus University in Toruń. Currently, she is continuing her master's studies in biotechnology.

Abstract:

An interesting case of exogenous activators of sterile inflammation are nanoparticles, which in recent years have gained very high popularity, especially in such fields as electronics and biomedicine. As it turns out, they can also irritate and stimulate the immune system. A good example is titanium dioxide (TiO₂) used, among others, as a pigment in cosmetics. Although there is a belief that it is biologically indifferent, you can find information about its irritating effects on the respiratory system in people exposed to frequent exposure .

During the tests it was shown that TiO₂ binds to the NLRP3 inflammasome, which is a multipartic protein complex that forms in the cytoplasm due to the signal flowing from TLR or other PRR-receptors. As a result of inflammasome activity, inactive pro-caspase-1 is transformed into active caspase-1, which cleaves pro-IL-1 β and pro-IL18 in IL1 β and IL-18. The resulting cytokines are released into the extracellular space, where they induce immune reactions by activating and migrating the cells of the immune system to the site of inflammation.

Chronic inflammation plays a key role in the pathogenesis of acute and chronic respiratory diseases.

Keywords:

Nlrp3 Inflammasome, titanium dioxide, caspase-1



STUDENTS IN THE FACE OF MODERN FAMILY CRISES - SEARCHING FOR SOLUTIONS

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Studentka pierwszego roku studiów magisterskich na kierunku Pedagogika ogólna, specjalność: pedagogika opiekuńczo-wychowawcza z profilaktyką uzależnień.

Abstract:

The poster contains the gaze of MA students of Educational studies, speciality: a care and education with addiction prevention, for problems that may affect a modern family. Divided into groups, students from many types of family crises chose the most common in contemporary world, ie unemployment, disappearance of relationships, violence, addictions, migrations, monoparentism, death of relatives and divorce. Afterwards, students undertook attempts to present a suggestions for solving family crises by preparing the illustrations. A lot of valuable ideas emerged from the brainstorm method that can be used in working with family. The research was carried out on the academic subject Family in crisis.

Keywords:

modern family, family crisis, students, solutions, research



INFLUENCE OF Al_2O_3 AND Cu POWDERS ON SELECTED PROPERTIES AND MICROSTRUCTURE OF Al_2O_3 – Cu – Ni COMPOSITES

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Abstract:

In this study Al_2O_3 – Ni – Cu composites were formed using slip casting. Two different kinds of Al_2O_3 and Cu powders were used in the manufacturing process. The following powders Al_2O_3 (TM-DAR), Al_2O_3 (Almatis) and Cu (Kamb) Cu (Sigma Aldrich) and Ni (Alfa Aesar) powders were used.

Types of phases in the obtained composites were identified by XRD analysis. The selected properties were measured using the Archimedes method. Microstructures of the samples were studied using the scanning electron microscope.

This work helps with a better understanding of the influence of the type of used matrix and copper on the obtained microstructure and properties of composites. The X-ray analysis showed that the composites after sintering were characterized by the presence of three phases: Al_2O_3 , CuNi , and Ni . It was found that the type of matrix and copper did not affect the phase composition in obtained materials. The samples made with Al_2O_3 (TM-DAR) powder were characterized by better density, higher shrinkage, and lower open porosity compared to the samples obtained from Al_2O_3 (Almatis).

The analysis of accomplished results leads to the conclusion that the kind of initial materials used in the manufacturing process has a great impact on the microstructure and properties of obtained composites.

The study was accomplished thanks to the funds allotted by The National Science Centre within the framework of the research project ‘OPUS 13’ no. 2017/25/B/ST8/02036.

Keywords:

Al_2O_3 – Ni – Cu system, slip casting, ceramic metal composites



PROFESSIONAL ACTIVITY OF WOMEN AND SELECTED PUBLIC POLICIES

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A few words about the author:

The author is an graduate of the University of Lodz, Faculty of International and Political Studies. Now he is a student of the first year of doctoral studies. In 2010 he was a finalist of the Olympiad in Knowledge about Poland and the Modern World.

Abstract:

The aim of the study was to present the policy of equality between women and men in the European Union and the role of the European Cohesion Fund in this policy taking into consideration previous inequalities. The question was asked if the professional situation of women in the EU member states, including Poland, has changed in recent years and what possibly influenced it. It seems that Europe could become a continent where women's rights are best protected. The analysis shows that legal acts on the EU labor market are aimed at eliminating inequalities of opportunities and all kinds of gender-based discrimination (remuneration, participation of women in managerial positions, participation of women in public life, including the parliaments). The Cohesion Fund together with EU legislation is a complementary tool for equalizing opportunities. In this context, attention was also paid to cohesion policy in the Lodzkie Voivodeship. Based on our research, it was found that the Regional Operational Program of the Lodzkie Voivodship result in an increase in the level of professional activity and the ability to employ people taking care of children up to the age of three.

Keywords:

gender equality, the labour market, gender discrimination, equality policy, cohesion policy



IMMOBILISATION OF GLUCOSE OXIDASE AND LACCASE ON LAYERS OF POLYMERS AND BIOPOLYMERS

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I am a student of chemistry at Faculty of Chemistry of University of Lodz.

Abstract:

The presented work concerns the immobilization of enzymes such as glucose oxidase and laccase on the surfaces of composite conductive materials. Composite materials containing polyacrylic acid or chitosan were used to bind the enzyme. The second component was poly (3,4-ethylenedioxythiophene), which was to ensure the electrical conductivity of the entire system. The elements of novelty are studies using conductive materials with the participation of chitosan. The enzymes were bound to the layer with linkers such as glutaraldehyde and N-(3-dimethylaminopropyl) -N'-ethylcarbodiimide hydrochloride. The presence of active enzymes in the obtained systems was checked with the help of chemical tests used to test the enzyme activity. Glucose oxidase activity was examined with an o-dianisidine test and laccase activity was tested by reaction with 2,2'-azino-bis (3-ethylbenzthiazoline-6-sulfonic acid). Both reactions in the presence of an active enzyme cause a clear change in the color of the solution. In the final stage of the research, the possibilities of using the obtained systems for the construction of electrochemical sensors were tested. The tests consisted of voltammetric and amperometric tests of the activity of the examined layers and their sensitivity to the presence of an analyte, e.g. glucose.

The research was financed from the Student Research Grants of University of Łódź for 2019.

Keywords:

immobilization, enzyme, PEDOT, glucose oxidase, chitosan



CHARACTERISTICS OF MODEL EMULSIONS WITH ADDITION OF WILD MARINE COD PROTEINS PREPARATION

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A few words about the author:

I am a PhD student at the 1st year of doctoral studies at the Faculty of Food Sciences at the Warsaw University of Life Sciences. I am mainly interested in fats and food concentrate technologies, with particular emphasis on fat products and oleogels.

Abstract:

The people population is constantly growing and food industry is developing. There is a need to look for other sources of food or food ingredients. So far, the main source is conventional food, mainly terrestrial animals meat and legumes. Wild sources of proteins instead livestock can create new perspectives.

The aim of this study was to determine the possibility of obtaining the model systems of low fat emulsions and evaluate the changes of their physical properties as a result of addition of marine cod proteins preparation.

Model systems of oil-in-water emulsions (30/70 v/v), stabilized with 5% (m/m) of soy lecithin and 1% (m/m) of CMC (carboxymethylcellulose), and with the addition of a proteins preparation from wild cod (0, 4, 6, 8, 10 % m/m), were successfully prepared. Physical properties of the emulsions were tested. The consistency coefficients, flow exponent (Brookfield DV3T, USA), penetration force (Texture Analyser TA.XT plus, Great Britain) and colour parameters (CIE Lab, Minolta CR200, Japan), were determined. The investigated emulsions were the non-Newtonian liquids thinned by shearing. Increasing the concentration of the additive resulted in an increase the viscosity and penetration force of the systems. In addition, it allowed to obtain “darker”, more “yellow” and more “red” emulsions, in comparison to the control sample.

Keywords:

oil-in-water emulsions, wild cod, proteins preparation, rheological properties, colour parameters



DECREASING THE CALORIC VALUE OF HIGH FAT PRODUCTS BY THE ADDITION OF MICROCRYSTALLINE CELLULOSE

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Abstract:

The cookie-and-bakery industry offers a wide range of sponge-fat products. Baking fats are usually solid fats, containing large amounts of saturated fatty acids. Their excessive consumption may contribute to an increased risk of diet-related diseases (eg. hypertension). Due to the high consumption of sponge-fat products, there is the need to low their caloric value, eg by using fat substitutes.

The aim of this project was the attempt to reduce a fat content in sponge-fat products by partially replacing it with microcrystalline cellulose (MCG), and the study of physical characteristics of finished products changes.

Baking sponge-fat products (Unox XBC, Italy) with the addition of a fat substitute (MCG) in the amount of 0.0, 1.1, 1.7, 2.2% in relation to the weight of the raw dough. Physical parameters: mass, volume and volume mass of finished product, volume mass and specific mass of crumb, porosity, moisture, hardness, cohesion, elasticity, gumminess, chewiness (Brookfield Texture Analyzer, USA), were assessed (after baking and 7, 14, 21 days of storage). The best physical parameters, high volume and mass of finished products, the best porosity of the crumb and high moisture had the products with 2.2% of MCG. Extending the storage time caused a deterioration of the quality of all products. It is possible to limit the amount of fat in sponge-fat products by up to 40% using MCG. This fat reduction allows to decrease the caloric value of the final product by 19%.

Keywords:

sponge-fat products, fat replacers, microcrystalline cellulose, texture, storage



INNOVATIVE SYNTHESIS AND CHARACTERISTICS OF MULTIFERROIC BFO NANOPARTICLES

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A few words about the author:

The correspondent author is a second degree student of Materials Science at Materials Science and Ceramics Faculty. His scientific team interests include ceramic materials, with particular emphasis on multiferroic and high-entropy oxides.

Abstract:

Undeniably, one the major challenges of science nowadays is storage and processing of huge amount of data in with the use of minimized devices. It requires usage of achievements of fascinating field of study, known as spintronics. The kind of electrotechnics use a spin of particles as a information carrier apart from electric charge flow and requires usage of materials with unique magnetic and electric properties called multiferroics.

In this work one of the most widely used multiferroic- bismuth ferrite (BFO, BiFeO_3), which was synthesized in a form of nanoparticles in two separate variants: undoped one and doped with lithium ions. Applied wet chemistry synthesis method did not require usage of high temperature typical for solid state reactions. The products was examined by X-ray diffraction (XRD) to investigate phase compositions. Morphology of the powders were imaged with the use of transmission electron microscopy (TEM). In order to accurately define the structure of materials, EXAFS technique was applied.

Keywords:

multiferroic, bismuth ferrite, nanoparticles, ceramics



A NOVEL APPROACH FOR SYNTHESIS HIGH-ENTROPY PEROVSKITE OXIDES

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A few words about the author:

Paweł Krawczyk is a master student of Chemical Technology. He and his research team, realize a project involves synthesis a high entropy perovskite type oxide. They also works on development of obtaining thin films and nanostructured BiFeO₃.

Abstract:

There is no doubt that development of new materials is the future of modern engineering. Multicomponent high entropy oxide has drawn a great attention because of their singular properties. The latest approach to obtaining high entropy oxide is synthesis and characterization of multicomponent equiatomic perovskite oxide (ME-PO), presented in this work.

Single phase perovskite type oxide containing 6 different cations in equimolar amounts have been synthesized via co-precipitation hydrothermal method for the first time. This work is a brief report on novel approach for synthesis of the ME-PO in (Y_{0.2}La_{0.2}Nd_{0.2}Sm_{0.2}Gd_{0.2})CoO₃ system. Solutions of sodium hydroxide and ammonia solutions were used to acquire a precipitate from nitrates of mentioned metals. With the purpose of obtaining a pure phase composition in Y-La-Nd-Sm-Gd-Co complex system, a proper heat treatment was required. Thus, a single-phase perovskite oxide, with orthorhombic distorted Pnma perovskite structure was obtained.

The second part of research involved deposition the thin film of obtained multicomponent perovskite oxide on SrTiO₃ substrate by pulsed laser deposition method. The surface of the layer has been characterized by X-ray reflectivity technique (XRR) and atomic force microscopy (AFM). The measurements revealed the high smoothness and homogeneity of obtained layer, as well as island growth model of deposited film.

Keywords:

multicomponent perovskites, hydrothermal synthesis, high entropy oxides, thin films



THE OSTEOGENIC EFFECT OF ZIRCONIUM DIOXIDE(ZR02) COATINGS ON PRE-OSTEOBLASTIC CELL LINE (MC3T3) CHARACTERIZED BY LOWERED EXPRESSION OF MIR-21

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A few words about the authors:

We are a very ambitious and energetic team of young researchers focused on molecular biology and its possible applications in regenerative medicine.

Abstract:

Osteoporosis is one of the most prevalent diseases in developed societies. Bone fractures are common among patients due to lower bone density and its disrupted homeostasis, therefore new, suitable fracture treatment methods should be developed. ZrO₂ contributes to more efficient metabolism and adhesion of the cells while mir-21a-5p is crucial in osteogenesis[1,2]. We decided to test whether the ZrO₂ coating applied on glass coverslip with ALD(atomic layer disposition) technique can downplay the effects of mir-21a-5p inhibition in MC3T3 pre-osteoblastic cell line. For this purpose we analyzed cell proliferative and metabolic activity, as well as mitochondrial network development. We also tested the influence of the coatings on cells viability. Further, we determined the mRNA and miRNA levels for genes associated with osteogenesis and apoptosis. The results indicated that miR-21a-5p inhibition reduces proliferation and metabolism of pre-osteoblasts. Additionally, ZrO₂ derived from coatings may exert cytotoxic effect, however the pre-osteoblast cultured on ZrO₂ coatings expressed higher levels of osteogenic genes.

Keywords:

Osteogenesis markers, zirconium dioxide coatings ,preosteoblast, mir-21a-5p



FORMATION OF CONE-SHAPED ASPERITIES ON BIFEO₃ TARGET BY LASER ABLATION

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Wojciech Salamon is graduated from Material Engineering with bachelor degree at the Faculty of Material Science and Ceramics, AGH University of Science and Technology.

Abstract:

BiFeO₃ material was synthesized via low temperature solid state reaction using Bi₂O₃ and Fe₂O₃ powders as precursors. Obtained powder was examined by X-Ray Diffraction in order to define phase composition. Target of BiFeO₃ was prepared by cold isostatic pressing and low temperature sintering. Pulsed Laser Deposition process was performed using KrF 248 nm excimer laser with 1000 and 5000 laser pulses at 600 °C. The cone-shaped asperities were observed on the heat affected zones of the BiFeO₃ target after ablation during SEM analysis. The mechanism of formation of such structure was explained as preferential ablation of secondary phases. The EDX technique was used to identify ablation-resistant phases.

Keywords:

laser ablation, multiferroics, pulsed laser deposition, bismuth ferrite



INFLUENCE OF NOVEL PYRAZOLE COMPLEXES OF PLATINUM(II) ON CASPASE 3 EXPRESSION IN DLD-1 COLON CANCER CELLS

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Katarzyna Supruniuk graduated from Laboratory Medicine at the Faculty of Pharmacy at the Medical University of Białystok in 2016. In 2017, began doctoral studies in The Department of Medical Chemistry at the supervision of PhD Iwona Radziejewska.

Abstract:

An interesting group of anticancer drugs are platinum compounds whose precursor and main representative is cisplatin. However, due to its numerous side effects, research on new anticancer complexes of platinum are being carried out. A new class of potential anticancer drugs are dinuclear pyrazole-platinum(II) complexes - PtPz4 and PtPz6. Apoptosis is an ordered and orchestrated process of cell death which mediators are caspases. Among them, caspase-3 is a frequently activated death protease that coordinates the destruction of cellular structures. The purpose of the study was to evaluate the effect of pyrazole complexes of platinum(II) on caspase 3 expression in DLD-1 colon cancer cells. To assess the effects of six novel derivatives of platinum(II) - PtPz1-6 compounds on the viability of fibroblast cells, MTT assays were performed. Based on IC₅₀ value PtPz4 and PtPz6 were selected to further studies. Colon cancer DLD-1 cells were cocultured for 24 h with 10 μ M PtPz4, PtPz6 and cisplatin (Pt). To assess CAS3 expression in cell lysates Western blotting analysis was performed. CAS3 gene expression was evaluated by real-time PCR. All studied compounds increased protein level of CAS3 in DLD-1 colon cancer cell. The mRNA level of caspase was significantly decreased after PtPz4 and PtPz6 treatment. The observed changes in CAS3 expression suggest an important role of pyrazole derivatives of platinum(II) in activation of this apoptotic executioner caspase in colon cancer cells.

Keywords:

caspase 3, cisplatin, glycosylation



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