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NATIONAL SCIENTIFIC CONFERENCE
"e-FACTORY OF SCIENCE"

APRIL • 09 • 2022

**THE BOOK
OF ABSTRACTS**

National Scientific Conference

„e-Factory of Science”

VII edition

The Book of Abstracts

April 09, 2022



7th edition
National Scientific Conference
"e-FACTORY OF SCIENCE"
April 09, 2022

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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 published in accordance with the submitted texts. The authors of individual papers are responsible for the lawful use of the materials used.

e-mail: fundacja@promovendi.pl
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ISBN: 978-83-963887-1-1

Open access



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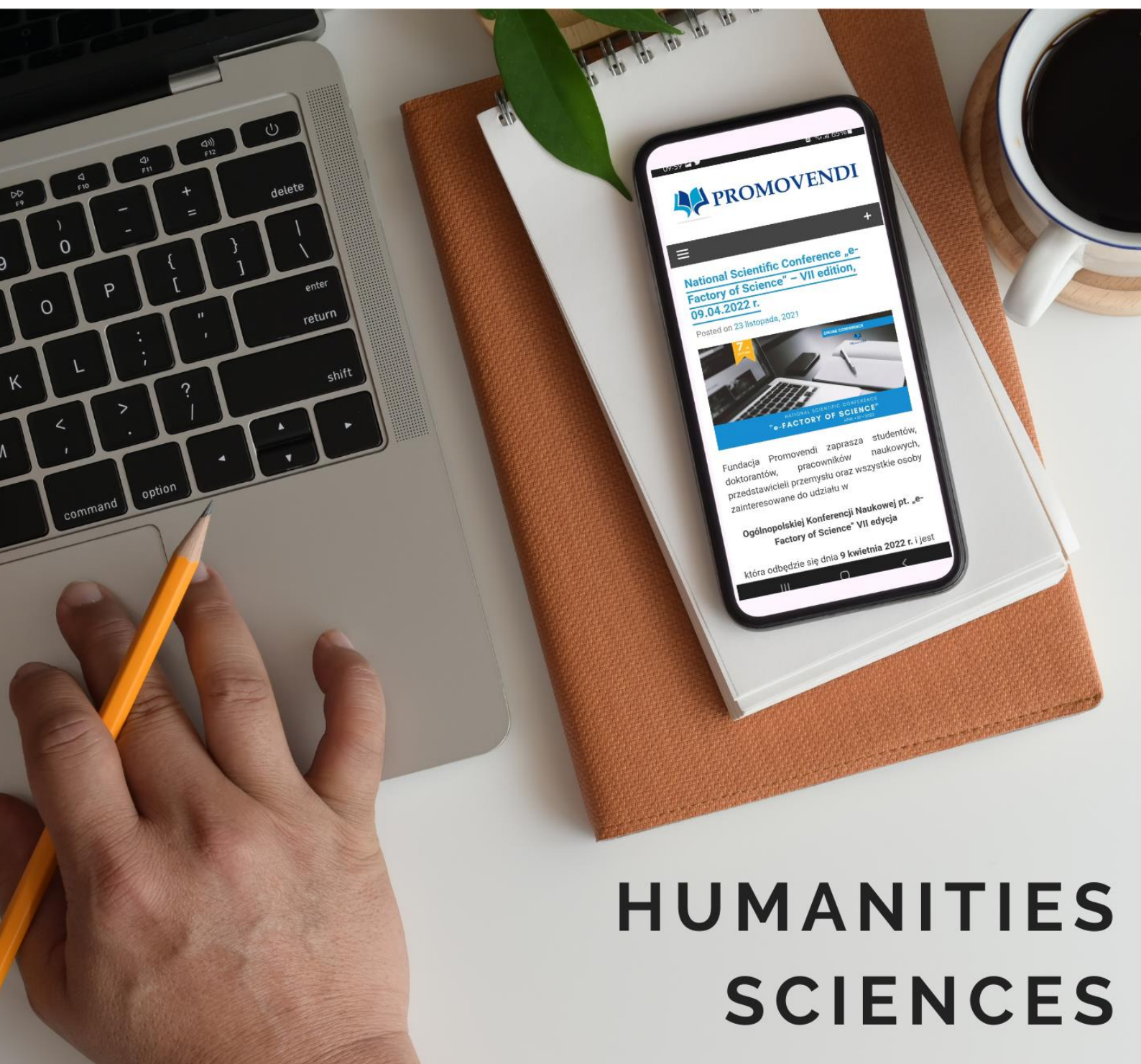
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ABSTRACTS OF PRESENTATIONS



HUMANITIES SCIENCES



THE BIOLINGUISTIC FOUNDATIONS OF THE MINIMALIST PROGRAM

Lis Amadeusz

University of Opole

amadeuszlis@interia.pl

A few words about the author(s):

The author is a Ph.D. student of Opole University. I am currently writing a thesis on the problem of inflectional languages in the Minimalist Program. Nevertheless, my research interests include, but are not limited to the biolinguistic enterprise.

Abstract:

In the presentation the author tries to challenge the existing views of the biological origins of the Minimalist Program that fossilized in the current scientific literature. Conforming to the most popular scientific beliefs, saltational theories fits well with the minimalist account. The remaining approaches, that is, adaptationist theories, exaptationist theories and spandrel theories do not fit the overall picture that is left open under a minimalist view of the Language Faculty. The author proposes an alternative proposition according to which the Human Language Capacity (HLC) (the biological capacity of the human brain that allows us to acquire and use any natural language) came into being not as a consequence of a single genetic mutation but rather as a consequence of a viral infection that took place somewhere in brain tissue of the early Homo Sapiens Sapiens representatives. It is speculated that approximately between 40 and 80 percent of the human genome originated from some archaic viral invasion. Following the same line of reasoning, the consciousness itself was also the product of an ancient virus. As a consequence, it can be speculated that Language (the capacity to utter any natural language) was an immediate response of being gifted the endowment of consciousness. Does Minimalism fit into the above picture? The viral infection theory is the newest enterprise in the generative reasoning supported by a few notable linguists, e.g., Benítez-Burraco, Uriagereka.

Keywords:

biolinguistics, the Minimalist Program, merge, natural language, saltational theories



THE NEUROBIOLOGY OF LUCID DREAMING

Weronika Nieciecka

SWPS University of Social Sciences and Humanities in Warsaw

verone.no13@gmail.com

A few words about the author(s):

Psychology student at SWPS University with a Bachelor's degree in Quantitative Methods. I believe psychology is a beautiful way to have science discover a beauty of the nature.

Abstract:

Dreaming, and especially lucid dreams, is a phenomenon studied from a biological, psychological and even therapeutic perspective. Dreams are most often associated with the REM sleep phase, the neural and behavioral correlates of which are similar to the states of psychosis, although dreams may also occur in the NREM phases. Research on lucid dreams indicates their occurrence during REM sleep, but with a suggested special electrophysiological activity - in the prefrontal cortex. At the neural pathways level, the role of the cholinergic and noradrenergic pathways is being investigated. The first models explaining the properties of lucid dreaming resulting from neurobiology have been developed, and the relationship between this phenomenon and mental processes in an excited state is being searched for. The aim of the presentation is to indicate that by integrating the knowledge about the biological background of lucid dreams, it is possible to better understand their possible practical applications.

Keywords:

ucid dreaming, neurobiology, REM



COVIDIANIE, ZASYFIONKOWANI, HYCLE Z TESTAMI. FIGURE OF THE OTHER/ENEMY IN THE DISCOURSE OF COVID-19 VACCINATION SCEPTICS

Beata Duda, Ewa Ficek*

University of Silesia in Katowice

*ewa.ficek@us.edu.pl

A few words about the author(s):

Beata Duda – Ph.D., academic interests: discourse analysis, corpus linguistics; peri-pandemic discourse related to COVID-19. Ewa Ficek – Ph.D., academic interests: discourse analysis; therapeutic discourse and peri-pandemic discourse related to COVID-19.

Abstract:

The scientific presentation will focus on the methods of naming and linguistic profiling of the Other/Enemy present in the Polish discourse of COVID-19 vaccination sceptics (the analysis will include, among others, discrediting labels relating to health service representatives, vaccinated persons, persons complying with epidemic restrictions or those in power/setting restrictions). Discourse analysis and corpus linguistics will constitute the theoretical and methodological basis of the research; the Internet comments posted on the official Facebook account of the Ministry of Health – as a neutral space, potentially open to representatives of various discursive communities – from September 1 to November 15, 2021, will be used as the research material.

Keywords:

pandemic, vaccination against COVID-19, the Other/Enemy discrediting, linguistic analysis of discourse, corpus linguistics



POPULIST DISCOURSE IN THE USA – HISTORICAL BACKGROUND

Albert Guziak

University of Warsaw

a.guziak@uw.edu.pl

A few words about the author(s):

Ph.D. candidate at the Institute of Applied Linguistics of University of Warsaw, interested in the linguistic analysis of contemporary discourse of right-wing populist parties in Europe, graduate of European law, German and French language studies.

Abstract:

The aim of this paper is to shed some light on the origins of the populist rhetoric in America and by extension of its worldwide occurrence. I intend to investigate the cultural and social phenomena in America in the 18th and 19th century that contributed to the rise of the first notable populist party (People's Party) in the world and left the traces in the modern times. There is no doubt that in the past few years, the populist rhetoric, irrelevant of the political spectrum, has resurged as an efficient political tool to gain power around the globe. The populist rhetoric invokes the „ordinary people“ as the true sovereigns of a country, opposing them to „corrupt elites“, of whatever nature they might be, that allegedly endanger the existence and growth of the „people“; of whom the populists consider themselves as the defenders. To understand the nature and persistence of populist language, one must return to its sources – the inheritance of most Americans who tried to speak for the people in the late nineteenth and twentieth century.

Keywords:

America, discourse, ordinary people, populism



PROFILE OF AN EXEMPLARY ACADEMIC TEACHER

Katarzyna Hałas

Maria Curie-Skłodowska University

khalas93@gmail.com

A few words about the author(s):

Ph.D. student at the Institute of Social Communication and Media Sciences. She pursues her research interests in the field of media education, new media, and innovative technologies in academic education.

Abstract:

The aim of the presentation is to present an image of an exemplary academic teacher. The image of an academic teacher is created by many entities. However, the most important source of the lecturer's image is the students' opinion. The audience creates the desired model of an ideal lecturer. The image of the teacher affects the quality and the effectiveness of his/her work, and even contributes to building the image of the university. Conducted surveys of the image of an academic teacher illustrate, what is the opinion on this subject in the perception of students. Personality is a component of the image. In order to find out what is imagined to make a perfect educator, a survey was carried out among 78 students from various universities. The analysis of the research material permitted the recognition of a profile of an exemplary academic teacher in the context of the desired personality traits.

Keywords:

profile, academic teacher, higher education



SYNTACTIC STUDIES OF SELECTED POLISH LEGAL ACTS

Weronika Kosmalska

*Modern Polish Language Grammar and Onomastics Facility, Faculty of Polish and Classic Philology,
University of Adam Mickiewicz in Poznan*

w.kosmalska4@gmail.com

A few words about the author(s):

Weronika Kosmalska – Ph.D. student at the Doctoral School of Language and Literature of Adam Mickiewicz University in Poznan; Master's degree in law and Polish philology of Adam Mickiewicz University in Poznan, author of texts on educational law.

Abstract:

The presentation presents results of syntactic research conducted on selected legal acts. The research material constitutes 600 utterances from six acts that can be sorted in three most important branches of the Law - Civil Law, Criminal Law, and Administrative Law (one key substantive law act and one procedural law act per each branch). The quantitative analysis of syntactic parameters has been performed with the use of traditional syntax description model. The results acquired in ten fields are collated with results of other statistical research conducted on scientific and artistic texts in order to determine the stylistic and syntactic properties of examined legal acts. The quantitative analysis is supplemented by the qualitative analysis of description.

Keywords:

legal acts, statistics, syntax, legal text



"WINNIE-THE-POOH" BY A. A. MILNE IN TWO POLISH TRANSLATIONS

Natalia Łaniecka

Adam Mickiewicz University in Poznań

2438099u@gmail.com

A few words about the author(s):

I am a student of Ethnolinguistics at Adam Mickiewicz University in Poznań. I am interested in translation.

Abstract:

"Winnie-the-Pooh" by A. A. Milne, despite the passage of time, is still very popular in Poland and in the world. The best-known Polish translation of this book is "Kubuś Puchatek" by Irena Tuwim. Few, however, know that there is also another Polish translation by Monika Adamczyk-Garbowska entitled "Fredzia Phi-Phi".

The purpose of this presentation is to compare both of these translations. Such elements of the novel as proper names (names of characters and places) and songs performed by the characters were compared.

Keywords:

"Winnie-the-Pooh", translation, comparison



THE TESTATOR'S CHILDLESSNESS AS A CIRCUMSTANCES INFLUENCING THE SHAPE OF THE STATUTORY ORDER OF SUCCESSION

Ewa Łapińska

University of Białystok

e.lapinska@uwb.edu.pl

A few words about the author(s):

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

Abstract:

The death of a natural person is a circumstance that makes it necessary to regulate the fate of the property accumulated during the testator's lifetime. The legislator gave priority to testamentary inheritance, which means the act will be the title of the inheritance, when the testator didn't make a will. The determinant influencing the shape of the statutory order of succession is the broadly understood lack of descendants of the testator. The death of a childless testator constitutes a circumstance of granting an inheritance share in his property to the following categories of statutory heirs: the spouse, parents, siblings of the testator and their descendants. Doubts arise when it comes to the legitimacy of appointing the testator's siblings and their descendants to inheritance. Noticing the lack of influence of the testator's siblings on the creation and enlargement of his property and the lack of diametrical changes in the economic sphere caused by the testator's death make it injustice to appoint the aforementioned group of statutory heirs to inheritance in conjunction with the spouse, who at least made efforts to improve the state of the assets of the joint property half of which is most often included in the estate. In the current legal status granting the right to inherit the testator's siblings and their descendants, appointment to inheritance a controversial group of statutory heirs becomes the source of "free" property benefits.

Keywords:

inheritance law, testator, childlessness



SCIENTOMETRIC ANALYSIS – STUDENT ORGANIZATION MANAGEMENT MODEL

Iwona Michalowska*, Sandra Szewczuk, Maria Stachurska

Poznan University of Technology

*iwona.michalowska@put.poznan.pl

A few words about the author(s):

A graduate of the Poznań University of Technology, an administrative employee of the Integrated Service Center. Since 2021, he has been combining professional work with a doctorate in the scientific discipline: management and quality science.

Abstract:

With the introduction of numerous and significant changes to the Act of 20 July 2018 – Law on Higher Education and Science, issues related to the academic research movement have become an essential and often underestimated aspect. The diversity and often lack of uniform rules at universities hinders numerous processes related to the management of student organisations. Changes in the office of unitary authorities and the central university bodies also require introducing rules whose cyclicity and centralisation will help with issues related to additional student activity.

The literature resear analysis of available statistical data has had the scale to which this issue applies. In addition, significant differences were discovered in the approach to the problems related to student organisations between universities located in Europe and those found, for example, in the United States.

The preparation goodquate introduction to the topic was made possible by performing a detailed scientometric analysis of selected keywords using the VOSviewer software. Numerous co-correlation categories, such as co-authorship, citations, etc., were also assessed. Above all, however, attention was paid to the increase in interest in similar topics over the last years, which was the first step in research work. Appropriately constructed rankings and visualisations will expand the case and create an optimal management model for student organisations.

Keywords:

student organizations, science clubs, management model, university management



THE PHENOMENON OF JUVENILE DELINQUENCY IN POLAND IN THE YEARS 2010-2020

Monika Niedźwiecka

The University of Szczecin, Law & Administration Department

monika.niedzwiecka@usz.edu.pl

A few words about the author(s):

He works as an assistant at the University of Szczecin, working in a team dealing with substantive criminal law. The subject of interest and research is substantive criminal law with particular emphasis on crimes against life and health.

Abstract:

The number of punishable acts committed by minors in the years 2010-2020 did not increase. Analysis of data shows that there has even been a clear decrease in the total number of crimes committed by minors. The of statistical data that the punishable acts of minors are characterized by increased brutality, which is associated with an increasing number of punishable acts. The problem of juvenile delinquency, although still important, seems to be well controlled and properly addressed, which may be indicated by the systematic decrease in total crime. The problem presented in the work is the lack of current, complete statistics that would present a complete picture of juvenile delinquency in terms of individual crimes, age groups, and gender of minors. The share of punishable acts of minors in the field of robbery offenses should also be analyzed in more detail due to the high percentage of activity of minors in this type of crime. More attention should also be brought to the issue of crime that occurs in schools. It is important to identify factors that contribute to increased aggression in a peer environment. Determining the factors that determine such behaviors will enable effective counteracting the commission of punishable acts and will enable the implementation of activities that will teach young people how to deal with the excess of bad emotions, preventing the escalation of aggression towards third parties.

Keywords:

crime, minors, punishable acts



THE UPPER PALAEOLITHIC MUSICAL INSTRUMENTS

Kacper Pelczarski

University of Wrocław

kpelczarski93@gmail.com

A few words about the author(s):

Born in Bielsko-Biała, graduate of University of Wrocław, where started research genesis and evolution of music, function of music in The Palaeolithic and palaeolithic musical instruments.

Abstract:

The presentation is about the classification and occurrence of musical instruments in the Upper Palaeolithic. As with other forms of symbolic culture, there was a significant increase in the number of musical instruments in the Upper Paleolithic in Europe. The most numerous group are aerophones, mainly flutes and pipes made of bird bones; whistles made of phalanges, which are found throughout Europe in practically all Upper Paleolithic cultures. Also there were found artifacts interpreted as percussion instruments, bullroarers, scrapers (including the so-called Venus of Laussel in a bas-relief). Additionally, on the basis of a rock painting from the Le Trois Freres cave, musical bows could appear in this period too.

Keywords:

The Upper Palaeolithic, musical instruments, bullroarers, Venus of Laussel, symbolic culture



PROBLEMS WITH LEARNING FOREIGN LANGUAGES CAUSED BY REMOTE LEARNING

Anna Pych

State Higher Vocational School in Nowy Sącz

annapasiut@interia.pl

A few words about the author(s):

The author is a teacher of Russian and a lecturer at the State Higher Vocational School in Nowy Sącz. She conducts research on motivation in learning foreign languages. As a trainer, he conducts trainings in the field of interpersonal communication.

Abstract:

Nowadays, children and young people are discouraged from learning foreign languages. There are a variety of problems in language learning caused by remote learning as well as isolation. Schoolchildren have very large gaps in knowledge, which is very difficult to make up. All this causes reluctance and lack of motivation to continue learning. Therefore, a number of actions are taken that can improve the situation and help students develop their language competences.

Keywords:

foreign languages, learning, motivation, remote learning, youth



THE RELATIONSHIP OF IDENTITY TO SELF-EFFICACY BELIEFS

Monika Strzelecka

Catholic University of Lublin

monstrzelecka@wp.pl

A few words about the author(s):

Doctoral student in Psychology at the Catholic University of Lublin, psychodynamic psychotherapist for adolescents and adults.

Abstract:

The relationship of identity to self-efficacy belief in the domains of occupational, knowledge acquisition, intimate relationship, worldview formation, interpersonal relationships (friendships), leisure activities, gender role taking, and virtual domain was examined. The Identity Development Dimensions Scale (Luyckx, 2006, in adaptation Brzezińska, Piotrowski; 2010) and the Domain Self-Efficacy Belief Scale (Schwarzera and Jeruzalem, 1993, in adaptation Juczyński, 2001) were used for the study. A total of 425 subjects participated in the study, ranging in age from 19 to 30 years, a period of emerging adulthood. Results indicated significant correlations at a moderately strong level between the identity-identification-commitment dimension and most of the self-efficacy belief domains. In contrast, the study did not confirm significant correlations between the identity-exploration-in-depth dimension and self-efficacy belief domains. Thus, it appears that taking on developmental tasks and identifying with them is associated with self-confidence, while simply exploring and reassuring oneself about commitments made is not associated with self-confidence.

Keywords:

domain self-efficacy belief, identity, identification with commitment, exploration in depth



"CHORALE IN HONOR OF SAINT BLAISE" BY EWA FABIAŃSKA-JEŁIŃSKA AS A WORK THAT IMPLEMENTS THE AUGUSTINIAN-BOETIAN MUSICAL IDEAS

Jerzy Fryderyk Wojciechowski

Adam Mickiewicz University, University of Zielona Góra, Poznań Uniwersytetu of Physical Education

jerzy.fryderyk.wojciechowski@gmail.com

A few words about the author(s):

Jerzy Fryderyk Wojciechowski. Composer, musicologist, violinist and pianist. He graduated in music composition at the Academy of Music in Poznań and musicology at the University of Adam Mickiewicz in Poznań.

Abstract:

Ewa Fabiańska-Jełińska has many religious compositions in her catalogue of pieces. Her creative interests, however, are concentrated in a special way within instrumental genres.

"Chorale in honor of Saint Blaise" is an example of an adaptation of the ideas related to music preached by Saint Augustine and also by Saint Boethius. Both philosophers try to transform ancient ideas and adapt them to Christian music, especially liturgical music. Fabiańska's composition is not liturgical, but her poetics, the composer's techniques and performance techniques are examples of adapting certain ideas that were particularly important for hundreds of years of religious music of the Catholic Church.

Keywords:

musicology, music, contemporary, Poznań, Fabiańska



ADVERTISING OF DRUGS TARGETED AT PROFESSIONALS AND ITS INDIRECT IMPACT ON PATIENTS

Weronika Woźna-Burdziak

Faculty of Law and Administration of the University of Szczecin

weronika.wozna-burdziak@usz.edu.pl

A few words about the author(s):

A lawyer by profession, dealing with the protection of consumer rights and advertising law. Assistant at the Faculty of Law and Administration of the University of Szczecin.

Abstract:

Medicines are a product of a special kind, taking them has a direct impact on the health and often even life of patients. However, few people pay attention to the impact of advertising on the amount or type of drugs consumed by patients, while it is known that advertising is one of the basic forms of contact between drug manufacturers and the patient/consumer. However, the legislator, taking into account the uniqueness of medicinal products, did not leave the manner of advertising them voluntary, introducing a number of related restrictions and bans. The Polish legislation introduces, among other things, the division of drug advertising into advertising directed to the public and advertising directed at professionals. It would seem that advertising targeted at professionals will not have an impact on the average patient, but it is not. The aim of this study is to analyze the regulations relating to advertising of drugs targeted at professionals and to show their indirect impact on consumers, with reference to case law and examples.

Keywords:

advertising, drugs, consumer protection



TEACHERS' OPINIONS ON CONTEMPORARY YOUTH

Marcelina Wróbel

University of Adam Mickiewicz in Poznań

m.wrobel97@o2.pl

A few words about the author(s):

I graduated from master studies in the field of pedagogy with the specialization of rehabilitation with elements of criminology. My research interests focus on the broadly understood category of young people.

Abstract:

My presentation presents the results of research and the analysis of my own research carried out for the thesis, which was an attempt to illustrate the general opinion of teachers about contemporary youth, taking into account the prevailing stereotypes. Conducting research with the use of questionnaires, I examined whether and how the opinion about youth, commonly accepted in society, determines how it is perceived by a specific social and professional group, such as teachers. I presented the most important terminology related to the topic of my work, the characteristics of school education as well as the most important functions and tasks of the teacher. The methodology of own research lists the research subject and objectives, research questions raised in the research, variables and indicators, as well as the tools and methods used. The last chapter focused on the analysis and interpretation of the results of own research. It presents the answers given by the respondents in the questionnaire, their analysis and interpretation were made, as well as a comprehensive summary of the own findings.

Keywords:

social functioning, teaching staff, contemporary youth, school environment, social environment



THE INFLUENCE OF PERSONALITY TRAITS ACCORDING TO THE BIG FIVE MODEL ON SHAPING THE RELATIONSHIP WITH MONEY

Waleria Zachwatowicz

University of Warmia and Mazury in Olsztyn

waleriazachwatowicz@gmail.com

A few words about the author(s):

I received a bachelor's degree in Management faculty and am currently studying Psychology. I am interested in the impact of human psychology on economics studies.

Abstract:

Shaping the relationship with money is influenced by many factors. Among them, parental attitudes, upbringing and personal life experiences are mainly distinguished. The presentation has proven that personality traits also have a significant impact. The analysis was based on the Big Five Model theory.

Keywords:

psychology, big five, money, personality



ASPECTS INFLUENCING PURCHASING DECISIONS WHEN CHOOSING FACE CARE COSMETICS

Weronika Onyśko

Poznań University of Business and Economics, Al. Niepodległości 10, 61-875 Poznań, Poland

weronikaonysko@gmail.com

A few words about the author(s):

I am 3rd year student of the 1st degree in the field of Commodity Science. I am a member of the student research club - Qualitas. I take part in various events and projects that allow me to broaden my knowledge.

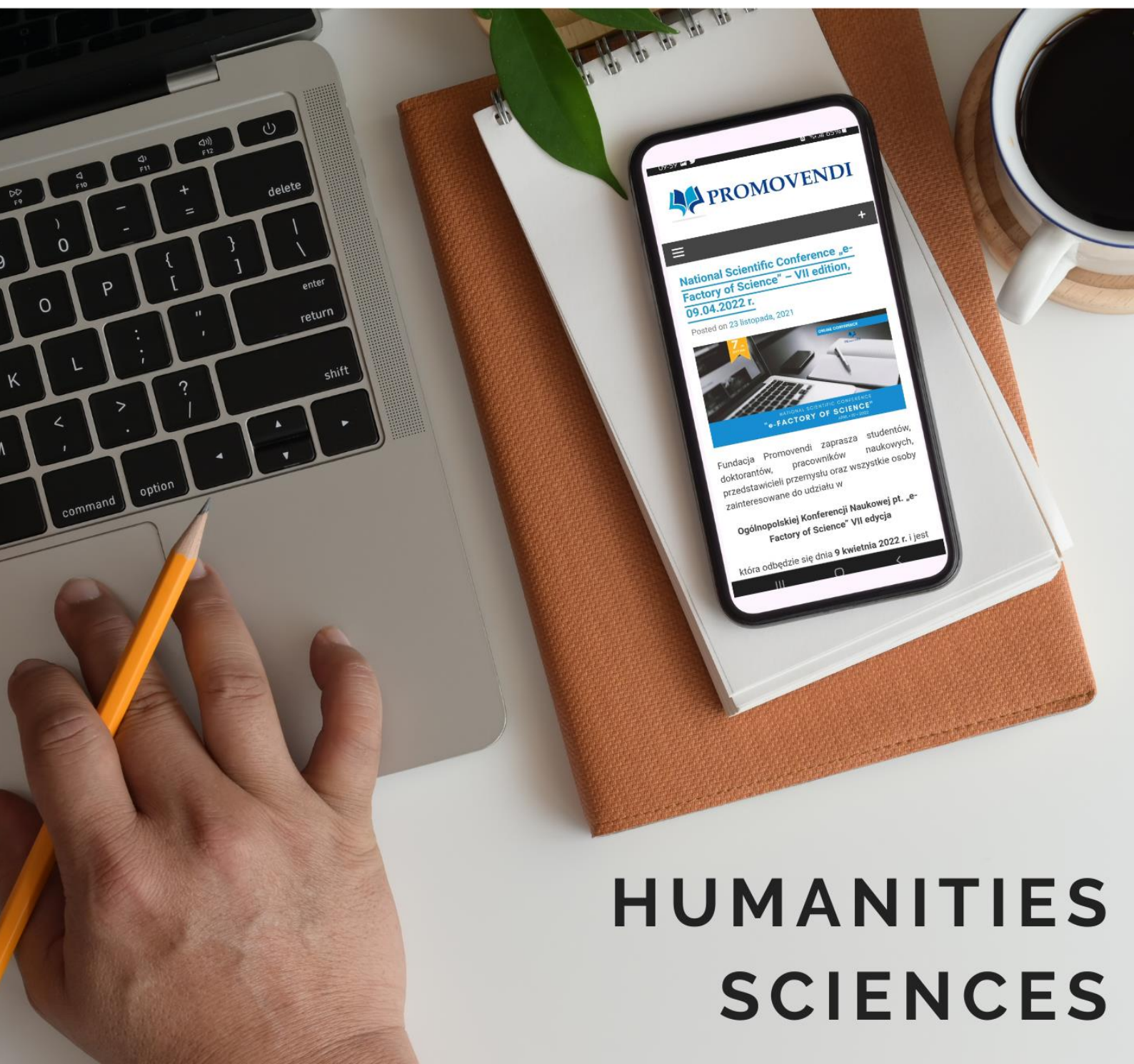
Abstract:

The modern market provides a wide range of cosmetic products. The increasing demand from buyers and the high level of competitiveness are forcing manufacturers to follow new trends both in industry and in the environment. Nowadays, cosmetics have to meet many consumers' expectations, because maintaining a healthy appearance is part of the everyday life of most buyers. The aim of the research was to find out about the determinants that influence purchasing decisions in the selection of cosmetics for facial care. The survey was conducted in March 2022 using a questionnaire. It was created and made available on an online platform. 100 people took part in the study and the largest group were women. The properties of the cosmetics and their ingredients turned out to be the most important for the respondents. As the results shown, the vast majority always or almost always familiarize themselves with the composition of the facial care products they buy. Satisfaction with products occurs when the cosmetic is in line with a manufacturer declaration on the packaging. The conducted research allowed to establish that for a potential consumer, the composition of the purchased face care products is very important, and the price is not the most important determinant influencing purchasing decisions. Products in this category are associated with good quality when they do not sensitize or irritate the face, but also when they have not been tested on animals and they contain natural ingredients.

Keywords:

skin care, cosmetics, purchasing decisions, face care

ABSTRACTS OF POSTERS



HUMANITIES SCIENCES



DEVELOPMENT ASPIRATIONS OF MUNICIPALITIES IN THE CONTEXT OF DEINDUSTRIALIZATION

Magdalena Cybulska

*University of Warsaw, Faculty of Geography and Regional Studies,
Chair of Urban Geography and Spatial Planning*

magdalena_cybulska@uw.edu.pl

A few words about the author(s):

Magdalena Cybulska – Ph.D. student and teaching assistant at the Faculty of Geography and Regional Studies.

Abstract:

After the changes that took place in many Polish municipalities as a result of the political transformation in 1989 (Karpiński et al. 2013), local authorities often had to face social and economic challenges and redirect the development of their municipality. The aim of the study is to show the impact of the deindustrialization process related to the collapse of industrial plants on development aspirations in selected local government units. As part of the qualitative study, pairs of municipalities with different changes in the level of industrialization of the local economy will be compared. Based on the analysis of the results of the survey and old and current strategic documents, an answer will be given to the following research questions: did the deindustrialization process in the early 1990s diversify the development aspirations of communes in Poland?

References:

Karpiński A., Paradysz S., Soroka P., Żółtkowski W., 2013, Jak powstawały i jak upadały zakłady przemysłowe w Polsce, MUZA SA, Warszawa.

Keywords:

deindustrialization, development aspirations, local authorities



A SCOUT WITH DISABILITY? THAT SOUNDS PROUDLY!

Maria Czubak

The Maria Grzegorzewska University in Warsaw

mc67500@aps.edu.pl

A few words about the author(s):

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

Abstract:

In 1958, the Polish Scouting and Guiding Association in cooperation with the Ministry of Health and the Ministry of Education created the Unblazed Trail Scouting Troops. The name comes from the snowy trail, which was traveled by the participants of the first scout leader course - it was as demanding to overcome as the daily work with children with disabilities. Is the trail easier to walk after all these years?

Keywords:

disability, scouting, Polish Scouting and Guiding Association



FACEBOOK IN THE CONTEXT OF MARKETING COMMUNICATION OF LOCAL ENTERPRISES FROM SZCZECIN – BASED ON OWN RESEARCH

Martyna Kostrzewska

University of Szczecin, Institute of Management

mkostrzewska93@gmail.com

A few words about the author(s):

Martyna Kostrzewska Ph.D. candidate at the Faculty of Economics, Finance and Management of the University of Szczecin. She is interested in the issues of Social Media Marketing.

Abstract:

Social Media are getting fast growing form of communication. Today customers often use available social media looking for information about companies. Interesting question seems to be, how the local business may use Facebook to communicate with customers. Based on observation of the market and the need for change the process of communication in service companies in Szczecin, the author adopted as the aim of the article the identification of new marketing solutions for the service market by way of an evaluation of the possibility of taking advantage of social media potential and social media activities carried out by local companies. In assessing the tools characteristic of new media and the attitude of companies towards these tools, an attempt was made to identify opportunities for companies to use social media. As part of the research, a questionnaire was used that was targeted at owners and managers of local companies from Szczecin. The study was expanded to include virtual ethnography, which involved observation of a company's profile on social media.

Keywords:

Facebook, communication, marketing innovations, social media, service companies



COMPLETE NUTRITION OF PRESCHOOL AND SCHOOL CHILDREN IN THE CONTEXT OF FOOD SELECTIVITY

Angelika Lenart

The John Paul II Catholic University of Lublin

nikia12@vp.pl

A few words about the author(s):

Angelika Lenart, M.A., Ph.D. student at CUL, Institute of Pedagogy.

Abstract:

Proper nutrition in preschool and school age determines the proper development and maintenance of a child's physical, intellectual and emotional fitness.

Wholesome, balanced nutrition is one of the most important factors influencing human development and maintaining good health. It consists in fully covering the body's need for energy and all the necessary nutrients in the right ratio and quantity, taking into account the number of meals and their distribution throughout the day, taking into account gender, age and physical activity.

Deficient nutrition contributes to the deterioration of health, impaired functioning of the immune system, disturbs the proper development of bone tissue and causes excessive irritability and decreased concentration. On the other hand, excessive consumption of food by children and adolescents leads to overweight or obesity, which may be caused by an incorrect diet established in the family.

Keywords:

nutrition, food selectivity, child, prevention



PEDAGOGUES, WHO CHANGED THE WAY OF THINKING ABOUT DISABILITY

Sylvia Romanowska-Jonio

University in Białystok

s.romanowska@uwb.edu.pl

A few words about the author(s):

My name is Sylvia Romanowska-Jonio. I am an academic lecturer at University and I am also early education teacher. I am interested in new technologies and special educational needs.

Abstract:

The purpose of the article entitled "Pedagogues, who changed the way of thinking about disability" is to present three profiles of educators, who significantly influenced the development of society's thinking about disability, especially children.

Keywords:

disability, special educational needs, pedagogy



SENIORS AS SOCIAL MEDIA USERS

Daria Wrukowska

NOWE POKOLENIE Martyna Kostrzevska

dariawrukowska@gmail.com

A few words about the author(s):

Daria Emilia Wrukowska is a Ph.D. student at the Faculty of Economics, Finance and Management of the University of Szczecin.

Abstract:

Social networks have become an everyday communication tool for many people, thanks to which they allow users to connect with each other more effectively than traditional communication tools allow. Social networks provide a place where owners of accounts on social channels can share their opinions through various activities (e.g. posting, commenting, sharing, chatting). Communication through social networks plays a vital role in achieving a more comprehensive social experience and connecting with friends and family members online.

Keywords:

social media, seniors, ICT, internet, e-health



ANIMALS IN THE THERAPEUTIC PROCESS

Sylvia Zaroślak

Maria Grzegorzewska University

sylvia.zaroslak@gmail.com

A few words about the author(s):

Student of The Maria Grzegorzewska University, in the field of Special Education, focused on early intervention for child development.

Abstract:

Animal therapy, also known as zootherapy, is one of the many possible therapeutic forms. It is used not only among people with disabilities, but also among people who need emotional support. The sensitivity of animals to picking up a variety of stimuli and the interactions they enter into with humans have an invaluable effect on both the cognitive and emotional development of an individual. For these reasons, animal therapy is increasingly used not only by children, but also by adults and the elderly.

Keywords:

animal therapy, forms of therapy

ABSTRACTS OF PRESENTATIONS



TECHNICAL AND NATURAL SCIENCES



RAMAN, AFM, SNOM IMAGING AND FLUORESCENCE STAINING IN THE BIOCHEMICAL ANALYSIS OF HUMAN INTESTINAL CELLS

Karolina Beton*, Beata Brożek-Pluska

*Lodz University of Technology, Faculty of Chemistry, Institute of Applied Radiation Chemistry,
Laboratory of Laser Molecular Spectroscopy, Wróblewskiego 15, 93-590 Łódź*

*karolina.beton@dokt.p.lodz.pl

A few words about the author(s):

Karolina Beton is a Ph.D. student at IDS PŁ in the field of Chemical Sciences. Her scientific research concerns Raman Spectroscopy and imaging and its applications in medical diagnostics. Her scientific work includes research on cell biology and cancers.

Abstract:

Colorectal cancer is the second most commonly diagnosed cancer in the world. Raman, AFM and SNOM imaging allow for unambiguous differentiation between normal and neoplastic cells based on spectroscopic biomarkers, nanomechanical properties and microscopic data. The subjects analyzed were: normal CCD-18 Co cells, CCD-18 Co cells under oxidative stress, CCD-18 Co cells under ROS generation conditions supplemented with vitamin C. Statistical analysis (ANOVA and PCA) showed that normal, ROS-treated cells and cancer cells of the human colon can be differentiated based on Raman spectra and nanomechanical properties. The proposed biomarkers of cancerous changes in the human intestine can be used in clinical diagnostics, supporting the classical (including intraoperative) histopathological analysis.

In recent years, a number of fluorochromes have been obtained, which, on the one hand, bind specifically to the membranes of specific cellular organelles, which allows to determine their possible location in the cell, and, on the other hand, are suitable for "in vivo" staining. Among them, we can distinguish dyes that bind to mitochondria, cell nuclei and lysosomes. Cell dyes are strictly specific, thanks to which they allow the localization of organelles in the cell and the tracking of changes in their properties and morphology.

This work was supported by the National Science Center of Poland (Narodowe Centrum Nauki) UMO-2017/25 / B / ST4 / 01788.

Keywords:

Raman spectroscopy, colon cancer, supplementation, oxidative stress, Raman imaging



PREPARATION AND PROPERTIES OF MATERIALS CONSTITUTING THE MATRIX IN SINTERED METALLIC-DIAMOND TOOLS

Elżbieta Cygan-Bączek*, Sławomir Cygan, Piotr Wyżga

*Lukasiewicz Research Network – Krakow Institute of Technology,
Center of Advanced Manufacturing Technology, Zakopiańska 73 Str., 30-418 Krakow, Poland*

*elzbieta.baczek@kit.lukasiewicz.gov.pl

A few words about the author(s):

Chief specialist in the field of materials science and manufacturing engineering.

Abstract:

The work presents the possibilities of producing a substitute for a commercial matrix material, which is characterized by increased mechanical and tribological properties for sintered metallic-diamond tools intended for the machining of stones and concrete. In this study, improvement in hardness and wear behavior of sintered prealloyed matrix for diamond impregnated tools by heat treatments was investigated. Powder mixtures were ball-milled for 8 hours and densified to <1% porosity using spark plasma sintering (SPS) methods. After consolidation, all samples were characterized by apparent density, X-ray diffraction (XRD), scanning electron microscopy (SEM), hardness and flexural strength tests. Resistance to abrasive wear was evaluated in both 3-body and 2-body abrasion tests. For this purpose, the Micro Wear Test (MWT) method was used, which allowed to compare the materials used on the matrix in sintered metallic-diamond tools for machining of concrete and stone surfaces.

The new matrix is promising for fabricating diamond tools with low cost, high processing efficiency and long service life.

The study was performed under LIDER IX Research Project No. LIDER/22/0085/L-9/17/NCBR/2018 entitled “Innovative metal-diamond tools without the addition of critical raw materials for applications in the process of grinding industrial floor systems” funded by the National Centre for Research and Development of Poland, Warsaw.

Keywords:

ball milling, matrix, diamond-impregnated tools, abrasive wear resistance, heat treatments



OPTIMIZATION OF THE YEAST CULTIVATION PROCESS WITH THE USE OF LAMBDA MINIFOR BIOREACTORS

Justyna Gawel*, Małgorzata Kus-Liśkiewicz

University in Rzeszów

*justynagawel.biot@gmail.com

A few words about the author(s):

Graduate student of biotechnology at the University of Rzeszów. As the subject of my work, I decided to focus on broadly understood work with yeast.

Abstract:

The research of thermostable yeast is becoming more and more popular because of many advantages of using these microorganisms in industry and medicine. Currently, the *Saccharomyces cerevisiae* strain is very popular, but its temperature tolerance is often limited. Therefore, fermentation at elevated temperature has numerous advantages, e.g. decreasing the cost for bioreactors cooling or reducing the chance of bacterial contamination.

The research was based on the measuring and optimize yeast growth conditions: pH, the amount of air supplied, and the temperature. The time taken for the yeast to use up all the glucose was also measured. The results allowed for selecting favorable conditions and confirming the effective growth at higher temperatures, 37 °C. The cultures were performed in Lambda Minifor Bioreactors, each in a volume of 300 mL. Bioreactors were inoculated with an initial OD 600 of 0.4 from the preculture in mid-exponential growth phase. 2% of the volume of YTerm-1 thermostable yeast.

Keywords:

yeast, optimisation, bioreactors



7th edition
National Scientific Conference
"e-FACTORY OF SCIENCE"
April 09, 2022

THE INFLUENCE OF CAPB ON STABILIZATION AND FLOCCULATION PROPERTIES OF AQUEOUS SUSPENSION OF CATIONIC STARCH AND MONTMORILLONITE

Ewelina Godek*, Elżbieta Grządka

*Department of Radiochemistry and Environmental Chemistry, Faculty of Chemistry,
Institute of Chemical Sciences, Maria Curie-Skłodowska University,
M. Skłodowskiej-Curie 3 Sq., 20-031 Lublin, Poland*

*ewelina.godek@poczta.umcs.lublin.pl

A few words about the author(s):

Ewelina Godek – Ph.D. student at the Ph.D. School of Quantitative and Natural Sciences at UMCS. Elżbieta Grządka – assistant professor. Interests include the physicochemistry of the dispersed systems, as well as the stability of the colloidal systems.

Abstract:

The aim of the work was to study the influence of cationic starch (CS) with the addition of pseudoamphoteric surfactant CAPB on stability of the water suspensions of montmorillonite (MMT). In the experimental part, measurements of the amount of cationic polymer (CS) adsorption in the presence or absence of CAPB on the montmorillonite surface were performed, as well as measurements of stability of the aqueous MMT suspensions with the addition of CS in the presence or absence of CAPB. Measurements were made using the spectrophotometric method. It can be concluded that CS adsorbs well on the MMT surface. The addition of a surfactant causes a decrease in the amount of adsorption. This is due to the competitive adsorption between the polymer macromolecules and CAPB. In this system, polymer-surfactant complexes are not formed, therefore CS may compete with CAPB for active sites on the MMT surface, resulting in a reduction of the polymer adsorption. The lack of formation of the polymer-surfactant complexes was confirmed by the surface tension measurements. On the other hand, stability measurements show that stability of the tested systems increases with the increase of the polymer concentration. The explanation for this is the effective adsorption of CS on the MMT surface. On the other hand, the addition of a surfactant causes a slight increase of stability. This is due to the competitive adsorption, where the surfactant competes with the polysaccharide.

Keywords:

stability, adsorption, surface tension, clay mineral, biopolysaccharide



PHASE TRANSITIONS AND MECHANISMS RELAXATION OF ORGANIC-INORGANIC QUINUCLIDINE HYBRIDS

Ewelina Jach

*Department of Experimental Physics, Wrocław University of Science and Technology,
Wyb. Wyspiańskiego 27 50-370 Wrocław*

ewelina.jach@pwr.edu.pl

A few words about the author(s):

I am a Ph.D. student of first year at the Wrocław University of Technology in the discipline of physical sciences. I am interested in physical chemistry, material synthesis, their functionalization and investigation.

Abstract:

The organic-inorganic hybrid of the following formula $QMeCl$ (Q =quinuclidinium, Me =Mn, Co, Pb, Cu) were synthesized using isothermal evaporation method, and its phase transitional and physical properties were investigated. The differential scanning calorimetry (DSC) measurements have determined the thermodynamic parameters of phase transition. The dynamic impedance spectroscopy (DIS) revealed the presence of both relaxation and conduction mechanism processes which are attributed to ordering of organic elements of this compounds. The experiments enable to study the role of organic quinuclidinium in the structural phase transition. The switching of dielectric constant around the phase transition show promising applications in the field of electrical and electronic devices, including phase shifters and rewritable optical data storage.

Keywords:

organic-inorganic hybrids, phase transition, differential scanning calorimetry, dielectric spectroscopy.



THE INNOVATIVE APPLICATION OF A MOLECULAR MAGNET [Fe₄(ACAC)₆(Br-P)₂] AS A FILLER OF ALGINATE MEMBRANES IN THE PROCESS OF ETHANOL DEHYDRATION VIA PERVAPORATION

Łukasz Jakubski*, Gabriela Dudek

*Department of Physical Chemistry and Technology of Polymers, Faculty of Chemistry,
Silesian University of Technology, Strzody 9, 44-100 Gliwice, Poland*

*lukajak378@student.polsl.pl

A few words about the author(s):

Łukasz Jakubski is a student of Chemical Technology, especially interested in pervaporation processes. Prof. Gabriela Dudek is specialized in dehydration of ethanol, in particular applications of nano-particle materials.

Abstract:

The novel composite alginate membranes containing molecular magnet [Fe₄(acac)₆(Br-p)₂] as a filler were investigated in the process of water/ethanol separation via pervaporation. We compared the obtained results with the results for membranes filled with Prussian blue and magnetite. It was showed that the greatest impact on the efficiency of separation process have the magnetic properties, compatibility between polymer and molecular magnet (MM) and hydrophilicity of filler. The powder of the new class of magnetic material (MM) shows the paramagnetic properties, however, when it is dispersed in the polymer, it becomes a superparamagnet. Thanks to this special properties of the MMs its homogeneous dispersion in polymer matrix is possible which is difficult to achieve in traditional magnets. Consequently, the MMs particles do not form clusters in the matrix and they are presented in the membrane in the entire volume, which allows them to freely interact with water molecules penetrating through the membrane. In case of the membranes filled with the Prussian blue and magnetite the same good efficiency of pervaporation process is not possible due to the less interaction between the magnetic field and water molecules. The best results were obtained for a composite alginate membrane filled with 15 wt% of [Fe₄(acac)₆(Br-p)₂], for which the separation factor reached the value of 68.99; and the PSI 1275 kg·m⁻²·h⁻¹.

Keywords:

single-molecule magnet, hybrid membrane, pervaporation, ethanol dehydration



7th edition
National Scientific Conference
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April 09, 2022

PREPARATION AND CHARACTERIZATION OF ALGINATE MEMBRANES CONTAINING DISPERSED NICKEL AND SILVER NANOWIRES, USED IN ETHANOL DEHYDRATION IN THE PERVAPORATION PROCESS

Damian Knyra*, Gabriela Dudek

*Department of Physical Chemistry and Technology of Polymers, Faculty of Chemistry,
Silesian University of Technology*

*dr.rock@o2.pl

A few words about the author(s):

M.Sc. Damian Knyra, is a graduate of the Silesian University of Technology. Ph.D. Gabriela Dudek is a Professor at the Silesian University of Technology who mainly deals with membranes (especially pervaporation), biophysics and polymers.

Abstract:

Looking for the modern and innovative filler materials for membranes, silver (Ag) and nickel (Ni) nanowires were used as a filler of hybrid alginate membranes in the process of ethanol dehydration via pervaporation. The project expected a positive effect of the addition of nanowires to the polymer matrix on the separation process of the water-ethanol mixture due to the elongated shape of the nanowires as well as the magnetic properties of the nickel nanowires. The applied nanowires were synthesized separately by the precipitation method and combined with the polymer matrix solution in the appropriate proportion. The obtained fillers and membranes were characterized by SEM, FTIR, measuring the degree of swelling and the contact angle. On the basis of SEM images it can be noticed that the nanowires are uniformly distributed into polymer matrix. FTIR, the degree of swelling and contact angle measurements indicated the decrease in hydrophilicity of obtained membranes after addition of nanowires. The evaluated parameters describing the effectiveness of the pervaporation process, i.e. flux, separation factor and pervaporative separation index, showed the positive effect of the addition of nanowires to the alginate matrix on the process of water-ethanol separation. It can be noticed that in relation to the pure alginate membrane it is possible to obtain at least 3 times better separation factor, 10 times better value of pervaporative separation index.

Keywords:

nanowires, pervaporation, membrane, sodium alginate, silver and nickel



NEW PRECATALYSTS FOR OLEFIN OLIGOMERIZATION – PHYSICOCHEMICAL AND CATALYTIC CHARACTERISTIC

Jacek Malinowski*, Joanna Drzeżdżon, Dagmara Jacewicz

Faculty of Chemistry, University of Gdansk, Wita Stwosza 63, 80-308 Gdansk, Poland

*jacek.malinowski@phdstud.ug.edu.pl

A few words about the author(s):

Mgr Jacek Malinowski - his research interests focus on the synthesis of complex compounds, the study of their physicochemical properties and their use as olefin oligomerization precatalysts.

Abstract:

Polymerization of olefins is a process that is very often used commercially. This is evidenced by the fact that about 18.5 million tonnes of polyethylene and polypropylene are produced annually. The dynamically developing industry of polymer materials means that the demand for polyolefin production increases. Postmetallocene precatalysts belong to the new generation of catalysts not only differing in the ligands used, but also based on transition metals of further groups of the periodic table. Non-metallocene precatalysts may contain in their structure neutral ligands (2,2'-bipyridyl, 1,10-phenanthroline) or anionic ligands having in their structure electron-donor atoms of nitrogen, oxygen, sulfur and phosphorus. It should be emphasized that the current state of knowledge on post-metallocene catalysts is only being learned by research groups around the world. Scientists are focusing on the synthesis of new complex compounds acting as precatalysts for olefin polymerization and, most importantly, establishing the relationship between the ligand structure of metal coordination compounds of further groups of the periodic table and the properties and microstructure of the obtained polymer materials. It should be emphasized that the advantages resulting from the features exhibited by post-metallocene precatalysts and the wide application of polymeric materials on an industrial scale make this an area worth further research.

Keywords:

post-metallocene precatalyst, oligomerization, late transition metal, complex compounds, catalytic properties



ATTEMPTING TO PRODUCE NEW RADIOISOTOPES FOR APPLICATIONS IN NUCLEAR MEDICINE

Natalia Młyńczyk*, Adam Konefal

University of Silesia in Katowice

*mlynczykn@gmail.com

A few words about the author(s):

Natalia Młyńczyk Ph.D. student at the doctoral school at the University of Silesia. She conducts research in medical physics, and seeks new radioisotopes for use in nuclear medicine. The research is conducted under the supervision of Adam Konefal prof. UŚ.

Abstract:

Nowadays more and more people are diagnosed with cancer. New methods of diagnosing and treating cancer are being developed all over the world. The main radioisotope used is technetium Tc-99m, which is produced in nuclear reactors. As nuclear reactors age, they are approaching the end of their lifespan, which is about 60 years. Therefore, the regression in the production of technetium is becoming more and more topical. The challenge is to develop new methods of producing technetium or to search for alternative medical radioisotopes.

Not every radioisotope can be used in medicine. A good candidate is the tin isomer Sn-117m, which has similar properties to technetium Tc-99m. The elements have very similar energies to each other. In addition, the half-life of tin is suitable for nuclear medicine applications.

Therefore, new methods of radioisotope production are sought as a suitable alternative to nuclear reactors. In addition, new radiopharmaceuticals are being searched for in order to find an alternative radioisotope to technetium Tc-99m. This project is devoted to the production of the tin isomer Sn-117m and its medical applications in nuclear medicine, mainly in diagnostics. The aim was the production of the tin isotope Sn-117m by photon beam and neutrons.

Keywords:

radioisotopes, nuclear medicine, diagnostics, radiopharmaceuticals



THE IMPROVEMENT OF THE PHYSICOCHEMICAL PROPERTIES OF CHITOSAN BIODEGRADABLE FILMS BY THE APPLICATION OF ECO-FRIENDLY PLASTICIZERS

Michał Nowotarski (1)*, Weronika Janik (2, 3), Gabriela Dudek (1)

(1) *Department of Physical Chemistry and Technology of Polymers, Faculty of Chemistry, Silesian University of Technology, Strzody 9, 44-100, Gliwice, Poland*

(2) *Łukasiewicz Research Network-The Institute of Heavy Organic Synthesis "Blachownia", Energetyków 9, 47-225 Kędzierzyn-Koźle, Poland*

(3) *Department of Physical Chemistry and Technology of Polymers, PhD School, Silesian University of Technology, Akademicka 2a, 44-100, Gliwice, Poland*

*michnow566@student.polsl.pl

A few words about the author(s):

Michał Nowotarski studies the Technology of Chemistry. His interest is focused on natural polymers. Weronika Janik Ph.D. student. Her research is focused on biodegradable films. Prof. Gabriela Dudek specializes in biodegradable materials.

Abstract:

The presented study shows the possibility of uses the alternative, eco-friendly plasticizers, besides typical glycerol and sorbitol as a component of chitosan biodegradable films. As a plastisizers: synthesized (propylene glycol monoacetate, propylene glycol esters of fatty acids and epoxidized propylene glycol esters) and commercial eco-friendly (epoxidized soybean oil and epoxidized palm oil) substances were used. Additionally, as a bactericide, horse chestnut extract was applied. The films were prepared by casting method and characterized by moisture content, swelling degree, total soluble matter, contact angle, oxygen and carbon dioxide permeability and mechanical properties measurements. The results showed that obtained films have good hydrophilic properties, appropriate thickness and gaseous barrier. Additionally, the application of alternative plasticizers improve the mechanical properties of the films compare with the films containing sorbitol and glycerol, especially after 10 months. The films with glycerol or sorbitol as a plasticizer were so brittle after storage of 10 months so the measurements of mechanical properties were not possible. The films with alternative plasticizers showed the good mechanical properties after 10 months storage. The most of alternative plasticizers improve the elongation at break of about 30-46%. The best tensile resistance indicates a film with mixed esters of succinic acid, propylene glycol and oleic acid as a plasticizer.

Keywords:

chitosan, plasticizers, films, polysaccharide, physico-chemical characterization



ANDRZEJ SCHINZEL – LIFE AND RESEARCH

Grzegorz Oleksik

University of Lodz, Faculty of Mathematics and Computer Science

grzegorz.oleksik@wmii.uni.lodz.pl

A few words about the author(s):

Doctor of mathematics at the Faculty of Mathematics and Computer Science of the University of Lodz, member of the Society of Friends of the Catholic University of Lublin and the Polish Mathematical Society.

Abstract:

The presentation will focus on the recently deceased professor Andrzej Schinzel. He was one of the most eminent Polish mathematicians, a world-renowned specialist in number theory. He was born in 1937 in Sandomierz. "A great man has passed away, a unique figure of Polish mathematics, Honorary Citizen of Sandomierz, Prof. Andrzej Schinzel," wrote Marcin Marzec, the mayor of Sandomierz. His math talent showed up very quickly. At the age of 14, he took first place in the 2nd Mathematical Olympics, at the age of 23 he was already a doctor, and 2 years later he obtained his habilitation. At the age of 37, he became a full professor. He connected his scientific life with the Institute of Mathematics of the Polish Academy of Sciences in Warsaw. He was the publisher of *Acta Arithmetica*. He was awarded the Medal of Stefan Banach.

Professor Andrzej Schinzel, as many mention him, was a very modest and kind person with a great personal culture. He was awarded the Knight's Cross and the Officer's Cross of the Order of Polonia Restituta and the Medal of the National Education Commission.

Moreover, Andrzej Schinzel was a man of deep faith. He was a member and active protector of the Literary Archiconfraternity of the Immaculate Conception of the Blessed Virgin Mary in Warsaw. He was awarded the Papal Cross "Pro Ecclesia et Pontifice". He was invited several times by Pope John Paul II to summer seminars at the papal residence of Castel Gandolfo.

Keywords:

number theory, polynomial, Schinzel's hypothesis H, Literary Archiconfraternities in Warsaw, The Papal Cross "Pro Ecclesia et Pontifice"



NEW TECHNOLOGIES IN EDUCATION USING THE INTERACTIVE FLOOR ENVIRONMENT

Rafal Petryniak

LavaVision

rafal.petryniak@lavavision.pl

A few words about the author(s):

Academic teacher, Ph.D. Biocybernetics and Biomedical Engineering, owner of LavaVision company. In his research work, he developed computer image analysis algorithms. Currently, he specializes in the construction of interactive systems.

Abstract:

The presentation concerns the results of selected research and development works that were carried out under the project RPMP.01.02.01-12-0175 / 18 (2019-2021) co-financed by the EU entitled Smart Coding - Development of interactive modules and methodology for teaching algorithms on the interactive floor using augmented reality techniques.

The environment for the development of the necessary technology to support education in teaching programming at school was the interactive floor space in which applications can be controlled by body movement or light pens. An extension of the existing possibilities of controlling the application on the interactive floor was a computer algorithm used for locating and recognizing graphic symbols included in the designed programming language in the image from a video camera. The algorithm was used in a dedicated application for learning the basics of algorithmics – Go Lumi!.

An interactive module for the optical locating and precise control of the robot's movement on the interactive floor has also been developed. The technology was used to expand the application – Go Lumi! with a riding robot control function.

The third method of work developed as part of the project was to connect mobile devices on which algorithms for the game heroes were designed – in the form of parallel programs – and then run them on an interactive floor or computer workstation. The solution was used in the educational game Kodi's Team.

Keywords:

interactive floor, IT education, programming, algorithmics



MODELING THE REVERSIBLE ADDITION–FRAGMENTATION CHAIN TRANSFER POLYMERIZATION

Filip Rękas

Rzeszów University of Technology, al. Powstańców Warszawy 6, 35-959 Rzeszów

filipfp71@gmail.com

A few words about the author(s):

Filip Rękas is a student at Rzeszów University of Technology.

Abstract:

Reversible addition-fragmentation chain transfer (RAFT) polymerization is a CRP technique which is used to synthesize polymers with narrow molecular weight distributions and defined architecture (e.g. gradient polymers, triblock copolymers, graft copolymers, 6-arm star polymers, miktoarm star polymers). In RAFT polymerization thiocarbonylthio compounds such as dithioesters and thiocarbamates are used as chain transfer agents (CTAs). The effectiveness of the CTA employed depends on the R and Z groups since they have a crucial influence on the result of the polymerization process as they alter the reaction kinetics. Furthermore, RAFT polymerization is one of the most versatile methods since it is applicable to a very wide range of monomers under many different experimental conditions.

In this study, the RAFT polymerization was investigated. For this purpose, a model and an algorithm using the Monte Carlo method were proposed. Then, simulations were performed based on the developed algorithm. They provided information about reaction rates, number average molecular weight, weight average molecular weight, dispersion index, monomer conversion, and information on different types of molecules such as propagating radical chains, adduct radical chains, dormant chains and dead chains. The influence of CTA concentration and values of rate constants on the mentioned parameter values were studied.

Keywords:

modeling of RAFT polymerization, Monte Carlo method



INTELLIGENT OBJECT MONITORING IN TECHNICAL INFRASTRUCTURE MANAGEMENT

Krzysztof Sell, Grzegorz Surmacz*

Medcore Sp. z o.o.

*gsurmacz@medcore.pl

A few words about the author(s):

Krzysztof Sell is CEO of Medcore with a longtime experience in software engineering, and the main author of the IMBO platform for Intelligent object monitoring. Grzegorz Surmacz is UX team leader in Medcore responsible for designing digital products.

Abstract:

The work presents modern methods of supervision of technical infrastructure. As the introduction it describes the issues of managing dispersed technical infrastructure in large facilities and its main problems. The analysis of each of these problems is supported by research results. The main part describes the role of software in the monitoring of technical infrastructure. As an practical work, it presents a demonstrator of intelligent object monitoring platform. The work presents main business goals of the solution, the problems it solves and also the main functions as well as detailed technical issues. Research and platform tests lead to conclusion that IT methods provide the most effective solutions in the shortest time.

Keywords:

software engineering, innovations, intelligent object monitoring



7th edition
National Scientific Conference
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April 09, 2022

PHOSPHATE SORPTION ON CHITOSAN MODIFIED WITH Fe_3O_4 NANOPARTICLES

**Łukasz Wujcicki*, Tomasz Mańdok, Wiktoria Reimann, Gabriel Kaczmarek,
Marcin Pająk, Gabriela Dudek, Krzysztof Piotrowski, Joanna Kluczka**

Silesian University of Technology, Faculty of Chemistry, M. Strzody 9, 44-100 Gliwice, Poland

*lukawuj232@student.polsl.pl

A few words about the author(s):

The authors of these results are members of a team working in the Laboratory of the Silesian University of Technology. J. Kluczka, G. Dudek and K. Piotrowski are academic staff. The rest of the authors are students at the Faculty of Chemistry.

Abstract:

Phosphorus is a biogenic element necessary for the proper development of all living organisms. Too much of it in water reservoirs may contribute to the deterioration of water levels as a result of the ongoing eutrophication process. The paper presents a modern method of removing phosphates from surface waters using a sorbent based on chitosan hydrogel modified with Fe_3O_4 nanoparticles. The kinetics of phosphate sorption was investigated and the Langmuir and Freundlich adsorption isotherms were determined. The technique of optical emission spectrometry with inductively coupled plasma (ICP-OES) was used in the research. It was found that the modified hydrogel adsorbed 87.2% of P-PO_4 , reducing the phosphate concentration in the tested solution from 0.901 ± 0.022 mg/L to 0.115 ± 0.008 mg/L. The observation of the structure surface of the hydrogel modified with iron oxide nanoparticles using a scanning electron microscope (SEM) showed a more developed, spongy structure, with more numerous pores of smaller size visible than in the case of chitosan without modification. This can explain the increased ability to sorption of phosphates in the hydrogel after modification than in the unmodified hydrogel. After phosphorus sorption, the structure became more compact with a smaller number of pores than that recorded before sorption. The applied separation method is a good solution which, in addition to being eco-friendly, shows very good removal efficiency.

Keywords:

sorption, phosphorus, hydrogel, chitosan, iron oxides nanoparticles



INTRODUCTION TO DIGITAL ELECTRONICS

Paweł Błaszczyk

Lodz University of Technology

228374@edu.p.lodz.pl

A few words about the author(s):

My name is Paweł Błaszczyk, I am 23 years old and I am the student of Lodz University of Technology. I like video games and basketball. My field of study are automation and robotics. I have been studying electronics for 4 years in my high school.

Abstract:

The presentation includes the most important things about Digital Electronics and its main rules. Viewer will be able to get some basic knowledge of boolean algebra, logic gates and functions. The main goal of this presentation is increasing people's interest in electronics as far as digital signals are concerned.

Keywords:

electronics, digital signals, Boolean Algebra



PROCESSES ACCOMPANYING FERTILIZATION

Agata Burska

University of Warmia and Mazury in Olsztyn, Faculty of Veterinary Medicine

burska.agata@wp.pl

A few words about the author(s):

Agata Burska, second year student of Veterinary Medicine, University of Warmia and Mazury in Olsztyn.

Abstract:

The fertilization process of the ovum in mammals involves physiological phenomena concerning the influence of the secretions of the female reproductive system on the metabolism of sperm before they make contact with the oocyte and the acrosome reaction after the two gametes come into contact; the merger of the male and female pronuclei, which leads to the formation of a zygote – karyogamy, followed by a series of biochemical processes. Mammalian sperm immediately after ejaculation are unable to fertilize the egg and, in order to acquire fertilizing ability, the sperm must undergo a series of biochemical and physiological modifications that make up the capacitation process. The last step in the activation of the male gamete is the acrosomal reaction, which is necessary for the subsequent penetration of the translucent sheath by the sperm and can take place thanks to acrosomal enzymes released during this process. This presentation aims to introduce the above-mentioned processes.

Keywords:

the fertilization process, ovum cell, sperm, the capacitation process, the acrosomal reaction



SPERM MOTILITY

Agata Burska

University of Warmia and Mazury in Olsztyn, Faculty of Veterinary Medicine

burska.agata@wp.pl

A few words about the author(s):

Agata Burska, second year student of Veterinary Medicine, University of Warmia and Mazury in Olsztyn.

Abstract:

Mammalian sperm plasma is a mixture of testicular secretions, exit ducts, and accessory sex glands. This fluid is associated with various physiological and biochemical functions of the sperm. Among the many components of the sperm plasma, peptide and protein substances play a special role in regulating the process of egg cell fertilization and male fertility. Sperm plasma peptides and proteins also participate in the regulation mechanisms of the sperm movement apparatus. It turns out that the stimulants of sperm motility do not have to come from the male reproductive system because, for example, the stimulator of sperm motility has been isolated and purified from the follicular fluid of the sow. This substance stimulated the motility of boar sperm depending on its concentration in the incubation mixture. In addition to factors stimulating the mobility of male germ cells, many substances have been identified in the sperm plasma, showing an inhibitory effect on the activity of the sperm locomotor system. Most often they are low molecular weight proteins or peptides. This presentation focuses on the operation of the sperm locomotive apparatus and the influence of various substances on the sperm motility.

Keywords:

sperm plasma, biochemical functions of the sperm, the fertilization process



MESOPOROUS CARBON/CONDUCTING POLYMERS COMPOSITES

Izabela Cimoch*, Emilia Grądzka, Krzysztof Winkler

University of Białystok, Faculty of Chemistry, Ciołkowskiego 1K, 15-245 Białystok, Poland

*i.wigda@uwb.edu.pl

A few words about the author(s):

Izabela Cimoch is a Ph.D. student in the Department of Chemistry at the University of Białystok. She received her M.Sc. degree in 2017. Her research activity are focused on synthesis and properties of fullerene polymers and their composites.

Abstract:

One of the most problem of contemporary world is constantly increased of energy demand. Among different materials that can be used to production of efficient energy storage devices are conducting polymers. Apart from many advantageous of conducting polymers such as high specific capacitance, easy synthesis and low cost they exhibit relatively low electrochemical stability and low mechanical strength that limit their practical applications. To overcome this problem composites materials of conducting polymers and carbon materials are formed. Mesoporous carbon is of particular interest due to its remarkable properties, such as good mechanical stability, high specific surface area, large pore volume and adjustable pore size contribution.

This work presents a brief review of the literature in the field of composites materials of mesoporous carbon and conducting polymers. The main attention is paid to synthesis of composite materials and study their morphology, chemical and electrochemical properties. These materials are usually characterized by such techniques as scanning electron microscopy, transmission electron microscopy, thermogravimetric analysis and nitrogen sorption analysis.

Keywords:

mesoporous carbon, conducting polymers, nanocomposite



USE OF CARBON NANOADDITIVES AS MATERIALS TO IMPROVE THE PROPERTIES OF POLYMER MEMBRANES

Karolina Dubiel

Lodz University of Technology

karolinadubiel0611@gmail.com

A few words about the author(s):

My name is Karolina Dubiel. I am 23 years old and I study on Lodz University of Technology on specialization Chemical Engineering. I am trainee in BSH in Approval Section. My hobby is skating. I like spent time with my pets.

Abstract:

The purpose of this presentation is to introduce the topic of membrane processes and to review the publications on the effect of carbon nano-additives on polymer membrane properties. Viexer will be able to get knowledge about basic concepts, applications of membrane processes, examples of carbon nanosubstituents.

The following will be analyzed the influence of graphene oxide, carbon nanotubes on membrane properties.

Keywords:

carbon nanoadditives, polymer membranes



INSECTS' ADAPTATION TO POLLINATION IN TERMS OF THE ANATOMICAL STRUCTURE OF THE LEGS AND MOUTHPARTS

Barbara Duda*, Patrycja Skowronek

*Department of Invertebrate Ecophysiology and Experimental Biology,
Faculty of Environmental Biology, University of Life Sciences in Lublin*

*bd0712@outlook.com

A few words about the author(s):

The authors work together in the Environmental Biology Section of the Environmental, Protection Research Club at the University of Life Sciences in Lublin. Their research interests focus on pollinating insects.

Abstract:

Insect pollinators are a major link in maintaining biodiversity of the ecosystem. They pollinate about 70% of the plants that become part of the diet of humans and animals. One of the best-known pollinators is the honey bee, which, apart from pollination, also provides its products, i.e. honey, propolis and wax. However, there are also other insect pollinators such as Colletidae, Andrenidae, Melittidae, Halictidae, Apidae (e.g. bumblebees) and Megachilidae, as well as wasps, flies and butterflies. Their diversity complements their ecological services. The variety of beneficial insects and their adaptations is manifested by the specific anatomy of the organs used for pollination, i.e. the legs and the mouthparts. The legs of pollinators are often covered with dense hairs that collect large amounts of pollen. A particular anatomical form developed for efficient pollen collection is the pollen basket located on the hind legs of worker bees. In addition to the legs, pollinators have various types of mouthparts, such as: siphoning (butterflies), chewing-lapping (honey bees) or lapping (flies). Furthermore, anatomical variation also occurs at the level of the genera. Differences are observed in the length of the glossa (long glossa of the bumblebee), type of tip (bifid glossa of Colletidae) or the presence/absence of the specific mouthparts. All these adaptations allow pollination of various plant species depending on the anatomy of the flower and the location of the pollen/nectar.

Keywords:

pollinators, insects, legs, mouthparts



INFLUENCE OF MULTI-STAGE HEAT TREATMENT ON THE STABILITY OF STRENGTHENING PRECIPITATES IN NOVEL Ni-BASED SUPERALLOYS

Małgorzata Grudzień-Rakoczy (1)*, Konrad Chrzan (1), Łukasz Rakoczy (2)

*(1) Łukasiewicz Research Network- Kraków Institute of Technology,
Zakopiańska 73, 30-418 Kraków, Poland*

*(2) AGH University of Science and Technology, Faculty of Metals Engineering and Industrial
Computer Science, al. Mickiewicza 30, 30-059 Kraków, Poland*

*malgorzata.grudzien@kit.lukasiewicz.gov.pl

A few words about the author(s):

The main author is working at Łukasiewicz Research Network- Kraków Institute of Technology as a Research Specialist. Her main scientific interests include investment casting of the Ni-based superalloys for the power industry applications.

Abstract:

The influence of the Al/Ti ratio and Ta concentration on the microstructure of modified IN740 superalloy was investigated. A significant content of Cr guarantees sufficiently high resistance to high-temperature corrosion. However, low mechanical properties at temperatures above 800 °C limit broader application possibilities. Various Al and Ta content was introduced to the IN740 superalloy to increase the volume fraction of strengthening phases, namely intermetallics and carbides. Heat treatment of castings consisted of double solutioning and double aging. All variants were subjected to microstructural observation using light and scanning electron microscopy, both in as-cast and heat-treated conditions. Based on energy X-ray spectroscopy for selected alloying elements, the segregation coefficient k was calculated. Significant differences were found in the distribution of alloying elements between dendrite arms and interdendritic spaces. The phase composition of the castings was determined by X-ray diffraction. The results show that the Al strongly influences the increase of the gamma prime size and volume fraction whereas the Ta led to the formation of the eta phase.

The authors gratefully acknowledge the funding by the Polish National Science Centre (Preludium 14) under grant for young scientists 2017/27/N/ST8/01801.

Keywords:

superalloy, casting, heat-treatment



ADVANCED GLYCATION PRODUCTS AS A SOURCE OF COMPLICATIONS IN DIABETES

Maja Hartung

University of Warmia and Mazury in Olsztyn

mhartung866@gmail.com

A few words about the author(s):

I am a 3rd year veterinary student, willing to learn and grow in my field. I am socially invested in my university life. Always willing to help and ready for new adventures.

Abstract:

Glycation - the process of non-enzymatic attachment of hexoses, mainly glucose, to free amino groups in proteins. It is a physiological process that determines their aging. It intensifies in states of hyperglycemia (a state of increased glucose concentration in biological fluids – a characteristic feature of diabetes), accelerating the occurrence of complications in the form of microangiopathy and macroangiopathy. The process takes place in living organisms and in vitro during food processing. Since the study of Diabetes Control and Complications Trial (DCCT) role of a biomarker of chronic complications diabetes is played by glycosylated hemoglobin (HbA1c). In recent years, it has been pointed out that its markings do not fully reflect the real course diseases. Therefore, a different one is sought, more so a precise biomarker that allows you to monitor diabetes, including using the phenomenon of the formation of final products intensified glycation (AGEs). In diabetes, AGE accumulates in the circulation and in various tissues and organs much earlier. The deposition of such products in the skin, lungs, kidneys, intestines, spinal cord discs, heart and vessels has been found not only in elderly people, but also in diabetic patients. In this presentation I would like to take a closer look on the impact of glycation process products on complications in diabetes.

Keywords:

glycation, diabetes, AGEs



DEEP HEAT RECOVERY FROM BIOMASS COMBUSTION GASES

Jarosław Kabiesz (1, 2)

(1) *Department of Chemical Engineering and Process Design, Silesian University of Technology,
M. Strzody 7, 44-100 Gliwice, Poland*

(2) *Losentech sp. Z o.o. ul. Chabrowa 1, 44-210 Rybnik*

jaroslaw.kabiesz@polsl.pl

A few words about the author(s):

Highly motivated and enthusiastic project manager. Doctoral student at the Faculty of Chemical Engineering of Silesian University of Technology. An engineer involved in the implementation of new technologies from the concept stage to start-up.

Abstract:

The overarching goal of EU energy policy is to achieve climate neutrality by 2050. Climate neutrality is understood as zero balance of carbon dioxide emission into the atmosphere. The RED II Directive treats biomass as zero-emission fuel because it is created as a result of natural assimilation of CO₂ from the atmosphere. Biomass energy potential in Poland, amounting to about 835 PJ, constitutes about half of the total renewable energy potential in the country. Since biomass combustion is not a clean process, the flue gases need to be cleaned of dust, sulfur oxides and nitrogen oxides to the levels specified in the Regulation of the Minister of Climate. A solution has been developed that, in addition to the required gas cleaning, allows for deep energy recovery by condensing moisture from the flue gases. Such a solution makes it possible to economically justify the combustion of biomass containing up to 60% water.

Keywords:

biomass, biomass combustion, deep heat recovery, flue gas heat recovery, moisture condensation



7th edition
National Scientific Conference
"e-FACTORY OF SCIENCE"
April 09, 2022

CONDUCTOMETRIC METHODS FOR THE DETERMINATION FOR THE FORMATION INCLUSION COMPLEXES OF DERIVATIVES CINNAMON ACID WITH L-CYCLODEXTRIN IN A WIDE RANGE OF TEMPERATURES

Zdzisław Kınart*, Aneta Ćwiklińska

*Department of Physical Chemistry, Faculty of Chemistry, University of Lodz,
90 – 236 Lodz, Pomorska 163/165, Poland*

*zdzislaw.kinart@chemia.uni.lodz.pl

A few words about the author(s):

I have been dealing with physicochemical measurements at the Department of Physical Chemistry at the University of Lodz for many years. The main trend of my research is conductometric and densimetric measurements in various types of solvents.

Abstract:

Electrical conductivity of aqueous solutions of sodium salts of trans-4-hydroxycinnamic acid (trans-p-coumaric acid), trans-3,4-dihydroxycinnamic acid (trans-caffeeic acid), trans-4-hydroxy-3-methoxycinnamic acid, (trans-ferulic acid), trans-3-phenylacrylic acid (trans cynaminic acid) with with α -cyclodextrin were measured in the temperature range 288.15 K - 318.15 K. For the first time in the literature, using the values of limiting molar conductivity obtained from conductivity measurements, the values of the complexation constants (K_f) of the discussed salts of phenolic acid derivatives with α -cyclodextrin were determined using a modified low concentration chemical model (ICM). An attempt was also made to analyze the individual thermodynamic functions Gibbs free energy, entropy and enthalpy describing the complexation process as a function of temperature.

Keywords:

electric conductivities, phenolic acids, cyclodextrins, limiting molar conductance active complexes, thermodynamic functions.



HOW GENERAL IS COGNITIVE ABILITY IN ANIMALS? FROM USING TOOLS BY OCTOPI TO CULTURES OBSERVED IN PRIMATES

Julia Korczyk

Jagiellonian University

julia.korczyk@gmail.com

A few words about the author(s):

I am studying biology at the Jagiellonian University. In my research I focus on animal cognition and neuroscience.

Abstract:

How general is cognitive ability in animals?: from using tools by octopi to cultures observed in primates.

The first observation of animal cognitive abilities have been discovered in the 1960s by Jane Goodall. Since then, significant development of research has occurred and magnetic resonance is even applied, which serves to scan animal brains, eg. dolphins or dogs. Moreover, a lot of behavioral studies show variety of cognitive ability observed in eg. octopi, ravens or primates.

During the presentation, I will focus on behavioral and neurobiological research based on the same group of animals: octopi, ravens, dolphins, dogs, and primates. That varieties of studies support arguments for animal intelligence. In octopuses have 500 million nerve cells and they have the largest nervous system among invertebrates (Albertin et al., 2015; Hochner, 2012). Octopuses remember the designs presented visually (Wells, 1987) and they can distinguish people (Anderson et al., 2010). I will focus on their communication capabilities and MRI research conducted on dogs (Polgárd et al., 2000), and dolphins (Janik, 2013). In the end, I will present research on memory with chimpanzees (Inoue and Matsuzawa, 2007) and the process of culture propagation among Japanese macaques (Kawamura, 1959).

In summary, in my presentation, I will present research showing new discoveries regarding animal intelligence.

Keywords:

animal cognition, octopus, cultures, neuroscience



WEEKEND OZONE EFFECT IN LUBLIN (2009-2017)

Ewelina Kruszczyńska*, Kamil Misztal, Jagoda Ziewiec, Kamil Kultys

Polish Geophysical Society

*ewelina826@op.pl

A few words about the author(s):

Kamil Misztal M.Sc. – geoinformatician, meteorologist, Kamil Kultys M.A. – geographer, specialist in environmental reconstructions, Jagoda Ziewiec M.A. - geographer, specialist in meteorology, Ewelina Kruszczyńska – a 3rd year student of geography.

Abstract:

A very important and current problem of meteorology is the human influence on the climate and atmosphere. One of the issues related to atmospheric pollution may be the concentration of tropospheric ozone. And its second type, tropospheric ozone, has a negative effect on such organisms. Therefore, the study focuses only on ozone in the troposphere.

Tropospheric ozone is a secondary pollutant. It is formed as a result of photochemical oxidation of nitrogen oxides in the presence of NMVOC, methane and carbon monoxide. Its concentration also depends on weather conditions. Industrial emissions are a key factor.

The aim of the study is to characterize changes in ozone concentrations in a weekly cycle.

Hourly data from the station of the Provincial Inspectorate for Environmental Protection in Lublin at Obywatelska Street was used for the study. They were obtained from the website of the Provincial Inspectorate of Environmental Protection, where such results are made available. The analysis was carried out for the multi-year period 2009-2017, where the weekly cycle of this element concentration was considered.

The results obtained on the basis of data processing indicate that the weekend is marked by higher ozone concentrations than the other days of the week. The highest mean value of the concentration of this element falls on Sunday ($46.1 \mu\text{g}/\text{m}^3$), and the lowest on Thursday ($40.5 \mu\text{g}/\text{m}^3$).

Keywords:

ozone, city climate, pollution, Lublin



INVESTIGATION OF THE EFFECT OF KAEMPFEROL AND MYRICETIN ON THE PROPERTIES OF NATURAL AND ARTIFICIAL ERYTHROCYTES

Paulina Laszuk*, Aneta D. Petelska

Faculty of Chemistry, University in Białystok, Ciołkowskiego Street 1K, 15-245 Białystok, Poland

**p.laszuk@uwb.edu.pl*

A few words about the author(s):

Dr hab. Aneta D. Petelska, prof. University in Białystok is a head of Bioelectrochemistry laboratory in the Department of Physical Chemistry and Paulina Laszuk is a Ph.D. student in the same Department.

Abstract:

Erythrocytes together with leukocytes and platelets constitute the basic component of blood. In the structure of erythrocytes, asymmetry in the lipid composition of monomolecular layers is observed. Phosphatidylcholine and sphingomyelin are located mainly in the outer monolayer, while phosphatidylserine is on the inner side. Cholesterol molecules are asymmetrically distributed in both parts of the lipid bilayer. In normal erythrocyte membranes, the ratio of cholesterol to phospholipids and sphingomyelin to phosphatidylcholine is approximately 0.9. On this basis, studies were carried out using natural erythrocytes isolated from animal blood and their model systems, such as liposomes. Natural systems and artificial cell membranes were modified with compounds from the flavonoids group: kaempferol and myricetin, showing many therapeutic properties including anticancer and antioxidant properties. The study used the method of microelectrophoresis, which allows determining the dependence of the surface charge density of the lipid membrane on the pH of the electrolyte. The influence of kaempferol and myricetin on the change of the surface charge density and the value of the isoelectric point of the membrane of natural erythrocytes and their model systems was investigated. As a result, it was found that the tested flavonoids effect the properties of natural and artificial erythrocytes.

Keywords:

erythrocytes, liposomes, surface charge density, kaempferol, myricetin



ANIMAL MODELS IN DIABETES RESEARCH

Adrianna Michniewicz

University Of Warmia and Mazury in Olsztyn

michniewiczada@gmail.com

A few words about the author(s):

I am a third-year student of veterinary medicine at the Faculty of Veterinary Medicine at UWM in Olsztyn. I also belong to the physiology club at university. After studies and physiology club, i like spending time with friends, good books and coffee.

Abstract:

Diabetes mellitus is a widespread metabolic disorder characterized by a steadily increasing incidence. In 1995, diabetes was diagnosed in 4% of the general population, estimates for 2025 are already 5.4%, which means an increase in the absolute number of patients in the world from 135 to 300 million within 30 years. In Poland, 1.3 million patients were registered in 2000, and now their number has increased to 2–2.5 million. Due to numerous increases in morbidity, new methods of treating diabetes and alleviating its accompanying symptoms, as well as its complications, are being searched for. For this purpose, animal research models are used. Animal models are of great interest among researchers, because research, which is often based on invasive procedures, can be performed on animals, which would not be possible in humans. For practical reasons, the most commonly used rodents are those that either develop diabetes spontaneously or are induced by streptozotocin and alloxan. These animals are relatively similar to humans on the anatomical and metabolic level, small and multiply rapidly. However, diabetes also occurs in dogs, cats, pigs, horses, cows, dolphins, and primates. In my work, I would like to describe the most commonly used research models for research into the diabetes epidemic of the 21st century, indicate their advantages and describe the progress they have brought in the history of diabetes treatment.

Keywords:

diabetes, mouse, pig, reasarch, rodents



RESEARCH ON HYDRAULICS AND MASS TRANSFER ON A SIEVE TRAY WITH A FLOW STABILIZING STRUCTURE

Wojciech Piotrowski (1, 2)

*(1) Silesian University of Technology, Department of Chemical Engineering and Process Design,
ul. ks. M. Strzody 7, 44-100 Gliwice, Poland*

(2) Losentech, ul. Chabrowa 1, 44-210 Rybnik, Poland

Wojciech.Piotrowski@losentech.com

A few words about the author(s):

Wojciech Piotrowski is a Ph.D. student at the Faculty of Chemistry of the Silesian University of Technology in Gliwice, specializing in Chemical Engineering. Specialty – chemical engineering, chemical apparatus.

Abstract:

In the presentation shows the original results of a research on sieve tray with a flow stabilizing structure, patented by the Losentech company (W.126958). In particular, studied novel geometry of a sieve tray was subjected to experimental analysis of either hydraulic performance and mass exchange process. The flow stabilizing element eliminates the tray dead zones, especially visible for small liquid flows. The presence of dead zones causes a decrease in the efficiency of such trays. When there is a stabilization grid on the tray, such zones does not occur and the liquid is uniformly distributed over the entire surface of the tray. On the basis of the conducted experiments, the equations describing the flow resistance and mass exchange on the tray were developed. The results of the experiment showed that the tray with the flow stabilizing element had a higher efficiency by approx. 10% compared to the standard sieve tray.

Keywords:

sieve trays, hydraulic, mass exchange



VON KARMAN VORTICES AS A PHENOMENON UNDERLYING THE MEASUREMENT OF THE FLOWMETER

Krzysztof Plewa

Poznan University of Technology, Faculty of Mechanical Engineering

plewa.krzysztof@outlook.com

A few words about the author(s):

Former masters student in mechanical engineering. Interested in industry automation, new technologies and production engineering, especially metal forming.

Abstract:

Proper optimization is key feature in the production process. The wide range of tools are used to both control and measure devices. One of them could be a flow meter. It enables the measurement of the volume or mass flow of a fluid. Obviously, there are numerous advantages of that have been useful for industry applications including chemical synthesis, food, fuel and energy productions. Nevertheless, commercial flow meters have numerous design solutions protected by patent law. Consequently, it seems necessary to find new ones. This presentation discusses the design of the IoT vortex flowmeter. The aim of experiments was to prepare the method of measuring the flow rate using the detection of vortex shedding behind the bluff body placed in the liquid stream. Furthermore, the vortex frequency measurement was carried out by processing the recorded pressure signal. Additionally, the Fast Fourier Transform was used. Further work developing the issue under study will be continued.

Keywords:

vortex flowmeter, Karman vortex street, bluff body, ESP32, Internet of Things



CHANGES IN EARTH'S MAGNETIC FIELD REGARDING THE ANTIGORITE SERPENTINE FILE

Anna Gogolewska, Marcin Jakubowicz, Makary Musiałek, Karolina Szostak*

*Faculty of Geoengineering, Mining and Geology, Wrocław University of Science and Technology,
50-421 Wrocław, Poland*

*240937@student.pwr.edu.pl

A few words about the author(s):

Anna Gogolewska is academic teacher and scientist at WUST. Marcin Jakubowicz, Makary Musiałek, Karolina Szostak are students of the Master's degree Mining and Geology at the Faculty of Geoengineering, Mining and Geology of the WUST.

Abstract:

The antigorite serpentinite deposit, which is part of the Gogołów-Jordan massif, is the only deposit of this raw material in Poland. In September 2021, some measurements were carried out using a proton magnetometer at the premises of the Opencast Road Raw Materials Mine in Nasławice. There was an analysis of results of the measurements and, on its basis, certain drawings were created regarding showing the changes in the strength of the earth's magnetic field within the deposit. The results concerning the research were compared with the data found in the available literature. The effectiveness of the used method was determined and estimated whether it was effective in this particular case.

Keywords:

serpentinite, Nasławice, magnetometer



ANALYSIS OF XRD RESULTS FOR SEMICONDUCTORS FROM THE A3B5 GROUP

Klaudia Wiktor

University of Rzeszów

Kalka.wiktor@gmail.com

A few words about the author(s):

My name is Klaudia Wiktor and I am from the University of Rzeszów. I have the title of an engineer in the field of materials engineering. I represents the Center for Microelectronics and Nanotechnology of the University of Rzeszów.

Abstract:

The aim of the study was to determine the composition of epitaxial layers of A3B5 semiconductor materials using high-resolution X-ray diffractometry. The $\text{Al}_{(1-x)}\text{Ga}_x\text{As}$ / GaAs epitaxial layers were produced in the process of molecular beam epitaxy in order to determine the growth parameters of layers with a specific Al content. This will allow the use of the $\text{Al}_{(1-x)}\text{Ga}_x\text{As}$ material for the production of more complex structures: i.e. single GaAs quantum wells with $\text{Al}_{(1-x)}\text{Ga}_x\text{As}$ barriers. For this purpose, a comprehensive structural analysis was performed using X-ray diffraction. Measurements were carried out for the analyzed structures for both optical axes of the diffractometer, as well as the analysis and simulation of the obtained results. The comparison of the measured diffraction curves with the simulations allowed for a precise determination of the aluminum content. The obtained results confirm the influence of the temperature used during the growth on the thickness and composition of the layers.

Keywords:

XRD, MBE, semiconductor



7th edition
National Scientific Conference
"e-FACTORY OF SCIENCE"
April 09, 2022

THE SEQUENCE DIVERSITY OF SYMBIOTIC GENES OF CHAMAECYTISUS ALBUS ENDOPHYTES

Karolina Włodarczyk*, Bożena Kowalczyk

*Maria Curie-Skłodowska University in Lublin, Faculty of Biology and Biotechnology,
Department of Genetics and Microbiology, Akademicka 19, 20-033 Lublin, Poland*

*k.wlodarczyk06@gmail.com

A few words about the author(s):

Karolina Włodarczyk and Bożena Kowalczyk are Ph.D. students at the Department of Genetics and Microbiology at the Maria Curie-Skłodowska University, Faculty of Biology and Biotechnology.

Abstract:

Chamaecytisus albus is a species strickly protected in Poland. In 2016 it was pronounced as „critically endangered” in the „Polish Red List of Fern and Flowering Plants”. The only one natural habitat of *Chamaecytisus albus* is located near the town - Hrubieszów (the south-eastern part of Poland), in the area covered by the program „Western Volyn Bug Valley (Natura 2000)”. *Chamaecytisus albus* belongs to the Fabaceae family, therefore it is able to establish symbiotic interactions with the Gram-negative soil bacteria of the Rhizobiaceae family. This proces provides an additional nitrogen source for the plant.

Until now, the symbionts of *Chamaecytisus albus* were not studied, thus the aim of the study was determine the genetic diversity of strains dwelling in *Chamaecytisus albus* tissues.

More than 30 isolates were obtained from root nodules of *Chamaecytisus albus* and used for genomic DNA isolation. After that, fragments of symbiotic genes (nodZ, nodC, nodA) were amplified and sequenced. The comparative analysis of obtained sequences and reference sequences available in the GenBank database showed that the tested isolates belong to *Bradyrhizobium*, and most of strains formed monophylogenetic groups.

Keywords:

symbiotic interaction, Rhizobia, Fabaceae, *Chamaecytisus albus*



FLUORESCENCE RECOGNITION OF SULFATES USING A ION PAIR RECEPTOR

Marta Zaleskaya-Hernik*, Łukasz Dobrzycki, Jan Romański

Faculty of Chemistry, University of Warsaw

*mzaleskaya@chem.uw.edu.pl

A few words about the author(s):

Marta Zaleskaya-Hernik received her Master's degree in Food Technology and Human Nutrition from Warsaw University of Life Sciences. She is currently studying for a Ph. D. degree Faculty of Chemistry at the University of Warsaw.

Abstract:

An anthracene functionalized squaramide dual-host Receptor 1 was developed and shown to be capable of selectively extracting sulfate salt, as was evidenced unambiguously by DOSY, mass spectrometry, fluorescent measurement and atomic absorption spectroscopy analyses. The receptors were investigated in terms of anion and ion pair binding using the UV-Vis and ¹H NMR titrations method in acetonitrile. The reference anion Receptor 3, lacking a crown ether unit, was found to lose the enhancement in anion binding induced by presence of cations. Additionally, we found that the contribution to anion binding comes not only from interaction with squaramide protons but also through interaction with the anthracene proton located at C-9 position in the case of 1-aminoanthracene substituted receptors, supported by ¹H NMR, 2D NMR measurements and solid-state X-ray measurements. By using the Receptor 1 and adjusting the water content in organic phase it was possible to selectively detect sulfates both by “turn-off” and “turn-on” fluorescence. Such properties of Receptor 1 have allowed the development of a new type of sensor capable of selectively recognizing and binding potassium sulfate from the aqueous medium, across a phase boundary, resulting in an appropriate fluorescent response in the organic solution.

Keywords:

sulfate extraction, ion pair receptor, crown ethers, squaramides

ABSTRACTS OF POSTERS



TECHNICAL AND NATURAL SCIENCES



A NEW WAY OF MAGNESIUM HYDRIDES MECHANOSYNTHESIS – HIGH TEMPERATURE AND HIGH PRESSURE BALL MILLING

Agata Baran

Military University of Technology, Urbanowicza 2 Street, 00-908, Warsaw, Poland

agata.baran@wat.edu.pl

A few words about the author(s):

Agata Baran is a researcher, lecturer and Ph.D. student at Military University of Technology in Warsaw. Her main field of study are hydrogen storage materials, including synthesis and characterization in the context of the functional parameter.

Abstract:

This work aims to present a new method for the synthesis of solid-phase hydrogen storage materials. Using high temperature, high pressure reactive ball milling (HTPRM), magnesium hydride samples were produced. This technique allows the mechanosynthesis of materials at fully controlled temperatures (up to 450 °C) and pressures up to 100 bar of hydrogen. The synthesis was carried out at controlled temperatures (room temperature (RT), 100, 150, 200, 250, 300 and 325 °C) while grinding in a planetary ball mill under hydrogen pressure (>50 bar). Mild grinding conditions of 250 rpm for 2 h were used in the experiment. The effect of different temperatures on the synthesis kinetics and outcome was investigated. Particle morphology, phase composition, reaction efficiency and particle size were investigated. The analysis was performed by scanning electron microscopy (SEM), X-ray diffraction (XRD) and differential scanning calorimetry (DSC). The results showed that increasing the process temperature significantly improved the reaction rate, suggesting the great potential of this technique for mechanochemical synthesis of materials.

Keywords:

magnesium hydride, mechanochemical synthesis, solid-state hydrogen storage, ball milling, reactive ball milling



DIY: CYLINDERS FOR MECHANOCHEMICAL SYNTHESIS OF SOLID-STATE HYDROGEN STORAGE MATERIALS

Agata Baran

Military University of Technology, Kaliskiego 2 Street, 00-908 Warsaw

agata.baran@wat.edu.pl

A few words about the author(s):

Agata Baran is a researcher, lecturer and Ph.D. Student at Military University of Technology in Warsaw. Her main field of study are hydrogen storage materials, including synthesis and characterization in the context of the functional parameter.

Abstract:

One of the major challenges of today's technology is finding alternative, green energy sources. This is a significant problem, especially now, in the era of the "climate crisis". Hydrogen is an example of such a carrier, being an ideal candidate due to its highest gravimetric density. However, in addition to its many advantages, it has one undeniable disadvantage - it is hard to store. One relatively safe method is to store hydrogen in the solid phase. Using metal hydrides for this guarantees a low operating pressure and a harmless by-product - water. To produce such metal hydrides we use mechanochemical synthesis methods. The technique is based on grinding powder particles in ball mills and is divided into several varieties - mechanical alloying, mechanical grinding and reactive grinding. Each method uses different phenomena and is associated with specific process conditions (type of mill, rotational speed, grinding time, grinding media, ball to powder ratio, ball size, etc.). There are many available solutions on the market, offered by mill manufacturers, but they are insufficient for laboratory studies and individual experiments. Therefore, we decided to make several types of "home-made" cylinders, which is the subject of this presentation.

Keywords:

ball milling, reactive ball milling, mechanical synthesis, mechanochemical synthesis, solid-state hydrogen storage, metal hydrides



ALUMINUM SURFACE MODIFICATION FOR ANTIMICROBIAL PROPERTIES

**Piotr Bollin (1), Katarzyna Czajka-Włóczyk (2), Jacek Wszolek (2),
Tamara Śliwińska (2), Alicja Stanisławska (3), Marek Szkodo (3), Rafał Banasiuk (1)***

(1) Institute of Biotechnology and Molecular Medicine, Gdańsk

(2) Elbit Śliwińscy Sp. J., Czeladź

(3) Institute of Manufacturing and Materials Technology, WIMiO, Gdańsk University of Technology

*rafal.banasiuk@ibmm.pl

A few words about the author(s):

The research was carried out as a part of the cooperation between Elbit Sp. J and Institute of Biotechnology and Molecular Medicine on the implementation of the aBAC layer production technology.

Abstract:

The lack of new and effective medical countermeasures may leave people defenceless against the growing number of multidrug-resistant (MDR) strains of bacteria and fungi. Human pathogens can survive many days on surfaces after contact. Continuous and complete disinfection under uncontrolled conditions is practically impossible. For this reason, it is crucial to develop surface modifications that will provide a protective layer against microbes without the need for additional actions. In this work, we present our solution based on the processes of anodizing and electrodeposition of silver for use on aluminium surfaces. Our coating exhibits strong antibacterial properties, with bacterial count reduction of over 99,9% against nosocomial pathogens like *S. aureus*, *P. aeruginosa* and *K. pneumoniae*. Its application potential and overall durability make it a promising solution for implementation in hospitals and other public environments.

Keywords:

aluminum, anodized, electrodeposition, antimicrobial, silver



INFLUENCE OF THE Al/Ti RATIO AND TANTALUM CONCENTRATION ON THE MECHANICAL PROPERTIES OF MODEL SUPERALLOYS BASED ON IN740 AFTER MULTI-STAGE HEAT TREATMENT

Konrad Chrzan (1), Małgorzata Grudzień-Rakoczy (1)*, Łukasz Rakoczy (2)

*(1) Łukasiewicz Research Network- Kraków Institute of Technology,
Zakopiańska 73, 30-418 Kraków, Poland*

*(2) AGH University of Science and Technology, Faculty of Metals Engineering and Industrial
Computer Science, al. Mickiewicza 30, 30-059 Kraków, Poland*

*malgorzata.grudzien@kit.lukasiewicz.gov.pl

A few words about the author(s):

The main author is working at Łukasiewicz Research Network- Kraków Institute of Technology as a Research Specialist. Her main scientific interests include investment casting of the Ni-based superalloys for the power industry applications.

Abstract:

Electricity is now a key pillar of human life and economic development. Despite different methods of electricity production, a large part of the energy sector still relies on coal. A factor that can effectively mitigate the effects of such crises is the continuous improvement of the power unit's efficiency. Next-generation materials designed for these devices are expected to have excellent oxidation resistance, high strength, and microstructural stability under severe operating conditions. The service requirements of A-USC (advanced ultra-supercritical) boiler components related to exposure to temperatures of 700 °C exceed those of commonly used alloys such as HR6W, IN617, Haynes 230, and Nimonic 263. The nine novel nickel-superalloys based on Inconel 740 superalloy were developed as part of this work. The modification of the chemical composition included the change of the Al/Ti concentration ratio and the introduction of a new element, tantalum. The produced materials have been subjected to mechanical testing at room and elevated temperatures. The tensile and creep tests have been carried out at 760°C. Based on the results, it was found that obtaining a higher volume fraction of the intermetallic phase with a larger mean size was key in increasing the strength of novel superalloys compared to the base IN740 superalloy.

The authors gratefully acknowledge the funding by the Polish National Science Centre (Preludium 14) under grant for young scientists 2017/27/N/ST8/01801.

Keywords:

superalloy, casting, heat-treatment



LUMINESCENT METAL-ORGANIC FRAMEWORK BASED ON THIAZOLO[5,4-D]THIAZOLE LIGAND FOR IONS DETECTION

Wiktor Gromelska

*Faculty of Chemistry, Adam Mickiewicz University,
Uniwersytetu Poznańskiego 8, 61-614 Poznań, Poland*

wikgro2@st.amu.edu.pl

A few words about the author(s):

Master Student at the Faculty of Chemistry of the University of Adam Mickiewicz in Poznań. The glowing-fanatic fiercely devotes itself to the synthesis of novel luminescent metal-organic frameworks for the detection of versatile analytes.

Abstract:

Metal-organic frameworks (MOFs) are porous coordination polymers consisting of metal cation or clusters bound together by organic linkers. Due to their porous structure and high internal surface is expected that they will play crucial role in gas storage, separation and sensing. Moreover, their unique properties can be easily modified by changing the metal ion or/and linker.

The most popular strategy of introducing the luminescence into MOFs bases on the utilization of a fluorescent linker. Such material contains conjugated ligands that absorb the UV-Vis light. Owe to porous structure of MOFs, analyte freely diffuses to their channels, where it interacts with the linker. Analyte-MOF interactions change luminescence properties, which is a base of detection.

Herein, we present a novel luminescent MOF $[\text{Zn}_2(\text{oba})_2(\text{BPPTzTz})(\text{DMF})]$. It was synthesized in reaction between zinc(II) nitrate, 4,4'-oxybis(benzoic acid) (H_2oba) and 2,5-bis(4-(pyridin-4-yl)phenyl)thiazolo[5,4-d]thiazole (BPPTzTz) in N,N-dimethylformamide (DMF). Furthermore, we showed that this material can be used for very selective detection of cations - Cu(II), Fe(III) and anion - $\text{Cr}_2\text{O}_7^{(2-)}$ in water medium.

Acknowledgment: National Science Centre (NCN, Poland) is gratefully acknowledged for the financial support of this research (Grants no. 2020/36/C/ST4/00534).

Keywords:

metal-organic frameworks, luminescence, detection



ASSESSMENT OF THE PHYSICAL PROPERTIES OF THE WHEAT PROTEIN-MALTODEXTRIN DISPERSIONS

Adonis Hilal*, Anna Florowska, Małgorzata Wroniak

Institute of Food Science, Department of Food Technology and Assessment, Warsaw University of Life Sciences (WULS-SGGW), 159c Nowoursynowska Street, 02-787 Warsaw, Poland.

*adonis_hilal@sggw.edu.pl

A few words about the author(s):

Adonis Hilal M.Sc. (Ph.D. candidate), Anna Florowska Ph.D., Małgorzata Wroniak Ph.D., work at the Institute of Food Sciences, Division of Fat and Oils and Food Concentrates Technology, of the Warsaw University of Life Sciences.

Abstract:

The purpose of this study was to evaluate the physical properties of the wheat protein-maltodextrin aqueous dispersions. The samples were prepared using the DOE tool, with wheat protein (concentrations ranging from 10 to 15 g/ 100 g) and maltodextrin (12 to 18 g/ 100 g). The physical properties of the samples were assessed using the microrheology, texture, and color parameters. According to the findings, the sample with the highest elasticity (EI), macroviscosity (MVI), strength, and spreadability value was found to contain 15 g of protein and 18 g of maltodextrin/ 100 g. However, the solid-liquid balance factor (SLB) of all dispersions was greater than 0.5, indicating that they had more liquid-like properties ($G' < G''$). Furthermore, the sample with the highest whiteness index contained 10 g of protein and 12 g of maltodextrin, whereas the sample with the highest yellowness index contained more than 12.5 g of protein and more than 12 g of maltodextrin. It is possible to influence the physical properties of the obtained dispersion by controlling the concentration levels of both wheat protein and maltodextrin.

Keywords:

MS-DWS method, food ingredients, food texture



THE INFLUENCE OF SUGARS ON METABOLISM OF LUNG CANCER CELLS

Monika Kopec*, Karolina Beton, Halina Abramczyk

*Lodz University of Technology, Institute of Applied Radiation Chemistry,
Laboratory of Laser Molecular Spectroscopy, Wroblewskiego 15, 93-590 Lodz, Poland*

*monika.kopec@p.lodz.pl

A few words about the author(s):

Monika Kopec works in the Institute of Applied Radiation Chemistry at the TUL in Lodz. She obtained her PhD degree in 2018. Her research concentrates on molecular spectroscopy and applications of Raman spectroscopy and imaging in cancer diagnostics.

Abstract:

Sugars play a lot of important role in the human body. Moreover sugars are one of the most important regulators of physiological processes in body such as growth and stress responses.

Diabetes is defined as a metabolic disease characterized by elevated levels of blood sugar, which leads to damage to many of the body's systems. According to World Health Organization diabetes is called 21st century epidemic.

The aim of presentation is demonstrate the possibility of monitoring glucose changes occurring in cancer cells by Raman spectroscopy and Raman imaging. We present a truly unique landscape of cancer cells biochemistry by non-invasive spectroscopic methods to study sugars changing in lung cancer. Currently use therapies don't perfectly address to many type of diabetes. It is very justified to develop new methods to complete this gap. Spectroscopic methods give fast, objective information about biochemical composition. Understanding of sugar's role in lung cancer with using Raman spectroscopy methods will help establish Raman spectroscopy and Raman imaging as a modern clinical diagnosis tools for diabetes monitoring.

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

Keywords:

lung cancer, Raman spectroscopy, Raman imaging, cell culture, glucose



PSEUDOINVERSE BINARY MATRIX ($N \times 2$)

Leszek Kowalik (1), Stanisław Kowalik (2)*

(1) *Company Enego, Sosnowiec*

(2) *Retired academic teacher of the Silesian University of Technology, Gliwice*

*stanislaw.kowalik@polsl.pl

A few words about the author(s):

Leszek Kowalik is a graduate of the Silesian University of Technology in Gliwice. He holds a Ph.D. in technical sciences. Stanisław Kowalik is a graduate of the Jagiellonian University (mathematics) and the Silesian University of Technology in Gliwice.

Abstract:

The paper presents considerations concerning the existence of a pseudo-inverse binary matrix of the $n \times 2$ type. The conditions for the existence of such a matrix were presented. Given are mathematical formulas to calculate the elements, if it exists. The relationships between the elements of the matrix A and the elements of the pseudo-inverse matrix B are presented in this paper. Three sums were defined for the given matrix A : SUMA1 - xor sum of the first row, SUMA2 - xor sum of the products of the corresponding elements of the first row and the second line, SUMA3 - xor sum of the second line. These sums were used to determine mathematical formulas for the computation of the pseudo-inverse binary matrix. The elements of the binary pseudo-inverse matrix are determined on the basis of the knowledge of the matrix of a given A and these three sums. An example of finding a binary pseudo-inverse matrix is given.

Keywords:

binary matrix, pseudo-inverse, xor operation



REMOVAL OF ORGANIC MATTER IN WASTEWATER SAMPLES FOR IDENTIFICATION OF MICROPLASTIC

Paulina Ormaniec

*Department of Environmental Technologies, Faculty of Environmental and Power Engineering,
Cracow University of Technology*

paulina.ormaniec@pk.edu.pl

A few words about the author(s):

First-year student of the Doctoral School. The author is interested in micropollutants in the environment and pays special attention to microplastics occurred in municipal wastewater treatment plants.

Abstract:

Various types of pollutants directly affect environmental media such as air, water and soil. Along with the growing world population and the development of industry the number of environmental pollutants, such as microplastics is increasing. Municipal wastewater treatment plants are among the main sources of environmental pollution by microplastics. Microplastic is very difficult to define but is assumed to be plastic particles smaller than 5 mm in size. The paper discusses the available methods for removal of organic matter in wastewater treatment samples for identification of microplastics. The characteristics of the presented methods have been developed based on literature review. In order to remove organic matter from wastewater samples the method of wet oxidation with hydrogen peroxide is used, often as the Fenton reaction. The combination of hydrogen peroxide with the catalyst in the form of iron (II) ions allows effective removal of impurities without affecting the tested microplastic. The oxidation of organic matter is also possible with the use of hydrogen peroxide alone, however this method requires longer reaction time. The enzymatic methods can also be used, sometimes in combination with hydrogen peroxide to increase the separation efficiency. Based on the analysis, the conclusions have been drawn regarding the recommended methods of microplastics separation.

Keywords:

microplastic, wastewater treatment plant, organic micropollutants



ANALYSIS OF THE CYTOTOXICITY OF NANODIAMONDS OBTAINED WITH THE DETONATION METHOD AND THEIR STABILITY IN AQUEOUS SOLUTIONS

Anna Ornatowska

Technical University of Lodz

244624@edu.p.lodz.pl

A few words about the author(s):

I am an engineer of Nanotechnology from Technical University of Lodz. I am interested in the medical use of polymers and learning about new research methods and interesting facts from the world of chemistry.

Abstract:

The work includes a literature review on carbon nanoparticles and their toxicity. As part of the work, solutions of nanodiamonds (NDs) in water and PBS at various concentrations were examined in terms of their size and stability, using the dynamic light scattering method. Scanning electron microscopy was used to assess the morphology of nanoparticles. Human endothelial cells and mouse fibroblasts were selected for biological studies and tested for viability and cytotoxicity in the presence of controls and NDs solutions.

The analysis of the DLS results showed that in the PBS the size of NDs reaches the value of about 1000 nm, regardless of the number of sonication cycles. However, in aqueous solutions, differences in size are noticeable and the smallest nanoparticles were obtained using 30 cycles of sonication during the preparation of the solutions. Based on biological studies it was found that the presence of NDs influences viability, decreasing it, and cytotoxicity, increasing its value.

Keywords:

nanoparticles, nanodiamonds, cytotoxicity, human endothelial cells, mouse fibroblasts



THE DFT CALCULATION OF THE INTERACTIONS BETWEEN GRAPHENE AND GE(001)

Przemysław Przybysz*, Paweł Dąbrowski

*Faculty of Physics and Applied Informatics, University of Łódź,
Pomorska 149/153, 90-236 Łódź, Poland*

*przemyslaw.przybysz@edu.uni.lodz.pl

A few words about the author(s):

The target of our research are hybrid van der Waals heterostructures. We are concerned with studying their electron and mechanical properties on the nanometer scale.

Abstract:

Graphene as a two-dimensional material, due to its properties (high electrical and thermal conductivity, low absorption of white light), has found application in material engineering and electronics. Hybrids of graphene with other two-dimensional materials are currently the aim of many research. In my work, I will focus on the interaction between graphene and the germanium surface Ge(001) using a combination of microscopic experimental techniques and complementary theoretical calculations. Density functional theory (DFT) for various reconstructions of the Ge(001) surface shows that the interactions between graphene and the Ge(001) surface introduce additional maxima in the density of states. Differential electron density showed that its stronger than pure Van der Waals interaction between the layers. Band Unfolding for this hybrid showed additionally that due interaction graphene becomes n-type doped which is in according with our experimental findings.

Keywords:

hybrids, van der Waals heterostructures, graphene, density functional theory



TUNING THE ADSORPTION PROPERTIES OF THE FLEXIBLE METAL-ORGANIC FRAMEWORK BY LINKER SUBSTITUTION

Szymon Sobczak

*Adam Mickiewicz University in Poznań, Faculty of Chemistry,
Department of Functional Nanostructures*

szysob@st.amu.edu.pl

A few words about the author(s):

I am a master student of chemistry at the Adam Mickiewicz University in Poznań. Recently and my scientific interests focus on employing the flexible metal-organic framework in gas related technologies, e.g. storage and separation.

Abstract:

Metal-organic frameworks (MOFs) are crystalline porous materials built from metal ions or metal clusters playing role of a node and organic ligands connecting those nodes in extended structure. The structure related properties of MOFs can be regulated by careful choice of components and reaction conditions. First class is known as rigid MOFs, the second as flexible MOFs (flexMOFs). Rigid metal-organic frameworks exhibit stable and permanent porosity after removal of guest molecules or adsorption, while flexMOFs adapt the structure in response to external stimuli such as desolvation, gas pressure, temperature or even light. They show several types of flexibility modes, e.g. breathing, swelling, linker rotation and subnetwork displacement. One of the parameters used for describing the flexible metal-organic-frameworks is gate opening pressure (pgo). It is defined as a gas pressure on which the structural changes have a place. Below the pgo, MOF is in close and non-porous state. Crossing this threshold gas pressure causes transformation and gas is able to enable diffuse gas to diffuse into MOF's channels. Herein, I investigate the GOP change. I will present tuning of pgo by depending on the composition of the ligands of the Metal-organic framework. In the latest experiments linker substitution, I research. My finding shows the effect of the molar ratio of different carboxylic acids in MOF built into flexMOF platform on the GOP gate opening pressure.

Keywords:

metal-organic framework, gas sorption, multivariate structures



SYNTHESIS OF TETRAHEDRAL BIMETALLIC COORDINATION NANOCAGES

Weronika Wachowicz

*Adam Mickiewicz University in Poznan, Faculty of Chemistry,
Uniwersytetu Poznańskiego 8, 61-614 Poznan, Poland*

werwac2@st.amu.edu.pl

A few words about the author(s):

Weronika Wachowicz, Master's student of materials chemistry at the Adam Mickiewicz University in Poznan. Member of the Stefankiewicz research group at the Institute of Functional Nanostructures Synthesis.

Abstract:

This poster presents research that led to synthesizing heterometallic coordination nanocages and then investigating the applicational potential. The nanocages were designed on the basis of the ambidentate pyridyl- β -diketone ligand (4,4-dimethyl-1-(pyridin-4-yl)pentan-1,3-dione) and metals such as: Fe (III), Cr (III), Al (III), Pd (II). The individual research tasks leading to obtaining supramolecular cages included ligand resynthesis, synthesis of metalloligands Fe (III), Al (III), Cr (III) and their analysis in solution, carrying out a series of reactions leading to the preparation of nanocages. We have successfully synthesized a tetrahedral bimetallic cage containing atoms of aluminum and palladium, characterized by a unique structure. Obtaining this material was possible due to chemical reaction taking place in solution during the process of diffusion of reagents in different solvents.

Keywords:

nanocages, nanomaterials, ambidentate ligands, aluminum, palladium



HYDROXYAPATITE

Piotr Warchal

Maria Curie-Skłodowska University in Lublin

piotrwar98@gmail.com

A few words about the author(s):

A graduate of the Faculty of Chemistry at the Maria Curie-Skłodowska University in Lublin. Employee of the National Center for Nuclear Research.

Abstract:

What is hydroxyapatite? What is its use and why is it so willingly used in many fields of science, among others in medicine? Preparation and characterization of hydroxyapatite. Physicochemical properties of hydroxyapatite depending on the cationic substituent.

Keywords:

hydroxyapatite, zeta potential



ASSESSMENT OF THE SORPTION CAPACITY OF HYDROXYAPATITE OBTAINED FROM BIO-WASTE TOWARDS REMOVAL OF CHROMIUM(VI), VANADIUM(V) AND MOLYBDENUM(VI) IONS

Alicja Wawszczak

*Department of Inorganic Chemistry, Faculty of Chemistry, Maria Curie-Skłodowska University
in Lublin, Pl. M. Skłodowskiej - Curie 2, 20-031, Poland*

alicja.wawszczak@tlen.pl

A few words about the author(s):

I am student at Maria Curie-Skłodowska University in Lublin with a bachelor's degree in chemistry. My research area is inorganic chemistry, which concentrate on ions sorption methods.

Abstract:

With the advancing new technologies and rapidly developing industry, the demand for raw materials, especially metals, is increasing. Along with this phenomenon, the amount of generated waste grows, and thus also its emission to the natural environment. More and more regulations are imposed on those responsible for this effect, limiting the amount of pollutants entering the natural environment. To deal with this, new methods are still being sought, which, among others, reduce the amount of toxic metals present in various types of water and sewage. One of the simplest solutions is the use of sorbents that have the ability to retain specific ions from aqueous solutions. Currently, there is a wide range of different sorbents targeting specific ions on the market, however, these are mostly synthetic products. The subject of these studies was to obtain hydroxyapatite using biological waste such as egg shells, which is of particular importance for the development of green chemistry. Its sorption capacity for the removal of chromium(VI), vanadium(V) and molybdenum(VI) ions from aqueous solutions was estimated, and the dependence of the pH of these solutions on the sorption efficiency was demonstrated. During the research, a UV-VIS spectrophotometer was used to determine chromium(VI) ions, and an ICP-OES spectrometer to determine the concentration of molybdenum(VI) and vanadium(V) ions.

Keywords:

sorption, hydroxyapatite, metal ions, biosorbents



SOLAR PANELS – PRINCIPLE OF OPERATION

Klaudia Wiktor

University of Rzeszow

Kalka.wiktor@gmail.com

A few words about the author(s):

My name is Klaudia Wiktor and I am from the University of Rzeszów. I have the title of an engineer in the field of materials engineering. I represent the Center for Microelectronics and Nanotechnology of the University of Rzeszów.

Abstract:

Photovoltaics is the process of generating electricity from free solar radiation, therefore its development is very dynamic. Solar energy can be used for power small portable devices, such as calculators or watches, lamps and traffic signals, and parking meters, as well as for space heating and water heating in residential buildings. In panels photovoltaic electricity generation during the day takes place regardless of the degree of sunlight. IN unlike other sources of electricity, electricity production cannot be interrupted during the day. Photovoltaics is an increasingly popular way of obtaining energy in households. The works will present the principles of operation of photovoltaic panels and their construction and application.

Keywords:

photovoltaics, power

ABSTRACTS OF PRESENTATIONS



MEDICAL SCIENCES



7th edition
National Scientific Conference
"e-FACTORY OF SCIENCE"
April 09, 2022

PHTHALOCYANINES IN PHOTODYNAMIC THERAPY OF SQUAMOUS CELL CARCINOMA IN AN IN VITRO MODEL

**Eliza Apolinarska (1)*, Weronika Liss (2), Oliwia Abramczyk (1), Jakub Kuta (1),
Rafał Czajkowski (2), Tadeusz Tadrowski (2), Małgorzata Grochocka (2)**

*(1) Student Scientific Circle for Experimental Dermatology, Collegium Medicum in Bydgoszcz, UMK,
Antoni Jurasz University Hospital No. 1, 9 M. Skłodowskiej-Curie Street, Bydgoszcz*

*(2) Department of Dermatology and Venereology, Collegium Medicum in Bydgoszcz, UMK in Torun,
Antoni Jurasz University Hospital No. 1, 9 M. Skłodowskiej-Curie Street, Bydgoszcz*

*eliza.apolinarska@gmail.com

A few words about the author(s):

Eliza Apolinarska, Oliwia Abramczyk, Jakub Kuta Weronika Liss Members of the Society for Investigative Derm. Małgorzata Grochocka Ph.D. student. Rafał Czajkowski head of the Department of Dermatology and Venereology. Tadeusz Tadrowski assistant professor.

Abstract:

Introduction: Photodynamic therapy (PTD) is complementary to classic methods of cancer treatment. Photodynamic therapy is carried out through the participation of a photosensitizer (a photosensitizing agent that accumulates in tumor tissues and sensitizes them to light), an oxygen environment, and a light source that emits a band with a wavelength appropriate for the photosensitizer. The purpose of the study was to determine the possibility of using phthalocyanines as potential photosensitizers in photodynamic therapy of squamous cell carcinoma of the skin in an in vitro model.

Methods: The study used:

- a cutaneous squamous cell carcinoma cell line A431;
- phthalocyanine compounds, including zinc phthalocyanine, cobalt phthalocyanine and synthetic non-metal phthalocyanine.

In order to conduct tests, the cytotoxicity assessment was performed (MTT test).

Results and conclusions: Comparing the effects of metallic phthalocyanines and demethylated phthalocyanine, higher cytotoxicity of metal-substituted phthalocyanines was observed in relation to A431 cells. Exposure to UV radiation increases the cytotoxicity of all three phthalocyanines, whereby the compound exhibited photoprotective activity for the highest concentration of non-metal phthalocyanine. The research has shown that the use of zinc phthalocyanine demonstrated the highest cytotoxicity of the phthalocyanines used in SCC therapy, which may also translate into the highest anti-cancer effect in photodynamic therapy.

Keywords:

photosensitizer, photodynamic therapy, phthalocyanine, A431, cutaneous squamous cell carcinoma



FINANCIAL SITUATION OF HOUSEHOLDS AND EATING HABITS AMONG YOUNG PEOPLE DURING THE COVID-19 PANDEMIC IN POLAND

Daria Buczkowska (1)*, Patrycja Beltowska (2)

Doctoral School of the University of Szczecin:

(1) Institute of Physical Culture Sciences

(2) Institute of Economics and Finance

*daria.buczkowska@phd.usz.edu.pl

A few words about the author(s):

Daria Buczkowska completed her master's studies in 2020 in the field of Physical Education. Currently, she is studying at the Doctoral School at the University of Szczecin.

Abstract:

The aim of the study is to determine the correlation between the financial situation of households and eating habits among adolescents during the COVID-19 pandemic in Poland.

The analysis covered indicators such as the level of earnings, the share of individual expenses in the basket of goods and services, the share of individual types of food products purchased by households, and the average consumption of individual types of food products per capita.

The study was conducted in February 2022. The study was carried out on the basis of the diagnostic survey method, the technique was a questionnaire, and the tool was an own questionnaire. The questionnaire was made available to various educational institutions in Poland: primary and secondary schools. 200 people aged 11 to 19 were included in the sample. Participation in the study was voluntary and anonymous. The research allowed for an initial characterization of eating habits among adolescents and their comparison with the financial situation of households in Poland.

Keywords:

eating habits, financial situation, COVID-19, pandemic



7th edition
National Scientific Conference
"e-FACTORY OF SCIENCE"
April 09, 2022

ASSESSMENT OF THE PREVALENCE OF ANTI-BORRELIA BURGDORFERI ANTIBODIES IN PREGNANT WOMEN

Laura Dziki*, Agnieszka Sikora

*(1) Student Scientific Association at Chair and Department of Medical Microbiology,
Medical University, Lublin, Poland*

(2) Chair and Department of Medical Microbiology, Medical University, Lublin, Poland

*laura52757@gmail.com

A few words about the author(s):

I am a student of Biomedicine at the Medical University of Lublin. In 2021 I finished my first-degree studies, and currently, I am continuing studying for a second degree.

Abstract:

Lyme Borreliosis (LB) is a multisystemic infectious disease caused by *Borrelia burgdorferi* sensu lato spirochetes. Although public awareness about LB has recently increased, infection during pregnancy is a commonly dismissed issue. The possible harmful effects include preterm birth, fetus death, and congenital malformations. However, there is still no clear evidence that would exclude or confirm the teratogenic effect of borreliosis. The aim of this work was the assessment of the prevalence of IgG antibodies directed against *B. burgdorferi* in pregnant women, and the evaluation of knowledge about LB in pregnancy among women who were planning a pregnancy or were pregnant. The sera from 184 pregnant women were checked for the presence of anti-*Borrelia* antibodies using ELISA test (January 2021). Ethical approval for this study was obtained from Bioethics Committee at the Medical University of Lublin (resolution number: KE-0254/279/2020). The survey was conducted on a group of 68 women planning a pregnancy or being pregnant using a proprietary questionnaire. The immunoassay tests showed the presence of specific anti-VlsE antibodies in the IgG class in 6 of examined women (3.3%), revealing their previous contact with *Borrelia* spirochetes. The results from the survey exhibited that the majority of respondents had never encountered this issue and had no knowledge about it. This indicates the need to take action to increase social awareness, especially among future mothers.

Keywords:

Lyme Borreliosis, borreliosis in pregnancy, *Borrelia burgdorferi*



MYTHS AND FACTS: THE INFLUENCE OF A PREGNANT WOMAN'S DIET ON THE DEVELOPMENT OF VAGINAL MICROBIOTA

Kamila Gorczyca (1)*, Malgorzata Koziol (2)

*(1) Student Scientific Association at the Chair and Department of Medical Microbiology,
Medical University of Lublin, Poland*

(2) Chair and Department of Medical Microbiology, Medical University of Lublin, Poland

*kamila.gorczyca@o2.pl

A few words about the author(s):

I am a 6th year student of medicine at the Medical University of Lublin. My passions are microbiology and gynecology, which I combine by researching the microbiome of pregnant women and their offspring since the 3rd year of my studies.

Abstract:

According to many studies, the microbiome influences the host's metabolism, immune status, and overall health.

The aim of the study was to investigate the correlation between the composition of the vaginal microflora and the overweight and obesity of a woman before pregnancy as well as improper eating habits in pregnant patients.

The study used an original questionnaire, which was conducted among 135 women in the puerperium period at the Obstetrics and Perinatology Department of the Independent Public Clinical Hospital No. 4 in Lublin. The composition of the vaginal microflora of pregnant women was checked by taking a vaginal swab for microbiological examination during admission to the department.

Improper eating habits often correlate with overweight (58%) and obesity in women (80%). Information about pregnancy changed eating habits in half of the respondents. The amount of dietary fiber (68.5%) and protein products (72%) increased. Pregnant women who were overweight (38%) and obese (33%) before pregnancy had an abnormal composition of the vaginal microflora more often than patients with a normal BMI (body mass index) (28%). Bacteria such as *Streptococcus agalactiae* were more often isolated in patients with poor eating habits.

Medical personnel should pay attention to educating pregnant women about a healthy lifestyle. A proper diet is associated with a good microflora composition, limiting the occurrence of metabolic disorders in women and their future offspring.

Keywords:

eating habits, maternal vaginal microflora, fetal programming



THE APPLICATION OF NANOCARRIERS IN ONCOLOGICAL THERAPY

Paweł Gumulka*, Monika Dąbrowska, Małgorzata Starek

*Department of Inorganic and Analytical Chemistry, Faculty of Pharmacy, Medical College,
Jagiellonian University, 9 Medyczna St, 30-688 Kraków, Poland*

*pawel.gumulka@student.uj.edu.pl

A few words about the author(s):

I am a master of pharmacy working in a hospital pharmacy in a cytotoxic drug laboratory. I conduct my doctoral dissertation at the Department of Inorganic Analytical Chemistry at the Pharmaceutical Faculty of the Jagiellonian University in Cracow.

Abstract:

The therapeutic effect of each drug is possible due to the proper interaction of the molecule on the therapeutic target. Often this goal is protected by biological barriers, or the drug molecule does not have the appropriate physicochemical properties. A solution to this problem can be found by binding the drug on specially designed nanocarriers. The benefits of this modifications include better solubility, the possibility of prolonged action, increased resistance to degradation or reduced toxicity. This is especially important in the context of targeted anti-cancer therapies. The main assumption in this case is the specific inhibitory effect on the neoplastic cell while not interfering with healthy tissues. For several decades, attempts have been made to create nanostructures with different characteristics. These include: liposomes, phospholipid and polymer micelles, dendrimers, polymers, and inorganic nanoparticles. The presented work provides an overview of the latest and most promising drug carrier research, with particular emphasis on oncological preparations. These reports show that the use of nanotechnology and nanoparticle-based therapies is effective. Unfortunately, a certain barrier in the application of such solutions may be the instability of the molecules used over a long period of time and the production costs. In addition, it is essential to understand the exact course of the body's response to nanoparticles and the long-term effects of such treatment.

Keywords:

nanocarriers, drug, oncology



TYPES AND MANAGEMENT OF URINARY CATHETERS USED IN CLINICAL PRACTICE

**Mateusz Kaczmarek (1)*, Paweł Kamiński (1), Piotr Kamiński (2, 3),
Małgorzata Koziół (4)**

*(1) Students Scientific Association at the Chair and Department of Medical Microbiology,
Medical University of Lublin, Lublin, Poland*

*(2) Department of Traumatology and Emergency Medicine, Medical University of Lublin,
Staszica 21, 20-081, Lublin, Poland*

(3) Department of Urology, Regional Specialist Hospital, Bema 1, 24-100, Puławy, Poland

(4) Chair and Department of Medical Microbiology, Medical University of Lublin, Lublin, Poland

*kaczmarskimat@o2.pl

A few words about the author(s):

Authors of this study are students of 3rd year of medical faculty. We conduct a great deal of science work in Students Research Group supervised by Małgorzata Koziół, Ph.D. in microbiology and cooperate with clinical supervisor M.D., Piotr Kamiński.

Abstract:

At the urology unit of a hospital, physicians provide a wide range of medical services. One of the most commonly performed procedures, supporting the ongoing treatment is catheterization. There are different types of urinary catheters. The choice depends on the patient's condition and anticipated time of use.

Catheter's shape resembles a tube-like object, although many models and types are commonly recognized. They may vary in size, number of eyelets, the opening and the material which they are made of. Considering those parameters, we may distinguish: Tiemann, Nelaton, Foley and Couvelaire catheter. Furthermore, ureteral catheters are used to catheterize a renal pelvis and an ureter. Catheters differ in appliance depending on the shape of their end. There are many factors, that may cause different kinds of complications, including infections. Urinary tract infections (UTI) are the most frequently reported types of infections in the hospital environment. Duration of the catheterization is a relevant risk factor for infection development. There is a chance of colonisation of the catheter by a pathogenic flora that may result in forming biofilm. It becomes a source of pathogens demonstrating increased resistance to disinfectants and antibiotics. The aim of the study was to analyze the current knowledge about methods of treatment with the appliance of catheters, frequently occurring complications of their usage and potential device-related infections development.

Keywords:

urology, UTI, biofilm, catheterization



LEPIDIUM MEYENII (MACA) – ANTIOXIDANT AND ANTI-INFLAMMATORY PROPERTIES

Rafał Kuś*, Barbara Jodłowska-Jędrych

*Chair and Department of Histology, Embryology and Cytophysiology, Medical University of Lublin,
Radziwiłłowska 11, 20-080 Lublin, Poland*

*krafal5@gmail.com

A few words about the author(s):

Rafał Kuś is a Ph.D. student in the Chair and Department of Histology, Embryology and Cytophysiology. Barbara Jodłowska-Jędrych is the head of the Chair and Department of Histology, Embryology and Cytophysiology in Medical University of Lublin.

Abstract:

Lepidium meyenii (Maca) is a plant native to Peru that has been cultivated at high altitudes above sea level by the local population for at least 2,000 years. Maca is rich in fiber. It contains a large number of amino acids, fatty acids and other nutrients, including vitamin C and minerals like copper, iron and calcium. In addition to the listed ingredients, Maca's roots also contain bioactive compounds that affect many processes, including those taking place at the cellular level. For this reason, the plant's popularity continues to grow and *Lepidium meyenii* is one of the main plants exported from Peru. Oxidative stress is one of the factors involved in the development of civilization diseases, as well as in the aging of the organism. Maca contains several antioxidant compounds: phenols, polysaccharides, and glucosinolates. Each of them plays a different role in preventing and reducing oxidative stress. Moreover, *Lepidium meyenii* has anti-inflammatory properties thanks to flavonoids, alkaloids and minerals (B, Co, Cr, Li, Ni, Zn, Na) contained in the root of this plant. The development and persistence of the inflammatory process is an important risk factor for tissue damage and faster aging of the body. The aim of the work is to present the properties of *Lepidium meyenii*, the direct influence of its components on anti-inflammatory and antioxidant processes.

Keywords:

Lepidium meyenii, Maca, properties



CAR-T IMMUNOTHERAPY VERSUS OTHER CANCER TREATMENT METHODS – A NEW HOPE?

Kamila Sobczak*, Wioletta Nieścior

Collegium Medicum of Nicolaus Copernicus University in Toruń

*kamilas77533@gmail.com

A few words about the author(s):

We are second year medical students, with great interest in different fields of science. In the process of finding most suitable one, that we would like to specialize in, we frequently work together.

Abstract:

The CAR-T technology, in which the letter C comes from the word chimera, is a combination of two types of specific immune system responses - cytotoxic (T lymphocytes) and humoral (antibodies). This is achieved by covalently linking the antibody variable fragment to the sub-membrane portion of the TCR and proteins involved in signal transduction from the TCR. By modifying the patient's T lymphocytes, the aforementioned CAR-T lymphocytes are obtained. Cancer cells escape each of the two separate in nature and independently acting specific responses of our immune system (humoral and cellular). CAR-T, which combines two response modes, is a weapon that cancer cells have not come into contact with before.

Immunotherapy is now considered the fifth pillar of cancer care, alongside surgery, chemotherapy, radiotherapy, and targeted therapy. Clinical trials have shown very promising results in patients with end-state of the disease, with complete recovery up to 92% in acute lymphocytic leukemia. Several studies have shown that immunotherapy is less effective with solid tumors, but can be enhanced using small antibodies that are still in the development phase.

Although CAR-T immunotherapy is now considered expensive, it can revolutionize the treatment of cancer.

Keywords:

immunotherapy, cancer, CAR-T



POTENTIAL USE OF SENOLITICS IN DISEASES RELATED TO THE CENTRAL NERVOUS SYSTEM

Sylwia Samojedny (1)*, Patrycja Pańczyszyn-Trzewik (2), Magdalena Sowa-Kućma (2)

*(1) Physiology Student Research Club "Neuron", Medical College of Rzeszow University,
Institute of Medical Science*

*(2) Department of Human Physiology, Medical College of Rzeszow University,
Institute of Medical Science*

*sylwiasamojedny@gmail.com

A few words about the author(s):

Sylwia Samojedny is a student of medicine at University of Rzeszów, a member of the Physiology Student Research Club "Neuron".

Abstract:

Aging is a chronic process affecting all physiological systems in the human body, increasing the risk of many diseases and death. Senescent cells (SCs) are characterized by morphological and metabolic alterations including changes in volume and shape, increased levels of cell cycle inhibitors and development of a pro-inflammatory called as the senescence-associated secretory phenotype (SASP). In the central nervous system (CNS), SCs can occur in diseases such as: mild cognitive impairment, Alzheimer's disease, ischemic stroke, or post traumatic-brain injury.

SCs can be detected and selectively destroyed by senolytics, i.e. substances that constitute a broad group of synthetic and natural compounds with great therapeutic potential. For example, dasatinib (a tyrosine kinase inhibitor) is an anti-cancer drug with ability to cross the blood-brain barrier. Preclinical studies have shown that the coadministration of dasatinib and quercetin (a naturally occurring flavonoid) showed a favorable safety profile and few side effects, making it an important outcome to clinical trials. Another promising senolytic in the context of human applications is navitoclax (ABT-263) - an anti-cancer drug whose mechanism of action is related to the inhibition of anti-apoptotic Bcl2 and Bcl-xl proteins.

The purpose of this presentation was to review results of research on the use of navitoclax as well as the combination of dasatinib and quercetin in mouse and rat models of CNS disorders.

Keywords:

dasatinib, quercetin, navitoclax



PREVALENCE OF DERMATOPHYTES AND THEIR ZOONOTIC POTENTIAL

Daria Stefaniak (1)*, Weronika Zielińska (1), Małgorzata M. Koziol (2)

*(1) Students Scientific Association at the Chair and Department of Medical Microbiology,
Medical University of Lublin, Lublin, Poland*

(2) Chair and Department of Medical Microbiology, Medical University of Lublin, Lublin, Poland

*dariastefaniak18@gmail.com

A few words about the author(s):

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

Abstract:

It is estimated that approximately 25% of people worldwide suffer from skin, hair or nail infection caused by pathogenic fungi. Dermatophytosis, called as well tinea, are caused by dermatophytes which require keratin for growth. They can affect humans and animals, and may be transmitted in both directions. Zoophilic infection refers to the contact with domestic animals and livestock as well, and manifest mostly on skin. The commonest pathogens transmitted onto human are from genus *Trichophyton* and *Microsporum*. We can distinguish some species which can be characterized by high zoonotic potential. Proper diagnosis based on case history taking and laboratory testing is essential not only for treatment of infected person but as well for isolation and therapy of infected animal, and for disinfection of their environment. The aim of the study was to analyze zoonotic potential of dermatophytes and to demonstrate clinical/laboratory diagnosis based on a case report presentation. The case illustrates *Trichophyton* infection in young woman after contact with mice and dog. Based on collected information it discloses the need to stay watchful to newly skin changes after contact with a novel domestic animal.

Keywords:

dermatomycoses, *Trichophyton*, anthroponosis



PRIMARY DYSMENORRHEA, AN OLD ILLNESS – MODERN TREATMENT

Damian Świątkowski

Nicolaus Copernicus University Ludwik Rydygier Collegium Medicum in Bydgoszcz

damswi@protonmail.com

A few words about the author(s):

Damian Świątkowski is student of Collegium Medicum in Bydgoszcz.

Abstract:

Dysmenorrhea is believed to occur in even 90 percent of reproductive age women in many regions of the world making it one of the most common diseases among humans. Many of these cases are not associated with any detectable pathology allowing to diagnose secondary dysmenorrhea, in these situations we talk about primary dysmenorrhea which cannot be cured by eliminating another illness. Although the disease seems to accompany humanity for ages it is still not fully understood by society, physicians, scientists and even affected women themselves. Like many other pain syndromes tends to be neglected and undercured not only lowering the life comfort of many women but also generating public costs due to work and school absence. Researching for more efficacious and better tolerated remedies should not be considered the duty of modern medicine but also education of physicians to not underestimate the possible intensity of this pain which can overcome cramps during labour and teach women to find accurate help in their condition. One of the promising methods of treatments might be using well known pain control transcutaneous electro nerve stimulation.

Keywords:

dysmenorrhea, electro nerve stimulation



SPRI'S INNOVATIVE BIOSENSORS FOR BIOMEDICAL APPLICATIONS

Izabela Turkowska*, Emilia Bujanowska, Natalia Kotyńska, Natalia Kowalewska, Wiktoria Sosnowska, Zuzanna Pietrasik, Barbara Breczko

Białystok University of Technology. Bioinvention Scientific Association

*turkowska.bioinvention.wm@gmail.com

A few words about the author(s):

The Bioinvention Circle team works in interdisciplinary aspects, one of which is biosensors. The topics are utilitarian and provide opportunities for continuous development.

Abstract:

Biosensors are devices using analytical methods for detection and quantification of selected substances in tested samples. In their construction, apart from the transducer, they have elements of biological origin, for example antigens, antibodies, enzymes, etc. In general, SPR biosensors (Surface Plasmon Resonance) are used to measure the reflectance as a function of the angle of incidence of an optical measurement beam on the surface of a sensor plate. Among SPR biosensors, SPRI type biosensors can be distinguished. The SPRI method eliminates the complexity of scanning the angle of incidence of the measuring beam, because the measurement of reflectance is performed at a constant value of this angle. The main components of the SPRI apparatus construction are: an optical path, a transducer interacting with the optical path, a sensor plate with a substance of biological origin, and a data processing and recording system. SPRI biosensors are widely used in biomedical sciences, including analysis of antigen-antibody interactions, studies on bivalent analytes, mutual influence of molecules of different drugs, monitoring of blood glucose levels, diagnosis and monitoring of many diseases, including cancer, assessment of biological activity of new compounds, including drugs. Bioinvention Scientific Circle is currently working on technological solutions concerning SPRI biosensors used in biomedical sciences.

Keywords:

biosensors, resonance, biomedical engineering, potential



THE USE OF 3D PRINTING IN ORTHOPEDIC APPLICATIONS

**Izabela Turkowska*, Ewa Andrzejewska, Martyna Brodowska,
Władysław Lewandowski, Artur Weremczuk**

Białystok University of Technology. Bioinvention Scientific Association

*turkowska.bioinvention.wm@gmail.com

A few words about the author(s):

Bioinvention Scientific Circle. He focuses his scientific interests in interdisciplinary.

Abstract:

3D printing is increasingly being used in biomedical applications and opens up huge opportunities for manufacturers of medical and orthopedic technology products. It is used to create implants, prostheses, medicines, tissues and artificial organs, among other things. The use of this method in orthopedics is an opportunity to change the current methods of treatment, as well as facilitate the process of creating selected products. Among other things, 3D models are used in orthopedic surgery, e.g. in planning treatment of multiple ankle fractures, cancerous lesions, etc. 3D printing of bone models is possible thanks to data obtained from computed tomography or magnetic resonance imaging. Based on the data obtained during the examination, 3D models of the patient's body are created. 3D prints of bone models are made to show details that are difficult to see on two-dimensional images. This allows specialists to better prepare for surgery with individual details. The technique shortens the time of surgery and there is less risk of error for the specialist performing the procedure. In case there is a defect in the bone, it is possible to design an individual implant that will fit exactly to the needs. Computer-aided design, such as CAD, is used to design the implant. The design of the implant can be facilitated by pre-printing a bone model reflecting the defect and, in the general case, incremental techniques can be used to print bone models that replicate the patient's anatomy.

Keywords:

3D printing, fractures, postural defects, scoliosis, orthopedics



WOMEN'S AWARENESS OF REPRODUCTIVE HEALTH

Oliwia Zalewska*, Katarzyna Wszolek

Poznan University of Medical Sciences

*oliwiazalewska68@gmail.com

A few words about the author(s):

I am a master of obstetrics, I work in the gynecology and obstetrics hospital on a daily basis. This year I would like to start a Ph.D.

Abstract:

Introduction: Infertility is defined as the inability to become clinically pregnant after 12 months of regular intercourse without the use of contraceptives. The main goal of the research is to verify women's knowledge of reproductive health, infertility risk factors, causes of reproductive problems, and whether their level of knowledge depends on sociodemographic variables. **Materials and Methods:** Using the proprietary questionnaire, a study was carried out among 111 patients of the Gynecology and Obstetrics Clinical Hospital of the Medical University of Karol Marcinkowski in Poznań, the Endocrinology sub-unit. The patients anonymously filled in a questionnaire with questions about fertility and fertility disorders. **Results:** Women have over good or very good knowledge about the causes of infertility. The test result was statistically significant ($p < 0.05$), but they do not have sufficient knowledge about the symptoms that may accompany diseases related to reduced fertility ($p > 0.05$). The level of knowledge about infertility does not depend on the age of the respondents, the level of education and does not depend on personal experience in this area ($p > 0.05$). The results of the study indicate that women's awareness of reproductive health is low. **Conclusions:** Aspects of reproductive health must be adequately disseminated through public education campaigns that should aim to correct misconceptions about risk factors related to infertility to help society protect their fertility.

Keywords:

female infertility, lifestyle, risk factors, reproductive health, knowledge



ASSESSMENT OF THE POTENTIAL ENVIRONMENTAL TOXICITY OF DRUGS WITH THE USE OF MICROBIOTESTS

Joanna Żandarek*, Żaneta Binert-Kusztal, Małgorzata Starek, Monika Dąbrowska

*Department of Inorganic and Analytical Chemistry, Faculty of Pharmacy, Medical College,
Jagiellonian University, 9 Medyczna St, 30-688 Kraków, Poland*

*jzandarek@gmail.com

A few words about the author(s):

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

Abstract:

The consumption of drugs has been steadily increasing in recent years leading to increased environmental pollution. Among the main sources of water contamination with drugs, sewage treatment plants are enumerated, where pharmaceutical materials and substances that are improperly disposed of are delivered. During the wastewater treatment process, it is a problem to execute the complete removal of pharmaceuticals as their residues pollute surface waters. Both parent substances of drugs and their photodegradation products pose a threat to the environment. The degradation products of verapamil or tetracyclines are characterized by increased toxicity compared to the parent substance. The above information indicates the need to conduct risk assessment analyzes related to the potential toxicity of both drugs and their derivatives on the living organism. Therefore, bioindication has become very important, which, using a living organism as an indicator, allows to assess the state of environmental pollution. Microbiotests (i.e. Microtox, Daphtoxikit F, Thamnotoxkit F, MARA, LumiMARA) have been developed to perform a quick and simple analysis of the effect of substances on the survival of bioindicators. Toxicity is determined by observing the immobilization or death of the test organism. The toxic concentration is then determined and expressed as EC50 or LC50. The presented work discusses the application of microbiotests to analyze the toxicity of drugs from various therapeutic groups.

Keywords:

drug toxicity, bioindication, microbiotests



EFFECTS OF PHYSICAL ACTIVITY ON COGNITIVE BRAIN FUNCTION – A REVIEW OF THE LITERATURE

Natalia Białoń* (1), Michał Trzęsicki (1), Anna Dolińska (1), Mikołaj Górka (2)

(1) Medical University of Silesia in Katowice

(2) Center of Experimental Medicine of the Medical University of Silesia in Katowice

*natalia_bialon@interia.pl

A few words about the author(s):

Biologist, neurobiologist. Ph.D. student in Health Sciences.

Abstract:

Cognitive functions enable cognition of reality, acquisition of knowledge, orientation in space, and processing of information. They include attention, memory, perception, and cognitive functions. Regular physical as well as mental activity helps to improve cognitive functions. Numerous scientific studies show that exercise has a beneficial effect on brain function by increasing levels of important neurotransmitters such as dopamine, serotonin, and norepinephrine. Exercise stimulates the formation of new nerve cells, or stimulates the process of neurogenesis in the hippocampus, the structure mainly responsible for memory and learning. In addition, movement positively influences the LTP phenomenon, referred to as longterm synaptic potentiation (LTP- Long-term potentiation). Current research shows that regular physical activity at an early age reduces the risk of developing neurodegenerative diseases, such as Parkinson's disease and Alzheimer's disease. The literature review also confirms the beneficial effect of physical exercise on neuroplasticity changes occurring in the brain. Physical exercise reduces stress hormones, oxygenates the brain, improves circulation, and increases feelings of relaxation. Practiced physical activity at every stage of our lives plays an important role in improving well-being, preventing some mental disorders.

Keywords:

physical activity, cognitive functions, neuroplasticity, the LTP phenomenon



THE EFFECT OF TRANSFORMING GROWTH FACTOR BETA (TGF- β) ON THE ATHEROSCLEROTIC PROCESS BASED ON RECENT SCIENTIFIC REPORTS

Klaudia Bonowicz*, Klaudia Mikolajczyk, Maciej Gagat, Alina Grzanka

*Department of Histology and Embryology, Faculty of Medicine,
Nicolaus Copernicus University in Toruń, Collegium Medicum in Bydgoszcz, Poland*

*doalkam@gmail.com

A few words about the author(s):

First year student of the Doctoral School of Medical and Health Sciences.

Abstract:

Atherosclerosis is currently defined as a chronic inflammatory disease caused by endothelial injury, in which increased retention of lipids to the subendothelial space play a significant role. Although the risk factors are well understood, the causes of its progression at the molecular level have not been fully defined and there is still no fully effective anti-atherosclerotic treatment. Therefore, currently developed therapies focus on identifying and regulating the activity of potential mediators enhancing the inflammatory response, such as cytokines involved in the atherosclerotic process. The ubiquitous Transforming Growth Factor Beta (TGF- β) plays a key role in maintaining vascular integrity and homeostasis. For a long time, the action of TGF- β in the context of atherosclerosis has been described in the literature as anti-inflammatory. However, recent reports prove that the role of TGF- β is ambiguous and may also be proinflammatory, which indicates a new area of research into molecular events that affect its regulatory functions and thereby contribute to the progression of atherosclerotic lesions. The aim of this presentation is to summarize the effect of TGF- β and its signaling on vascular inflammation and the development of atherosclerosis based on the latest research.

Keywords:

Transforming Growth Factor Beta, vascular inflammation, atherosclerosis



GASTRIC NEUROENDOCRINE TUMORS – WHAT DO WE KNOW ABOUT THEM?

Marlena Budek,* Jarosław Nuskiewicz, Karolina Szewczyk-Golec

*Ludwik Rydygier Collegium Medicum in Bydgoszcz Nicolaus Copernicus University in Toruń,
Department of Medical Biology and Biochemistry, Faculty of Medicine*

*marlenamarkiewicz@o2.pl

A few words about the author(s):

I am a Ph.D. student at Ludwik Rydygier Collegium Medicum in Bydgoszcz, Faculty of Medicine.

Abstract:

Neuroendocrine tumors are neoplasms that arise from specialized neuroendocrine cells with the characteristics of nerve cells that release biogenic amines and hormones. The most common locations for tumors are the lungs, appendix, small intestine, rectum, and pancreas. Gastric neuroendocrine tumors (gNETs) are neoplasms originating from enterochromaffin-like cells (ECL cells) of the gastric mucosa. These are rare lesions with slow development and neuroendocrine differentiation. Their diagnosis is more and more frequent due to the widespread use of upper gastrointestinal endoscopy and the increased expenditure on the technical improvement of endoscopists and the cooperation of doctors of many specialties. gNETs encompass different clinical subtypes which are the basis for selecting an appropriate therapy. The tools necessary to determine the type of gNET are laboratory diagnostics (gastrin determination) and histopathological diagnostics of gastric mucosa sections. Correct identification of the clinical type and histological stage allows for individual and correct management. However, more research is still needed to elucidate the biology of the disease and improve patients' quality of life.

Keywords:

neuroendocrine tumors, gastric neuroendocrine tumors



THE IMPORTANCE OF NEURON-SPECIFIC ENOLASE IN NEUROENDOCRINE NEOPLASMS

Marlena Budek*, Jarosław Nuskiewicz, Karolina Szewczyk-Golec

*Ludwik Rydygier Collegium Medicum in Bydgoszcz Nicolaus Copernicus University in Toruń,
Department of Medical Biology and Biochemistry, Faculty of Medicine*

*marlenamarkiewicz@o2.pl

A few words about the author(s):

I am a Ph.D. student at Ludwik Rydygier Collegium Medicum in Bydgoszcz, Faculty of Medicine.

Abstract:

Enolase is an enzyme of the lyase class. Neuron-specific enolase (NSE) is an isoenzyme of enolase, i.e. a glycolytic enzyme (important in the late stages of glycolysis). NSE appears in the final stages of neuronal differentiation and is therefore a good marker of nerve cell maturation. It is a highly specific marker of neurons and peripheral neuroendocrine cells. Under normal physiological conditions, NSE is not secreted into the extracellular space, but during cell damage or death, it can both leak into the extracellular space and be increased in response to damaged neuronal tissue. NSE, apart from some normal cells, mainly of the nervous and neuroendocrine systems, is present in neuroblastoma (tumor of the nervous system), glioblastomas, small cell carcinoma of the lung and thymus, from which it can be passively released into the bloodstream as a result of the aforementioned necrosis of cells.

Keywords:

neuroendocrine tumors, neuron-specific enolase



APPLICATION OF IONIC LIQUIDS IN ENANTIOSELECTIVE BIOTRANSFORMATIONS OF PHARMACEUTICAL ACTIVE SUBSTANCES

Joanna Chalupka*, Adam Sikora, Michał Piotr Marszał

*Nicolaus Copernicus University in Toruń, Ludwik Rydygier Collegium Medicum in Bydgoszcz,
Faculty of Pharmacy, Medicinal Chemistry Department*

*joanna.chalupka92@gmail.com

A few words about the author(s):

I am Ph.D. student at Faculty of Pharmacy of Collegium Medicum in Bydgoszcz. As a part of my studies I am involved in kinetic resolution of various pharmaceutical compounds with the use of lipases as biocatalysts and ionic liquids as reaction media.

Abstract:

Many of the pharmaceutical substances used in medicine today are racemates. Enantiomers may have different pharmacodynamic and pharmacokinetic properties and therefore different biological effects. Atenolol belongs to the group of β -blockers. It is used in the treatment of hypertension and ischemic heart disease. Clopidogrel belongs to the group of thienopyridine derivatives. This drug is in the form of a prodrug and acts as inhibitor of ADP-induced platelet aggregation with therapeutic antithrombotic effect. The aim of the study was to obtain chirally pure therapeutic agents by kinetic resolution with the use of two-phase catalytic systems obtained by direct addition of an ionic liquid to a bioreactor. Then, the influence of the added ionic liquids on the catalytic activity of the enzymes was examined, as well as the general parameters of kinetic resolution, e.g.: enantioselectivity, conversion and enantiomeric excess of products and substrates. As a result of the conducted research, the high enantiomeric purity of the products for the designed enantioselective biotransformations of both pharmaceutical substances was confirmed. The use of an ionic liquid in the kinetic resolution allowed for the separation of the reactants and products from the reaction environment, which made it possible to use the enzyme in the next catalytic cycle, which reduced the overall cost of the kinetic resolution process.

Keywords:

ionic liquids, lipase, clopidogrel, atenolol



TISSUE-ENGINEERED AUTOLOGOUS BLADDERS FOR PATIENTS NEEDING CYSTOPLASTY

Aleksandra Ciurzyńska

*Ludwik Rydygier Collegium Medicum in Bydgoszcz Nicolaus Copernicus University in Toruń,
Jagiellońska 13/15, 85-067 Bydgoszcz*

ciurz.aleksandra@gmail.com

A few words about the author(s):

Fifth year medical student.

Abstract:

Patients with the final stage of bladder disease can be treated with cystoplasty in which gastrointestinal segments are used. However, placing these into the urinary tracts can become a reason for many complications. Therefore, an attempt was made to find an alternative method and construct human bladder tissues by grafting autologous cells onto matrices and implanting these into patients.

Seven patients (4-19 y.o.) with high-pressure and hypertonic low-compliant bladders due to myelomeningocele were scheduled for cystoplasty. Seven weeks before the surgery, these patients underwent a biopsy. Urothelial and muscle cells were grown in a culture medium, and then placed on a scaffold made of collagen or composite of collagen and polyglycolic acid. The scaffold with seeded cells was anastomosed to the native bladder with or without an omental wrap. Urodynamic tests, cystograms, kidney ultrasounds, serum analyses, and bladder biopsies were performed.

Every patient tolerated the procedure well. The average intravesical pressure, which caused the mean leak point, decreased post-operatively (the most in collagen-polyglycolide composite bladders with an omental wrap). The catheterization interval time increased, renal function remained stable and biopsy showed a regular three-layered structure.

The study shows that tissue-engineered autologous bladders can be used for cystoplasty, optimally employing a scaffold composed of collagen and PGA with omental wrap.

Keywords:

autologous bladders, cystoplasty, engineered bladder tissues



ENZALUTAMIDE IN CASTRATION-RESISTANT PROSTATE CANCER TREATMENT

Robert Gattner

Nicolaus Copernicus University in Toruń, Ludwik Rydygier Collegium Medicum in Bydgoszcz

ro.gattner@gmail.com

A few words about the author(s):

A student in the Faculty of Medicine at Ludwik Rydygier Collegium Medicum in Bydgoszcz.

Abstract:

Prostate cancer is a growing public health problem. It is estimated, that in 2020 over 1.4 million men got diagnosed with this malignancy. Although prostate cancer is a typical example of a hormone-dependent cancer, it's treatment can get much trickier than one would expect if it becomes castration-resistant. This summary presents the most recent facts about the role of enzalutamide in the treatment of androgen deprivation therapy-resistant prostate cancer.

Keywords:

enzalutamide, prostate cancer, castration-resistant



DOES THE USE OF ANTIEPILEPTIC DRUGS DURING PREGNANCY INCREASE THE RISK OF MAJOR CONGENITAL MALFORMATIONS (MGM)?

Anna Górka

NCU Collegium Medicum in Bydgoszcz

annateresagorka@gmail.com

A few words about the author(s):

I am 5th year student of Medicine faculty.

Abstract:

Pregnancy of a woman suffering from epilepsy is classified as high-risk. There are many places where you can read about the several-fold increased risk of birth defects in children of women receiving epilepsy treatment. In some circumstances these claims are true, but it should be emphasized that there are currently (relatively-) new drugs with little or no effect on the health of the fetus. The CDC estimates that birth defects affect about 3% of newborns in the general population, while according to the cited studies, the risk of birth defects in children of pregnant women receiving lamotrigine or levetiracetam in monotherapy is about 2%. However, a conscious approach to motherhood is absolutely necessary. Pregnancy planning gives the possibility of changing the drug to a safer one, dose adjustment and, depending on the treatment, including supplementation with more folic acid.

Keywords:

epilepsy, AED, pregnancy, congenital malformation



STATE OF QUALITY AND FOOD SAFETY IN POLAND BASED ON LATEST PUBLICATIONS

Barbara Janota*, Anna Dolipska

*Department of Basic Medical Sciences, School of Health Sciences in Bytom,
Medical University of Silesia in Katowice*

*d201083@365.sum.edu.pl

A few words about the author(s):

Students of the Doctoral School of the Medical University of Silesia in Katowice.

Abstract:

The production of safe, high-quality food requires constant supervision and control. Authors aimed to summarize recent publications on the quality and food safety produced and traded on the Polish market. The Authors' attention is focused on the production of meat and its products, the problem of using food additives and supervision over the dietary supplements market. As it occurs, it is necessary to increase the care for the health safety of food products at every stage of production and distribution, and moreover, it is necessary to improve the control of products at all stages of their market circulation.

Keywords:

food safety, food quality, food evaluation and control



AUTOLOGOUS MESENCHYMAL STEM CELLS IN RENOVASCULAR DISEASE

Bartosz Kozakiewicz

Nicolaus Copernicus University, Ludwik Rydygier Collegium Medicum in Bydgoszcz

bartosz.d.kozakiewicz@gmail.com

A few words about the author(s):

5th year student of medicine at the Collegium Medicum in Bydgoszcz.

Abstract:

Atherosclerotic renovascular disease (RVD) reduces renal blood flow and GFR and accelerates poststenotic kidney tissue injury. Reactive oxygen species (ROS) can modulate renal hemodynamics and function both directly, by leading to vasoconstriction, and indirectly, by inducing renal inflammation and tissue growth. The involvement of oxidative stress in the pathogenesis of renovascular disease (RVD) is increasingly recognized, but the relative contribution of long-term tissue injury to renal dysfunction remains unclear. Preclinical studies indicate that mesenchymal stem cells can stimulate angiogenesis and modify immune function in experimental RVD. This first-in-man dose-escalation study provides evidence of safety of intra-arterial infusion of autologous MSCs in patients with RVD. MSC infusion without main renal artery revascularization associated with increased renal tissue oxygenation and cortical blood flow.

Keywords:

renovascular disease



EFFECT FLAVANOLS OF THEOBROMA L. BEANS ON THE CARDIOVASCULAR SYSTEM

Joanna Kruszka (1)*, Jarosław Nuskiewicz (2)

*(1) Students Research Club of Medical Biology, Department of Medical Biology and Biochemistry,
Faculty of Medicine, Ludwik Rydygier Collegium Medicum in Bydgoszcz,
Nicolaus Copernicus University in Toruń*

*(2) Department of Medical Biology and Biochemistry, Faculty of Medicine,
Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń*

*joannakruszka99@gmail.com

A few words about the author(s):

Joanna Kruszka is a second-year student of medicine at Collegium Medicum, Nicolaus Copernicus University; working at the Students Research Club of Medical Biology for last two years.

Abstract:

Cocoa (*Theobroma L.*) beans have been known and used by people mainly for food and ceremonial purposes for thousands of years. When analysing their rich composition, scientists pay more and more attention to their possible health-promoting properties. Flavanols, also known as catechins, are the main biologically active compounds found in cocoa beans. Flavanols are a group of organic compounds with a heterocyclic structure. Flavanols have antioxidant properties and thus they might be used in the supporting treatment of neurodegenerative, cancerous, cardiovascular and diabetes diseases. The possible mechanisms of the pro-health effects of cocoa on the cardiovascular system include the activation of nitric oxide (NO) synthase. The increase in NO concentration has a vasodilatory effect, which results in a reduction in blood pressure and improves vascular function.

Keywords:

cardiovascular diseases, cocoa, flavanols, oxidative stress



THE EFFECT OF BIOACTIVE SUBSTANCES FOUND IN WINE ON THE DIGESTIVE SYSTEM CANCERS

Joanna Kruszka (1)*, Karolina Szewczyk-Golec (2)

(1) Students Research Club of Medical Biology, Department of Medical Biology and Biochemistry, Faculty of Medicine, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń

(2) Department of Medical Biology and Biochemistry, Faculty of Medicine, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń

*joannakruszka99@gmail.com

A few words about the author(s):

Joanna Kruszka is a second-year student of medicine at Collegium Medicum, Nicolaus Copernicus University; working at the Students Research Club of Medical Biology for last two years.

Abstract:

The health-promoting effect of including wine in the diet on human health has been studied for years. It is a source of many bioactive compounds, both non-flavonoid (resveratrol) and flavonoid (flavonols, flavanols, anthocyanins). Content of those compounds in a particular type of wine depends on many factors, such as the climate, region or harvest year of grapes. Non-flavonoid and flavonoid compounds show anti-inflammatory, antioxidant and antibacterial properties, which brings health-promoting effects in cardiovascular, degenerative and cancer diseases. A particularly interesting thread is the influence of wine components on the function and cancerous processes occurring in the digestive tract.

Keywords:

antioxidants, cancer, wine



THE INFLUENCE OF CANNABIDOL ON THE WOUND HEALING PROCESS

Bartosz Kulpa

Nicolaus Copernicus University in Toruń, Collegium Medicum in Bydgoszcz

bartosz.kulpaa@gmail.com

A few words about the author(s):

I am a medical student at Ludwik Rydygier Collegium Medicum in Bydgoszcz.

Abstract:

Cannabidiol (CBD) is one of the cannabinoids obtained as an extract from hemp (*Cannabis sativa* L), which, unlike Δ -9-tetrahydrocannabinol (THC), has no psychoactive activity. In recent years, there has been interest in using CBD to treat a wide variety of disorders. The available evidence suggests that CBD may be effective in treating a variety of inflammatory skin conditions. The physiological effects of cannabinoids are mediated by the CB1R receptor and the CB2R receptor, which are members of the G protein-coupled receptor family. Research indicates that both CBR1 and CBR2 receptors are found in epidermal keratinocytes and dermis cells. There is evidence that CBD has an anti-inflammatory effect and also influences the proliferation and differentiation of epidermal cells and the function of fibroblasts, which may positively influence the complex process of wound healing.

Keywords:

cannabidol, CBD, wound healing



SPECIES OF THE GENUS HAWTHORN (CRATAEGUS L.) IN THE ARRANGED GREENERY OF SELECTED AREAS OF THE SILESIAN UPLAND AND EVALUATION OF THE USEFULNESS OF THE FEATURES USED TO IDENTIFY THEM

Natalia Litkowicz

Medical University of Silesia

nanta@plogic.pl

A few words about the author(s):

Natalia Litkowicz is a pharmacy graduate student of Medical University of Silesia, highly interested in botany.

Abstract:

Hawthorn (*Crataegus* L.) is a genus of the rose family (Rosaceae). Hawthorn is valued in therapy for its cardiovascular effects. The inflorescence (*Crataegi inflorescentia*) and the fruit (*Crataegi fructus*) coming equally from two species of hawthorn: common hawthorn (*Crataegus monogyna*) and midland hawthorn (*C. oxyacantha*), and their hybrids are recognised as pharmacopeial raw materials in Poland. The main purpose of this paper was differentiation between three closely related species of hawthorn including common hawthorn (*Crataegus monogyna* Jacq.), midland hawthorn (*Crataegus laevigata* (Poir.) DC.) and *Crataegus ×media* (*Crataegus ×media* Bechst.) with the aim of comprehensive comparison of their features, as well as indication of new differences between those species. Herbarium specimens of each specie included in the study have been prepared and labelled, using literature on the subject, and subsequently, outline drawings and photos of shoots, leaves and fruits' details using USB micro cameras were made on their basis. Measurements of the researched plant structures were based on specimens and photos. Afterwards, the features of the leaves, inflorescence and flowers' structure of each specie were thoroughly compared. After analysis of the results, it was concluded that the most useful for marking morphological features of the test species are the length of the leaf petioles, flower size and the ratio of the lengths of stamina' filaments to the lengths of their anthers.

Keywords:

botany, hawthorn, identification, morphology



NEW THERAPIES FOR NEUROENDOCRINE NEOPLASMS

Jan Milanowski (1)*, Paulina Mucha (1), Karolina Szewczyk-Golec (2)

(1) Students Research Club of Medical Biology, Department of Medical Biology and Biochemistry, Faculty of Medicine, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń

(2) Department of Medical Biology and Biochemistry, Faculty of Medicine, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń

*janek.milanowski@wp.pl

A few words about the author(s):

Jan Skarbimir Milanowski is a student of medicine at Collegium Medicum, Nicolaus Copernicus University, working at the Students Research Club of Medical Biology for last three years. Interested in neurodegenerative diseases.

Abstract:

Neuroendocrine neoplasms (NENs) are neoplasms of the neuroendocrine cells that share features of both nerve and endocrine cells in various organs of the body. NENs account for approximately 0.5% of neoplastic diseases in total. Both precise diagnostics and appropriate NEN therapy are a challenge. Treatment of tumors is based primarily on surgical treatment but some NENs, such as the neoplasms of the pancreas and duodenum, should not undergo surgical intervention, similarly to NENs caused by a mutation in the MEN1 gene. Those types of NENs require the use of proton pump inhibitors. The classic form of therapy include chemotherapy and radiotherapy. Non-surgical therapies with the use of somatostatin analogues or targeted therapies with sunitinib and everolimus are promising. In clinical practice, radiological embolization is also used in patients with liver damage. The secretory activity of NENs is eliminated using interferon alpha. The development of therapeutic possibilities is, next to the development of NEN diagnostics, the main task of physicians in the fight against neuroendocrine neoplasms.

Keywords:

neoplasms, neuroendocrine tumors, surgery, treatment



DIAGNOSTICS OF LUNG NEUROENDOCRINE NEOPLASMS

Jan Milanowski (1)*, Paulina Mucha (1), Jarosław Nuskiewicz (2)

(1) Students Research Club of Medical Biology, Department of Medical Biology and Biochemistry, Faculty of Medicine, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń

(2) Department of Medical Biology and Biochemistry, Faculty of Medicine, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń

*janek.milanowski@wp.pl

A few words about the author(s):

Jan Skarbimir Milanowski is a student of medicine at Collegium Medicum, Nicolaus Copernicus University, working at the Students Research Club of Medical Biology for last three years. Interested in neurodegenerative diseases.

Abstract:

Neuroendocrine neoplasms (NENs) occur in many organs of the human body. Among other types of lung cancer, NENs affect the lungs, accounting for up to 2% of all lung neoplasms. There are four subtypes of lung NETs, including malignant large cell carcinoma (LCNEC), highly malignant small cell lung carcinoma (SCLC) and two carcinoids, namely typical low-grade lung carcinoid (TC) and atypical highly differentiated carcinoid (AC). Developmental predisposing factors include tobacco use, age, genetics and gender. The symptoms are often non-specific, which makes diagnosis difficult. The basis of diagnostics is clinical imaging of lesions and immunohistochemical examination, based on markers such as synaptophysin or chromogranin A. By differentiating the types of NENs, the number of mitoses at 2 mm² and the presence of necrosis in a living tumor are estimated. Accurate assessment of the changes allows for the implementation of specific treatment, ranging from radiochemotherapy to standard lobectomy, finally adjuvant therapy. The selection of a diagnostic route is the basis for maximizing the patient's life expectancy, and, at the same time, it is a great challenge in the case of non-specific symptoms of lung NENs.

Keywords:

carcinoid, carcinoma, diagnostics, lung, neuroendocrine tumors



LITHIUM IN THE TREATMENT OF BIPOLAR DISORDER

Paulina Mucha (1)*, Jan Milanowski (1), Jarosław Nuskiewicz (2)

(1) Students Research Club of Medical Biology, Department of Medical Biology and Biochemistry, Faculty of Medicine, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń

(2) Department of Medical Biology and Biochemistry, Faculty of Medicine, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń

*paulinamucha99@gmail.com

A few words about the author(s):

Paulina Mucha is a fourth-year student of Pharmacy at Collegium Medicum, Nicolaus Copernicus University, working at the Student Research Club of Medical Biology.

Abstract:

Bipolar disorder (BPD) is a chronic mental disorder. Alternating condition of depression and overactivity (mania) of varying severity are characteristic of BPD. One of the medications on this disease is lithium. Lithium has been used for the treatment of bipolar disorder for the sixty years and still it is one of a main treatment of bipolar disorder. New studies have proved that lithium could be used of choice for long-term treatment and prophylaxis for acute manic, mixed and depressive episodes of BPD. Among mood-stabilizing drugs, lithium has the biggest effect on preventing suicidal behaviors. To explain the lithium's therapeutic mechanism of action, it has been proposed that it has an impact on neuronal plasticity and it is associated mainly with the inhibition of glycogen synthase kinase-3 and an effect on intracellular signaling.

It is supposed that the cellular mechanisms and biological systems modulated by lithium relate to the biological disorders associated with BPD.

Keywords:

bipolar disorder, lithium, pharmacological mechanisms



7th edition
National Scientific Conference
"e-FACTORY OF SCIENCE"
April 09, 2022

EFFECT OF VITAMIN D ON THE COURSE OF SARS-COV-2 INFECTION

Paulina Mucha (1)*, Jan Milanowski (1), Karolina Szewczyk-Golec (2)

*(1) Students Research Club of Medical Biology, Department of Medical Biology and Biochemistry,
Faculty of Medicine, Ludwik Rydygier Collegium Medicum in Bydgoszcz,
Nicolaus Copernicus University in Toruń*

*(2) Department of Medical Biology and Biochemistry, Faculty of Medicine,
Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń*

*paulinamucha99@gmail.com

A few words about the author(s):

Paulina Mucha is a fourth-year student of Pharmacy at Collegium Medicum, Nicolaus Copernicus University, working at the Student Research Club of Medical Biology.

Abstract:

COVID-19 pandemic started in December 2019 in Wuhan and has created a global public health crisis lasting until today. During the epidemic caused by SARS-CoV-2 and the high incidence of COVID-19, physicians and scientists are looking for factors that can support the organism immune functions. Many studies have proven the effectiveness of vitamin D supplementation in COVID-19 patients. Vitamin D can regulate the renin-angiotensin system which plays an important role in the proper functioning of Vitamin D influences immune system against the development of viral infection and regulates the immune system through different mechanisms. Epidemiologic studies of the relationship between vitamin D and respiratory infections discussed clinical protective role of vitamin D in preventing of COVID-19 infection, progression and severity. It has been reported that patients with severe course of COVID-19 had low levels of vitamin D. Moreover, in one of studies, it has been suggested that it might exist a cause – effect relationship between vitamin D levels and the number of COVID-19 cases and deaths.

Keywords:

COVID-19, immune system, supplementation, vitamin D



POSSIBILITIES OF MERKEL CELL CARCINOMA TREATMENT IMPROVEMENT

Michalina Nasiadek

Nicolaus Copernicus University Ludwik Rydygier Collegium Medicum in Bydgoszcz

nasiadek.michalina@gmail.com

A few words about the author(s):

I prepared the presentation about rare skin cancer because, as a student of Nicolaus Copernicus University Collegium Medicum in Bydgoszcz I am passionate about dermatology and oncology.

Abstract:

Nowadays, many say one of the most aggressive cutaneous malignancies is Merkel cell carcinoma (MCC), a rare skin cancer form with a neuroendocrine origin that often occurs with other neoplastic conditions. Present evaluations estimates 0.25-0.32 per 100,000 population annual incidences. MCC pathogenesis is associated with either the presence of Merkel cell polyomavirus or chronic exposure to ultraviolet light (UV). The most common location of this tumor is the skin of the head and neck (44–48% of cases), followed by the skin of the upper limb (approx. 19% of cases) and the lower limb (16–20% of cases). At the time of diagnosis, lymph node metastases are already present in half of the subjects. The standard treatment for Merkel cell carcinoma is radical resection and sentinel lymph node biopsy. If there is a sentinel node metastasis, one performs a lymphadenectomy and radiotherapy as adjuvant therapy. Recent advances in the biology of MCCs - the discovery of the oncogenic Merkel cell polyomavirus - have opened up opportunities for new therapeutic strategies and hope for improved treatment efficacy. Recent clinical trials of immune-checkpoint inhibitors indicate that these therapies may improve treatment outcomes by releasing anti-tumor immunity to the immunogenic tumor.

Keywords:

Merkel cell carcinoma (MCC)/polyomavirus



PHARMAGOLOGICAL TREATMENT OF OBESITY WITH GLUCAGON – LIKE PEPTIDE 1 (GLP-1) ANALOGUES

Julia Ruszkiewicz

Ludwik Rydygier Collegium Medicum in Bydgoszcz Nicolaus Copernicus University in Toruń

juliaruszkiewicz6@gmail.com

A few words about the author(s):

Julia Ruszkiewicz – 5th-year student of medicine at the Ludwik Rydygier Collegium Medicum in Bydgoszcz Nicolaus Copernicus University in Toruń.

Abstract:

Obesity is a major problem in this day and age, with increasingly more people developing the disease and its consequences contributing to further illnesses. Because of that, there are ongoing intensive studies on new and better treatments for obesity. These include pharmacological treatment with GLP-1 analogues. Liraglutide is currently registered for use, and numerous studies confirm its effectiveness. The treatment uses its action to slow gastric emptying, suppress appetite and reduce food intake, resulting in weight loss, lower blood pressure and reduced cardiovascular risk. There are currently studies conducted on semaglutide, with one study demonstrating greater effectiveness of that agent compared to liraglutide.

Keywords:

liraglutide, semaglutide, obesity, treatment



PASSIVE EXERCISES AS MOVEMENT OF PEOPLE IMMOBILE DUE TO DISEASES AND INJURIES RULING OUT OF PHYSICALACTIVITY

Janina Rzeszot

WSZ postgraduate studies

danuta.rz@op.pl

A few words about the author(s):

Mgr Janina Rzeszot, physiotherapist.

Abstract:

Passive exercise are exercises in which the patient's movement is triggered by the appropriate work of a physiotherapist or a device that moves a part of the patient's body. Passive exercises are dedicated to sick people who are immobilized in a bed, who cannot move independently, but their condition is stable. These exercises are intended for people who have difficulty moving their arms or legs to the full extent due to limited joint mobility or muscle weakness caused either by diseases or by prolonged inactivity. The purpose of passive exercises is to prevent contractures of pathological changes in the joints and periarticular tissues. Lack of exercise and stress on the joints impairs the nourishment of the articular cartilage, which leads to its atrophy. Movement stimulates the synovium of the joints to produce synovial fluid, which is the only source of nourishment for the joint cartilage. Lack of exercise leads to muscle atrophy, impairs blood flow stagnation can lead to thrombosis of the veins, especially in the legs. Passive exercises are performed in isolated positions, limiting the movement to one joint and one plane of movement, always in the physiological axis of the joint.

Keywords:

passive exercises, movement



7th edition
National Scientific Conference
"e-FACTORY OF SCIENCE"
April 09, 2022

COMPARISON OF THE CONTENT OF FLAVONOIDS IN FLOWERS AND LEAVES OF HYPERICUM PERFORATUM AND H. MACULATUM

**Anna Turostowska (1)*, Agnieszka Dębińska (1), Anna Knozowska (1),
Natalia Szymańska (1), Alicja Bartoszek (1), Dominika Kwiecień (1),
Dorota Gawenda-Kempczyńska (2), Tomasz Zaluski (2)**

*Faculty of Pharmacy, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus
University in Toruń:*

(1) Students' Scientific Association of Pharmaceutical Botany

(2) Department of Pharmaceutical Botany and Pharmacognosy

*an.turostowska@gmail.com

A few words about the author(s):

We are members or former members of the Students' Scientific Association of Pharmaceutical Botany as well as teaching employees of the Department of Pharmaceutical Botany and Pharmacognosy, Collegium Medicum, Nicolaus Copernicus University.

Abstract:

Hypericum perforatum and *H. maculatum* constitute an important source of flavonoids and hypericin, but in medicine the most oftenly used is the first species. The medicinal raw material obtained from both species is *Hyperici herba*. The aim of the study was to determine the content of flavonoids in flowers and leaves of both species, as well as to compare these data with the content in the herb. The material (flowers, leaves and herbs) for each species was collected from three localities in northern Poland. The analyses were performed according to the Polish Pharmacopoeia VI (2002), determining the percentage of flavonoids per hyperoside. The results of the analyses revealed that the flavonoid content in the flowers of *H. perforatum* is circa 14% lower rather than in the leaves ($p = 0.48$), and the content in the leaves is circa 100% higher than in the herb ($p < 0.001$). Whereas the content of flavonoids in flowers of *H. maculatum* is circa 20% lower rather than in leaves ($p < 0.01$) and circa 28% higher rather than in herbs ($p < 0.001$). The large difference between the content of flavonoids in the flowers and leaves of *H. perforatum* and the content in the herb probably results from more developed (rather than in *H. maculatum*) branches of the inflorescence, and thus more stems and flowers at various stages of development, including overblown flowers. The results indicate the possibility of herb use of *H. maculatum*.

Keywords:

flowers, leaves, *Hyperici herba*, flavonoids



MODERN METHODS OF TREATMENT OF IATROGENIC URINARY INCONTINENCE IN MEN USING MUSCLE-DERIVED CELLS

Jakub Zblewski

*Ludwik Rydygier Collegium Medicum in Bydgoszcz Nicolaus Copernicus University in Toruń,
Jagiellonska 13/15, 85-067 Bydgoszcz*

kuba.zet1997@gmail.com

A few words about the author(s):

Fifth-year medical student.

Abstract:

The problem of urinary incontinence is very common and affects approximately 200 million people worldwide. The most common form is stress urinary incontinence. It occurs most often as a postoperative complication after radical prostatectomy. It is also associated with the aging process and obesity, which is occurring in an increasing number of people. In addition to conventional treatment methods, such as the use of drugs, surgeries, and injection of fillers, modern researches introduce new methods of cell transplantation. This paper presents the results of research conducted using autologous fibroblasts and myoblasts. These cells have the ability to divide and remodel into mature cells. Methods of their collection from skeletal muscle, isolation and culture on tissue media are described. A transplant of cultured cells is injected under ultrasonography into the area of the external urethral sphincter in male subjects. Improvement in incontinence was observed in more than half of the men studied. A successful endoscopic cell injection depends largely on the skill of the surgeon and should be performed by experienced urologists. It appears that injection of muscle cells or stem cells into the central urethra can restore the contractile response of the external urethral sphincter. The results are very promising and further studies of autologous transplantation of cells derived from skeletal muscle may help many people around the world suffering from urinary incontinence.

Keywords:

stress urinary incontinence, muscle-derived cells, prostate cancer, radical prostatectomy, endoscopic cell injection

ASSESSMENT OF THE QUALITY OF LIFE IN CANCER IN ADULTS

Ewa Ziółkowska (1)*, Mirosława Krzemieniowska (2)

(1) Academy of Kalisz, Nowy Świat 4, 62-800 Kalisz, Poland

(2) Health Center of Ostrzeszów, Al. Wolności 4, 63-500 Ostrzeszów, Poland

*ewa.ziolkowska@poczta.onet.pl

A few words about the author(s):

Dr hab. Ewa Ziółkowska – specialist in oncological radiotherapy, professor at the Academy Kalisz at the Faculty of Medicine.

Abstract:

Admission: Oncological disease can modify a patient's quality of life in many ways. The quality of life in cancer - which is a very subjective value - largely depends on what is the greatest value in a given patient's life.

Objective of the work: The aim of this study is to assess the quality of life in cancer in adults.

Material and methods: The research was carried out in the period from 01/11/2020 to 10/05/2021 in the Ostrzeszów Health Center, with the consent of the director of the facility. People taking part in the study were informed that it was voluntary and that the obtained data would be used only for scientific purposes. The research was carried out using the diagnostic survey method, with the use of the survey technique. The research tool was the original questionnaire.

Results and conclusions:

1. 96% of the respondents assessed their quality of life as very bad or rather bad.
2. Conducting research on the quality of life of elderly people with cancer should contribute to better planning of palliative care and reduction, as far as possible, of the noticeable deficits in the functioning of cancer patients.

Keywords:

quality of life, cancer, assessment, examination, diagnostic survey

ABSTRACTS OF POSTERS



MEDICAL SCIENCES



THE ROLE OF CASR IN CANCER DEPENDING ON ITS LOCATION

Kamila Florek, Michał Błaszkiwicz*

Wroclaw Medical University, Wybrzeże L. Pasteura 1, 50-367 Wrocław, Poland

*michalbl26@wp.pl

A few words about the author(s):

We are the third year Wrocław Medical University students with passion for medicine and turtles.

Abstract:

The discovery of Calcium Sensing receptor- CaSR- in 1993 was preceded by the concept which focused on unsolved problems of parathyroid physiology. There are tissues in which CaSR acts as an oncogene- breast, prostate, kidney, gastric. The mechanism of the CaSR oncogenic impact is not fully understood, but inhibition of apoptosis or proliferation promotion are considered to be the reason, as well as the stimulating influence of the CaSR on the PTHrP synthesis, which is noticed often in patients with bone metastasis. There are data that CaSR- through its influence on the extracellular Ca^{2+} concentration- in breast, prostate and renal cell carcinoma aids bone metastasis. Considering the topic of pharmacological therapies perspectives it is necessary to mention about calcimimetics and calcilytics. Understanding the role of CaSR in the metastasis to bone can be used in the pharmacological treatment- e.g. in renal cancer the CaSR inhibitor- NPS 2143- inhibited the bone metastasis in patients.

The CaSR acts as a tumor suppressor in- parathyroid adenoma or carcinoma, neuroblastoma, colorectal cancer. The first interest in CaSR considering its tumor- suppressor role was connected with the visible influence of high dietary calcium level and reduced risk to the colon cancer. The protective impact of the CaSR disappears in certain tumors while reducing or because of the loss of CaSR expression during hyperplasia.

Keywords:

CaSR, cancer, oncology, metastasis



ECG PHENOMENA IN ATHELETS

Michał Błaszkiwicz*, Kamila Florek

Wroclaw Medical University, Wybrzeże L. Pasteura 1, 50-367 Wrocław, Poland

**michalbl26@wp.pl*

A few words about the author(s):

We are the third year Wrocław Medical University students with passion for medicine and turtles.

Abstract:

Usually the first symptom of undiagnosed cardiac disease in athletes is sudden cardiac death during the exercise. To prevent early termination of sport career it is important to attentively monitor patients over pre-participation examination. During electrocardiographic analysis in athletes it is crucial to differentiate common physiological pattern modifications which are considered as adaptation and response to regular training, from those caused by pathological subclinical cardiac changes or structural and electrical abnormalities. ECG pattern depends on sport discipline, frequency and type of exercises or profile of the athlete (sex, age, ethnicity). This review is focused on exercise related common benign ECG alterations - bradyarrhythmia, specific repolarization changes, first degree AV block or partial right bundle branch blocks and how to recognize and diagnose pathological aberrations which can lead to threatening arrhythmias such as WPW syndrome.

Keywords:

ECG, athletes, WPW, sport, bradyarrhythmia



THE CONTENT OF MERCURY IN SELF-COLLECTED PHARMACEUTICAL RAW RESOURCES

Barbara Brodziak-Dopierała*, Katarzyna Kwiecień, Agnieszka Fischer

*Department and Division of Toxicology and Bioanalysis, Faculty of Pharmaceutical Sciences
in Sosnowiec, Medical University of Silesia in Katowice, Poland*

*bbrodziak@sum.edu.pl

A few words about the author(s):

Barbara Brodziak-Dopierała, Ph.D., majoring in heavy metals and trace elements in human tissues, plants.

Abstract:

Plenty of plants is often gathered and used by oneself thanks to demonstrated healing effects. To such plants belong dog rose and common hawthorn. Dog rose fruits are characterised by great number of acids and polyphenolic elements and are a valuable source of vitamin C. The main hawthorn ingredients are flavonoids and proanthocyanidins, about action cardioprotective, and antioxidant functions.

The goal of this research was to analyse the content of mercury in naturally growing and independently harvested samples of dog rose (*Rosa canina*) and common hawthorn (*Crataegus monogyna*) fruits. The content of mercury in fruit samples was indicated using the AAS method (AMA 254 mercury analyser).

The average content of mercury in dog rose fruits amounted to 0.52 µg/kg and was significantly lower when compared to the same content in common hawthorn, which amounted to 9.15 µg/kg. The lower and upper quartile amounted to 0.32-0.75 µg/kg for dog rose fruits and 4.15-11.09 µg/kg for hawthorn. There occurred a considerable statistical differences in the content of mercury between examined fruits. The samples collected from Silesian Voivodeship had the highest mercury content (9.88 µg/kg for hawthorn, 0.54 µg/kg for rose). On the basis of conducted research, it can be concluded that consumption of dog rose fruits results in smaller exposure to mercury than consumption of common hawthorn fruits. The place of harvesting had a significant meaning on the content of mercury.

Keywords:

pharmaceutical raw materials, mercury



KIM-1 CONCENTRATION IN THE KIDNEYS OF MICE INFECTED WITH ACANTHAMOEBA SPP.

Aleksandra Czepan*, Joanna Pawlik, Izabela Owsiany, Daria Kołodziej

*Students Scientific Association, Department of Biology and Medical Parasitology,
Pomeranian Medical University in Szczecin, Powstańców Wielkopolskich 72, 70-111 Szczecin, Poland*

*aleksandra.czepan@wp.pl

A few words about the author(s):

Aleksandra Czepan is a student of laboratory medicine at Pomeranian Medical University in Szczecin.

Abstract:

Recent studies show that *Acanthamoeba* spp. may play a significant role in diseases associated with renal dysfunction. Therefore, an ideal marker of kidney damage is being sought. This study aimed to determine the kidney injury molecule type 1 (KIM-1) levels in the kidneys of immunocompetent and immunosuppressed mice infected with *Acanthamoeba* spp.

The study used mouse kidneys that were collected from 96 male BALB/c mice, which were divided into four groups: C (*Acanthamoeba* spp. uninfected, immunocompetent animals; n=18), CS (*Acanthamoeba* spp. uninfected, immunosuppressed animals; n=18), A (*Acanthamoeba* spp. infected, immunocompetent animals; n=30), AS (*Acanthamoeba* spp. infected, immunosuppressed animals; n=30). Mice in CS and AS groups were administered methylprednisolone four days before parasite infection to lower the immune response. Group A and AS animals were inoculated with *Acanthamoeba* spp. suspension. Mice from groups C and CS received 0.9% NaCl. The concentration of KIM-1 was measured by ELISA method.

KIM-1 levels were found to be higher in immunocompetent animals infected with *Acanthamoeba* spp. compared to uninfected immunocompetent hosts at 8 days post infection (dpi) and 16 dpi. In immunosuppressed animals, KIM-1 levels were higher in the infected group of mice than in uninfected mice at 16 dpi.

The results of the study suggest that KIM-1 can be potential biomarker of renal injury in disseminated acanthamoebiasis in immunocompetent and immunosuppressed hosts.

Keywords:

Acanthamoeba spp., kidney, KIM-1



LIPOPEPTIDES B5 AND B6 IN THE FIGHT AGAINST DRUG-RESISTANT PSEUDOMONAS AERUGINOSA

**Róża Czerwińska (1)*, Aleksandra Śmietańska (2), Tomasz Pietrucha (1),
Olga Bortkiewicz (3), Damian Neubauer (4), Joanna Nowicka (3)**

*(1) Students Scientific Society of Microbiologists association at the Department of Microbiology,
Faculty of Medicine, Wrocław Medical University*

*(2) Students Scientific Society of Microbiologists association at the Department of Microbiology,
Faculty of Pharmacy, Wrocław Medical University*

(3) Department of Microbiology, Faculty of Medicine, Wrocław Medical University

(4) Department of Inorganic Chemistry, Faculty of Pharmacy, Medical University of Gdańsk

*rozczerswiska@gmail.com

A few words about the author(s):

We are a collective of researchers from Wrocław Medical University and Gdańsk Medical University. In our research we are interested in new perspectives on antibacterial properties of different peptides.

Abstract:

Pseudomonas aeruginosa is a bacterial species, commonly responsible for opportunistic infections, especially in immunocompromised patients in serious general condition. Such infections pose a great clinical challenge due to a broad spectrum of natural and acquired resistances. Focused research on new therapeutic options is desperately needed. Great hope lies with antimicrobial peptides, presenting extended antimicrobial spectrum and an ability to stimulate regeneration of damaged tissues.

The aim of the study was to determine the activity of short lipopeptides against imipenem and meropenem resistant strains of *P. aeruginosa*. 10 clinical *P. aeruginosa* strains, isolated from the respiratory tract secretion of ICU patients were used. We worked with two short lipopeptides: B5 and B6. The sensitivity of the strains was quantified by determining the minimum inhibitory concentration (MIC) value. The ability of the peptide to stop the development of the biofilm and the activity against the mature biofilm was quantified by determining the minimum biofilm inhibitory concentration (MBIC) and the minimum biofilm eradication concentration (MBEC).

The MIC, MBIC and MBEC ranges amounted respectively 4-18 µg/ml, 4-32 µg/ml and 64-256 µg/ml for the B5 and 4-8 µg/ml, 4-8 µg/ml and 32-256 µg/ml for the B6 peptide. The MBIC values were equal or 2-4 times higher than the MIC values. The MBEC value increased 8-64 times. Both peptides exhibited antimicrobial activity against analysed strains.

Keywords:

Pseudomonas aeruginosa peptides antimicrobial activity



EXPRESSION LEVELS OF PTEN AND SMOX GENES IN PATIENTS WITH GASTRIC CANCER

Magdalena Dzikowiec (1)*, Dorota Pastuszek-Lewandoska (2)

(1) Department of Biomedicine and Genetics, Chair of Biology and Medical Microbiology, Medical University of Lodz, Poland

(2) Department of Microbiology and Laboratory Medical Immunology, Chair of Biology and Medical Microbiology, Medical University of Lodz, Poland

*magdalena.dzikowiec@umed.lodz.pl

A few words about the author(s):

M. Dzikowiec: Assistant at the Department of Biomedicine and Genetics. The aim of doctorate research is to look for diagnostic and prognostic non-invasive biomarkers in patients with gastric cancer, focusing on altered expression of genes and miRNAs.

Abstract:

Gastric cancer is the most frequently neoplasm diagnosed in late stage, associated with poor prognosis. The progress of gastric cancer is a long and complex process that begins with the development of inflammation. Both genetic and environmental factors are involved. The aim of the study was to determine the levels of PTEN and SMOX gene expression in patients with gastric cancer. The SMOX gene encodes the enzyme spermin oxidase, which is associated with oxidative damage to DNA, while PTEN is a tumor suppressor gene. Gene expression was assessed in primary tumor tissue, and in two samples of macroscopically unchanged tissue obtained during gastrectomy in patients (n=32) with diagnosed gastric cancer. The qPCR results showed increased SMOX expression in tumor tissue (mean RQ:2.87) and decreased expression of PTEN (mean RQ:0.3). The expression levels of both genes in macroscopically unchanged tissue was only slightly decreased (mean RQ:0.84 and 0.83, respectively). We also analyzed the microsatellite instability in PTEN locus, which, depending on the tested marker, ranged from 18.2 to 25.9%. The obtained results point to the role of both genes in the development of a neoplastic lesions in gastric cancer and their probable influence: DNA damage due to the increased oxidative stress and cell-cycle dysregulation due to the lack of TSG activity. Understanding the molecular mechanisms related to carcinogenesis may help to look for diagnostic and prognostic markers in gastric patients

Keywords:

PTEN, SMOX, gastric cancer



DRUG RESISTANCE. SUPERBACTERIA AND THEIR REMARKABLE ANTIBIOTIC RESISTANCE

Katarzyna Gdula

*Maria Curie-Skłodowska University, Institute of Biological Sciences, Department of Immunobiology,
Akademicka 19, 20-033 Lublin, Poland*

katarzynagdula28@gmail.com

A few words about the author(s):

I am studying biotechnology at the UMCS in Lublin. I am interested in immunobiology and phenomenon of drug resistance. I am looking for new experiences, which let me extend my knowledge.

Abstract:

In recent years, the problem of progressive bacterial resistance to antibiotics has become more and more serious. More and more strains of bacteria contain genes in their genome that code the mechanisms of resistance to antibiotics. Thus, the trait of drug resistance becomes common among bacteria. Moreover, it is not resistance to one or two types of antibiotics, but to many more. As a consequence, specific strains are endowed with genes for resistance to many types of antibiotics. An additional problem in antibiotic resistance is the phenomenon of gene transfer between bacterial species. This can be done by conjugating, transforming or transducing bacteria, or using mobile genetic elements (MGEs), which include plasmids and transposons. Bacteria equipped with the mechanisms of resistance to many antibiotics are commonly called superbacteria. Infections caused by strains belonging to this group pose many difficulties in the treatment process. It is difficult to choose an antibiotic which will work effectively. It also happens that the infection cannot be cured by drug therapy. To effectively treat infections caused by bacteria resistant to multiple antibiotics, new, recombinant antibiotics or entirely new treatments are required. An example of one such method is the use of specially designed bacteriophages that attack only selected bacteria (superbacteria).

Keywords:

drug resistance, bacteria, superbacteria



OLFACTORY DYSFUNCTION AFTER COVID-19 – A SURVEY RESEARCH

Anna Jędrasiak*, Patryk Krześniak, Julia Łuczak, Patrycja Kupnicka

*Department of Biochemistry and Medical Chemistry, Pomeranian Medical University in Szczecin,
Powstańców Wlkp. 72, 70-111 Szczecin, Poland*

*annajedrasiak99@gmail.com

A few words about the author(s):

Students of the Faculty of Medicine, members of the scientific club at the Department of Biochemistry at the Pomeranian Medical University in Szczecin.

Abstract:

INTRODUCTION: One of the more common complications of COVID-19 is olfactory dysfunction. This disability may exist alone or coexist with other symptoms and take various forms, such as complete or selective loss of smell, or the inability to distinguish and identify odors. In addition, this pathology can have a sudden or gradual onset and end. Despite the individuality of each case, all olfactory dysfunctions reduce the quality of life of the patients. They not only lead to problems in everyday functioning, but also to an increase in the health burden, and even a possible direct threat to the patients' lives.

AIM: The aim of this study was to evaluate the problem of olfactory dysfunction in COVID-19 patients.

METHODS: Based on the research an online survey was prepared and shared among COVID-19 convalescents. Sixty surveys were collected and analysed.

RESULTS: Of 72% of patients that experienced smell/taste loss during SARS-CoV-2 infection 27% suffer from olfactory dysfunction after recovery (24% among patients that recovered more than 3 months before the survey). None of the respondents developed olfactory dysfunction without smell loss during the infection.

CONCLUSIONS: Olfactory dysfunction is common among COVID-19 convalescents. The symptoms persist even a year after the infection.

Keywords:

complications of COVID-19, olfactory dysfunction, smell loss



ASSESSMENT OF THE LEVEL OF SOMATIC INDICATORS AND AEROBIC PHYSICAL CAPACITY IN FIRST LEAGUE FOOTBALLERS

Izabela Kaczorowska (1)*, Łukasz Tota (2), Tomasz Palka (2)

(1) *Students' Scientific Association at the Department of Physiology and Biochemistry of the Academy of Physical Education in Krakow, al. Jana Pawła II 78, 31-571 Krakow, Poland*

(2) *University School of Physical Education in Krakow, al. Jana Pawła II 78, 31-571 Krakow, Poland*

*48486@student.awf.krakow.pl

A few words about the author(s):

M.Sc. in Physical Education. A student with a passion for human physiology.

Abstract:

INTRODUCTION: A high level of aerobic capacity in footballers enables them to develop intense activity during the match and maintain it during the game for a longer period of time. It also promotes better tolerance to increasing fatigue as well as to faster body regeneration during and after the match.

AIM OF THE THESIS: The aim of the thesis was an assessment of the level of somatic indicators and aerobic capacity in Polish top league footballers.

MATERIALS AND METHODS: Twenty Polish top league football players participated in the study. The measurements of somatic indicators were taken as well as a graded treadmill test was performed, additionally pace capacity of the footballers was measured by the WITTY test and post-exercise changes in lactate were assessed.

RESULTS: In the conduct of the study, the average maximum oxygen uptake ($\text{VO}_{2\text{max}}$) in the subjects, expressed in global values was 4.3 ± 0.5 ($\text{L}^{-1} \cdot \text{min}^{-1}$), at the level of the second ventilation threshold (VT2) 3.5 ± 0.4 ($\text{L}^{-1} \cdot \text{min}^{-1}$) what makes 79.6% $\text{VO}_{2\text{max}}$. An improvement in the results of the second WITTY test trial was observed.

CONCLUSIONS: On the basis of the conducted test, we cannot state any significant relationship between the global $\text{VO}_{2\text{max}}$ result and the difference in lactate levels between 0'-3' and 3'-20', however one tendency was observed, as the value of $\text{VO}_{2\text{max}}$ increases, the restitution processes expressed in the level of lactate between 3 and 20 minute are accelerated.

Keywords:

aerobic capacity, football, graded exercise test, somatic indicators



FREQUENCY OF ENDOLEAKS IN PATIENTS AFTER CLASSIC AND BRANCHED/FENESTRATED ENDOVASCULAR AORTIC REPAIR

**Wojciech Kazimierczak*, Natalia Kazimierczak, Zbigniew Serafin,
Waldemar Leszczyński**

Collegium Medicum, Nicolaus Copernicus University in Toruń

*wojtek.kazimierczak@gmail.com

A few words about the author(s):

University academics.

Abstract:

97 computed tomography angiography examinations were performed in 15 women and 82 men after endovascular aortic repair. In the study group, 69 patients underwent classic endovascular aortic aneurysm repair (EVAR), 28 patients underwent branched or fenestrated stent graft implantation (br/fEVAR).

The analysis of the endoleaks revealed the presence of endoleaks in 23 (33.34%) patients after the classic EVAR procedure and in 21 (75%) patients after the br/fEVAR. The most common type of the diagnosed endoleak was type II, detected in 32 cases, which constitutes 57% of the total number of endoleaks. The next most common type of endoleaks was type III, detected in 12 cases, which constitutes 21.43% of the number of all endoleaks.

The complexity of the structure of the stentgrafts used in / br/fEVAR, related to the need to provide blood flow to the visceral arteries, is one of the reasons for the more frequent occurrence of endoleaks in this group of patients. Another factor influencing the incidence of complications is the morphology of aneurysms supplied with br/fEVAR. These facts are reflected in the statistics on the occurrence of endoleaks in this group of patients and indicate the need for increased surveillance in this group.

Keywords:

aortic aneurysm, EVAR, endovascular repair



7th edition
National Scientific Conference
"e-FACTORY OF SCIENCE"
April 09, 2022

INNOVATIVE DENTAL MEDICAL DEVICE FOR RINSING PERIODONTAL POCKETS

**Joanna Kleczewska (1)*, Anna Surtel (2), Małgorzata Kiernicka (2),
Joanna Wysokińska-Miszczyk (2)**

(1) ARKONA Laboratorium Farmakologii Stomatologicznej, Nasutów 99C, 21-025 Niemce, Poland

*(2) Medical University of Lublin, Chair and Department of Periodontology,
Chodźki 6, 20-093 Lublin, Poland*

*joanna@arkonadent.com

A few words about the author(s):

Ph.D. Eng. with specialization in the field of Chemical Technology; R&D Manager in the Polish company specializing in a dental medical devices manufacturing.

Abstract:

Periodontal diseases are a global public health problem as they are the second main cause of tooth loss in the adult population, after caries.

One of the methods of treating periodontal diseases is the use of topical antiseptics. The application of such preparations directly to the periodontal pockets allows to obtain high local concentration within the pocket and limits the possibility of systemic effects or the development of drug resistance. The limitation in the use of such therapy is, above all, its time-consuming, relatively high cost and difficulties in effective drug administration, especially reaching the bottom of very deep periodontal pockets and furcations.

The newly developed biocompatible liquid medical device in the dosing syringe enables precise rinsing and cleaning of periodontal pockets. The study showed that such a composition containing the phosphate buffer and the chosen quaternary ammonium salt (QAS) is effective against reference aerobic microorganisms and has clinically proven activity against pathogenic anaerobic bacteria inhabiting periodontal pockets. Supporting mechanotherapy by rinsing periodontal pockets with a designed medical device may improve the condition of the periodontium and protect the patient from surgical procedures.

Keywords:

periodontal diseases, treatment of periodontal pockets, dental medical device



PGE2 CONCENTRATION IN THE EYES OF MICE WITH DISSEMINATED ACANTHAMOEBIASIS

Daria Kołodziej*, Anna Węgrzycka, Aleksandra Czepan

Students Scientific Association, Department of Biology and Medical Parasitology, Pomeranian Medical University in Szczecin, Powstańców Wielkopolskich 72, 70-111 Szczecin, Poland

*daria_kolodziej@wp.pl

A few words about the author(s):

Daria Kołodziej is a student of laboratory medicine at Pomeranian Medical University in Szczecin.

Abstract:

Acanthamoeba spp. may invade eyes by migrating through optic nerve from the brain to the eyes. The aim of the study was to determine prostaglandin E2 (PGE2) concentration in the eyes of immunocompetent and immunosuppressed mice infected with *Acanthamoeba* spp. The study used eyes that were collected from male mice (n=96). The animals were divided into four groups: *Acanthamoeba* spp. infected, immunocompetent animals (A; n=30); *Acanthamoeba* spp. infected, immunosuppressed animals (AS; n=30); *Acanthamoeba* spp. uninfected, immunocompetent animals (C; n=18); *Acanthamoeba* spp. uninfected, immunosuppressed animals (CS; n=18). Animals in CS and AS groups were administered methylprednisolone to lower the immune response. Group A and AS animals were inoculated with *Acanthamoeba* spp. suspension, while animals from groups C and CS received 0.9% of sodium chloride. The concentration of PGE2 was measured by ELISA method. There were no statistically significant differences in PGE2 concentration between immunocompetent *Acanthamoeba* spp. infected and uninfected animals. PGE2 concentration was statistically significant lower in the immunosuppressed *Acanthamoeba* spp. infected mice at 8 days post infection compared to control group of animals, and it was higher in the eyes of immunosuppressed mice at 16 dpi compared to control group of animals. The results of the study confirm inflammatory process in the eyes of immunosuppressed mice infected with *Acanthamoeba* spp. without damaged cornea.

Keywords:

Acanthamoeba spp., eyes, PGE2



NEUROTOXIC EFFECTS OF ALUMINIUM EXPOSURE – A LITERATURE REVIEW

**Jakub Kwiatkowski*, Anna Baranowska, Michał Tomaszek, Kamil Janawa,
Patrycja Kupnicka**

*Department of Biochemistry and Medical Chemistry, Pomeranian Medical University in Szczecin,
ul. Powstańców Wielkopolskich 72, 70-111 Szczecin, Poland*

*kwiatkowski.jakub1@gmail.com

A few words about the author(s):

Students of the Faculty of Medicine, members of the scientific association at the Department of Biochemistry at the Pomeranian Medical University in Szczecin.

Abstract:

INTRODUCTION: Aluminium is a widespread neurotoxic metal. Despite its weak absorption, chronic Al exposure leads to the accumulation of this element and changes in cerebral tissue. However, the mechanism underlying Al toxicity is not fully understood, making it a promising subject of research.

AIM: The review of the latest research on the neurotoxicity of aluminium.

METHODS: The literature review was prepared by searching for scientific reports in the NCBI database. 15 papers were analyzed.

RESULTS: Increased production of reactive oxygen species (ROS), mediated by intracellular iron imbalance, is believed to be the main mechanism of the neuronal toxicity of aluminium. ROS disrupt crucial metabolic pathways and destroy organelles in cells of the central nervous system (CNS). What is interesting, antioxidant curcumin exerts protective activity against Al oxidative damage in rat astrocytes. Moreover, treating rat astrocytes with aluminium oxide-nanoparticles results in increased synthesis of pro-inflammatory cytokines IL-1 β , IL-2, and IL-6. Furthermore, increased activity of AChE, a greater content of Amyloid β 1-42, and up-regulation of apoptosis-related markers (caspase-3, TNF- α) in the cerebrum was observed. Additionally, phytochemicals such as sesamol, allicin, and myrcene are successful in ameliorating aluminium-induced damage of the CNS in rodents.

CONCLUSIONS: Exposure to Al results in a potentially preventable pro-oxidative and pro-inflammatory response in the CNS.

Keywords:

aluminium, neurotoxicity, antioxidants, phytochemicals



BODY COMPOSITION AND ANAEROBIC PERFORMANCE AND THE SPORTS LEVEL OF ELITE SPEEDWAY RIDERS IN THE JUNIOR AND SENIOR CATEGORY

Kamil Michalik*, Stefan Szczepan, Maciej Markowski, Marek Zatoń

Wroclaw University of Health and Sport Sciences, Poland

*kamil.michalik@awf.wroc.pl

A few words about the author(s):

Kamil Michalik, Ph.D. Research of sport science and physiology. Stefan Szczepan, Ph.D. Cooperates with motor riders. Maciej Markowski M.Sc. Motor speedway commentator. Marek Zatoń, Ph.D, Prof. Research interests: physiology and sport performance.

Abstract:

The main goal was to examine the differences between the body composition, anaerobic performance and the sports level of elite junior and seniors riders, as well as relationships between them. Sixty motor speedway riders of professional clubs in the highest speedway league in Poland participated in this study. They were divided into two groups (n 30): senior (age=29.7±5.2 years) and junior (age=19.7±1.1 years). An assessment of the body composition and the Wingate test on cycle ergometer was carried out. The sport level was defined as the number of heats won, winning percentage, total points scored during the season and average points scored per heat. Juniors differed in index BMI by 4% ($p<0.01$) and fat mass by 20.5% ($p<0.01$), obtaining lower values. The anaerobic capacity did not differ between groups. Only seniors have been found a higher fatigue index by 2.3% ($p<0.05$). Moreover, seniors have higher point indicators specifying the sports level. In the junior group only age correlated with the number of wins ($r=-0.37$, $p<0.05$) and the percentage of wins ($r=-0.36$, $p<0.05$). At seniors, the body height correlated in the range $r=-0.41$ to -0.55 , and the peak power output from $r=-0.39$ to -0.41 with selected sports level indicators. Impact on sports level in the speedway competition have anthropometric indices body height, lean body mass and body surface area. Therefore they should be included in the selection of motor speedway riders.

Keywords:

motorcycle speedway, anthropometry, anaerobic capacity, sport performance



7th edition
National Scientific Conference
"e-FACTORY OF SCIENCE"
April 09, 2022

THE USE OF FOLIC ACID IN THE TARGETED TREATMENT OF COLORECTAL CANCER

Sylwia Milewska (1)*, Gabriela Siemiaszko (2, 3), Anna Sadowska (1),
Diana Sawicka (1), Piotr Nowicki (1), Iwona Misztalewska- Turkowicz (2),
Agnieszka Z. Wilczewska (2), Halina Car (1), Katarzyna Niemirowicz-Laskowska (1)

*(1) Department of Experimental Pharmacology, Medical University of Bialystok,
Bialystok, 15-361, Poland*

(2) Faculty of Chemistry, University of Bialystok, Bialystok, 15-245, Poland

(3) Department of Organic Chemistry, Medical University of Bialystok, Bialystok, 15-222, Poland

*sylwia.milewska@umb.edu.pl

A few words about the author(s):

I am a Public Health Specialist and a Pharmacy Technician, currently in the process of completing my PhD at Medical University of Bialystok. Professionally, I deal with the implementation of telemedicine solutions.

Abstract:

In Poland, colorectal cancer (CRC) is the second most common neoplasm in terms of incidence and mortality. In 2020, CRC was responsible for over 119 thousand deaths. In the same year, over 935 thousand deaths due to CRC were registered worldwide.

It should be emphasized that the challenge and future of standard cancer treatment regimens are to search for new forms of drugs and modification of existing ones. There are a number of papers that focus on the application of folic acid (FA) as a targeting ligand in the treatment of CRC. Analysis of the cytotoxicity bioassays in the case of FA-positive and FA-negative cells demonstrated that the FA- conjugates were 4- or even 28-fold more active against cells that overexpressed FA. Published results indicated that application of FA targeting had a definite effect on migration and invasiveness properties of the treated cells as well as exhibited better pharmacokinetic profile at in vivo level. In effect, the use of FA targeting-based treatment solutions in oncology provides great opportunities to reduce side effects of standard treatment and enables early detection of cancerous lesions, shortening the duration of therapy and monitoring of patient compliance. The aim of the study is the discussion of properties and identification of the predictive use of folic acid as a promising candidate for optimizing and tailored drug delivery in the case of CRC treatment based on our experience as well as published results.

Keywords:

folic acid, FA targeting, colorectal cancer, CRC, cancer treatment



OPTIMAL WINGATE TEST LOAD DEPENDING ON THE NUMBER OF SPRINTS IN THE FORCE-VELOCITY MODEL AT ACADEMIC ATHLETES

Marcin Smolarek (1)*, Kamil Michalik (1), Bartosz Ochman (2), Marek Zatoń (2)

*(1) Department of Human Motor Skills, Faculty of Physical Education and Sport,
University School of Physical Education in Wrocław, 51-612 Wrocław, Poland*

*(2) Department of Physiology and Biochemistry, Faculty of Physical Education and Sport,
University School of Physical Education in Wrocław, 51-612 Wrocław, Poland*

*marcin.smolarek@awf.wroc.pl

A few words about the author(s):

Marcin Smolarek Ph.D student. Cooperates with ice hockey players; Kamil Michalik, Ph.D. Cooperates with National team track cyclists; Bartosz Ochman, Ph.D. Research interests: physiology, statistics; Marek Zatoń, Ph.D, Prof. Research interests: physiology.

Abstract:

The goal of the study was the determination of the optimal external load expressed as a percentage of the total body mass (%BW) in the measurement of the peak power output (PPO) of the lower limbs on a cycloergometer using mathematical models based on linear force-velocity (F-v) and polynomial power-velocity (P-v) relationship depending on the number of sprints in model. Fifteen male academic athletes participated in the study. During the first visit to the laboratory, the Wingate test (WAnT) was performed. During the following (2, 3 and 4), the Torque-Velocity relationship Test (TVT) was performed as three 10-second sprints per session with a random load between 3-11 kg. 9, 5, 4 and 3 sprints (Curve9, Curve5, Curve4, Curve3) were used to create the models, respectively. PPO measured during WAnT was 27-30% lower and differed statistically significantly compared to the presented P-v models ($F_{4.70}=3.044$, $p=0.02$, $\eta^2=0.148$). The optimal load for generating PPO in relation to the percentage of body weight was 13.8 ± 3.2 (%BW) for Curve3, in Curve4 14.1 ± 3.5 (%BW), in Curve5 13.5 ± 2.8 (%BW), and in Curve9 13.4 ± 2.6 (%BW) and it did not differ statistically significantly ($F_{3.56}=0.174$, $p=0.91$, $\eta^2=0.01$). In the PPO assessment based on TVT, three sprints can be used, lasting a few seconds with a load of 3, 7 and 11 kg. This will allow you to determine the optimal load expressed as a percentage of the total body weight, PPO as well as maximum torque, maximum and optimal cadence.

Keywords:

anaerobic performance, wingate test, force-velocity test, power assessment



CADMIUM EXPOSURE AND MICROGLIA REACTIVITY - LITERATURE REVIEW

**Michał Tomaszek*, Kamil Janawa, Anna Baranowska, Jakub Kwiatkowski,
Patrycja Kupnicka**

*Pomeranian Medical University in Szczecin, Department of Biochemistry,
al. Powstańców Wlkp. 72, 70-111 Szczecin*

*michaltomaszek97@gmail.com

A few words about the author(s):

We are students of the Pomeranian Medical University in Szczecin and members of the student research club of the biochemistry department.

Abstract:

INTRODUCTION: Cadmium is a highly toxic element. It has the ability to cross the blood-brain barrier, induce pro-inflammatory pathways, and stimulate the formation of free radicals within the central nervous system (CNS).

AIM: Literature review on the association between cadmium exposure and microglia reactivity.

METHODS: The review was prepared by analyzing 12 scientific articles in Medline and Scopus databases.

RESULTS: Accumulation of cadmium within the microglia causes an increased expression of genes responsible for oxidative stress, such as heme oxygenase-1(HO-1), glutathione S transferase. Also, an increase in the expression of the metallothionein gene, a low-molecular protein responsible for the detoxification of harmful heavy metal ions and the body's defense reactions related to oxidative stress, was observed. In addition, exposure to cadmium induces the formation of free radicals such as hydrogen peroxide, resulting in the development of an oxidative stress state within the microglia, and the release of pro-inflammatory cytokines such as IL-1 β , IL-6 and TNF- α due to the activation of the microglia M1 phenotype.

CONCLUSIONS: Exposure to cadmium increases microglia reactivity and induces inflammation within the CNS.

Keywords:

cadmium, microglia reactivity



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ISBN: 978-83-963887-1-1



ISBN 978-83-963887-1-1



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