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Editorial Office

Medical University of Gdańsk
European Journal
of Translational Medicine
Dębinki 7 Street, Building 1
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Phone: +48 58 349 15 37

E-mail: ejtcm@gumed.edu.pl
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**MIĘDZYNARODOWA INTERDYSCYPLINARNA
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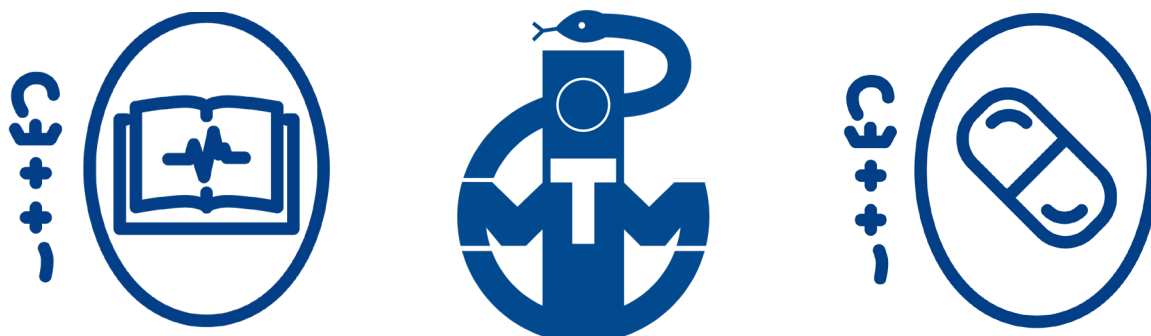
III Konferencja Naukowa
Interdyscyplinarne spojrzenie na Nauki o Zdrowiu
pamięci prof. dr. hab. n. med. Piotra Lassa

V Kongres Medycyny Morskiej, Tropikalnej i Podróży
IMMiT GUMed

XXVII Konferencja Naukowa
Wydziału Farmaceutycznego GUMed

Gdynia, 29-30 września 2023 r.

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CZWARTEK 28.09.2023

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prowadzenie: dr inż. Marta Jaskulak

V Kongres Medycyny Morskiej, Tropikalnej i Podróży IMMiT GUMed

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10:00-10:30 Rozpoczęcie

10:30-11:00 Wykład inauguracyjny I: Medycyna oparta na obrazowaniu

prof. dr hab. n. med. Edyta Szurowska, prorektor ds. klinicznych GUMed

11:00-11:30 Wykład inauguracyjny II: Medycyna morska i tropikalna – aktualne wyzwania

prof. dr hab. n. med. Katarzyna Sikorska, p.o. Dyrektora IMMiT w Gdyni

11.30-12:00 Wykład inauguracyjny III: Opieka farmaceutyczna w Polsce

dr hab. Agnieszka Skowron, prof. UJ

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Nowości w medycynie pracy

Jolanta Walusiak-Skorupa

Dlaczego warto pamiętać o zakażeniu HIV?

Tomasz Smiatacz

Czynniki ryzyka sercowo-naczyniowego wśród marynarzy

Joanna Szafran-Dobrowolska, Marcin Renke

Aktualne możliwości leczenia cukrzycy na morzu

Lukas Palenicek, Marcin Renke

Wirusowe zapalenia wątroby wśród marynarzy

Michał Rokicki, Marta Gessing

15:00-15:20 Przerwa kawowa

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Warsztaty *Pacjent w gabinecie medycyny podróży*

Prowadzi: prof. dr hab. n. med. Krzysztof Korzeniewski

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12:30-13:00	Omówienie działalności Krajowej Sieci Ośrodków Medycyny Podróży
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**Sesja 1: Sztuczna inteligencja w medycynie – czy to możliwe?****Trust and credibility of medical AI solutions.
How FUTURE-AI guidelines can help**

Zaufanie i wiarygodność medycznych rozwiązań z zakresu sztucznej inteligencji. W jaki sposób wytyczne FUTURE-AI mogą nam pomóc

Maciej Bobowicz

2nd Department of Radiology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Progress in delivering medical artificial intelligence (AI) solutions and computer decision support systems is extremely fast. New algorithms emerge daily. They address several different unmet needs of patients and health-care. These solutions help to diagnose and characterise various health conditions, help predict response to specific pharmacological agents, and thus help in treatment planning. Algorithms are usually assessed for technical aspects such as sensitivity, specificity and performance. Such assessment is necessary for technological approval by the Food and Drug Administration in the United States of America and the European Medicines Agency at the European Commission. Such tools undergo an assessment of the effectiveness and safety to receive clearance based on the compatibility with the declared intended use and the level of risk to patients. In the last year, several initiatives, such as an 'AI act' developed by the European Commission, tried regulating the AI market, including the health-AI sector, to decrease AI-related risk.

Therefore, what is the trustworthiness and credibility of medical AI solutions? How generalisable and usable are their outputs in real-world clinical scenarios? Are there any guidelines for good practices and self-regulation of the AI research and development market?

To answer these questions, the process of AI development will be presented and discussed, and various performance metrics will be explored with the main focus on clinical usability and utility. Explainability and interpretability aspects will be presented along with examples of everyday use and failures.

Finally, the FUTURE-AI guidelines developed by the international group of researchers concentrated around the 'AI for Health Imaging' network will be presented. This set of guidelines aims to implement good practice and self-regulation of the AI research and development market.

Citation

Bobowicz M. Trust and credibility of medical AI solutions. How FUTURE-AI guidelines can help. Eur J Trans Clin Med. 2023;6(Suppl.4):20.



Sesja 1: Sztuczna inteligencja w medycynie – czy to możliwe?

Decision support system for small vessel disease diagnosis powered by artificial intelligence algorithms

System wspomagania decyzji w diagnostyce chorób małych naczyń wspierany przez algorytmy sztucznej inteligencji

Maria Ferlin¹, Julia Niemierko², Małgorzata Grzywińska², Rafał Buler¹, Jakub Buler¹, Michał Grochowski¹, Edyta Szurowska²

¹ Department of Intelligent Control Systems and Decision Support, Faculty of Electrical and Control Engineering, Gdansk University of Technology, Gdańsk, Poland

² 2nd Department of Radiology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Small Vessel Disease (SVD) is a term that encompasses a variety of changes in the human brain that are attributed to pathological changes in the small vessels. Mainly, it increases the risk of stroke and dementia along with age. Early detection enables introduction of proper treatment and prevention. However, it is typically detected by accident in examination with a different purpose. Reviewing diverse imaging findings can sometimes be difficult for the human eye to decide where the edges of the disease are, monitor the disease and assess its severity.

Automatic solutions seem promising, as they can provide expert support by speeding up the assessment and suggesting appropriate treatment. However, synthesis of the automatic tool for SVD diagnosis is a challenge, mainly because the high performance in terms of metrics is not sufficient. It is important not to miss any lesions, but simultaneously too much false positive predictions lowers the user trust in the system. Therefore, the balance should be maintained. Further, the diagnosis is based on detected small lesions such as microbleeds, but also larger, irregular, segmented ones such as leukoaraiosis.

We will show the results of a research on SVD diagnostics, conducted by an interdisciplinary team from MUG and GUT. We take advantage of deep learning state-of-the-art detection and segmentation methods as well as interpretable deep Multiple Instance Learning approach. Finally, we will outline the concept of using radiomics to support domain experts like radiologists in SVD detection.

Citation

Ferlin M, Niemierko J, Grzywińska M, Buler R, et al. Decision support system for small vessel disease diagnosis powered by artificial intelligence algorithms. Eur J Trans Clin Med. 2023;6(Suppl.4):21.

**Sesja 1: Sztuczna inteligencja w medycynie – czy to możliwe?****Prostate cancer – diagnosis and treatment in new digital era****Mateusz Michalski^{1,2}, Miłosz Chodyna^{1,2}, Dawid Sigorski^{3,4}, Jacek Gulczyński^{1,2}**¹ Department of Pathology and Neuropathology, Medical University of Gdańsk, Poland² Department of Pathology, Copernicus Hospital, Gdańsk, Poland³ Department of Oncology, Collegium Medicum, University of Warmia and Mazury, Olsztyn, Poland⁴ Department of Biochemistry and Molecular and Cellular Biology, Georgetown University Medical Center, Washington, DC, USA**Abstract**

Prostate cancer was known since ages. Herophiles was probably the first to name the malignancy of prostate gland. Rediscovered in 16th century, diagnosed later to be fully confirmed with histopathological examination of the tumour tissue samples in 19th century, allegedly by John Adams in London. Development of pathology concluded in more detailed classifications of malignancies including prostate cancer. In 70ties of 20th century Donald Gleason proposed his 5 grade classification. It has been used still used up today modified only, or implemented in new Prostate Cancer groups by ISUP (International Society of Urological Pathology).

Standard staining with hematoxylin-eosine (HE) was supplemented by additional stainings (IHC) that give “negative – positive” answer. They can easily be assessed and quantified. Through scanning of the microscopic slides we move to digital realm with images and additional clinical information. Artificial Inteligence (AI) can quickly analyse sets of standard microscopic slides (HE) with additional stainings, combine the images overlapping the specific areas suggesting the pathologist possible/probable areas infiltrated by a malignancy. This can shorten the time of diagnose letting the clinicians to introduce surgical procedures earlier for the benefit of the patient. Depending on the circumstances and general state of a patient the physicians may apply robotic surgery just as da Vinci system with all the positives for better outcome.

Citation

Michalski M, Chodyna M, Sigorski D, Gulczyński J. Prostate cancer – diagnosis and treatment in new digital era. Eur J Trans Clin Med. 2023;6(Suppl.4):22.

Sesja 1: Sztuczna inteligencja w medycynie – czy to możliwe?

The patient in the 'arms' of a medical robot. Robotic surgery – from induction of anaesthesia to awakening

Pacjent w „ramionach” robota medycznego. Zabiegi robotyczne – od znieczulenia do wybudzenia

Przemysław Żuratyński^{1,2}

¹ Zakład Ratownictwa Medycznego, Gdański Uniwersytet Medyczny, Gdańsk, Polska

² Dział Anestezjologii i Intensywnej Terapii, Centrum Onkologii im. prof. F. Łukasiewicza w Bydgoszczy, Bydgoszcz, Polska

Abstract

Introduction: Robotic surgery is one of the fastest developing specialities in surgical treatment. With the implementation of the PUMA Robotic Surgical System in the operating theatre in 1978, robot-assisted laparoscopic procedures are rapidly gaining popularity. This is due to its many advantages, i.e. minimal invasiveness, less post-operative pain, smaller incisions, shorter hospital stay, shorter recovery time and faster return to work. In Poland and globally, the most popular is the da Vinci robotic system, developed by the US company Intuitive Surgical in 1999. From 1 April 2022. The National Health Fund finances robotic procedures for the treatment of prostate cancer (27 institutions), while from 1 August 2023 also for the treatment of endometrial cancer and colorectal cancer (22 institutions). Aim of the study. The aim of this study is to describe the course of surgery using the da Vinci robotic system from the induction procedure to anaesthesia until the patient awakens, including the instrumentation and the role of the different members of the team involved in the procedure.

Discussion: A patient qualified for surgery using the robotic system should have an ERAS protocol in place. The procedure is performed under general anaesthesia and is carried out by the surgeon from a console that is located near the operating table on which the patient lies. The anaesthetic team and the surgical team participate in the procedure. In surgery, urology and gynaecology, there are distinct differences in the procedure performed, i.e. the positioning of the patient, the instrumentation used and the surgical access.

Conclusions: Robotic procedures are not methods dedicated to every patient. The surgical team and the anaesthetic team are responsible for qualifying the patient for the procedure. Robotic procedures improve safety, better treatment outcomes and a better quality of life for patients. It is important to remember that medical robots do not replace medical staff, but only support their work. Proper training of the personnel using the robotic system, the so-called standardised training pathway, can contribute to better treatment outcomes.

Keywords: robotic surgery; robot-assisted laparoscopic procedures; surgical treatment; anaesthesia

Citation

Żuratyński P. The patient in the 'arms' of medical robot. Robotic surgery – from induction of anaesthesia to awakening. Eur J Trans Clin Med. 2023;6(Suppl.4):23.

**Sesja 1: Sztuczna inteligencja w medycynie – czy to możliwe?****Computer aided system for breast cancer diagnosis – interpretable deep multiple instance learning approach****Komputerowy system wspomagania diagnostyki raka piersi – interpretowalne wieloinstancyjne podejście uczenia głębokiego****Jakub Buler¹, Rafał Buler¹, Maciej Bobowicz², Michał Grochowski¹, Marlena Rygusik², Maria Ferlin¹, Edyta Szurowska²**¹ Department of Intelligent Control Systems and Decision Support, Faculty of Electrical and Control Engineering, Gdańsk University of Technology, Gdańsk, Poland² 2nd Department of Radiology, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Breast cancer is the most common cancer in women, and its early detection is crucial for effective treatment. Artificial intelligence (AI) and machine learning (ML) algorithms have great potential for supporting radiologists and oncologists in medical data screening and analysis towards diagnosis. In particular, they are extremely effective when analysing medical images.

Developing an AI- and ML-powered computer-aided diagnosis system is complex due to challenges like limited pixel-level annotations, small cancer lesion sizes within high-resolution images, class imbalances, tumour diversity, and breast density variations. Furthermore, medical practitioners are concerned about using these black-box models due to the lack of transparency in inference.

Our ongoing research focuses on the detection of breast cancer using digital mammography images with only image-level annotations. The analysis was performed on fragmented high-resolution images, preserving their quality during processing. Employing artificial deep neural networks and Multiple Instance Learning (MIL) algorithms, we distinguish between cancerous and non-cancerous instances. Notably, our attention-based MIL aggregation approach enhances algorithm interpretability and aids in lesion localization. Moreover, barely-visible artefacts were found, whose presence drastically distorted the algorithm's performance. The study was conducted on two mammography datasets with diverse imaging attributes, showcasing both high classification metrics (AUC-ROC0.892) and the potential for algorithm generalization. Collaboration between AI specialists and healthcare professionals enhanced by the model's interpretability, demonstrates the importance of integrating domain knowledge and leveraging human expertise to ensure system performance and reliable decision-making.

Additionally, our present research concentrates on predicting breast cancer metastasis to axillary lymph nodes using mammography images.

Citation

Buler J, Buler R, Bobowicz M, Grochowski M, et al. Computer aided system for breast cancer diagnosis – interpretable deep multiple instance learning approach. Eur J Trans Clin Med. 2023;6(Suppl.4):24.



Sesja 1: Sztuczna inteligencja w medycynie – czy to możliwe?

AI, autonomy, algorithms and a physician in diagnostics

Jacek Gulczyński^{1,2}, Aleksander Żołnierski³, Ewa Iżycka-Świeszewska^{1,2}

¹ Department of Pathology and Neuropathology, Medical University of Gdańsk, Poland

² Department of Pathology, Copernicus Hospital, Gdańsk, Poland

³ Institute of Economics, Polish Academy of Sciences

Abstract

What is AI – artificial intelligence? In general it is ability of the computer system to mimic the work of a human mind. Through analysis, learning, acquiring data to problem solving. In pathology it should deal with the work usually done by a pathologist, analysing images from microscopic slides. With insufficient number of specialists and growing number of slides the use of AI seems inevitable. Additional stainings of slides with tissue/tumour samples, especially in problematic cases, increase the amount of work, but also supply vital information. For both, human and AI. Several algorithms using ancillary tests/stainings have already been developed to help state final histopathological diagnosis. Positive and negative stainings create a set of information that can be quite easily and quickly analysed by AI, to suggest the answer. We reach the point where a machine is ready to conclude. So far human being is necessary and obligatory to give the final diagnosis. Published papers on several malignancies analysed by a pathologist and AI parallelly, show comparable ratio of false negative and false positive answers, but not necessarily overlapping. Cooperation of AI and experienced specialists can guarantee optimal results, along with maintaining safety of a patient. Nevertheless the progress of business oriented companies developing newer and newer algorithms will most probably try to diminish the role of a human experience in process of diagnosing, giving AI bigger or full autonomy. Up to now there is no country where such procedure is legal and/or accepted, but how long?

Citation

Gulczyński J, Żołnierski A, Iżycka-Świeszewska E. AI, autonomy, algorithms and a physician in diagnostics. Eur J Trans Clin Med. 2023;6(Suppl.4):25.

**Sesja 2: Pielęgniarstwo i położnictwo w Polsce i na świecie****Clinical effectiveness through the tools of description and measurement of the quality of nursing care****Efektywność kliniczna poprzez narzędzia opisu i pomiaru jakości opieki pielęgniarstwa****Dorota Kilańska¹, Aleksandra Gaworska-Krzemińska²**¹ Department of Coordinated Care, Faculty of Health Sciences, Medical University of Łódź, Łódź, Poland² Institute of Nursing and Midwifery, Department of Nursing Management, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Background: Nursing documentation is the key to transparent clinical communication. The documentation allows for the reflection of nursing assessments, changes in the clinical status of the patient, procedures performed by nurses and relevant information about the patient. In this way, it supports a multidisciplinary team in providing individualized care. Documentation using structured terminology provides understandable evidence of care and is an important occupational and medical legal requirement for nursing practice. Documentation enables the process of achieving high quality care. The aim: To provide a structured and standardized approach to nursing documentation will ensure consistent clinical communication processes across and quality of care.

Methods: A search was conducted for English-language, peer reviewed publications of any research design via Pubmed, and Google. Keywords used in the search are nursing Quality Data Reporting, Nursing Diagnosis, Data, Indicators, ICNP Terminology.

Results: The findings suggest that nursing documentation is a key to assessment the quality of nursing care and will support clinical effectiveness of nursing procedures and standards. Nursing documentation with documented diagnosis can independently predict patients care effectiveness. Using the structured terminology which is recommended for nursing practice will help to document high quality of data necessary to achieve.

Conclusion: Nursing practice needs to assess the quality of care and evaluate procedures using Health Technology Assessment for practice change. This requires high-quality data. Data consistency will be achieved by implementing a nursing dictionary into ICT systems.

Citation

Kilańska D, Gaworska-Krzemińska A. Clinical effectiveness through the tools of description and measurement of the quality of nursing care. Eur J Trans Clin Med. 2023;6(Suppl.4):26.



Sesja 2: Pielęgniarstwo i położnictwo w Polsce i na świecie

Knowledge of medical personnel about automated external defibrillation under the ERC 2021 Guidelines

Wiedza personelu medycznego na temat automatycznej defibrylacji zewnętrznej w świetle Wytycznych ERC 2021

Przemysław Żuratyński^{1,2}

¹ Zakład Ratownictwa Medycznego, Gdański Uniwersytet Medyczny, Gdańsk, Polska

² Dział Anestezjologii i Intensywnej Terapii, Centrum Onkologii im. prof. F. Łukasiewicza w Bydgoszczy, Bydgoszcz, Polska

Abstract

Introduction: Defibrillation is one of the links in the “chain of survival” and consists of the passage of a pulse of electrical energy through the heart muscle with the appropriate therapeutic value (voltage, intensity, power) to reverse the normal heart rhythm. It should be performed as quickly as possible. Automated external defibrillators that provide easy and intuitive operation are used for this purpose. Knowledge of the location and AEDs and how they can be used should be communicated to all members of the community. Aim of the study. The main aim of the study was to assess the knowledge of medical personnel about automated external defibrillation and its role according to the European Resuscitation Council (ERC) Resuscitation Guidelines 2021.

Methodology: The study was conducted among 133 representatives of medical staff working at the Professor Franciszek Łukaszczyk Oncology Centre in Bydgoszcz. A proprietary questionnaire was used for the study.

Conclusions: The level of medical personnel’s knowledge of automated external defibrillation and its role according to the ERC Resuscitation Guidelines 2021 is unsatisfactory. Midwives/midwives and doctors have a higher level of knowledge on the above-mentioned topic compared to other professional groups. There is a need to focus on detailing the topics of the legal aspects of automated external defibrillation in Poland, the system of public access to defibrillation, the steps preceding the use of an AED and the use of a defibrillator in paediatric victims. A significantly higher level of knowledge regarding automated external defibrillation occurs when training is conducted in the form of self-learning, e.g. publicly available materials provided by the trainers. There is a definite need for medical personnel to expand their knowledge on the subject of automated external defibrillation. In the opinion of medical personnel, the Polish society definitely lacks adequate knowledge and skills in the field of automated external defibrillation.

Keywords: automated external defibrillation; knowledge; medical personnel; resuscitation; public access to defibrillation

Citation

Żuratyński P. Knowledge of medical personnel about automated external defibrillation under the ERC 2021 Guidelines. Eur J Trans Clin Med. 2023;6(Suppl.4):27.

**Sesja 2: Pielęgniarstwo i położnictwo w Polsce i na świecie****Do pregnant women using the Coordinated Care for a Pregnant Woman feel safer than in the traditional model of care?**

Czy ciężarne korzystające z Programu Koordynowanej Opieki nad Kobieta w Cięży czują się bezpieczniej niż w tradycyjnym modelu opieki?

Marta Gallas¹, Aleksandra Gaworska-Krzemińska², Katarzyna Pogorzalczyk³

¹ Institute of Nursing and Midwifery, Department of Nursing Management, Medical University of Gdańsk, Poland

² Institute of Nursing and Midwifery, Department of Nursing Management, Medical University of Gdańsk, Poland

³ Independent researcher, Poland

Abstract

Care for a pregnant woman can take various organizational forms. For years, we have been exploring solutions to ensure a high quality of services provided in this period, which is unique for a woman and her child.

The aim of the study is to compare the quality parameters of two models of care for pregnant women in Poland according to their safety.

The study presented in this paper was conducted using a diagnostic survey on a group of 1,697 Polish women in the traditional model of care (TM) and 3,216 women in the Coordinated Care for Pregnant Women Program (CCP). Two research tools were used in this study.

The results indicate that in CCP, women were significantly more likely to receive midwife assistance in infant care (90%) than women in the traditional care model (60%). Significantly more CCP patients want to return to the same hospital for their subsequent childbirth (74%) than women in the traditional model of care (43%). It was noted that more women using CCP (71%) felt safe throughout their pregnancy than women using the TM (42%).

In patients' opinion, the new CCP model is superior in meeting their needs and providing higher quality services. The CCP program was considered more satisfactory by patients, they could rely on help from midwives more often after childbirth, and most of them would choose the same hospital again for childbirth. However, educating women that an obstetrician-gynecologist and a midwife can manage their pregnancy is still necessary.

Citation

Gallas M, Gaworska-Krzemińska A, Pogorzalczyk K. Do pregnant women using the Coordinated Care for a Pregnant Woman feel safer than in the traditional model of care?. Eur J Trans Clin Med. 2023;6(Suppl.4):28.



Sesja 2: Pielęgniarstwo i położnictwo w Polsce i na świecie

Preferences of women with low obstetric risk for birth type

Preferencje drogi zakończenia ciąży w grupie kobiet niskiego ryzyka położniczego

Anna Michalik, Lucyna Wójcicka¹, Agnieszka Czerwińska-Osipiak¹, Anna Szablewska¹, Jolanta Olszewska¹

¹ Department of Obstetrical and Gynaecological Nursing, Institute of Nursing and Midwifery, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Background: Taking care of a women during pregnancy and birth is the core of midwifery. The global number of Caesarean sections is constantly increasing. Optimizing the number of CS is one of the most important challenges, especially in the low-risk pregnancy group. Midwives are particularly called upon to do so.

Methods: The cross-sectional study included 1013 pregnant women. A descriptive on-line questionnaire which provided quantitative data was conducted. The following data was analyzed: demographic, obstetrical, level of anxiety, depressiveness, need for social support and sense of control. Standardized tools in the Polish language version were used.

Results: Pregnant women preferring CS were multigravidas, elder and more frequently city inhabitants than women choosing VB. The preference for CS was equally strong in multiparas and primiparas in the older age group. The former were featured by higher depressiveness and higher level of anxiety. What is more, the vast majority of women after CS declared their willingness to repeat that procedure in their current pregnancy. Participation in antenatal classes had no impact on preferences regarding the birth route.

Conclusion: The main factors correlating with high CS rates in the low-risk group are: former experience related to childbirth and high fear of childbirth (FOC) rates. Good practices require the introduction of evidence-based recommendations for a given population in order to identify and continue to guide women with exceptionally high levels of FOC. Successful interventions should be based on an in-depth interview and take into account previous birth type, depressiveness, low social support and the knowledge about childbirth.

Citation

Michalik A, Wójcicka L, Czerwińska-Osipiak A, Szablewska A, et al. Preferences of women with low obstetric for birth type. Eur J Trans Clin Med. 2023;6(Suppl.4):29.

**Sesja 2: Pielęgniarstwo i położnictwo w Polsce i na świecie****Analysis of selected elements of support among breastfeeding women after preterm birth****Analiza wybranych elementów wsparcia wśród kobiet karmiących piersią po porodach przedwczesnych****Aleksandra Krawczyk, Agnieszka Czerwińska-Osipiak, Anna Szablewska, Wiktoria Rozmarynowska**

Department of Obstetrical and Gynaecological Nursing, Institute of Nursing and Midwifery, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Introduction: Preterm births are an ongoing problem. Annually, about 7% of babies are born preterm. Preterm birth involves many health problems, which can impair the functioning of the whole family as a social unit. Postpartum women who have had a preterm birth require particular attention from medical staff and special support. Lactation is a physiological part of the puerperium, which may appear late in postpartum women with preterm births. There are multiple factors that determine successful lactation.

The objective of the paper: The objective of this paper was to identify and assess the determinants of lactation in women after preterm birth. This included assessing how patients felt about the available support, the demand for support, the search for support and the actual support received. The specific objectives of the study were to evaluate subjective perceived support, determine demand for support, evaluate and analyse correlations.

Material and methods: Women in the early postpartum period (i.e., up to the end of 1 week postpartum) who delivered prematurely or at term were surveyed. In order to carry out the study, a diagnostic survey was applied. The questionnaire included five standardised scales of the Polish version of the Berlin Social Support Scale (BSSS) questionnaire.

Conclusions: The analysis of the results showed that better lactation outcomes were achieved by women who started early lactation stimulation, pumped colostrum immediately after delivery and had a positive attitude towards breastfeeding. Women after preterm birth had a greater demand for support.

Citation

Krawczyk A, Czerwińska-Osipiak A, Szablewska A, Rozmarynowska W. Analysis of selected elements of support among breastfeeding women after preterm birth. Eur J Trans Clin Med. 2023;6(Suppl.4):30.



Sesja 3: Modern Cancer Imaging & Therapy

Modern imaging and therapy of prostate cancer with radiolabeled ligands of prostate-specific membrane antigen (PSMA)

Nowoczesne obrazowanie i leczenie radioizotopowe raka prostaty z użyciem ligandów specyficznego dla prostaty antygenu błonowego (PSMA)

Wojciech Cytawa

Department of Nuclear Medicine, Faculty of Health Sciences, Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Prostate cancer (PCa) is the second most common (first in developed countries) malignancy in men worldwide and a leading cause of cancer-related death. The aim of this work was to present a review of the newest achievements concerning prostate-specific membrane antigen (PSMA) directed radionuclide imaging and therapy of PCa. PSMA positron emission tomography/computed tomography (PET/CT) is now a well-established imaging modality detecting recurrent PCa, even at very low levels of prostate-specific antigen (PSA), 0.2-0.5 ng/ml after radical treatment. In the context of primary staging of PCa there is a growing body of evidence the PSMA PET/CT outperforms conventional imaging based on computed tomography (CT) and bone scan, especially in high-risk disease (according to d'Amico classification). In metastatic castration resistant prostate cancer (mCRPC) – a lethal form of disease – PSMA radioligand therapy (RLT) proved effective in prospective clinical trials and is expected to be used in wider patient populations. PSMA targeted alpha therapy, due to high linear energy transfer of alpha particles is another promising method of treatment of mCRPC, showing high response rates in experimental studies.

Citation

Cytawa W. Modern imaging and therapy of prostate cancer with radiolabeled ligands of prostate-specific membrane antigen (PSMA). Eur J Trans Clin Med. 2023;6(Suppl.4):31.



Sesja 3: Modern Cancer Imaging & Therapy

Magnetic resonance imaging of salivary gland tumors

Obrazowanie zmian ogniskowych ślinianek w rezonansie magnetycznym

Karolina Markiet

2nd Department of Radiology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Multiparametric magnetic resonance is a precise tool of preoperative assessment of salivary gland tumors, allowing precise characterization of focal lesions and their correlation to the extracranial part of the facial nerve and thus optimization of treatment. This educational talk will focus on indications for the use of magnetic resonance imaging in salivary glands, advanced imaging techniques (such as DWI, PWI, IVIM) and characterization of the most common salivary gland tumors. Limitations will also be mentioned.

Citation

Markiet K. Magnetic resonance imaging of salivary gland tumors. Eur J Trans Clin Med. 2023;6(Suppl.4):32.



Sesja 3: Modern Cancer Imaging & Therapy

Long-term survival of a patient with lung adenocarcinoma and intramedullary cauda equina metastasis (ICEM) – a case report

Długotrwałe przeżycie pacjenta z rakiem gruczołowym płuca i przerzutem do „ogona końskiego” – studium przypadku

Barbara Gibas¹, Jacek Teodorczyk², Wojciech Cytawa², Artur Bandura³

¹ Students' Scientific Circle Department of Nuclear Medicine, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

² Department of Nuclear Medicine, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

³ Department of Oncology and Radiotherapy, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Non-small cell lung cancer (NSCLC) is one of the most common malignancies worldwide and a leading cause of cancer-related death. Intramedullary cauda equina metastases (ICEM) are rare lesions in patients with malignant tumors, accounting for < 1% of all metastatic sites. Here, we present a history of a 65-year-old female diagnosed with lung adenocarcinoma who achieved long disease-free survival (DFS) after local treatment of ICEM in the course of oligometastatic disease.

The patient was initially treated with left pneumonectomy and lymphadenectomy due to NSCLC. After 24 months disease recurred with a single lesion in the right lung, detected by 18F-fluorodeoxyglucose positron emission tomography/computed tomography (FDG PET/CT). The patient underwent stereotactic body radiation therapy (SBRT), resulting in a complete metabolic response of the lung metastasis. After another 12 months she started complaining of the low back pain radiating to the right gluteal region and pudendum, with occasional urine incontinence. Magnetic resonance imaging (MRI) of the pelvis revealed a focal lesion in S2, interpreted as neurofibroma. Eventually, the lesion was resected and histopathologically confirmed as an adenocarcinoma metastasis. Subsequent FDG PET/CT showed focal uptake in S1/S2 region, highly consistent with residual neoplastic process, without other metastases. Hence, the patient was referred for adjuvant radiotherapy.

Our patient is an example of the late diagnosis of ICEM, being a single disease focus, confirmed 67 months after the primary diagnosis of NSCLC. The lesion was treated with surgery and radiation therapy with radical intent. Until now, the patient remains under regular follow-up and has reached a DFS of more than 24 months, which further supports the use of local radical treatment in the course of oligometastatic NSCLC.

Citation

Gibas B, Teodorczyk J, Cytawa W, Bandura A. Long-term survival of a patient with lung adenocarcinoma and intramedullary cauda equina metastasis (ICEM) – a case report. *Eur J Trans Clin Med.* 2023;6(Suppl.4):33.

**Sesja 3: Modern Cancer Imaging & Therapy****Complete radiographic response to immunotherapy in a patient with metastatic anaplastic thyroid cancer**

Całkowita odpowiedź radiologiczna na immunoterapię u pacjenta z rozsiałym rakiem anaplastycznym tarczycy

Wojciech Cytawa¹, Jacek Teodorczyk¹, Monika Mierzejewska¹, Bartłomiej Tomasiak², Jacek Rutkowski², Piotr Wiśniewski³, Maciej Śledziński⁴, Renata Zaucha²¹ Department of Nuclear Medicine, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland² Department of Oncology and Radiotherapy, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland³ Department of Endocrinology and Internal Medicine, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland⁴ Department of General, Endocrine and Transplant Surgery, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Immunotherapy has revolutionized modern oncology. Remarkable response rates and survival outcomes were reported after therapy with immune checkpoint inhibitors in a variety of solid tumors at the stage of metastatic disease. Anaplastic thyroid cancer (ATC), while rare, is one of the most aggressive malignancies, with limited therapeutic options when the disease has spread.

Here, we present a case of a 76-year-old female diagnosed with ATC initially treated with total thyroidectomy and central cervical lymphadenectomy (stage IVA, pT3bN0). Due to non-radical surgery (R1 resection), the treatment was followed by the adjuvant radiotherapy. However, two months after completion of radiotherapy, the patient began to experience increasing fatigue, dyspnea, and a decline in overall performance. Computed tomography revealed multiple lung metastases and significant pleural effusion. Post-operative verification of the primary tumor including next-generation sequencing did not indicate any targetable mutations (such as *BRAF-V600E*) suitable for specific anti-cancer treatment. Nonetheless, immunohistochemical staining uncovered exceedingly high (99%) expression of programmed death-ligand 1 (PD-L1) on the cancer cells. Hence, after obtaining an informed consent, the patient was offered a systemic, off-label treatment with anti-PD-1 drug, nivolumab. Four two-weekly infusions remarkably improved the patient performance status. Her breathing difficulties abated, and both the lung metastases and pleural effusion showed complete response in subsequent radiographic evaluation. After 3.5 months of immunotherapy the patient experienced progression, with appearance of suspicious lung lesions.

The observed marked response to nivolumab therapy – despite its short duration – may be of great significance, considering the unsatisfactory response rates of systemic therapy in ATC. This case underscores the potential value of immune checkpoint inhibitors as a promising therapeutic avenue for patients with metastatic ATC, especially those who exhibit elevated PD-L1 expression levels.

Citation

Cytawa W, Teodorczyk J, Mierzejewska M, Tomasiak B, et al. Complete radiographic response to immunotherapy in a patient with metastatic anaplastic thyroid cancer. *Eur J Trans Clin Med.* 2023;6(Suppl.4):34.

Sesja 3: Modern Cancer Imaging & Therapy**Pregnancy and gynecological malignancies: diagnosis and treatment during pregnancy****Ciąża i nowotwory ginekologiczne: diagnostyka i leczenie w trakcie ciąży****Natalia K. Mazur^{1,2}, Magdalena E. Grzybowska^{1,2}, Dagmara Klasa-Mazurkiewicz^{1,2}, Dariusz G. Wydra^{1,2}**¹ Department of Gynecology, Obstetrics and Neonatology, Medical University of Gdańsk, Gdańsk, Poland² Clinic of Obstetrics and Gynecology, Oncological Gynecology and Gynecological Endocrinology, University Clinical Centre, Gdańsk, Poland**Abstract**

Oncological diagnosis during pregnancy is rare, yet constantly rising. Gynecological malignancies may be diagnosed early in pregnancy due to regular examinations with ultrasonography and recommended screening. Cervical cancer is diagnosed in up to 1-3% of pregnant or postpartum patients and often remains asymptomatic until diagnosis. Adnexal masses are diagnosed in 1 in 600-1500 pregnancies and 1-3% are malignant. Serum tumor markers have limited use during pregnancy and their interpretation is difficult.

Two patients' diagnostic processes and treatments during pregnancy and after delivery are presented. A female, aged 34, in 25th week of fifth pregnancy, was admitted due to cervical tumor. Planoepithelial cervical carcinoma grade 2 was diagnosed and magnetic resonance imaging revealed rIB3 stage. The patient was administered 2 courses of chemotherapy (Carboplatin AUC5, Paclitaxel 175mg/m²). The second patient, aged 27, in 18th week of first pregnancy was admitted for ovarian tumor resection. Due to histopathological diagnosis of mature teratoma with malignant transformation G2/G3, 4 courses of Carboplatin AUC5, Paclitaxel 175mg/m² were administered. Both patients, delivered healthy neonates and proceeded to surgical treatment.

Adverse effects of chemotherapy and surgical treatment on the fetus should be considered in relation to patient prognosis. Patient consent and psychological wellbeing is crucial during oncological treatment in pregnancy which is challenging and requires a multidisciplinary and individual approach. Maternal survival rates are similar to those of non-pregnant population and positive neonatal outcomes prove that oncological treatment during pregnancy is possible without endangering maternal and fetal health.

Citation

Mazur NK, Grzybowska ME, Klasa-Mazurkiewicz D, Wydra DG. Pregnancy and gynecological malignancies: diagnosis and treatment during pregnancy. Eur J Trans Clin Med. 2023;6(Suppl.4):35.

**Sesja 4: Od pediatrii do geriatrici****Ondine's Curse – is defeated?****Klątwa Ondyny – czy pokonana?****Damian Bieszczad¹, Jolanta Wierzba^{1,2}, Maria Mazurkiewicz-Befeldzińska³,
Wojciech Kloc^{4,5}, Wojciech Wasilewski⁵, Patryk Kurlandt⁵**

¹ Department of Pediatrics, Hematology and Oncology, University Clinical Center in Gdańsk, Medical University of Gdańsk, Poland

² Department of Internal and Pediatric Nursing, Medical University of Gdańsk, Poland

³ Department of Developmental Neurology, University Clinical Center in Gdańsk, Medical University of Gdańsk, Poland

⁴ Department of Psychology and Sociology of Health and Public Health Collegium Medicum, University of Warmia-Mazury in Olsztyn, Poland

⁵ Department of Neurosurgery, Copernicus PL Hospital in Gdańsk, Poland

Abstract

Congenital central hypoventilation syndrome (CCHS), also known as Ondine's Curse, is a rare disorder characterized by abnormal control of respiration in the absence of neuromuscular, lung or cardiac disease, or an identifiable brainstem lesion. In 2022, on the initiative of the Copernicus PL Neurosurgery Department and the Polish CCHS Foundation "Remove the Curse" was established in Gdańsk the first center in Poland dealing with comprehensive diagnostics and treatment of CCHS, located at the Department of Developmental Neurology of the University Clinical Center in Gdańsk. The Center consists of a multidisciplinary team of specialist doctors, physiotherapists and psychologists. One of the latest methods of treating CCHS is the implantation of a phrenic nerve stimulator, which improves the quality of life of patients and their daily functioning.

Citation

Bieszczad D, Wierzba J, Mazurkiewicz-Befeldzińska M, Kloc W, et al. Ondine's Curse – is defeated?. Eur J Trans Clin Med. 2023;6 (Suppl.4):36.



Sesja 4: Od pediatrii do geriatrici

Precision medicine in geriatrics

Medycyna precyzyjna w geriatrici

Dorota Religa

Department of Neurobiology, Care Sciences and Society (NVS), Karolinska Institutet, Sweden

Abstract

Precision medicine spans various specialties, yet it is not yet fully utilized in geriatrics. I will discuss two areas where precision medicine dominates in geriatrics. The first example is cognitive dysfunction in terms of prevention, diagnosis, and treatment. In the case of cognitive disorders, the ability to live independently becomes more challenging. This negatively impacts the ability to work, social relationships, and the ability to take care of oneself in daily life. The impact on cognitive functions is well-known in the case of diseases such as Alzheimer's disease and other neurodegenerative disorders after their diagnosis. Genomics (APOE4), precise brain imaging, and targeted neuropsychological tests can be considered at the time of diagnosis and potential treatment. Multimorbidity requires more effort to properly assess and diagnose cognitive dysfunction that is not identified in a timely manner in today's healthcare system.

Another example of geriatric precision medicine that I will discuss is the accurate dosing of medications, taking into account interindividual variability in genomics, basic demographic data, kidney and liver function, cognitive function disorders, environment, and lifestyle in planning and observation strategies.

Citation

Religa D. Precision medicine in geriatrics. Eur J Trans Clin Med. 2023;6(Suppl.4):37.

**Sesja 4: Od pediatrii do geriatrici****Modern pharmacology and AI: where we are heading?**

Nowoczesna farmakologia I AI: dokąd zmierzamy?

Ivan Kocić¹, Milan Kocić²¹ Department of Pharmacology, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland² Spark DigitUp, Gdańsk, Poland**Abstract**

Aim and scope: We are witnessing the greatest technological revolution in human history, related to the emergence and development of artificial intelligence (AI). At the same time, for the first time, man has created something he does not understand. We provide data and get a result but we do not know what is in the “black box” and how AI makes the process of evaluation and analysis. Chat GPT4 can already program at a basic level. Therefore, in the near future it is inevitable that AI will escape human control, because it will improve itself. No one knows how this will end, but AI already has a huge impact on science. In my presentation I will try to explain what are the consequences of using AI (deep learning) in pharmacology understood as rational use of drugs according to current medical knowledge and search for new drugs and what are the possible benefits and risks associated with the use of AI methods in this field. I will also present the directions of my own research in this context.

Materials and methods: For the first part of my presentation we searched PubMed for articles published before July 2023 related to AI and pharmacology. For the second part we used MIMIC-III database, MySQL database, scripts in Python programming language, Pandas and NumPy libraries.

Main conclusions: AI is a powerful tool in modern pharmacology for different aspects of drug research, but should be used carefully and under control.

Citation

Kocić I, Kocić M. Modern pharmacology and AI: where we are heading. Eur J Trans Clin Med. 2023;6(Suppl.4):38.



Sesja 5: Psychologiczne aspekty funkcjonowania człowieka w różnych kontekstach klinicznych

Rail travel during the cholera epidemic in 19th century Russia

Podróż koleją w czasie epidemii cholery w XIX-wiecznej Rosji

Iwona Janicka

Institute of History, Faculty of History, University of Gdańsk, Gdańsk, Poland

Abstract

Introduction: In the years 1817-1896, Russia was plagued by cholera pandemics five times. Initially, the disease was transmitted by the army moving on foot or water transport. With the rise of railways, disease transmission became faster and more long-distance. The railway was quite a cheap means of travel, so many people used it, which also increased the risk of an epidemic outbreak in various places.

Thesis: The new means of transport made it necessary to prepare new regulations for travellers and precautionary measures during the cholera epidemic. The government instructions provided for the creation of sanitary points at stations, disinfection points, inhalation in waiting rooms at stations, and even interfered with the menu, specifying what could be sold in railway buffets. Fixed hospitals were organized in the depot buildings (engine sheds) and other facilities belonging to the railway or located in the vicinity of stations. Mobile hospitals were arranged in sanitary cars connected to trains. Depending on the railway route, it could be 5 cars or more. They housed: a hospital, a pharmacy, room with kitchen for feldshers or doctors.

Research methodology: The research was based on the analysis of archival materials, including medical reports, cost estimates for the equipment of hospital carriages, diagrams of medical trains, reports of sanitary commissions.

Conclusions: As a result of the research, it was established that the sanitary system which was created marked the beginning of the development of travel medicine in Russia. Thanks to it, the movement of travellers was controlled, care for the sick was organized, and the spread of epidemics was prevented. Unfortunately, the reports of the sanitary commissions show that many railway stations were in poor sanitary condition.

Funding: Polish National Science Center [UMO-2015/19/B/HS3/02117].

Keywords: cholera; epidemics; medical train; travel medicine; travels; Russia; 19th century; hygiene

Citation

Janicka I. Rail travel during the cholera epidemic in 19th century Russia. Eur J Trans Clin Med. 2023;6(Suppl.4):39.

**Sesja 5: Psychologiczne aspekty funkcjonowania człowieka w różnych kontekstach klinicznych****Neuropsychological language assessment in patient with low grade glioma pre, intra and post neurosurgery**

Ocena neuropsychologiczna funkcji językowych przed, w trakcie i po zabiegu neurochirurgicznym u pacjentki z glejakiem o niskim stopniu złośliwości

Anna B. Marcinkowska^{1,2,3}, Małgorzata Grzywińska⁴, Stanisław Adamski³, Ewa Szutowicz⁵, Kacper Winiarski⁵, Jan Czauderna³, Paweł J. Winklewski⁶, Wojciech Kloc^{3,7}, Edyta Szurowska²

¹ Applied Cognitive Neuroscience Lab, Department of Neurophysiology, Neuropsychology and Neuroinformatics, Medical University of Gdańsk, Gdańsk, Poland

² 2nd Department of Radiology, Medical University of Gdańsk, Gdańsk, Poland

³ Department of Neurosurgery, Copernicus Medical Center, Gdańsk, Poland

⁴ Neuroinformatics and Artificial Intelligence Lab, Department of Neurophysiology, Neuropsychology and Neuroinformatics, Medical University of Gdańsk, Gdańsk, Poland

⁵ Department of Oncology and Radiotherapy, Medical University of Gdańsk, Gdańsk, Poland

⁶ Department of Neurophysiology, Neuropsychology and Neuroinformatics, Medical University of Gdańsk, Gdańsk, Poland

⁷ Department of Psychology and Sociology of Health and Public Health, University of Warmia and Mazury in Olsztyn, Olsztyn, Poland

Abstract

Preoperative neuropsychological assessment and functional magnetic resonance imaging (fMRI) enable most safe planning and performing neurosurgery for individual with brain tumor in eloquent areas. Combining preoperative fMRI with intraoperative language assessment allows neurosurgeons for both most radical and safe tumor resection. We report our experience using fMRI to plan and guide an awake craniotomy for a tumor impinging on the language area. Preoperative neuropsychological language assessment was performed in female patient with low grade glioma. Patient had no preoperative language deficit. Intraoperative awake language mapping was performed, revealing speech arrest, comprehension disruption, and paraphasic errors at areas of the tumor boundary correlating to functional regions that explained these findings confirmed preoperatively with fMRI. Post neurosurgery neuropsychological assessment resulted with discrete anomic disturbances and specific phonems paraphasic errors. This instructive case highlights the potential benefits of implementing combined fMRI and awake surgery in neurosurgical practice of resecting eloquent brain tumors.

Citation

Marcinkowska AB, Grzywińska M, Adamski S, Szutowicz E, et al. Neuropsychological language assessment in patient with low grade glioma pre, intra and post neurosurgery. Eur J Trans Clin Med. 2023;6(Suppl.4):40.



Sesja 5: Psychologiczne aspekty funkcjonowania człowieka w różnych kontekstach klinicznych

Sense of preparedness for providing spiritual care to hospice and oncology patients among medical workers – preliminary research results

Poczucie przygotowania pracowników medycznych do wsparcia duchowego pacjentów hospicjów i oddziałów onkologicznych – wyniki badań pilotażowych

Zuzanna Gurzyńska¹, Krzysztof Sobczak²

¹ Wydział Nauk o Zdrowiu z Instytutem Medycyny Morskiej i Tropikalnej, Gdański Uniwersytet Medyczny, Gdańsk, Poland

² Zakład Socjologii Medycyny i Patologii Społecznej, Katedra Medycyny Społecznej, Wydział Nauk o Zdrowiu z Instytutem Medycyny Morskiej i Tropikalnej, Gdański Uniwersytet Medyczny, Gdańsk, Poland

Abstract

Introduction: A great deal of research suggests that the realization of patient's spiritual needs is connected with a higher effectivity of therapeutic processes. The aim of this research was the analysis of health care workers' sense of preparedness to provide spiritual care to patients.

Tools and methods: The research was conducted in 2022 in hospices and hospital oncology wards. The Spiritual Supporter Scale was used in the study. It's a tool intended for assessing competency in terms of spiritual care, sensibility to spiritual needs and spiritual support skills. The questionnaire also includes questions concerning self-assessment of the sense of preparedness to provide spiritual care. 79 people took part in the study; 53 nurses, 13 physicians and 9 psychologists between the ages of 22 and 63 (SD = 43,64).

Results: The analysis showed statistically significant differences in the overall score of the scale ($p < 0,00$). Respondents working in oncology wards got in average lower scores ($M = 5.11$; $SD = 1.50$). Persons employed in oncology wards (54%), significantly less often than hospice workers (88%), declared that providing spiritual care to patients is an inseparable part of their job ($p < 0.02$). They also declared less often (77%) that spiritual support is necessary in the place they're working, than persons providing care in hospices (95%; $p < 0,01$).

Conclusions: The study showed the differences in the sense of preparedness as well as competencies to provide spiritual care among medical workers in hospices and oncology wards.

Citation

Gurzyńska Z, Sobczak K. Sense of preparedness for providing spiritual care to hospice and oncology patients among medical workers – preliminary research results. Eur J Trans Clin Med. 2023;6(Suppl.4):41.

**Sesja 5: Psychologiczne aspekty funkcjonowania człowieka w różnych kontekstach klinicznych****Pediatric palliative care – where are we today?****Pediatryczna opieka paliatywna – gdzie dziś jesteśmy?****Katarzyna Żak-Jasińska, Ninela Irga-Jaworska, Anna Pomorska**

Department of Pediatrics, Hematology and Oncology, University Clinical Center in Gdańsk, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Pediatric Palliative Care is a holistic care involving all aspects of the life of a child with serious illness and their family, including the care and support of the body, mind, and spirit (WHO).

In Poland, the availability of palliative care for children has significantly improved in recent years due to the establishment of home and stationary hospices for children. Currently, the task of all those who care about children's health is to try to integrate individual pediatric specialties with palliative care. We should strive to establish causal treatment teams in conjunction with members of children's hospice teams.

It is important that the decision on the child's treatment can be modified by such a team depending on the effects of treatment of the underlying disease. This will lead to determining the optimal time for the possible transfer of the child to palliative care and will allow to take care of all areas of the child's and his family's life.

In the field of Pediatric Oncohematology, we strive in our country to introduce the concept of Pediatric Palliative Oncology and early integration of pediatric oncohematology with palliative care. We believe that this will improve the quality of care and the comfort of life of the child and his family in a situation where causal treatment turns out to be ineffective and it is necessary to make room for palliative treatment.

Citation

Żak-Jasińska K, Irga-Jaworska N, Pomorska A. Pediatric palliative care – where are we today?. Eur J Trans Clin Med. 2023;6(Suppl.4):42.



Sesja 5: Psychologiczne aspekty funkcjonowania człowieka w różnych kontekstach klinicznych

Mentalization Based Therapy (MBT) and therapeutic work with a patient at risk of suicide

Psychoterapia oparta na mentalizacji (Mentalization Based Therapy – MBT) a praca terapeutyczna z pacjentem zagrożonym samobójstwem

Tomasz Lech¹, Anna Burkiewicz-Kierzkowska²

¹ University of Health in Gdańsk, Gdańsk, Poland, Wyższa Szkoła Biznesu – National – Louis University, Nowy Sącz, Poland

² Division of Clinical Psychology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

The group of patients particularly exposed to suicide attempts are patients with a fragile ego. As research shows, before a suicide attempt, these people develop a characteristic state of mind, which includes, among others, a persistent and desperate feeling of entrapment, a sense of deep hopelessness, affective disturbance, loss of cognitive control, hyperarousal, and social withdrawal. This state is often a secondary experience to the original early childhood relational traumatic experiences. Recently, a number of studies have indicated the supportive potential of mentalization-based therapy (MBT) in reducing suicidal thoughts and suicide risk in patients with a fragile ego. It could be dictated by the fact that the ability of mentalization allows to distinguish between thinking about suicide and behavior caused by suicidal impulses. Suicidal threats expressed by a person in a suicidal state of mind, overcome by such a strong emotional experience, filled with fear and hopelessness, unable to mentalize, may disturb the psychotherapist's ability of mentalization, according to the principle that mentalization breeds mentalization, and non-mentalization breeds non-mentalization. In turn, mentalization disorders in a therapist may result in an increase in his or her fear and anxiety, which as a result causes an increase in a patient's anxiety, and consequently may lead to therapeutic failure.

The aim of the presentation is to broaden the knowledge about possible difficulties in working with patients at risk of suicide and the possibility of using MBT in working with patients in a suicidal state of mind.

Citation

Lech T, Burkiewicz-Kierzkowska A. Mentalization Based Therapy (MTB) and therapeutic work with a patient at risk of suicide. Eur J Trans Clin Med. 2023;6(Suppl.4):43.

**Sesja 5: Psychologiczne aspekty funkcjonowania człowieka w różnych kontekstach klinicznych****Depression and loneliness among nonbinary people**

Depresyjność i poczucie osamotnienia wśród osób niebinarnych

Aleksandra Pajdak, Julia Terech, Julia Gwiazda, Dagmara Wróblewska, Iga Tarazewicz

Health Psychology, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Gender identity minorities are more likely to feel lonely, have a higher level of depression and a lower level of social support compared to the cisgender group. However, there is little research focusing on a particular subgroup of the transgender community – nonbinary people, who are also exposed to presented difficulties. The aim of this study was to check whether there are significant differences in loneliness, social support and depression levels between the mentioned groups. The study included 170 participants aged 18-56 (M = 24.13; SD = 7.37), 108 non-binary (M = 23.11; SD = 6.08) and 62 cisgender (M = 25.90; SD = 9.03). For this study, Polish adaptations of: The Revised R-UCLA Loneliness Scale, DASS-21 questionnaire and the Multidimensional Scale of Perceived Social Support were used. The results showed no statistically significant difference between groups in the R-UCLA questionnaire score and the score of the MSPSS questionnaire. The results showed a statistically significant gender difference in the score of the DASS-21 questionnaire (H1 = 8.73, $p < 0.01^{**}$) and its subscales (DASS-D: H1 = 10.19, $p < 0.01^{**}$, DASS-A: H1 = 6.06, $p < 0.05^*$, DASS-S: H1 = 6.59, $p < 0.05^*$). The presented results show the importance of focusing on the nonbinary group in terms of medical care, especially in the psychiatric and psychological fields. Moreover, there is a need to continue studies on psychosocial aspects of nonbinary people's life in order to explore reasons for their higher levels of depression and to create an efficient prevention system.

Citation

Pajdak A, Terech J, Gwiazda J, Wróblewska D, et al. Depression and loneliness among nonbinary people. Eur J Trans Clin Med. 2023;6(Suppl.4):44.



Sesja 6: Nowoczesna opieka na oddziale intensywnej terapii

Non-invasive ventilation support for patients with respiratory failure in the intensive care unit

Nieinwazyjne wsparcie wentylacji pacjentów z niewydolnością oddechową w oddziale intensywnej terapii

Dominika Batycka-Stachnik

Clinical Department of Heart, Vascular and Transplant Surgery, John Paul II Cracow Specialistic Hospital, Kraków, Poland

Abstract

Backgrounds: Respiratory failure is a life-threatening condition responsible for approximately 30% of in-hospital mortality. At John Paul II Cracow Specialistic Hospital, nearly 2,000 patients undergo cardiac surgery each year, some of whom develop type I or type II respiratory failure in the postoperative period. A method of effective treatment of this condition that improves both oxygenation and ventilation is non-invasive ventilation (NIV).

Objective: The aim of this study was to present a ventilation support model for patients undergoing cardiac surgery with respiratory failure occurring in the perioperative period.

Material and methods: Fifty patients who underwent coronary artery bypass graft surgery were analysed. Patients were divided into two groups: the first (TB) of 20 patients – patients after lateral thoracotomy in whom NIV was used prophylactically to avoid postoperative pulmonary complications; the second group consisted of the remaining patients (PP) in whom NIV was initiated when symptoms of respiratory failure occurred.

Results: In the first group – TB – 10% of patients (n = 2) required additional intervention despite the use of NIV. In these cases, this was HFNOT. In the remaining group of patients, 56.7% (n = 17) had type II respiratory failure and 43.3% (n = 13) had type I respiratory failure.

Conclusions: Using NIV in the ICU reduces the risk of requiring mechanical ventilation for patients with type I or type II respiratory failure. Some patient groups might benefit from the preventive use of NIV, which can help avoid complications associated with mechanical ventilation and reduce the duration of ICU and hospital stays.

Citation

Batycka-Stachnik D. Non-invasive ventilation support for patients with respiratory failure in the intensive care unit. Eur J Trans Clin Med. 2023;6(Suppl.4):45.

**Sesja 6: Nowoczesna opieka na oddziale intensywnej terapii****Respiratory physiotherapy for mechanically ventilated patients at home****Fizjoterapia oddechowa chorego wentylowanego mechanicznie w warunkach domowych****Anna Pyszora**

Department of Palliative Care, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń, Toruń, Poland

Home Mechanical Ventilation Center in Bydgoszcz, Bydgoszcz, Poland

Abstract

Respiratory physiotherapy is essential to the comprehensive care of mechanically ventilated patients at home. It applies to both invasively and non-invasively ventilated patients. It allows, e.g. to support the process of clearance of the airways, decrease work of breathing, increase lung volume, reduce the risk of atelectasis, prevent inflammatory changes in the respiratory system and improve the strength and endurance of respiratory muscles. For this purpose, various techniques in the field of respiratory physiotherapy are used. They include, e.g. peripheral, and proximal airway clearance techniques (ACTs), positioning that reduces the patient's respiratory effort, and respiratory muscle training. Individual plans are selected based on an examination during which the physiotherapist determines the patient's therapeutic problems. The assumptions of respiratory physiotherapy conducted among mechanically ventilated patients at home will be presented during the lecture. The therapeutic techniques most used in this group of patients will be discussed and demonstrated.

Citation

Pyszora A. Respiratory physiotherapy for mechanically ventilated patients at home. Eur J Trans Clin Med. 2023;6(Suppl.4):46.



Sesja 6: Nowoczesna opieka na oddziale intensywnej terapii

Physiotherapy in patients after cardiopulmonary resuscitation in intensive care unit

Fizjoterapia pacjentów po resuscytacji krążeniowo-oddechowej w oddziale intensywnej terapii

Wojciech Wolański^{1,2}, Aleksander Wojtyłko¹, Renata Szyguła¹

¹ Institute of Health Sciences, Opole University, Opole, Poland

² Intensive Care Unit, University Clinical Hospital in Opole, Opole, Poland

Abstract

The vast majority of patients in Intensive Care Units (ICU) have experienced sudden cardiopulmonary arrest (CPA). They most frequently include patients with multi-organ injuries, advanced circulatory system diseases (cardiology, cardiac surgery), those after major surgical procedures (surgery, neurosurgery, orthopaedics etc.), complicated ones after full sedation as a result of undiagnosed diseases or weakened due to chronic medical conditions, or even who such who did not report taking medications in early medical interview and experienced their interaction with anaesthetics and CPA as the consequence. The longer the period of asphyxia and the time of CPR, the worse the condition of the patient admitted to ICU after CPA is. The treatment process in such cases requires highly specialized and multidisciplinary therapeutic attitude. A physiotherapist plays a major role in such a therapeutic team. During the physiotherapeutic procedures some divergencies might be presents in terms of early and proper proceedings aimed at counteracting the effects of patient's immobility, which is understood as all vital systems dysfunctions, and restoring functionality of a patient. Available literature on the physiotherapeutic processes in such cases together with the experience of many clinicians prove that complex medical treatment – which integrally includes physiotherapy – affects the efficiency of the process and shortens the time of recovery.

Keywords: Physiotherapy; Cardiopulmonary resuscitation; Intensive Care Units (ICU)

Citation

Wolański W, Wojtyłko A, Szyguła R. Physiotherapy in patients after cardiopulmonary resuscitation in intensive care unit. Eur J Trans Clin Med. 2023;6(Suppl.4):47.

**Sesja 6: Nowoczesna opieka na oddziale intensywnej terapii****Neuroesthetics and prevention of delirium in the Intensive Care Unit****Neuroestetyka a prewencja delirium w Oddziale Intensywnej Terapii****Wioletta Mędrzycka-Dąbrowska**

Department of Anesthesiology Nursing & Intensive Care, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

Abstract

In the ideal intensive care unit (ICU), all patients are free of delirium and long-term cognitive impairment. Good patient care practices should complement the ICU Liberation A-F package with further elements of G-I. With regard to architecture and neuroaesthetics, most healthcare providers have little experience in the design and construction of intensive care units. The design team should include not only architects but also clinicians, nursing staff, psychologists, physiotherapists, etc. Evidence shows that the physical environment can influence the physiology, psychology and social behavior of patients. Neuroesthetics has grown in popularity in recent years. Using neuroimaging technologies, scientists have begun to understand the processes that occur in the human brain when exposed to a work of art. Conscious sensations are states of the brain that can arise as a result of external or purely internal reciprocal excitations of the neural structures of the brain. Neuroaesthetics researchers study the activation of reward systems and the default mode network when viewing or creating art. The reward system releases feel-good chemicals in the brain, such as dopamine, serotonin and oxytocin, which induce feelings of pleasure and positive emotions. Features of the healing environment include: materials and finishes that reduce noise levels, minimize glare and support infection control; floor plans, equipment and other features such as human engineering principles can increase the efficiency and effectiveness of patient care and minimize workplace injuries; stress-reducing furnishings and decorations that take into account natural light and views of nature; and thoughtful comfort for patients, families and staff. Optimal ICU design can contribute to reducing medical errors, improving patient outcomes, shortening hospital stays, and may also play a role in lowering costs.

Keywords: neuroesthetics; cognitive functions; delirium; intensive care unit**Citation**

Mędrzycka-Dąbrowska W. Neuroesthetics and prevention of delirium in the Intensive Care Unit. Eur J Trans Clin Med. 2023;6(Suppl.4):48.



Sesja 6: Nowoczesna opieka na oddziale intensywnej terapii

The impact of psychological safety on healthcare workers

Wpływ bezpieczeństwa psychologicznego na pracowników ochrony zdrowia

Dawid Turski¹, Regina Żuralska²

¹ Rapid Response Team, University Clinical Center, Gdańsk, Poland

² Division of Community Nursing & Health Promotion, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Introduction: The presented work focuses on the analysis of adverse event reporting by nurses, examining it in the context of psychological safety.

Objective: The aim of the study is to present the impact of the level of psychological safety on the reporting of adverse events by healthcare workers, including nurses.

Materials and Methods: The presentation includes conclusions from the analysis of the literature on the subject and the results of original research.

Results: Negative experiences after reporting an adverse event affect the sense of psychological safety. Simultaneously, a decreased level of psychological safety does not always influence the reporting of adverse events. Psychological safety impacts several other areas allowing for better functioning of healthcare facilities.

Conclusions: (1) The sense of psychological safety does not play a key role in the decision to report adverse events by nurses. (2) The negative consequences of reporting adverse events can paradoxically have a positive impact on reportability.

Citation

Turski D, Żuralska R. The impact of psychological safety on healthcare workers. Eur J Trans Clin Med. 2023;6 (Suppl.4):49.

**Sesja 6: Nowoczesna opieka na oddziale intensywnej terapii****Alternative didactic methods used during practical exercises to prepare students to work with the intensive care unit patient**

Alternatywne metody dydaktyczne wykorzystywane podczas ćwiczeń przygotowujących studentów do pracy z pacjentem oddziału intensywnej terapii

Tomasz Zwoliński¹, Bartłomiej Siek², Dominika Szalewska¹, Jarosław Jendza³

¹ Division of Rehabilitation Medicine, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

² Department of History and Philosophy of Medical Sciences, Medical University of Gdańsk, Gdańsk, Poland

³ Institute of Education, Center for the Development of Teaching and Tutoring, Faculty of Social Sciences, University of Gdańsk, Gdańsk, Poland

Abstract

Introduction: The advantages of alternative teaching methods are increasingly recognised in the education of physiotherapy elements.

Objective: This presentation introduces the use of flipped teaching elements and activation methods during classes for physiotherapy students at two universities in Gdańsk, Poland (Medical University of Gdańsk – MUG, Academy of Physical Education and Sport – AphES).

Materials and Methods: In the academic year 2022/2023, both instructional videos with which students were familiarised before class and the principle of students rating (on a scale of 0 to 3) during class were used during the teaching of the subjects Physiotherapy in Intensive Care and Surgery (MUG) and Fundamentals of Physiotherapy in Intensive Care (APhES).

Results: Both techniques resulted in a high level of student activity during the practical classes and were appreciated by the students. In addition, all students successfully passed the subject in the first term.

Conclusions: It is worth considering the introduction of alternative methods when teaching physiotherapy students in the form of flipped teaching and instructional videos, as this may increase both student engagement during class and final pass rates.

Citation

Zwoliński T, Siek B, Szalewska D. Alternative didactic methods used during practical exercises to prepare students to work with the intensive care unit patient. Eur J Trans Clin Med. 2023;6(Suppl.4):50.



Sesja 7: Medycyna pola walki

Injury management in the conditions of the Russian-Ukrainian war

Postępowanie z pacjentem urazowym w czasie wojny rosyjsko-ukraińskiej

Nataliya Izhytska^{1,2}, Dmytro Samofalov³

¹ Danylo Halytsky Lviv National Medical University, Lviv, Ukraine

² Institute of Health Sciences, Zielona Góra University, Zielona Góra, Poland

³ Surgeon at Mobile Hospital No. 61. Emergency Medicine Expert, Ukraine

Abstract

Introduction: Trauma management in a war setting can be challenging due to ongoing conflict, limited resources, and the need to prioritize medical care for those with life-threatening injuries.

Objective(s): The treatment of the wounded in the conditions of the Russian-Ukrainian war requires a comprehensive approach, prioritizing the medical needs of the wounded soldiers, taking into account the limitations resulting from the ongoing conflict. The aim of the work is to show the need to change the methods of providing assistance in 2014 in relation to 2023.

Materials and methods: Analysis of data collected from field hospitals in Ukraine in 2014 and 2023 and official sources of information. Source materials come from people staying and working in field hospitals in Ukraine.

Results: In the conditions of the Russian-Ukrainian war, injury management becomes a critical aspect of providing medical care to those affected by the conflict. Here are some key considerations for injury management in such a conflict: Emergency Medical Care, Triage and Prioritization, Medical Supplies and Equipment, Medical Facilities, Field Hospitals and Mobile Clinics, Safety and Security, Coordination and Communication, Psychological Support, Rehabilitation, Documentation and Data Collection.

Conclusions: Due to limited resources and the severity injuries, it is important to prioritize medical care based on the severity of the injury. Medical staff should be properly trained to deal with the wounded in wartime conditions. In conflict zones injury management requires a combination of medical expertise, logistical planning, collaboration between humanitarian organizations, and diplomacy to ensure that those affected by the conflict receive the necessary medical care despite the challenging circumstances.

Citation

Izhytska N, Samofalov D. Injury management in the conditions of the Russian-Ukrainian war. Eur J Trans Clin Med. 2023;6(Suppl.4):51.

**Sesja 7: Medycyna pola walki****Special dimension of police intervention related to the use of electric stun gun****Szczególny wymiar interwencji policyjnej związanej z użyciem paralizatora elektrycznego****Marcin Nowak**

Prevention and Prophylaxis Department, Institute of Preventive Service, Faculty of Security and Legal Sciences, Police Academy in Szczytno, Szczytno, Poland

Abstract

Police officers undertake several hundred interventions every day. These incidents sometimes involve a risk of loss of life or health. In order to face dangerous situations and especially dangerous people, in addition to appropriate training, police officers must have appropriate technical means to ensure this safety. Such means are the means of direct coercion specified by the legislator. One such means is an object designed to incapacitate persons by means of electricity referred to as an electric stun gun. This object in particular is dedicated to distance use. Undoubtedly, it is one of the most modern means of direct coercion on the equipment of the Police, where its technical advances implemented by Axon make this device one of the best means of guaranteeing the safety of police officers, as well as the persons against whom it is used.

Citation

Nowak M. Special dimension of police intervention related to the use of electric stun gun. Eur J Trans Clin Med. 2023;6(Suppl.4):52.

Sesja 8: Immunologia w badaniach podstawowych i klinicznych**Detection of specific anti-*Toxoplasma* antibodies in human serum samples using recombinant *Toxoplasma gondii* chimeric proteins**

Wykrywanie swoistych przeciwciał antytoksoplazmowych w surowicach ludzkich z wykorzystaniem rekombinantowych białek chimerycznych *Toxoplasma gondii*

Bartłomiej Ferra¹, Justyna Gatkowska², Maciej Chyb^{2,3}, Lucyna Holec-Gąsior⁴

¹ Department of Tropical Parasitology, Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdynia, Poland

² Department of Molecular Microbiology, Faculty of Biology and Environmental Protection, University of Lodz, Łódź, Poland

³ Bio-Med-Chem Doctoral School of the University of Lodz and Lodz Institutes of the Polish Academy of Sciences, Faculty of Biology and Environmental Protection, University of Lodz, Łódź, Poland

⁴ Department of Molecular Biotechnology and Microbiology, Faculty of Chemistry, Gdańsk University of Technology, Gdańsk, Poland

Abstract

Currently, diagnosis of *Toxoplasma gondii* invasion is based mainly on the use of the native antigens in enzyme immunoassay which allow for detection of IgG, IgM and IgA antibody classes. However, in some cases the performed studies give the ambiguous results. For this reason, many research groups are currently working on new diagnostic tools, which are mainly recombinant proteins. Compared to the native antigens their production is much easier, cheaper, faster and safer. An additional advantage of the recombinant proteins is easier way to standardize assays as well as the possibility of proteins selection characteristic for the development form of the parasite, which may allow for differentiation phases of the disease.

The aim of this study was to improve the performance of the IgM, IgG and IgG avidity ELISAs using next-generation recombinant chimeric proteins and thus, to demonstrate the diagnostic utility of *T. gondii* recombinant tri- and tetravalent chimeric proteins, composed of combination of three or four well-characterized antigens.

The results of the study with human sera demonstrated, that a newly produced tri- and tetravalent recombinant chimeric proteins can be successfully used in the serodiagnosis of *T. gondii* invasion. Results obtained in IgM, IgG and IgG avidity ELISAs based on chimeric proteins yield data comparable to TLA, used in commercial assays. The results of the study with human sera demonstrated, that a newly produced chimeric proteins can be a good alternative to TLA in the serodiagnosis of toxoplasmosis in human.

This study was supported by Polish National Science Centre grant UMO-2018/31/D/NZ6/02839.

Citation

Ferra B, Gatkowska J, Chyb M, Holec-Gąsior J. Detection of specific anti-*Toxoplasma* antibodies in human serum samples using recombinant *Toxoplasma gondii* chimeric proteins. Eur J Trans Clin Med. 2023;6(Suppl.4):53.

**Sesja 8: Immunologia w badaniach podstawowych i klinicznych****Immunomodulation of T cell response by peptides targeting the BTLA-HVEM complex****Immunomodulacja odpowiedzi limfocytów T z użyciem peptydów wiążących kompleks BTLA-HVEM****Karolina Wojciechowicz¹, Katarzyna Kuncewicz², Sylwia Rodziewicz-Motowidło², Anna Wardowska¹, Marta Spodzieja²**¹ Department of Physiopathology, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland² Department of Biomedical Chemistry, Faculty of Chemistry, University of Gdańsk, Gdańsk, Poland**Abstract**

One of the research directions in immunology is the analysis of immune checkpoints. Targeting such molecules may exert immunomodulatory effects leading to altered reactivity of the immune cells. The BTLA-HVEM complex, an inhibitory immune checkpoint, has recently gained much attention as one of the pathways vital for T cell responsiveness to various stimuli. The present study reports the immunomodulatory potential of peptides that bind specifically to BTLA or HVEM.

The peptides targeting BTLA or HVEM were designed and synthesized in the Department of Biomedical Chemistry, University of Gdańsk. Magnetically isolated T cells from healthy donors were exposed to the peptides alone or combined with CD3/CD28 mAb for 72h or 120h. Subsequently, cytometric assessment of activation markers and changes in the memory compartment of T cells was performed. Also, the proliferation rate and apoptosis level of T cells were assessed.

The obtained data showed that the examined peptides can affect the activation status of T cells. However, the final result differs depending on the environment and the additional trigger. In the presence of TCR activating signals, the analysed compounds augment T cell activation. Additionally, it is anticipated that in the hyperreactive milieu perpetuating T cell over-stimulation, the introduction of BTLA or HVEM binding ligands may restore this immune checkpoint inhibitory function. The most promising compounds were Pep(2) binding HVEM and Pep(5) recognising BTLA.

These results shed light on the immunomodulatory properties of the BTLA-HVEM complex on immune cell activity, potentially offering new targets for anticancer therapies.

Research was financially supported by National Science Center (Poland): SONATA 13 grant (No. UMO-2017/26/D/ST5/00919) "Inhibitors of BTLA-HVEM complex formation as potential targets for cancer immunotherapy" and OPUS 22 grant (no. UMO-2021/43/B/NZ7/01022) "New immunomodulators of BTLA-HVEM complex as potential therapeutics in systemic lupus erythematosus".

Citation

Wojciechowicz K, Kuncewicz K, Rodziewicz-Motowidło S, Wardowska A, et al. Immunomodulation of T cell response by peptides targeting the BTLA-HVEM complex. *Eur J Trans Clin Med.* 2023;6(Suppl.4):54.



Sesja 9: Lotnicze pogotowie ratunkowe

Acute coronary syndromes in the activities of HEMS crews

Ostre zespoły wieńcowe w działaniach załóg HEMS

Przemysław Kożan¹, Patryk Rzońca²

¹ Department of Medical Rescue, Faculty of Health Sciences with the Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdańsk, Poland

² Department of Human Anatomy, Faculty of Health Sciences, Medical University of Warsaw, Warsaw, Poland

Abstract

Myocardial infarction is one of the leading causes of death and disability worldwide. In Poland, about 15,000 people die every year because of it. This accounts for about 7% of deaths caused by cardiovascular disease. About 90,000 people are hospitalized annually in Poland due to myocardial infarction.

The study was based on a retrospective analysis of the medical records of the HEMS and EMS crews of the Polish Medical Air Rescue from January 1, 2018 to December 31, 2022. The analysis included all cases of sickness flights and interhospital transports related to patients in whom the interventions of the ambulance crews were caused by acute coronary syndrome. In the analyzed period, a total of 52,094 missions were performed, of which 3,542 interventions related to ACS were included in the final analysis.

Acute coronary syndromes accounted for 6.8% (n = 3542) of all interventions by HEMS and EMS crews. The group of analyzed cases was dominated by male patients, who accounted for over 70% of all patients, and the average age was 64 years. Nearly 80% of the interventions were related to sickness flights, and interhospital transports accounted for 20% of all interventions. In the analyzed material, the dominant diagnosis was unspecified myocardial infarction (n = 1771), inferior wall infarction occurred in 26.4% of patients, and anterior myocardial infarction in 16.4% of patients. Nearly 15% of all patients with ACS experienced cardiac arrest (n = 521). Pre-hospital mortality in this group of patients was 20% (n = 104).

Acute coronary syndromes constitute a significant percentage of interventions of the Polish Medical Air Rescue crews. Most of the flights were performed by HEMS crews, and men were a group of patients who had interventions more often than women. The risk of myocardial infarction increases with age, and the average age of patients was 64 years. Sudden cardiac arrest is a significant complication of acute coronary syndromes and leads to a large number of deaths.

Citation

Kożan P, Rzońca P. Acute coronary syndromes in the activities of HEMS crews. Eur J Trans Clin Med. 2023;6 (Suppl.4):55.

**Sesja 9: Lotnicze pogotowie ratunkowe****A pediatric patient in the practice of the HEMS and EMS crews of the Polish Medical Air Rescue****Pacjent pediatryczny w praktyce załóg HEMS i EMS Lotniczego Pogotowia Ratunkowego****Łukasz Kręgliński**

Department of Emergency Medical Services, Faculty of Health Sciences, Jagiellonian University Collegium Medicum, Kraków, Poland

Abstract

A pediatric patient is always a big challenge for medical staff in pre-hospital care. Over the last 5 years, the teams of the Helicopter Medical Rescue Service and the Air Transport Team (HEMS and EMS) have provided assistance on board of the Polish Medical Air Rescue to nearly 7,000 small patients. Annually, this is an average of about 14% of all rescue missions. The presentation will bring you closer to the most important aspects of working with a pediatric patient. The most interesting clinical cases from the practice of air ambulance teams during flights for accidents, illnesses and interhospital transports will be presented. It will explain why a systematic approach to a small patient according to developed standards of conduct significantly contributes to the improvement of medical emergency services, reduces uncertainty and stress of medical staff and optimizes a holistic approach to a pediatric patient.

Citation

Kręgliński Ł. A pediatric patient in the practice of the HEMS and EMS crews of the Polish Medical Air Rescue. Eur J Trans Clin Med. 2023;6(Suppl.4):56.



Sesja 9: Lotnicze pogotowie ratunkowe

Prehospital management of difficult airways

Trudne drogi oddechowe – zasady postępowania w warunkach przedszpitalnych

Mariusz Grażewicz¹, Patryk Rzońca², Ewa Kowalska³

¹ Department of Emergency Medicine, School of Medicine, University of Warmia and Mazury in Olsztyn, Olsztyn, Poland

² Department of Human Anatomy, Faculty of Health Sciences, Medical University of Warsaw, Warsaw, Poland

³ Department of Didactics and Medical Simulation of Collegium Medicum from the Center for Medical Simulation, School of Medicine, University of Warmia and Mazury in Olsztyn, Olsztyn, Poland

Abstract

Maintaining airways patency is one of the most essential interventions to undertake when treating patients in critical condition. Tracheal intubation is definitive technique to achieve effective ventilation and satisfactory airway protection. Advantages, success rates and potential risks of tracheal intubation in pre-hospital environment are subject of studies and ongoing discussions. The present review analyses airway management methods used in HEMS crews practice.

The study is based on retrospective data review collected from medical documentation of incidents attended by HEMS. Incidents were selected over time period from 1st January 2018 to 31st December 2022. Included patients were those who required advanced airways management. From 43641 events attended by HEMS, 10648 patients were qualified for review.

Advanced airways have been undertaken in 24.4% patients. Of the qualified patients 74.5% were men in average age of 40. Advanced airways techniques were mainly used in patients with trauma (41.2%) and cardiac arrest (30.2%). Dominant technique used in managing airways during HEMS missions was tracheal intubation (82%).

Tracheal intubation was the most common advanced airways technique used by HEMS crews. Contributing factors for choosing above method were appropriate skills of medical personnel, adequate training, ongoing practice and using premade checklists.

Citation

Grażewicz M, Rzońca P, Kowalska E. Prehospital management of difficult airways. Eur J Trans Clin Med. 2023;6(Suppl.4):57.

**Sesja 10: Prehabilitacja i fizjoterapia pacjentów leczonych z powodu różnych dysfunkcji i chorób****Effect of prehabilitation on functional assessment of patients scheduled for colorectal cancer surgery****Wpływ prehabilitacji na ocenę funkcjonalną pacjentów zakwalifikowanych do leczenia chirurgicznego z powodu nowotworu jelita grubego****Katarzyna Gierat-Haponiuk^{1,2}, Magdalena Dudkowska¹, Zofia Sotomska¹, Kinga Samborska¹, Julia Haponiuk-Skwarlińska³, Ireneusz Haponiuk⁴, Patryk Wołoszyn¹**¹ Pracownia Fizjoterapii Uniwersyteckiego Centrum Klinicznego w Gdańsku² Klinika Rehabilitacji, Gdański Uniwersytet Medyczny³ Klinika Kardiologii Wieku Dziecięcego i Pediatrii Ogólnej Warszawskiego Uniwersytetu Medycznego, Szkoła Doktorska Warszawskiego Uniwersytetu Medycznego⁴ Akademia Wychowania Fizycznego w Gdańsku**Abstract**

Introduction: Colorectal cancer is the most common cancer of the gastrointestinal tract. The main treatment for colorectal cancer is surgical resection with chemotherapy, but radiation therapy is also used. The invasiveness and extent of the treatment methods are associated with a significant functional burden, which can increase the likelihood of complications. The main goal of the preoperative physiotherapy (ie. prehabilitation) is to optimize the patient condition before the treatment, so that the postoperative recovery is shorter, allowing the patient to return to physical fitness and functioning in daily life more quickly.

Aim: The purpose of this study is to evaluate the impact of prehabilitation on the functional state of patients scheduled for surgical treatment of colorectal cancer.

Method: The study was conducted at the University Clinical Center in Gdańsk from October 2022 to August 2023. The study group consisted of patients scheduled for elective surgery for colorectal cancer. Patients underwent an initial examination (3-4 weeks before surgery), prehabilitation education and physiotherapy recommendations, and a final examination (the day before surgery). Both examinations consisted of anthropometric measurements, a thoracic mobility test, "Timed Up&Go" test and "6-Minute Walk Test (6MWT)".

Results: In a group of 35 patients (18K, 17M) aged 68 [Q1 = 63; Q3 = 75] years and with average body weight of 73±17 kg, before and after prehabilitation, the results were statistically significantly different in: chest mobility test (3.98±1.23 vs. 4.5±1.2 [p = 0.001]), the score of the "Timed Up&Go" test (9.5 [Q1 = 8.3; Q3 = 12] vs. 9 [Q1 = 7.5; Q3 = 11] [p = 0.015]), the distance of the "6MWT" test (433.3±93.6 vs. 462.7±94.1 [p = 0,013]), resting systolic blood pressure values (137±17 vs. 131±16 [p = 0.018]), and post-exercise heart rate (90±16 vs. 84±14 [p = 0.016]). Body weight, resting heart rate, resting diastolic blood pressure and post-exercise systolic and diastolic blood pressure, Borg scale and quality of life scores were not statistically significantly different before and after prehabilitation.

Conclusions: Prehabilitation including patient's education and implementation of the physiotherapy recommendations improves some parameters assessing the condition and functional state of patients scheduled for colorectal cancer surgery.

Citation

Gierat-Haponiuk K, Dudkowska M, Sotomska Z, Samborska K, et al. Effect of prehabilitation on functional assessment of patients scheduled for colorectal cancer surgery. Eur J Trans Clin Med. 2023;6(Suppl.4):58.



Sesja 10: Prehabilitacja i fizjoterapia pacjentów leczonych z powodu różnych dysfunkcji i chorób

Prehabilitation of breast cancer patients qualified for a surgical reconstruction: preliminary report

Prehabilitacja pacjentek z rakiem piersi zakwalifikowanych do leczenia chirurgicznego metodą rekonstrukcji: wstępne doniesienia

Kinga Samborska¹, Katarzyna Gierat-Haponiuk^{1,2}, Maja Nowacka-Kłos¹, Magdalena Dudkowska¹

¹ Samodzielny Zespół Fizjoterapeutów, Uniwersyteckie Centrum Kliniczne w Gdańsku

² Klinika Rehabilitacji, Gdański Uniwersytet Medyczny

Abstract

Introduction: Breast cancer is the most common women's malignant tumour in Europe and the United States, and its incidence is continuously increasing. The consequences of the disease, together with radical treatment, decrease the quality of life among successfully treated women. Prehabilitation includes education of patients and provide answers to important questions such as "how to prepare for the surgery?", "what are possible limitations after the treatment?", "how to safely return to everyday activities?". These actions can possibly contribute to faster and safer return to activity as well as reduce postoperative complications.

Aim: The aim of the study was to present the functional status of patients qualified for surgical treatment due to breast cancer covered by the prehabilitation programme.

Method: Prehabilitation included patients qualified for IBR (Immediate Breast Reconstruction) at the University Clinical Center of Gdańsk. Physiotherapeutic intervention consisted of examination and recommendations from a physiotherapist. The examination included an interview, functional assessment of the upper limbs and the shoulder girdle (assessing position of the shoulder, scapula, measuring the range of motion and circumference of the upper limbs). 16 women participated in the study. The appointment took place 2-3 weeks before the procedure, where the patients were given exercise instructions.

Results: The mean age of the patients was 54.4 years (38 ± 71), body mass index (BMI) 26.94 kg/m² (22.6 ± 36.79). 50% of patients answered that they avoided physical activity. Half of the patients reported problems with the function of the upper limb. On the DASH scale, the highest score was 36 out of 100. The results of functional assessment indicated that shoulder protraction was present in 90% of the patients. 19% of women did not achieve a full range of motion in abduction and flexion of the upper limbs. In the scapula scratch test, 81% of the subjects had below-normal results.

Conclusions: Initially, the patients presented shoulder joint dysfunctions and avoided physical activity. Determining the limitations before the procedure enables optimal preparation for surgical treatment and postoperative rehabilitation.

Citation

Samborska K, Gierat-Haponiuk K, Nowacka-Kłos M, Dudkowska M. Prehabilitation of breast cancer patients qualified for a surgical reconstruction: preliminary report. Eur J Trans Clin Med. 2023;6(Suppl.4):59.

**Sesja 10: Prehabilitacja i fizjoterapia pacjentów leczonych z powodu różnych dysfunkcji i chorób****Shoulder pain in women after cesarean section – the possibility of using physiotherapy****Bóle barku u kobiet po cesarskim cięciu – możliwości zastosowania fizjoterapii****Zofia Sotomska¹, Joanna Siereńska²**¹ Independent Team of Physiotherapists, University Clinical Center, Gdańsk, Poland² Department of Gynecology, Obstetrics and Neonatology, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Shoulder pain occurring in the first few days after a cesarean section can affect up to 39.45% of women. Most often the pain occurs in the right shoulder. The pain is described as sharp and can radiate to the chest and neck. It occurs regardless of the form of anesthesia used, but it is more common after general anesthesia. The cause of shoulder pain after a cesarean section is not fully investigated, but it is reported that it may be related to diaphragm irritation by amniotic fluid or blood. Shoulder pain due to irritation of the diaphragm is best anatomically explained by the anastomosis between the diaphragmatic nerve coming from the C3-C5 nerve root and the brachial plexus, in some individuals. Through the connections of the phrenic nerve with the branches of the brachial plexus nerves, pain can be transmitted to the shoulder. Few studies are available that suggest that there are physiotherapy methods that can reduce shoulder pain occurring after a cesarean section. Physiotherapy for patients with a painful shoulder should include techniques that mobilize and improve the flexibility of the tissues of the thoracic area. Based on available reports and anatomical relationships, the crucial structures that should be addressed during physiotherapy are the respiratory diaphragm with its branches, the thoracolumbar fascia, and the area of the upper thoracic inlet.

Citation

Sotomska Z, Siereńska J. Shoulder pain in women after cesarean section – the possibility of using physiotherapy. Eur J Trans Clin Med. 2023;6(Suppl.4):60.



Sesja 10: Prehabilitacja i fizjoterapia pacjentów leczonych z powodu różnych dysfunkcji i chorób

Use of the modified PERFECT scheme to assess pelvic floor muscles function in women with perineal trauma in the first two postpartum days

Możliwość zastosowania zmodyfikowanego schematu PERFECT w celu oceny funkcji mięśni dna miednicy u kobiet z urazem krocza w pierwszych dwóch dobach po porodzie

Joanna Siereńska¹, Zofia Sotomska², Magdalena Emilia Grzybowska¹

¹ Department of Gynecology, Obstetrics and Neonatology, Medical University of Gdańsk, Gdańsk, Poland

² Independent Team of Physiotherapists, University Clinical Center, Gdańsk, Poland

Abstract

Introduction: The PERFECT scheme was developed to evaluate pelvic floor muscles in a more accessible and simple way. It includes P power (muscle strength); E endurance; R repetitions; F fast contractions, and ECT each contraction with time measurement.

Aim: Evaluation of the applicability of selected PERFECT scheme elements in the early postpartum period.

Materials and methods: The study was conducted among patients in the obstetric department. Perineal trauma and informed consent were the inclusion criteria. The pelvic floor was assessed by a physiotherapist between the first and second postpartum days using three elements of the PERFECT scheme (power, endurance, repetitions). Patients were asked if they had any pain/discomfort while unidigital vaginal palpation and performing pelvic floor muscle contractions. The collected data were processed for the primary analysis.

Results: A total of 182 women with a mean age 30.65 ± 4.02 years and BMI 27.59 ± 4.19 kg/m² were examined, of which 100 (54.9%) were primiparas. Among the subjects, 159 (87.4%) had episiotomy, and 43 (23.6%) had grade I-III perineal tears. The subjects' pelvic floor was evaluated as follows – median (first quartile; third quartile): power 2 (2;3), endurance 5 (4;10), fast contractions 10 (8;10). Participants in the study reported no discomfort or pain associated with conducting the examination and contracting their pelvic floor muscles.

Conclusions: The use of PERFECT scheme elements is possible in women after perineal trauma in the first days after delivery and does not lead to complications. Early pelvic floor assessment can result in faster diagnosis and treatment of pelvic floor muscle dysfunction and increase women's body awareness.

Citation

Siereńska J, Sotomska Z, Grzybowska ME. Use of the modified PERFECT scheme to assess pelvic floor muscles function in women with perineal trauma in the first two postpartum days. Eur J Trans Clin Med. 2023;6(Suppl.4):61.

**Sesja 10: Prehabilitacja i fizjoterapia pacjentów leczonych z powodu różnych dysfunkcji i chorób****Face and content validity of the Polish version of The Angle Labor Pain Questionnaire and Angle Pictorial Pain Mapping & Pain Ranking Companion Tool**

Walidacja polskiej wersji kwestionariuszy służących wieloparametrowej ocenie bólu porodowego – The Angle Labor Pain Questionnaire oraz Angle Pictorial Pain Mapping & Pain Ranking Companion Tool

Anna Awchimkow¹, Katarzyna Bukato¹, Magdalena Emilia Grzybowska²

¹ Department of Obstetrics and Gynecology, Gynecologic Oncology and Gynecologic Endocrinology, University Clinical Center, Gdańsk, Poland

² Department of Gynecology, Obstetrics and Neonatology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Introduction and hypothesis: The Angle Labor Pain Questionnaire (A-LPQ) and Angle Pictorial Pain Mapping & Pain Ranking Companion Tool (A-PPMRT) are performed to assess the labor pain intensity. The study aimed to translate the scales into Polish and perform a face and content validity of A-LPQ and A-PPMRT.

Methods: Following permission from the authors, initial forward translation from English to Polish was performed on A-LPQ and A-PPMRT. A community review process consisting of cognitive interviews and confirmation via backward translation was performed. An independent translator performed back-translation. The A-LPQ is a condition-specific instrument comprising 5 subscales (Enormity of Pain, Fear/Anxiety, Uterine Contraction Pain, Birthing Pain, and Back Pain/Long Haul) describing childbirth pain experiences verbally, and A-PPMRT is an additional pictorial scale to point out the most distressing pain spots. Cognitive interviews were conducted during one-on-one sessions by a physician who did not translate the instruments. The Local Ethics Committee approved the study.

Results: Cognitive interviews included 6 women at a university-based clinic during the first stage of labor who were not yet administered anesthesia. It was concluded that the forward translation had some comprehension problems, particularly in the Enormity of Pain subscale. The initial Polish translation included words that described pain as “disgusting” and “killing”. Patients felt these words should not be used during labor because they were offensive. Response-gathering clinicians had to reword words to help patients understand what they meant. After necessary adjustments, we proceeded with back-translation and review by clinicians. The scale was assessed by 5 obstetricians and reviewed by a certified translator. The final and back translations were submitted to the Mapi Research Trust for review.

Conclusions: The final Polish versions were established after the face and content validity of A-LPQ and A-PPMRT. The scales are prepared for the next steps of the validation protocol.

Citation

Awchimkow A, Bukato K, Grzybowska ME. Face and content validity of the Polish version of The Angle Labor Pain Questionnaire and Angle Pictorial Pain Mapping & Pain Ranking Companion Tool. Eur J Trans Clin Med. 2023;6 (Suppl.4):62.



Sesja 11: Środowisko a zdrowie

Detection of Asian genetic components in autochthonous human *Echinococcus multilocularis* infections from endemic Warmia-Masuria (north-eastern Poland)

Elementy genetyczne azjatyckiego pochodzenia w genomach postaci larwalnych *Echinococcus multilocularis* pozyskanych od chorych na bąblowicę wielojamową zamieszkujących endemiczny region Warmii i Mazur

Paweł Gładysz^{1,2}, Anna Lass²

¹ Department of Forensic Medicine, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland

² Department of Tropical Medicine and Parasitology, Faculty of Health Sciences with the Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdynia, Poland

Abstract

Alveolar echinococcosis is a life-threatening zoonotic disease caused by the larval stage of the cestode *Echinococcus multilocularis*. People are aberrant intermediate hosts accidentally infected with the parasite eggs via faecal-oral route, usually by the consumption of unwashed fruit and vegetable or direct contact with definitive hosts. The recently reported presence of Asian admixture in *E. multilocularis* tapeworms from Polish red foxes prompted the question of metacestode descent in the human population. In this study, a Maximum Likelihood tree based on partial sequences of *E. multilocularis* mitochondrial genes *cox1*, *cob*, and *nad2* coupled with a hierarchical clustering analysis of microsatellite EmsB profiles and supplemented by Sammon's nonlinear mapping with k-means clustering revealed Asian genetic components, to date associated only with the sylvatic cycle, in two autochthonous samples from alveolar echinococcosis patients living in endemic Warmia-Masuria, north-eastern Poland. The red fox is the most likely source of contamination in the environment shared by people and wildlife that led to these infections. Our results confirm that Asian genetic variants participate in the synanthropic cycle in north-eastern Poland and indicate that they may be present in the human population in other areas where Asian genetic variants were detected in red foxes.

Citation

Gładysz P, Lass A. Detection of Asian genetic components in autochthonous human *Echinococcus multilocularis* infections from endemic Warmia-Masuria (north eastern Poland). *Eur J Trans Clin Med.* 2023;6(Suppl.4):63.

**Sesja 11: Środowisko a zdrowie****Detection of *Toxoplasma gondii* in sylvatic rodents in Poland using molecular and serological methods****Joanna Nowicka¹, Daniela Antolova², Anna Lass¹, Beata Biernat¹, Karolina Baranowicz¹, Aleksander Goll¹, Martyna Krupińska¹, Bartłomiej Ferra¹, Aneta Strachecka³, Jerzy M. Behnke⁴, Anna Bajer⁵, Maciej Grzybek¹**¹Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdańsk, Poland²Institute of Parasitology SAS, Košice, Slovakia³University of Life Sciences in Lublin, Poland⁴University of Nottingham, Nottingham, UK⁵University of Warsaw, Warsaw, Poland**Abstract**

Rodents are known to be reservoirs of *Toxoplasma gondii* and keep the parasite circulation in the environment.

We conducted biomonitoring to assess the role of sylvatic rodents in maintaining *T. gondii* and to analyse the prevalence and seroprevalence of the parasite in seven wild rodent species.

Rodents were collected in our open grassland study site located in northeastern Poland and dissected. We collected brain, spleen, blood and serum samples. We applied both molecular (PCR assay, nested-PCR assay) and serological (ELISA and agglutination tests) methods to indicate the best approach for application in the biomonitoring of *T. gondii* in small mammals.

We screened samples from 68 individuals using PCR assays and found no *T. gondii* DNA. The agglutination test showed no signal. We found antibodies against *T. gondii* in 5 sera samples out of 56 analysed (seroprevalence = 8.9% [4.4-16.8]).

Our results confirm that rodents participate in the life cycle of *T. gondii* as reservoirs of this parasite in the sylvatic environment. However, biomonitoring should be performed with the ELISA tests to search for *T. gondii* antigens, rather than a molecular approach only.

Citation

Nowicka J, Antolova D, Lass A, Biernat B, et al. Detection of *Toxoplasma gondii* in sylvatic rodents in Poland using molecular and serological methods. Eur J Trans Clin Med. 2023;6(Suppl.4):64.

Sesja 11: Środowisko a zdrowie

The comparison of the impact of air pollution on the number of new cases of type 1 diabetes in children in the Lubelskie Voivodeship in 2017-2018 and 2020-2021

Porównanie wpływu zanieczyszczenia powietrza na liczbę nowych zachorowań na cukrzycę typu 1 u dzieci w województwie lubelskim w latach 2017-2018 oraz 2020-2021

Anna Skowronek¹, Marta Jaskulak¹, Małgorzata Michalska¹, Żaklina Tomczyk², Sylwia Krawczyk², Robert Piekarski², Iwona Beń-Skowronek², Katarzyna Zorena¹

¹ Department of Immunobiology and Environment Microbiology, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

² Department of Pediatric Endocrinology and Diabetology with the Endocrinology-Metabolic Laboratory at the University Children's Hospital in Lublin, Medical University of Lublin, Lublin, Poland

Abstract

The type 1 diabetes (T1DM) is an autoimmune disease with an increasing number of cases. It is caused by destruction of pancreatic β cells, which results in impaired insulin synthesis. There are many factors which can trigger the T1DM like genetic predisposition or infectious diseases. However, there is increasing evidence that air pollution is also a risk factor of that disease. In this study, we wanted to check this hypothesis based on the data from the Lubelskie Voivodeship before and during COVID-19 pandemic.

In collaboration with the Department of Pediatric Endocrinology and Diabetology with the Endocrinology-Metabolic Laboratory at the University Children's Hospital in Lublin, Medical University of Lublin, we obtained the number of the new T1DM cases in 2017-2018 and 2020-2021 in the Lubelskie Voivodeship. Then, they were statistically compiled against data about air pollution in the area in that time which was obtained from the reports on the Annual Air Quality Assessment 2017-2018 and 2020-2021, made available by the Voivodeship Inspectorate for Environmental Protection (WIOS) in Lublin.

Based on the results, a positive relationship is seen between NO₂ or PM_{2.5} and the number of newly diagnosed cases of T1DM before the pandemic. However, during the pandemic there was a significant decrease in the amount of air pollution, which also resulted in a weaker correlation between this factor and the incidence of T1DM. We believe that with further research of this correlation can cause developing new standards to reduce the risk of T1DM.

Citation

Skowronek A, Jaskulak M, Michalska M, Tomczyk Ż, et al. The comparison of the impact of air pollution on the number of new cases of type 1 diabetes in children in the Lubelskie Voivodeship in 2017-2018 and 2020-2021. Eur J Trans Clin Med. 2023;6(Suppl.4):65.

**Sesja 11: Środowisko a zdrowie*****Vibrio* spp. prevalence in the coastal region of Tricity, Poland, during the summer of 2022**Występowanie *Vibrio* spp. w rejonie Trójmiasta w sezonie letnim 2022**Monika Kurpas¹, Marta Potrykus^{2,1}, Arkadiusz Zakrzewski³, Katarzyna Zorena¹**

¹ Department of Immunobiology and Environmental Microbiology, Faculty of Health Science with the Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdańsk, Poland

² Laboratory of Biologically Active Compounds, Intercollegiate Faculty of Biotechnology University of Gdańsk and Medical University of Gdańsk, Gdańsk, Poland

³ Department of Industrial and Food Microbiology, Faculty of Food Science, University of Warmia and Mazury, Olsztyn, Poland

Abstract

Vibrio spp. are Gram-negative, rod-shaped bacteria widely found in warm aquatic and marine environments in tropical regions. For several years, due to climate change, these bacteria have been more and more often found in the Baltic Sea. Especially in the summer, an increased number of infections caused by *V. vulnificus*, *V. cholerae*, and *V. parahaemolyticus* is observed.

Our research aimed to isolate strains of *Vibrio* spp. and determine their diversity. The strains were isolated in the summer of 2022 from the seawater and beaches in the Tricity area (Poland).

Water and wet sand samples were collected once a month in June, July, and August (2022) from 8 locations: Gdynia city beach, Gdynia Orłowo, Kacza River, Sopot Swelina Estuary, Swelina River, Gdańsk gate 66, Oliwski Stream and Brzeźno-Pier. *Vibrio* spp. isolation from collected water and sand samples was performed with filtration and selective culture on CHROMagar *Vibrio* and chromogenic thiosulfate-citrate-bile salts-sucrose medium. Colonies characteristic for *Vibrio* sp. were then identified with MALDI-TOF and differentiated with PCR BOX fingerprinting.

V. vulnificus and *V. cholerae/mimicus* isolates (15 and 9, respectively) were found and isolated in July and August from both water and wet sand samples. The *V. vulnificus* strains were found in 4 locations while *V. cholerae/mimicus* were in 3.

Studies have shown that both *V. vulnificus* and *V. cholerae/mimicus* could be isolated in Tricity beaches in the summer. This could be a potential hazard of getting the infection caused by these species for people using beaches for recreational purposes.

Citation

Kurpas M, Potrykus M, Zakrzewski A, Zorena K. *Vibrio* spp. prevalence in the coastal region of Tricity, Poland, during the summer of 2022. Eur J Trans Clin Med. 2023;6(Suppl.4):66.



Sesja 11: Środowisko a zdrowie

Presence and dissemination of antibiotic resistance in agricultural soil supplemented with sewage sludge

Obecność i rozprzestrzenianie oporności na antybiotyki w glebach rolniczych nawożonych osadami ściekowymi

Marta Jaskulak¹, Katarzyna Zorena¹, Franck Vandebulcke²

¹ Division of Immunobiology and Environmental Microbiology, Faculty of Health Sciences with the Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdańsk, Poland

² University of Lille, Laboratory of civil engineering and environment (LGCgE), Environmental Axis, Villeneuve d'Ascq, France

Abstract

For the last 20 years in EU-15 countries, the sewage sludge produced by wastewater treatment plants (WWTPs) has increased from 6.5 million tDM (dry matter) up to 9.5 million tDM (2000-2020). Applying sewage sludge (SS) to agricultural soil can improve the soil fertility, allows to recycle this biowaste and helps to meet crop nutritional needs. However, SS may contain various unregulated emerging contaminants, as well as mobile genetic elements (MGEs) and antibiotic resistance genes (ARGs), increasing the danger of the spread of antibiotic resistance. We looked at how applying thermally dried anaerobically digested SS affected the physical, chemical, and microbiological characteristics of the soil, and (ii) the relative abundance of 96 ARGs and 10 MGE-genes in the soil. Three factors – the dose of application, the technology of sludge treatment, and the amount of time since the last treatment – were different for each of the SS-amended agricultural fields from which soil samples were collected. ARGs and MGE-genes were both more abundant in soils fertilized with sewage sludge relative to non-amended soils in SS-amended soils, particularly in more recent SS applications and in soils supplemented by SS repeatedly thorough the last 5 years. The relative abundance of ARGs and MGE-genes was positively linked with some physicochemical factors, such as cation exchange capacity, nitrogen and phosphorus content. The primary explanation for the distribution pattern of ARGs and MGE-genes was the application of sewage sludge. We concluded that adding thermally dried anaerobically digested sewage sludge to agricultural soils without any additional treatments can enhance the chance of antibiotic resistance spreading. Much future research needed for the development of innovative treatments and technologies for SS in order to reduce the risk of further emergence and spread of ARGs and MGE-genes in SS-amended agricultural soils and afterwards, in crops. Until then, SS should be applied in agricultural soils with caution.

Citation

Jaskulak M, Zorena K, Vandebulcke F. Presence and dissemination of antibiotic resistance in agricultural soil supplemented with sewage sludge. Eur J Trans Clin Med. 2023;6(Suppl.4):67.

**Sesja 11: Środowisko a zdrowie****Medical importance of millipedes (Diplopoda)****Znaczenie medyczne krocionogów (Diplopoda, Arthropoda)****Grzegorz Kania**

Department of Biology and Parasitology, Medical University of Lublin, Lublin, Poland

Abstract

The class of millipedes (Diplopoda) in the phylum Arthropoda includes approximately 12,000 known species divided into 16 orders worldwide. When irritated, millipedes release poisonous secretions from their glands, in liquid or volatile state. Certain tropical species of Diplopoda can release their secretions over a significant distance. For example, African species *Epibolus pulchripes* (Spirobolida) sprays its secretion over a distance of more than 40 cm. Millipedes produce secretions containing quinazoline alkaloids (glomerin and homoglomerin) in the order Glomerida, cyanogenic compounds (mandelonitrile and benzoyl cyanide) in the order Polydesmida or aliphatic compounds (2-methyl-3-methoxy-1,4-benzoquinone) in the orders Julida, Spirostreptida and Spirobolida. There are reports of harmful effects of the defensive secretions of millipedes on humans. For example, benzoquinones released by *Archispirostreptus gigas* cause erythema, edema, blisters, localized skin discoloration and conjunctivitis or corneal ulceration. The threat of chemical secretions of synanthropic millipedes *Oxidus gracilis*, *Chamberlinius hualienensis*, *Parafontaria lamina* (Polydesmida), *Ommatoiulus sabulosus* and *Cylindroiulus caeruleocinctus* (Julida) should be taken into account during mass occurrence.

Citation

Kania G. Medical importance of millipedes (Diplopoda). Eur J Trans Clin Med. 2023;6(Suppl.4):68.



Sesja 11: Środowisko a zdrowie

Blastocystis species in Polish soldiers stationed in the Republic of Kosovo

Gatunki Blastocystis u żołnierzy polskich stacjonujących w Republice Kosowa

Barbara Pietrzak-Makyla¹, Krzysztof Korzeniewski², Paweł Gładysz¹, Anna Lass¹

¹ Department of Tropical Parasitology, Institute of Maritime and Tropical Medicine in Gdynia, Medical University of Gdańsk, Gdynia, Poland

² Department of Epidemiology and Tropical Medicine, Military Institute of Medicine – National Research Institute, Warsaw, Poland

Abstract

Blastocystis species (sp.) is one of the less well-understood water- and foodborne protozoa of medical and veterinary importance linked to different gastrointestinal disorders. Soldiers participating in military missions are particularly vulnerable to infection with this protozoa. The present study used molecular methods to detect, identify, and subtype (ST) Blastocystis sp. in Polish soldiers stationed in the Republic of Kosovo. Fecal samples were collected from 192 soldiers on arrival and after four months of stay. After DNA extraction, the barcoding region of the small subunit ribosomal RNA (SSU-rRNA) gene was amplified and sequenced. The DNA of Blastocystis sp. was detected in 6 (3.13%) and 30 (15.16%) samples in the first and second batch, respectively. Sequencing analysis revealed infections with ST 2, 3, 4, and 7. There was no statistical association between Blastocystis sp. infection and the parasite's ST or the age or rank of soldiers. The results indicate that the visit to a new environment and prolonged stay in the area of military operation in Kosovo resulted in a significant increase of both Blastocystis sp. infections and STs diversity among surveyed soldiers. This shows the need to undertake appropriate countermeasures to reduce Blastocystis infections in the military environment abroad.

Funding: This research was supported and co-funded by Military Institute of Medicine in Warsaw (project no. 573) and the Ministry of Science and Higher Education in Poland (MUG ST 02-0104/772).

Citation

Pietrzak-Makyla B, Korzeniewski K, Gładysz P, Lass A. Blastocystis species in Polish soldiers stationed in the Republic of Kosovo. Eur J Trans Clin Med. 2023;6(Suppl.4):69.

**Sesja 12: Urazowość oraz interdyscyplinarna diagnostyka sportowców****Muscle injuries prevention in modern soccer players****Prewencja urazów mięśniowych u zawodników we współczesnej grze w piłkę nożną****Łukasz Radziński**

Gdansk University of Physical Education and Sport, Gdańsk, Poland

Abstract

Modern soccer requires from the players the ability to often repeat efforts of very high intensity. The increasing number of sprints and rapid accelerations results in a large load, among others, on the hamstring muscles. In the light of medical reports published annually by the European Football Federation (UEFA), nearly 50% of muscular injuries in soccer players at the professional level concern the knee flexor muscles. In the available literature, one can find data showing that the factors that increase the risk of injury include, among others, too low level of strength of these muscles and too large disproportions between the strength of the right and left limbs. Identification of such potential deficits can effectively support activities aimed at reducing the number of injuries. The currently available technologies allow for a quick and reliable analysis of the strength of the muscles of the lower limbs. Based on the data obtained, medical and coaching staffs can prepare and implement appropriate training programs that will effectively compensate for any deficits and, as a result, contribute to fewer injuries.

Citation

Radziński Ł. Muscle injuries prevention in modern soccer players. Eur J Trans Clin Med. 2023;6(Suppl.4):70.



Sesja 12: Urazowość oraz interdyscyplinarna diagnostyka sportowców

Injuries, sports specialization, physical abilities and subjective health quality in young athletes. The project “Science of healthy sports for children and adolescents” – preliminary results

Urazowość, specjalizacja sportowa, zdolności fizyczne i subiektywna jakość zdrowia u młodych sportowców. Wstępne wyniki projektu „Nauka zdrowego sportu dla dzieci i młodzieży”

Bartosz Wilczyński¹, Karol de Tillier², Damian Łuniewski², Tymoteusz Czujko², Dominika Kuchta³, Dawid Białowias⁴, Katarzyna Zorena¹

¹ Department of Immunobiology and Environment Microbiology, Medical University of Gdańsk, Gdańsk, Poland

² Medical University of Gdańsk, Gdańsk, Poland,

³ Sports psychologist, independent researcher

⁴ Sports nutritionist, independent researcher

Abstract

The problem of sports injuries, and the subsequent consequences, is a noteworthy focus in interdisciplinary efforts on the health of young athletes. A retrospective approach to the search for causes of injury, combined with a prospective evaluation of injuries, can reveal the source of the issue. Therefore, the study aimed to assess the causes of injuries that have already occurred and to attempt to identify risk factors for future injuries.

The pilot study included an assessment of the author's questionnaires, Rosenberg self-report, EQ-5D-Y, and sports specialization scale. Anthropometric measurements were also conducted, including body composition analysis. Subsequently, abilities such as dynamic balance, isometric strength of the lower extremities, and functional movement patterns were examined.

Sixty-six young (43% female) athletes (age: 13 yrs, range: 10-16) participated in the study. As many as 37 of the 66 (56%) participants had suffered a musculoskeletal injury in the last year. Up to 25 of 58 (38%) have “high” values on the sports specialization scale, 31 (47%) have “moderate” and only 2 have “low” values. Sports specialization scores were not significantly related to injury history, motor skills, or subjective assessment of health quality ($p > 0.05$). Also, there were no significant differences in the variables studied between the group of participants with a history of injury and the group without injury ($p > 0.05$). Continuation of the project will expand the number of participants, improve the completeness of the data, and obtain follow-up on injury occurrence.

Citation

Wilczyński B, de Tillier K, Łuniewski D, Czujko T, et al. Injuries, sports specialization, physical abilities and subjective health quality in young athletes. The project “Science of healthy sports for children and adolescents” – preliminary results. Eur J Trans Clin Med. 2023;6(Suppl.4):71.

**Sesja 12: Urazowość oraz interdyscyplinarna diagnostyka sportowców****The effect of different types of warm-up on jump parameters in recreationally active men****Wpływ różnego rodzaju rozgrzewki na parametry skoku u aktywnych rekreacyjnie mężczyzn****Łukasz Poniąkowski¹, Paulina Ewertowska¹, Marta Głazewska¹, Agnieszka Gawrońska¹, Kacper Tuptanowski¹, Oskar Formella¹, Katarzyna Świtała¹, Michał Krzysztofik^{2,3}, Robert Urbański¹, Piotr Aschenbrenner¹**¹ Faculty of Physical Culture, The Jędrzej Śniadecki Academy of Physical Education and Sport, Gdańsk, Poland² Institute of Sport Sciences, The Jerzy Kukuczka Academy of Physical Education in Katowice, Poland³ Department of Sport Games, Faculty of Physical Education and Sport, Charles University in Prague, Prague, Czech Republic**Abstract**

Warming up is an essential part of training to maximize exercise efficiency, and whole body vibration (WBV) can be one of its components. The aim of the study was to check whether WBV, drop jump (DJ) or a combination of both will affect Akimbo Countermovement Jump (CMJ) vertical jump parameters and lower leg temperature in recreational runners.

The study involved 12 healthy recreational runners aged 38.0 ± 4.0 years. Jump height (JH), relative power (RPP), peak velocity (PV) and contraction time during CMJ (Kistler platform, Winterthur) as well as lower leg skin surface temperature (FLIR thermal imaging camera, Wilsonville) were measured. Measurements were carried out before the warm-up, 3 minutes after and immediately after a 3 km run on a mechanical treadmill (Saturn, HP Cosmos). Four types of warm-ups were randomly assigned, one week apart: control group (GK), whole body vibration (WCC), drop jump (DJ) and vibration combined with DJ (WCC+DJ).

A higher JH ($p=0.043$) was found after using the WBVcr warm-up compared to CTRL. There was an improvement in JH after the run compared to the measurements before ($p < 0.001$) and after the warm-up ($p = 0.001$). A higher RPP ($p = 0.001$) and PV ($p < 0.001$) were observed after the run compared to the measurement before and after the warm-up. There were no significant differences for contraction time and lower leg temperature ($p > 0.05$).

None of the applied warm-ups affect the parameters of the Akimbo CMJ vertical jump and the temperature of the lower legs. A 3-kilometer run improves CMJ performance, regardless of the warm-up used.

Citation

Poniąkowski Ł, Ewertowska P, Głazewska M, Gawrońska A, et al. The effect of different types of warm-up on jump parameters in reactionally active men. Eur J Trans Clin Med. 2023;6(Suppl.4):72.

Sesja 12: Urazowość oraz interdyscyplinarna diagnostyka sportowców**Assessment of the influence of Osgood Schlatter disease history on motor skills and knee joint function in young football players**

Ocena wpływu historii schorzenia Osgood Schlatter na zdolności motoryczne i funkcję stawu kolanowego wśród młodych zawodników piłki nożnej

Rafał Bruzda¹, Bartosz Wilczyński², Katarzyna Zorena²

¹ Gdansk College of Health, Gdańsk, Poland

² Department of Immunobiology and Environment Microbiology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Osgood Schlatter disease is one of the most common chronic injuries of the limb of the lower limb among children and adolescents participating in sports during puberty. The main purpose of this study was to examine whether there are deficits in ankle dorsiflexion mobility, quadriceps flexibility, lower extremity explosive strength and perceived functional deficits of the knee joint. These variables have been described in the literature as risk factors for OSD. Eighteen (15.6 ± 1.3 years) young male football players from the local football club participated in the study. The research group consisted of 9 players who had a history of OSD, the control group consisted of 9 players who had never experienced OSD-specific symptoms. The participants were evaluated with the KOOS (Knee Osteoarthritis Outcome Scale), body composition analysis (InBody 270), explosive strength and lower limb power on the Keiser crane, and the Single Leg Tests. Range of motion of the ankle, hip and knee joint were performed by goniometer. There was a statistically significant difference in the KOOS Scale score both in the total scores ($p = 0.002$) and in subscales: Sports and Recreational Activities ($p = 0.004$), and Quality of Life ($p = 0.034$). However, there were no significant differences in the subscales Pain ($p = 0.093$), Daily Activities ($p = 0.057$) and Symptoms ($p = 0.565$). Moreover, there were no statistically significant differences between the groups in the values of ranges of motion and lower extremity explosive strength ($p > 0.05$). The young athletes experienced subjective deficits in sports activities and quality of life, despite recovery from OSD.

Citation

Bruzda R, Wilczyński B, Zorena K. Assessment of the influence of Osgood Schlatter disease history on motor skills and knee joint function in young football players. Eur J Trans Clin Med. 2023;6(Suppl.4):73.

**Sesja 12: Urazowość oraz interdyscyplinarna diagnostyka sportowców****Relationship between length and muscle strength
of the lower extremities in young athletes****Ocena zależności między długością a siłą mięśni kończyn
dolnych u młodych sportowców****Karol de Tillier¹, Bartosz Wilczyński², Agnieszka Sobierajska-Rek³, Kuba Bracha¹**¹ Student Scientific Circle of Clinical Physiotherapy, Medical University of Gdańsk, Gdańsk, Poland² Department of Immunobiology and Environment Microbiology, Medical University of Gdańsk, Gdańsk, Poland³ Rehabilitation Clinic, Faculty of Health Sciences with Institute of Marine and Tropical Medicine,
Medical University of Gdańsk, Gdańsk, Poland**Abstract****Background:** This paper is an observation of the relationship between the length of the lower limbs and its segments, and strength of the muscles of the lower limbs.**Methods:** 36 players with an average age of 12 (\pm 1.56) years, an average height of 163.22 (\pm 13.14) cm and an average body weight of 53.81 (\pm 13.77) kg practicing team sports, including football, basketball and rugby in the Tricity area in Poland have been observed. The test was performed with the use of an anthropometric tape and a Lafayette Model-01165 and Hoggan microFET2 handheld dynamometer. Statistica version 14.0.1.25 was used to process the collected data.**Results:** The obtained results show a statistically significant, positive correlation between the length of the lower limb, femur bone length and tibial bone length and the average strength and peak strength of the quadriceps femoris muscle, hamstring muscles and gluteus medius muscle.**Conclusion:** The length of the lower limbs has a significant impact on the forces generated by the athlete, which suggests the consideration of this aspect in the context of sports injury.**Citation**

de Tillier K, Wilczyński B, Sobierajska-Rek A, Bracha K. Relationship between length and muscle strength of the lower extremities in young athletes. Eur J Trans Clin Med. 2023;6(Suppl.4):74.

Sesja 12: Urazowość oraz interdyscyplinarna diagnostyka sportowców

Humeral torsion and retroversion in striking combat sports. Correlation of the results with the functional range of motion and the mobility of the shoulder

Kąt retrowersji i torsji kości ramiennej w uderzanych sportach walki. Korelacja wyników z funkcjonalnym zakresem ruchu oraz mobilnością obręczy barkowej

Bartosz Sieger¹, Bożena Sztuka², Jakub Bracha³, Bartosz Wilczyński⁴

¹ Gdansk College of Health, Gdańsk, Poland

² Provincial Integrated Hospital in Gdańsk, Gdańsk, Poland

³ Student Scientific Circle of Clinical Physiotherapy, Medical University of Gdańsk Department of Physical Culture, Physiotherapy, Gdańsk, Poland

⁴ Department of Physical Culture, Physiotherapy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Background: Previous studies have documented changes in bony anatomy and glenohumeral rotation in the dominant shoulder of baseball players, handball players, volleyball players and swimmers. This paper is the first observation of the relationship between training loads and humeral retroversion as well as torsion in striking combat sports athletes. The aim of the study was also to correlate the humeral retroversion and torsion with the functional range of motion and mobility of the shoulder. **Methods:** Forty young healthy participants took part in the study. 20 people were qualified to the group of athletes, and 20 people to the control group. Measurements of the retroversion angle were made by a radiodiagnostics specialist and an assistant. An ultrasound diagnostic device and a digital inclinometer were used for the examination. The mobility of the shoulder was also tested using the standardized Functional Movement Screen test. **Results:** There were no statistically significant differences between the retroversion of the humerus of the dominant and non-dominant upper limb. No statistically significant differences were also shown in the comparison angles of the humeral retroversion of the dominant and non-dominant upper limb in the group of athletes compared to the control group. Statistically significant correlation ($p < 0,05$) was found between the value of the retroversion angle and the range of motion of passive internal rotation, active external rotation, passive external rotation, and the mobility of the shoulder assessed in the standardized FMS© test. **Conclusion:** Training loads in striking combat sports do not change the humeral retroversion. The value of the humeral retroversion is related to the range of motion and mobility of the shoulder.

Keywords: humeral retroversion; humeral torsion; combat sports

Citation

Sieger B, Sztuka B, Bracha J. Humeral torsion and retroversion in striking combat sports. Correlation of the results with the functional range of motion and the mobility of the shoulder. Eur J Trans Clin Med. 2023;6(Suppl.4):75.

**Sesja 12: Urazowość oraz interdyscyplinarna diagnostyka sportowców****The effect of proprioception training conducted in water on the level of proprioception and swimming efficiency in members of the swimming team**

Wpływ treningu propriocepcji prowadzonego w wodzie na poziom czucia głębokiego i efektywność pływania u zawodników drużyny pływackiej

Helena Strachanowska, Wiesław Ziółkowski

Faculty of Health Sciences with IMMiT, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Background: The aquatic environment, compared to land one, provides human body with thirty times greater stimulation of proprioceptors and provides profitable conditions for exercises and rehabilitation. The primary goal of this experiment was to investigate the impact of proprioception training conducted in water on the level of feeling and swimming efficiency in the athletes of the academic swimming team.

Material and methods: A total of 12 swimmers, 7 women and 5 men, were assigned to two groups: experimental (E) and control (C). In 6 weeks both groups participated in 10 swimming training sessions that differed only in warm up: group C had a standard swimming warm up while group E had a proprioception training in water. Before and after training stage all athletes were subjected to 5 tests: joint position test (JPT), short and long swimming stroke analysis (SAS and SAL), time measurement on 50 m freestyle (t50) and stroke self-assessment (SSa).

Results: The study found statistical significance between the differences in the post-pre results of the two groups in all 5 adopted parameters ($p < 0.05$).

Conclusion: Hydroproprioception training has proven to be an effective tool to improve proprioception and effectiveness of swimming, but also a beneficial alternative to the standard swimming warm-up. Therefore, it is worth considering as an element of rehabilitation and training program.

Keywords: proprioception; aquatic exercise; hydroproprioception; swimming; hydrotherapy

Citation

Strachanowska H, Ziółkowski W. The effect of proprioception training conducted in water on the level of proprioception and swimming efficiency in members of the swimming team. Eur J Trans Clin Med. 2023;6(Suppl.4):76.

Sesja 13: Nowoczesne badania biochemiczne w różnych jednostkach chorobowych**Dietary supplements vs. the raw vegetable –
bromatological assessment of dietary supplements
containing *Beta vulgaris* L.****Suplementy diety vs. surowe warzywo – ocena
bromatologiczna suplementów diety zawierających
Beta vulgaris L.****Joanna Brzezińska-Rojek¹, Małgorzata Rutkowska², Paulina Malinowska³,
Justyna Ośko¹, Kamila Gadaj¹, Piotr Konieczka², Magdalena Prokopowicz⁴,
Małgorzata Grembecka¹**¹ Department of Bromatology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland² Department of Analytical Chemistry, Faculty of Chemistry, Gdańsk University of Technology, Gdańsk, Poland³ Pharmacist, Gdańsk, Poland⁴ Department of Physical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Due to the high content of bioactive substances, beetroot has a potential pro-health effect. Beetroot-based dietary supplements (DSs) are chosen by consumers as an alternative to raw vegetables, but there is a lack of evidence confirming their effectiveness and safety. The study aimed at the bromatological assessment of 54 DSs and 20 beetroot samples because of the content of nitrates (III), (V) and mineral composition. The content of nitrates was determined according to ISO 6635-1984(E), while the 17 elements (Na, K, Fe, Ca, Mg, Zn, Cu, Ba, Mn, Ni, Co, Mo, Al, Sr, Cr, Cd, Pb) were determined using spectrometric measurement technique with excitation in microwave nitrogen plasma (MP-AES). Furthermore, chemometric analysis was adopted. The methods were validated, and the obtained parameters allowed for determinations with satisfactory accuracy (80-120%) and precision (up to 10%). DSs differed in terms of nitrates (III) content (10-78 µg/daily dose (d.d.)), nitrates (V) content (16-169 mg/d.d.), and mineral composition. The majority of DSs provided fewer bioactive substances than a 100-gram portion of beetroot. The exception was products enriched with Fe salts, which contained greater amounts of this element (36%-247% of the Recommended Dietary Allowance (RDA) for Fe) than vegetables (5.01-8.83% RDA for Fe). Ten DSs were notably contaminated with Cd (4-134% of the Provisional Tolerable Monthly Intake). Factor analysis allowed for the differentiation of the samples because of type (DSs, vegetable), the pharmaceutical form of DSs (powder, tablet, capsule), and Fe enrichment. The research showed that more stringent control of the DSs market is necessary to ensure consumer safety.

CitationBrzezińska-Rojek J, Rutkowska M, Malinowska P, Ośko J, et al. Dietary supplements vs. the raw vegetable – bromatological assessment of dietary supplements containing *Beta vulgaris* L. Eur J Trans Clin Med. 2023;6(Suppl.4):77.

**Sesja 13: Nowoczesne badania biochemiczne w różnych jednostkach chorobowych****The impact of *Nigella sativa* seed essential oil on T-cell activity and their cytokine profile in patients with Hashimoto's thyroiditis**

Wpływ olejku eterycznego z nasion *Nigella sativa* na aktywność komórek T oraz ich profil cytokin u pacjentek z zapaleniem tarczycy Hashimoto

Klaudia Ciesielska-Figlon¹, Karolina Wojciechowicz¹, Agnieszka Daca², Adam Kokotkiewicz³, Maria Łuczkiwicz³, Jacek Maciej Witkowski¹, Katarzyna Aleksandra Lisowska¹

¹ Department of Physiopathology, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland

² Department of Pathology and Experimental Rheumatology, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland

³ Department of Pharmacognosy, Faculty of Pharmacy, University of Gdańsk, Gdańsk, Poland

Abstract

Hashimoto's thyroiditis (HT) is an autoimmune disease, in which the thyroid gland is constantly attacked by T and B cells. Therefore, HT patients require chronic treatment with levothyroxine. However, the autoimmune reaction directed against thyrocytes is not inhibited, so HT patients have a higher risk of developing another autoimmune disease. The course of the disease can vary widely and often correlates with a decrease in patients' well-being.

There is increasing interest worldwide in alternative plant-based therapies for chronic diseases, including HT. One of the plants is *Nigella sativa*. In this study, we analyzed the immunomodulatory properties of *Nigella sativa* essential oil (NSEO) against T cells from HT patients. Their peripheral blood mononuclear cells (PBMCs) were stimulated with monoclonal anti-CD3 antibodies in the presence of ethanol NSEO dilutions. Using flow cytometry, we examined the proliferative activity and susceptibility to apoptosis of T cells. We also assessed the ability to produce Th1/Th2/Th17 cytokines in the presence of NSEO.

We demonstrated that NSEO at the lowest dilutions exhibited proapoptotic and antiproliferative effects against T cells under cell culture conditions. NSEO significantly reduced the concentration of IL-17A, IL-10, and TNF and increased the concentration of IL-2 and IL-4 in cell culture supernatants. Our results show that NSEO exhibits strong immunomodulatory effects that could favorably affect the abnormal response of T cells in immune-related diseases, including HT. Further studies are needed to confirm whether supplementation with *Nigella sativa* extract could benefit patients.

Citation

Ciesielska-Figlon K, Wojciechowicz K, Daca A, Kokotkiewicz A, et al. The impact of *Nigella sativa* seed essential oil on T-cell activity and their cytokine profile in patients with Hashimoto's thyroids. Eur J Trans Clin Med. 2023;6(Suppl.4):78.

Sesja 13: Nowoczesne badania biochemiczne w różnych jednostkach chorobowych**Changes in the fatty acid profile of different lipid classes in breast cancer****Zmiany w profilu kwasów tłuszczowych w różnych klasach lipidów w raku piersi****Oliwia Lange¹, Alicja Pakiet¹, Monika Czapiewska², Paweł Kabata³, Michalina Ciosek⁴, Adriana Mika^{1,2}**¹ Department of Environmental Analysis, University of Gdańsk, Gdańsk, Poland² Department of Pharmaceutical Biochemistry, Medical University of Gdańsk, Gdańsk, Poland³ Department of Surgical Oncology, Medical University of Gdańsk, Gdańsk, Poland⁴ Department of General, Endocrine and Transplant Surgery, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Background: Our previous studies have shown changes in the fatty acids profile (FAs) in breast cancer (BC) tissue. FAs are the basic unit of which most lipid classes are composed and which determines their properties. Polyunsaturated fatty acids (PUFAs) as well as very long-chain fatty acids (VLCFAs) are involved in cell membrane assembly and intercellular signalling. Changes in their composition can affect the fluidity and biophysical properties of cell membranes.

Methods: The aim of this study was to analyse the FAs profiles of selected lipid groups in tumour and adjacent healthy tissue from 27 BC patients. Lipids were extracted by the Folch method. Then they were divided into fractions using two solid phase extraction methods: the Kaluzny and Bodennec methods. The subclasses were derived to methyl esters and FA profiles were analysed by gas chromatography-mass spectrometry.

Results: The tumour tissue showed increased levels of VLCFAs and PUFAs in the most of fractions. In phospholipids there were increased concentrations of 20:0 ($p < 0.001$), 22:0 ($p < 0.01$), 24:0 ($p < 0.01$), 26:0 ($p < 0.05$), 28:0 ($p < 0.01$) and 20:3 n-6 ($p < 0.001$), 18:3 n-3 ($p < 0.001$). Also, in glycosphingolipids there were increased levels of 26:0 ($p < 0.001$), 28:0 ($p < 0.001$) and 20:3 n-6 ($p < 0.01$), 22:5 n-3 ($p < 0.01$).

Conclusion: Accumulation of VLCFA was detected in BC tissues, mainly in non-esterified form and as components of polar membrane lipids. The membrane lipids were also characterized by an increase in PUFA. VLCFAs appear to be essential for tumour growth, which may provide a clue in exploring the development of targeted therapies.

Citation

Lange O, Pakiet A, Czapiewska M, Kabata P, et al. Changes in the fatty acid profile of different lipid classes in breast cancer. Eur J Trans Clin Med. 2023;6(Suppl.4):79.



Sesja 13: Nowoczesne badania biochemiczne w różnych jednostkach chorobowych

Novel tools for comprehensive functional analysis of LDLR gene variants

Nowe narzędzia do kompleksowej analizy funkcjonalnej wariantów genu LDLR

Monika Targońska¹, Anna Janaszak-Jasiecka², Monika Żuk¹, Magdalena Chmara^{3,4}, Leszek Kalinowski^{2,5}, Krzysztof Waleron⁶, Bartosz Wasąg^{1,4}, Jacek Jasiecki⁵¹ Department of Biology and Medical Genetics, Medical University of Gdańsk, Gdańsk, Poland² Department of Medical Laboratory Diagnostics—Fahrenheit Biobank BBMRI.pl, Medical University of Gdańsk, Gdańsk, Poland³ Center of Translational Medicine, Medical University of Gdańsk, Gdańsk, Poland⁴ Laboratory of Clinical Genetics, University Clinical Centre, Gdańsk, Poland⁵ BioTechMed Centre, Department of Mechanics of Materials and Structures, Gdańsk University of Technology, Gdańsk, Poland⁶ Department of Pharmaceutical Microbiology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Familial hypercholesterolemia is an autosomal-dominant disorder caused mainly by substitutions in the low-density lipoprotein receptor (LDLR) gene, leading to an increased risk of premature cardiovascular diseases. Genetic studies have revealed more than 3000 variants of the LDLR gene in the human genome, but not all are clinically relevant. Therefore, a functional analysis of selected variants is required for the variants' proper classification. For the functional study, an LDLR-defective HEK293T cell line was established by a CRISPR/Cas9-mediated luciferase–puromycin knock-in. The resulting LDLR promoter–luciferase knock-in reporter system allows the study of transcriptional regulation of the *LDLR* gene, which can serve as a simple tool for screening and testing new HMG-CoA reductase-inhibiting drugs for atherosclerosis therapy. Moreover, the expressing vector with the *LDLR* gene under the control of the regulated promoter and with a reporter gene has been designed to overproduce LDLR variants in the host cell. Our results demonstrate that the obtained LDLR-deficient human cell line HEK293T-ldlrG1 and the dedicated pTetRedLDLR expression vector are valuable tools for studying LDL internalization and functional analysis of LDLR and its genetic variants. Using appropriate equipment, LDL uptake to a single cell can be measured in real-time.

CitationTargońska M, Janaszak-Jasiecka A, Żuk M, Chmara M, et al. Novel tools for comprehensive functional analysis of LDLR gene variants. *Eur J Trans Clin Med.* 2023;6(Suppl.4):80.

Sesja 13: Nowoczesne badania biochemiczne w różnych jednostkach chorobowych**Analysis of very long chain fatty acids in lipid fraction from brain in a mouse model of IKSHD disease using GC-MS****Analiza bardzo długołańcuchowych kwasów tłuszczowych we frakcji lipidowej z mózgu w mysim modelu choroby IKSHD przy użyciu GC-MS****Agata Zwara¹, Oliwia Lange¹, Agnieszka Jakubiak³, Adriana Mika^{1,2}**¹ Katedra Analizy Środowiska, Wydział Chemii, Uniwersytet Gdański, Gdańsk, Poland² Katedra i Zakład Biochemii Farmaceutycznej, Wydział Farmacji, Gdański Uniwersytet Medyczny, Gdańsk, Poland³ Trójmiejska Akademicka Zwierzętnia Doświadczalna, Gdański Uniwersytet Medyczny, Gdańsk, Poland**Abstract**

IKSHD (ichthyotic, keratoderma spasticity, hypomyelination, dysmorphic features) is a genetic disease discovered in 2017 by Professor R. Płoski, which was found in two unrelated patients. Its only cause is the p.Ser165Phe mutation in the gene encoding fatty acid elongase 1 (ELOVL1). The mutation causes accumulation of very long chain fatty acids (VLCFA) with 20 and 22 carbon atoms (C20:0 and C22:0) and FA deficiency of \geq C24:0. Symptoms appear on the skin and in the central nervous system (CNS). VLCFAs are involved in the formation of skin barrier and the proper maintenance of myelin. They are components of sphingolipids, such as ceramides, sphingomyelins and glycosphingolipids, with significant impact on the proper functioning of the CNS.

In our study, we analyzed the brain tissue of a mouse model of IKSHD. The tissue was collected from three types of mice: Elov1^{p.S165F/p.S165F} (homozygous), Elov1^{p.S165F/wt} (heterozygous) and control group (wild type, WT) from which lipids were extracted. Some of the obtained extracts were separated by solid phase extraction on fractions, including, ceramide, glycosphingolipids and sphingomyelin. VLCFA levels were analyzed by GC-MS.

We observed accumulation of C19:0, C20:0 and deficiency of C22:0-C26:0 in Elov1^{p.S165F/p.S165F} were observed in comparison to WT mice in ceramide and glycosphingolipids. In sphingomyelin, amount of C19:0 was higher, while the content of $>$ C22:0 was lower in Elov1^{p.S165F/p.S165F} compared to WT mice.

The obtained results indicate the mutation changes the content of VLCFA, which may result in hypomyelination of the nervous system and progressive disturbances of its functioning.

Citation

Zwara A, Lange O, Jakubiak A, Mika A. Analysis of very long chain fatty acids in lipid fraction from brain in a mouse model of IKSHD disease using GC-MS. Eur J Trans Clin Med. 2023;6(Suppl.4):81.

**Sesja 13: Nowoczesne badania biochemiczne w różnych jednostkach chorobowych****Cytotoxic effect of homocysteine on endothelium –
role of iron****Cytotoksyczny wpływ homocysteiny na śródbłonek naczyniowy –
rola żelaza****Andżelika Borkowska, Szczepan Olszewski, Jędrzej Antosiewicz**

Department of Bioenergetics and Physiology of Exercise, Medical University of Gdańsk, Gdańsk, Poland.

Abstract

Hyperhomocysteinemia is an independent risk factor of cardiovascular diseases (CVDs). It is well known that elevated levels of homocysteine (Hcy) damage the endothelium of blood vessels, which is one of the first symptoms of CVDs development. However, molecular mechanism of homocysteine (Hcy) action has not been well understood. There is evidence that Hcy toxicity is mediated by iron.

Aim: The main goal of this study was to evaluate the effects of Hcy and its derivative – homocysteine thiolactone (HcyT) on iron metabolism in HUVEC cells.

Results: We observed that the treatment of the HUVEC cell line with 3 mM Hcy and 2 mM HcyT leads to changes in the levels of proteins responsible for the storage, import and export of iron in the cell. Ferritin, a protein that stores iron in a safe form, increases very significantly in cells exposed to Hcy and HcyT, which is accompanied by a disturbance in the Akt-FOXO3a signaling pathway. In turn, the proteins responsible for export from the cell (ferroportin, APP) and intracellular transport (PCBP1, PCBP2) are definitely unregulated. Interestingly, the level of the transferrin receptor of the protein responsible for importing iron into the cell decreases with increasing exposure to HcyT, which may suggest that the cell is defending against excessive iron accumulation.

Conclusions: Results indicate that the damage to the blood vessel endothelium induced by the cytotoxic effect of Hcy and HcyT may result from disorders in iron metabolism mediated by alternation of the Akt-FOXO3a signaling pathway.

Citation

Borkowska A, Olszewski S, Antosiewicz J. Cytotoxic effect of homocysteine on endothelium – role of iron. Eur J Trans Clin Med. 2023;6(Suppl.4):82.



Sesja 13: Nowoczesne badania biochemiczne w różnych jednostkach chorobowych

Assessment of dietary intake in female endurance athletes. RED-S syndrome

Ocena spożycia energii wśród kobiet trenujących sporty wytrzymałościowe. Zespół RED-S

Dorota Langa, Marta Naczyk, Zdzisław Kochan

Laboratory of Nutritional Biochemistry, Department of Clinical Nutrition, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Nowadays physical activity is not only a way of spending free time but also plays a wider role – it helps people to maintain physical and mental health. But what happens when athletes, especially women, will consume insufficient amount of calories not only during training sessions but also throughout a longer period of time? The aim of this study was to assess energy intake, energy availability as well as macro- and micronutrients intake among women who train endurance sports. Twenty amateur female athletes (38.9 years, BMI 21.5 7.5 kg/m²) were asked to keep a food and training diary for three days. Also, LEAF-Q questionnaire was used to evaluate the risk of Low Energy Availability (LEA). The results of analysis indicated that 17 out of 20 participants consumed too little energy in comparison to their energy expenditures. In first, second and third day of research accordingly – 10, 6 and 6 women did not cover calorie requirement for Basal Metabolic Rate (BMR). Intake of carbohydrates and micronutrients such as iron, calcium and vitamin D was beyond recommended level. In addition, vast majority of athletes did not eat enough or any carbohydrates during their training sessions (> 90 minutes). Consumption of protein and fats was sufficient. Two women had irregular menstrual cycle during research. This study highlights the importance of raising awareness of consequences for LEA among athletes, coaches and physicians. There is a need of holistic approach towards those who suffers from RED-S syndrome. A multidisciplinary team including medical, dietary and mental health support should be created.

Citation

Langa D, Naczyk M, Kochan Z. Assessment of dietary intake in female endurance athletes. RED-S syndrome. Eur J Trans Clin Med. 2023;6(Suppl.4):83.

**Sesja 13: Nowoczesne badania biochemiczne w różnych jednostkach chorobowych****Relationship between fluctuations in estrogen levels during the two phases of the menstrual cycle and cognitive functioning in women of reproductive age**

Zależność między fluktuacją poziomu estrogenu w dwóch fazach cyklu menstruacyjnego a funkcjonowaniem poznawczym kobiet w wieku rozrodczym

**Katarzyna Michalak¹, Angelika Sawicka², Anna Marcinkowska^{2,3},
Paweł Winklewski^{3,4}**

¹ Students Scientific Association at the Department of Neurophysiology, Neuropsychology and Neuroinformatics, Medical University of Gdańsk, Gdańsk, Poland

² Applied Cognitive Neuroscience Lab, Department of Neurophysiology, Neuropsychology and Neuroinformatics, Medical University of Gdańsk, Gdańsk, Poland

³ Second Department of Radiology, Faculty of Health Sciences, Gdańsk Medical University, Gdańsk, Poland

⁴ Department of Neurophysiology, Neuropsychology and Neuroinformatics, Medical University of Gdańsk, Gdańsk, Poland

Abstract

According to research, steroid hormones, and estrogen in particular, are often referred to as 'neurosteroids' because they have a significant impact on brain development and cognitive functioning. This is particularly noticeable in women, due to the fluctuation of hormones during the menstrual cycle.

The purpose of this study was to examine the relationship between fluctuating estrogen levels and cognitive functioning in women of maternal age. To this end, 32 women (aged 20-33 years) who met all inclusion and exclusion criteria were examined for their cognitive function (digit repetition test, CORSI, and VPT were performed). The tests were conducted during two phases of the menstrual cycle: the menstrual phase and the late follicular phase (when estrogen fluctuation is highest). Their blood levels of steroid hormones were also laboratory checked.

The results showed significant differences in the performance of direct memory, concentration, attention and the extent of working memory. The listed cognitive functions were more effective when estrogen levels were higher. However, no significant differences were noted in visuospatial orientation and visuospatial working memory.

Citation

Michalak K, Sawicka A, Marcinkowska A, Winklewski P. Relationship between fluctuations in estrogen levels during the two phases of the menstrual cycle and cognitive functioning in women of reproductive age. Eur J Trans Clin Med. 2023;6(Suppl.4):84.



Sesja 14: Sesja studentów i młodych naukowców

To amputate, or not to amputate: The ethical implications of treating body integrity dysphoria

Problematyczne implikacje leczenia dysforii integralności ciała

Barbara Siewert

Medical student, Medical Faculty, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Body Integrity Dysphoria (BID) or previously referred to as Body Identity Integrity Disorder is a rare condition of different origins that can be considered on neurological, psychiatric, and psychological grounds. People who suffer from BID feel incomplete and unsatisfied with their actual body and feel a strong desire to amputate a healthy limb or become paralyzed. Treatment methods vary in outcomes, but from the perspective of BID individuals the most effective is amputation that sparks fierce debate. Many surgeons turn down such requests because of many reasons e.g., jurisdiction or interpretation of medical ethics. Assessment of all the possible treatment options is therefore essential for arriving at conclusions. Nevertheless, the main problem remains unsolved – some individuals might perform self-amputation, which puts their lives at risk. Hence, it is crucial to determine whether those patients should be allowed to undergo such surgery or it is entirely against the most remarkable rule of the Hippocratic oath “primum non nocere”.

Citation

Siewert B. To amputate, or not to amputate: The ethical implications of treating body integrity dysphoria. Eur J Trans Clin Med. 2023;6(Suppl.4):85.

**Sesja 14: Sesja studentów i młodych naukowców****The use of topical heat therapy in women with dysmenorrhea – case study****Zastosowanie miejscowej terapii ciepłem u kobiet z bolesnymi miesiączkami – opis przypadków****Zuzanna Kwiatkowska¹, Zofia Sotomska², Magdalena Emilia Grzybowska³, Katarzyna Zorena⁴**¹ Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland² Independent Team of Physiotherapists, University Clinical Center, Gdańsk, Poland³ Department of Gynecology, Gynecologic Oncology and Gynecologic Endocrinology, Medical University of Gdańsk, Gdańsk, Poland⁴ Department of Immunobiology and Environment Microbiology, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

The study aimed to evaluate the effectiveness of heat therapy in women with painful menstruation.

Material and methods: Four women with a mean age of 23.5 with dysmenorrhea participated in the study. The intervention started a few days before the anticipated menstrual period. It was a series of 3 sessions during which local heat therapy was applied. Depending on where the patient experienced more pain during menstruation, the therapy area was the lower abdomen or the lumbar spine. As a heat source, hot water bottle, hotbag with cherry pits or mud plaster were used, depending on randomization. The pain was rated on the Visual Analogue Scale (VAS) and referred to the lower abdomen and the lumbar spine. The duration of pain was also assessed. Moreover, using a five-point Likert scale, the patients' quality of life during menstruation was evaluated. Using these variables, the previous cycles were compared with menstruation after therapy.

Results: Patient 1 had a mud plaster applied to the lumbar area. After therapy lower abdominal pain decreased from 5/10 to 2/10, and lumbar pain from 7/10 to 5/10 in VAS scale. Pain duration decreased from 2 days to 1 day. In patient no. 2, a hot water bottle was applied to the lower abdomen. Lower abdominal pain was usually 7/10, after therapy increasing to 8+/10 for a few hours, and then decreased to 4/10. The pain in lumbar region decreased from 5/10 to 4/10 for a few hours, and then decreased to 0/10. The duration of pain was also reduced, from 3-4 days to a few hours. In patient no. 3, a hotbag with cherry pits was applied to the lower abdomen. Lower abdominal pain decreased from 10/10 to 9/10, and lumbar pain from 8/10 to 0/10. The duration of pain was reduced from 4-5 days to 3 days. Patient 4 had mud plaster applied to the lower abdomen. This patient had lower abdominal pain, which was 10/10. Pain severity and duration did not change after therapy. The patients' quality of life during menstruation improved slightly or remained at a similar level.

Conclusions: The use of heat therapy before menstruation is likely to have an effect on pain relief, pain duration and quality of life for patients, but more research is needed in a larger group of patients.

Citation

Kwiatkowska Z, Sotomska Z, Grzybowska ME, Zorena K. The use of topical heat therapy in women with dysmenorrhea – case study. Eur J Trans Clin Med. 2023;6(Suppl.4):86.



Sesja 14: Sesja studentów i młodych naukowców

Reusable tourniquets for blood sampling as a source of multi-resistance organism – a literature review

Wielorazowe stazy do pobierania krwi jako nośnik patogenów – przegląd literatury

Julia Szymczyk¹, Michelle Månsson², Wioletta Mędrzycka-Dąbrowska³

¹ Student Scientific Club of Anesthesia and Intensive Care, Medical University of Gdańsk, Gdańsk, Poland

² Student Nursing Programme, Swedish Red Cross University, SE-141 21 Huddinge, Sweden

³ Department of Anesthesiology Nursing Camp; Intensive Care, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Introduction: The use of reusable tourniquets is widespread around the world, and reports suggest they may be overused. Several studies have shown that reusable tourniquets can affect the spread of pathogens between patients. The aim of this study is to analyze the bacterial loads of blood collection tourniquets in daily clinical practice based on available research.

Methods: A systematic review of the literature was conducted according to the PRISMA protocol guidelines. The contents of PubMed, EBSCO (electronic databases) and Scopus were screened. Keywords used in the search included: “tourniquet,” “cross infection,” “nosocomial infection,” “staphylococcus aureus,” “MRO,” or a combination of these using AND or OR operators. Finally, 10 publications were included. Data were analyzed both descriptively and quantitatively by calculating a balanced average for specific synthesized data.

Results: The genus *Staphylococcus aureus* was the most common type of bacteria in tourniquets, ranging from 2% to 75%. A review of studies revealed the presence of methicillin-resistant *Staphylococcus aureus* 3-25.7% and grew *Bacillus* and coagulase-negative staphylococci.

Conclusion: Patient safety may be at risk due to elevated contamination rates of reusable tourniquets. The microorganisms responsible for this contamination include a variety of species, the most common of which is the genus *Staphylococcus*. For this reason, we recommend the use of disposable tourniquets.

Keywords: tourniquet; cross-infection; nosocomial infection; staphylococcus aureus; MRO

Citation

Szymczyk J, Månsson, Mędrzycka-Dąbrowska W. Reusable tourniquets for blood sampling as a source of multi-resistance organism – a literature review. *Eur J Trans Clin Med.* 2023;6(Suppl.4):87.

**Sesja 14: Sesja studentów i młodych naukowców****Occurrence of *Vibrio vulnificus* in biofilms on plastic wastes obtained from the Gulf of Gdańsk****Występowanie *Vibrio vulnificus* w biofilmach obecnych na odpadach plastikowych pozyskanych z Zatoki Gdańskiej****Maciej Pancewicz¹, Krzysztof Galla¹, Antonina Sikorska², Julia Musiał², Justyna Ejzel³, Monika Kurpas⁴**

¹ Student Scientific Group of Interdisciplinary Health Science, Department of Immunobiology and Environmental Microbiology, Medical University of Gdańsk, Gdańsk, Poland

² Student of Oceanography, University of Gdańsk, Gdańsk, Poland

³ Student Scientific Group of Pharmaceutical Microbiology, Department of Pharmaceutical Microbiology, Medical University of Gdańsk, Gdańsk, Poland

⁴ Department of Immunobiology and Environmental Microbiology, Faculty of Health Science with the Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Vibrio vulnificus is a Gram-negative tropical bacteria recently found on the Polish coast of the Baltic Sea due to climate changes. Infections in humans can lead to necrotizing fasciitis and severe septic shock. These bacteria can form biofilms on polymers and travel on plastic surfaces for several kilometers. *V. vulnificus* has been reported in coastal waters and wet sand of the Gulf of Gdańsk; however, its presence on the plastic debris on the Polish coast has not been explored. The aim of this study was to determine if *V. vulnificus* could be found in the biofilm on macroplastic waste in the Gulf of Gdańsk.

Samples of plastic waste were found either floating in the water or lying in the wet sand. After rinsing in sterile water, the samples were homogenized and tested on CHROMagar Vibrio. Colonies with characteristic green-blue color were plated on TCBS medium (chromogenic thiosulfate-citrate-bile salts-sucrose medium). Single isolates with colonies morphology typical for *Vibrio vulnificus* were identified using MALDI-TOF.

Preliminary results show that bacteria belonging to *Vibrio* spp. are present on the surface of plastic waste. It is necessary to continue to monitor the presence of these potentially dangerous bacteria on surfaces of plastic debris.

This project also involves education about the pollution of the Baltic Sea. So far, we have organized a beach cleaning campaign with an educational stand.

Citation

Pancewicz M, Galla K, Sikorska A, Musiał J, et al. Occurrence of *Vibrio vulnificus* in biofilms on plastic wastes obtained from the Gulf of Gdańsk. Eur J Trans Clin Med. 2023;6(Suppl.4):88.

Sesja 14: Sesja studentów i młodych naukowców

The evaluation of serum adipokines and inflammatory factors in people with abnormal body mass

Ocena surowiczego poziomu adipokin oraz czynników zapalnych u osób z nieprawidłową masą ciała

Malwina Zimowska^{1,2}, Marta Rolbiecka², Marta Jaskulak³, Klaudia Antoniak³, Katarzyna Zorena³

¹ Department of Nursing and Midwifery, Faculty of Health Sciences with the Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Poland

² Intercollegiate Faculty of Biotechnology, University of Gdańsk and Medical University of Gdańsk, Poland

³ Division of Immunobiology and Environmental Microbiology, Faculty of Health Sciences with the Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Poland

Abstract

The World Health Organization defines obesity as a complex multifactor disease leading to increased risk of many illnesses. Overweight and obesity are currently found in about 60% of adults in the WHO European Region. There are more and more studies highlighting the link between inflammation and obesity.

The objective of this study was to evaluation of serum of zinc α 2-glycoprotein (ZAG), adiponectin, leptin, nesfatin-1 and Interleukin-6 (IL-6) in people with abnormal body mass index (BMI). Materials and Methods: The research involved 46 participants categorized into three groups: those with a normal BMI (group I; n = 19), individuals classified as overweight (group II; n = 14), and people with obesity (group III; n = 13). Serum level of IL-6, ZAG, Nesfatin-1, Leptin, and Adiponectin were measured by ELISA enzyme immunoassay (R&D Systems, Minneapolis, MN, USA) according to the manufacturer's protocol. Results: The statistical analysis showed an upwards trend for IL-6 ($p = 0.0008$), Leptin ($p = 0.00001$), and hsCRP ($p = 0.113$), wherein an increase in the level of these markers correlates with a concurrent increase in BMI. In contrast, adiponectin ($p = 0.578$) and ZAG ($p = 0.241$) exhibit a downward trend, demonstrating that an elevation in the levels of these markers is associated with a decrease in BMI. The data showed a very weak correlation between nesfatin-1 ($p = 0.858$) and BMI. Moreover, our study showed a correlation between increased level of ZAG and decreased levels of adiponectin, leptin, and IL-6. Conclusions: Based on the results of this study, we suggest that parameters such as IL-6 and ZAG could be used as indicators of obesity risk in people with abnormal BMI. Further studies are needed with a larger cohort of patients.

Citation

Zimowska M, Rolbiecka M, Jaskulak M, Antoniak K, et al. The evaluation of serum adipokines and inflammatory factors in people with abnormal body mass. Eur J Trans Clin Med. 2023;6(Suppl.4):89.

**Sesja 14: Sesja studentów i młodych naukowców****Women's self-esteem in the postpartum period and its impact on the sexual functioning****Samoocena kobiet w okresie poporodowym i jej wpływ na funkcjonowanie seksualne****Wiktoria Rozmarynowska, Agnieszka Czerwińska-Osipiak, Anna Szablewska, Aleksandra Krawczyk**

Department of Obstetrical and Gynaecological Nursing, Institute of Nursing and Midwifery, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Introduction: Resumption of sexual activity after birth can cause changes in intercourse frequency as well as satisfaction. Women's self-esteem during pregnancy and after childbirth may be damaged by changes in physique, and accommodating for motherhood, during which a woman often loses her sense of identity.

The objective of the paper: The objective of this paper was identifying the level of self-esteem and the factors determining the resumption of sexual activity in women after childbirth. An additional purpose is assessing the relationship between taking up sexual activity and self-esteem level of the surveyed women.

Material and methods: The research material consisted of 350 women within a month up to a year after birth, who have a permanent partner. The following study used the diagnostic survey method using a proprietary questionnaire as well as a test for assessing the general self-esteem level (SES – Rosenberg's Self-Esteem Scale – PL). The questions concerned the respondent's last delivery. The respondent was also asked about her feelings regarding the last delivery and sexual activity with her partner during pregnancy and after birth.

Conclusions: Most important results showed that women who had intercourse everyday had the highest self-esteem, the less they had intercourse the lower their self-esteem was. Lower self-esteem level is often linked to the lack of feeling sexually attractive, closeness to the partner and decreased frequency of sexual intercourse after childbirth. Stress before resumption of sexual activity is connected to the changes in body, fear of being dissatisfied with the intercourse and other causes. Sexual activity is an important subject in every woman's life that is still not discussed enough. Realizing the connection between self-esteem and sexual activity is key to helping women have a more satisfying sexual life after childbirth.

Citation

Rozmarynowska W, Czerwińska-Osipiak A, Szablewska A, Krawczyk A. Women's self-esteem in the postpartum and its impact on the sexual functioning. Eur J Trans Clin Med. 2023;6(Suppl.4):90.



Sesja 14: Sesja studentów i młodych naukowców

Effects of physical activity on perinatal indicators – preliminary reports

Wpływ aktywności fizycznej na wskaźniki okołoporodowe – doniesienia wstępne

Paulina Budna, Anna Szablewska

Department of Obstetrical and Gynaecological Nursing, Institute of Nursing and Midwifery, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Background: Research shows that regular physical activity has a positive effect on the body's health. It is particularly important before and during pregnancy, as it contributes to the mother's mental and physical condition, fetal development or childbirth. Physical activity of mothers during pregnancy contributes in the long term to better health of children, for example, reducing the risk of obesity. The right type of physical activity for the stage of pregnancy can reduce pregnancy discomforts and allow for faster recovery after delivery.

Methods: The cross-sectional study is conducted within a group of healthy women in second trimester of singleton pregnancy and in the postpartum period. The study design included a questionnaire for characterizing socio-demographic, medical history (including pre-pregnancy BMI and weight gain) and International Physical Activity Questionnaire (IPAQ). All statistical analysis will be performed on dedicated software.

Results: The study revealed that women who reported being physically active before and during pregnancy were more likely to have full-term birth and had a lower incidence of very premature and extremely premature births. Women who exercised during pregnancy more often gave birth to children with a normal body weight and were less likely to have children with low, very low or extremely low body weight.

Conclusion: Our results show the positive effects of physical activity during pregnancy not only on women, but also on the fetus, the course of labor, and newborns. Promoting an active and healthy lifestyle for women of childbearing age is extremely important for even future generations.

Citation

Budna P, Szablewska A. Effects of physical activity on perinatal indicators – preliminary reports. Eur J Trans Clin Med. 2023;6(Suppl.4):91.

**Sesja 14: Sesja studentów i młodych naukowców****The importance of collaboration between a lactation counselor and neurologopedist a specialist in supporting breastfeeding – a case study****Znaczenie współpracy doradcy laktacyjnego i neurologopedy we wspieraniu karmienia piersią – studium przypadku****Julia Donarska¹, Anna Szablewska¹, Aleksandra Jakubowska², Barbara Kamińska²**¹ Department of Obstetrical and Gynaecological Nursing, Institute of Nursing and Midwifery, Medical University of Gdańsk, Gdańsk Poland² Department of Philology, Faculty of Neurologopedics, University of Gdańsk, Gdańsk, Poland**Abstract**

Introduction: As WHO experts point out, promoting natural breastfeeding and protecting and supporting breastfeeding mothers is one of the most effective strategies for improving population health. It is associated with greater immunity of children to disease, has a positive effect on development, creates a strong bond between mother and child and positively influences a woman's health. Nevertheless, current data indicate that only about 40% of infants are exclusively breastfed in the first six months of life. Unfortunately, certain clinical situations, including oral abnormalities, can hinder this way of feeding the baby.

Case study: A boy born at 41 weeks gestation, by spontaneous labour, with a birth weight of 3,520g. The mother reported to a Certified Lactation Consultant (CDL) due to the oral abnormalities she perceived and the duration of breastfeeding (max. 6 minutes from both breasts) that was too short in her opinion – with no effect on the baby's weight gain. After evaluation by the CDL, the patient was referred to the neurologopedic clinic for consultation. During the examination, the neurologist found: in the facial structure, narrow eyelid crevices, receded mandible, highly arched palate, shortening of the posterior tongue frenulum in grade 3/4 of the Coryllos scale, shortening of the upper lip frenulum penetrating, not limiting the movement of the lip, placing it in a tenting position, abnormal resting position of the tongue and lips (without recommendations for plastic surgery). In the interview, the mother reported that the child was scheduled for a genetic consultation. In the examination, primitive oral reactions were assessed, as well as the reactions and efficiency of the facial and supraglottic muscles. Due to the accompanying feeding sounds of nipple gaping, predominance of posterior tongue work, abnormal resting position of the tongue – myotherapy was recommended to regulate the functioning of the oral-facial complex. Care continued during neurologopedic consultations and consultations at the lactation clinic. As a result, a phrenotomy was not performed (myotherapy proved sufficient). Thanks to the measures taken, it was possible to continue breastfeeding.

Conclusion: Due to the benefits of natural feeding, it is important to support the mother during lactation. Cooperation and comprehensive therapeutic action are crucial for early diagnosis and implementation of therapeutic post-treatment.

Citation

Donarska J, Szablewska A, Jakubowska A, Kamińska B. The importance of collaboration between a lactation counselor and neurologopedist a specialist in supporting breastfeeding – a case study. Eur J Trans Clin Med. 2023;6(Suppl.4):92.



Sesja 14: Sesja studentów i młodych naukowców

Factors determining procreation plans of people of reproductive age in Poland – cross-sectional study

Czynniki determinujące plany prokreacyjne osób w wieku rozrodczym w Polsce – badanie przekrojowe

Aleksandra Goliczewska, Paulina Trepczyk, Emilia Zagórska, Anna Szablewska

Department of Obstetrical and Gynaecological Nursing, Institute of Nursing and Midwifery,
Medical University of Gdańsk, Gdańsk, Poland

Abstract

Background: The available literature shows that the number of births in Poland has been declining over the years. According to forecasts from the Central Statistical Office for the years 2013-2050 unfavorable changes are expected in the number and age structure of women of childbearing age, which, despite the assumed birth height age, will cause the number of newborns to systematically decrease throughout the forecasted period. The Central Statistical Office also states that the observed volatility shaping of demographic processes takes place as a result of multi-directional, difficult to predict factors conditioning the social, economic and health situation that consequentially determine personal decisions of Poles. The above data shows how important the attitude of Poles is to the issue of planning offspring. The main goal of the research is to understand and analyze the current factors determining the procreation plans of Poles ages 18-55.

Methods: The cross-sectional study included 736 Poles in age 18-55. The study was conducted using the CAWI method, which allowed collection of public opinion via internet forums. A descriptive on-line questionnaire which provided quantitative data was conducted. The following data was analyzed: economic, legal and biopsychosocial. Standardized tools in the Polish language version were used.

Conclusion: The factors determining the procreation plan of Poles are multi-threaded. In fear of changing natural growth, state authorities should pay attention to the element of economic, legal, sociological and health basis, which significantly discourage Poles from making a decision on parenting. In addition, medical staff should constantly educate a society about the need to care for their health in a multi-faceted way, especially supporting people struggling with pregnancy difficulties and delivery on various substrates.

Citation

Goliczewska A, Trepczyk P, Zagórska E, Szablewska A. Factors determining procreation plans of people of reproductive age in Poland – cross-sectional study. Eur J Trans Clin Med. 2023;6(Suppl.4):93.

**Sesja 14: Sesja studentów i młodych naukowców****Association between previous mental disorders and postpartum mental health condition among Polish women – preliminary reports**

Podobieństwo pomiędzy wcześniejszymi zaburzeniami psychicznymi a kryzysem zdrowia psychicznego po porodzie wśród polskich kobiet – doniesienia wstępne

Julia Osak, Anna Szablewska

Department of Obstetric and Gynaecological Nursing, Institute of Nursing and Midwifery, Faculty of Health Sciences with the Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdańsk, Poland

Abstract

One of the factors which increases risk of postpartum depression is previous mental health disorder. According to the researches, women with prior mental health problems are more likely to experience maternal distress in future. Moreover, they are often overlooked when it comes to procreation, encounter social misunderstanding and lack of support. It means that education and professional care of midwives and doctors is necessary. Women who have psychotic disorders are less likely to have children than other women of childbearing age, with low fertility rates mainly observed in women with schizophrenia. Women who have mental disorders are justifiably concerned about recurrence during the postpartum period. The aim of the study is assessing the similarities between previous and postpartum mental health conditions, especially in the first month after childbirth. The second purpose is the assessment of care needs expressed by women in the perinatal period in reference to the described problem.

Material and method: A retrospective cross-sectional study was conducted among Polish women in the postpartum period. The study design included a questionnaire for characterizing sociodemographic data, medical history (including previous mental health disorders and current symptoms) and questions about subjective needs for care or support. All statistical analysis will be performed with dedicated software.

Conclusions: Women with a history of mental disorders are significantly more vulnerable for maternal distress and depression in postnatal period. Midwives should encourage pregnant women during antenatal education to express emotional issues during their transition to motherhood in order to offer appropriate professional support and care.

Citation

Osak J, Szablewska A. Association between previous mental disorders and postpartum mental health condition among Polish women – preliminary reports. Eur J Trans Clin Med. 2023;6(Suppl.4):94.



Sesja 14: Sesja studentów i młodych naukowców

Benefits and risks of non-nutritive sucking in an interdisciplinary perspective – a review of the literature

Korzyści i zagrożenia z zastosowania ssania nieodżywczego w ujęciu interdyscyplinarnym – przegląd piśmiennictwa

Wanda Kwiatkowska, Anna Szablewska, Hanna Popowicz

Department of Obstetrics and Gynecology Nursing, Medical University of Gdańsk, Faculty of Health Sciences with the Institute of Maritime and Tropical Medicine, Institute of Nursing and Midwifery, Gdańsk, Poland

Abstract

Background: One of the current problems is that there is too little interest in the proper use of non-nutritive suction (NNS). NNS is one of topics, through the exploration of which it will be possible to make informed and purposeful choices about the use of NNS in various children related to child development.

Description of the problem: The suckling reflex is counted among the primary unconditioned reflexes. It appears already during embryonic development (17th week of pregnancy). Non-nutritive sucking includes any type of sucking that does not provide nutritional benefit, such as sucking on a pacifier, a finger, or an empty mother's breast. In preterm infants in particular, NNS can be extremely beneficial, as it will support the function of nutritional sucking, weight gain, maintenance of normal blood pressure and saturation values, which will directly translate into reduced hospitalization time. When used correctly, NNS will have a positive impact on the baby's functioning and development (e.g., reduce the risk of sudden crib death). When NNS is not adhered to, a number of developmental abnormalities can occur regarding both malocclusion, speech defects, as well as lactation disorders or increased frequency of infections that could be avoided.

Conclusions: Based on the scientific articles obtained and analyzed, the diversity of attitudes and beliefs regarding the use of non-nutritive suckling in children of all ages. The effect of NNS is with The effect of NNS depends on the timing, frequency and developmental age of the child at which its use was initiated. It can be both favorable and unfavorable, which will result from the correctness of its use, according to current recommendations. Accurate determination of the impact of non-nutritive suckling on the development of the child will enable the introduction of correct rules for its use, which will directly translate into a reduction in the incidence of adverse reactions resulting from the NNS, as well as increasing the number of benefits.

Citation

Kwiatkowska W, Szablewska A, Popowicz H. Benefits and risks of non-nutritive sucking in an interdisciplinary perspective – a review of the literature. Eur J Trans Clin Med. 2023;6(Suppl.4):95.

**Sesja 14: Sesja studentów i młodych naukowców****Illness perception and coping strategies in adults with Pompe disease****Spostrzeganie choroby a sposoby radzenia sobie w sytuacjach trudnych u osób dorosłych z chorobą Pompego****Barbara Naparło**

Health Psychology Faculty of Health Sciences with the Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdynia, Poland

Abstract

Pompe disease (glycogenosis type II) is a rare genetic disorder mainly resulting in degeneration of striated muscles. Due to the progressive nature of the disease, these individuals struggle with numerous physical limitations (fatigue, muscle and joint pain, respiratory failure, sleep disorders, dysphagia, impaired digestive tract function) and psychosocial problems (depression, social withdrawal, anxiety)

The main purpose of this study was to characterize the relationship between illness perception and coping in the context of fatigue and pain severity, illness perception and acceptance, mood, anxiety and self-efficacy in adult patients with Pompe disease. Nine individuals participated in the study. The assessment addressed: pain (10-point scale), illness perception (ICQ – Illness Cognition Questionnaire and B – IPQ – Brief – Illness Perception Questionnaire), coping (Mini-COPE), mood (HADS – Hospital Anxiety and Depression Scale), fatigue (CFQ – The Chalder Fatigue Questionnaire and MFIS – Modified Fatigue Impact Scale) and self-efficacy (GSES – Generalized Self-Efficacy Scale). It was hypothesized that low disease acceptance would be associated with avoidant coping strategies. Contrary to expectations, illness perception was not associated with a specific pattern of coping mechanisms. However, fatigue was related to the intensity of depressive symptoms and poor self-efficacy was associated with avoidant coping. Further studies, with larger sample sizes are needed to elucidate the relationship between illness perception and coping in Pompe disease.

Citation

Naparło B. Illness perception and coping strategies in adults with Pompe disease. Eur J Trans Clin Med. 2023;6 (Suppl.4):96.



Dzień 1, Sesja 2

Zoonotic nematodes originating from marine fish: risk assessment for consumers in Poland

Zoonotyczne nicienie pochodzące z ryb morskich: ocena zagrożenia dla konsumentów w Polsce

Beata Szostakowska

Department of Tropical Parasitology, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Sea fish are valuable food, being a source of highly digestible proteins and fat rich in unsaturated fatty acids. In Poland heat-treated fish is still eaten most often, but in other European countries the consumption of dishes made of raw and semi-raw fish is increasing. Marine fish all over the world can be infected with nematodes of the Anisakidae family, which are also pathogenic to humans. After eating (semi-)raw fish, humans may develop anisakidosis, caused by the penetration of nematode larvae into the gastrointestinal mucosa, while after eating both raw and heat-treated fish, sensitive people may develop an anaphylactic reaction of varying severity. In order to minimize the risk of these diseases, the European Food Safety Authority recommends the appropriate handling of marine products before they are released to the market, however, despite this, there are many cases of the disease: globally over 76,000, half of which in Europe. Anisakidosis is little known by Poles and doctors in our country. The first symptoms of infection appear within 24 h after swallowing the larva and resemble symptoms of other gastrointestinal diseases: gastric ulcers, appendicitis, Crohn's disease, etc. The diagnosis of anisakidosis is based on the detection of the nematode during endoscopic examination, and the most common treatment is their mechanical removal. Therefore, it is important that physicians ask about consumption of (semi-)raw fish dishes when taking the medical history of patients complaining of sudden abdominal pain and order urgent gastroscopy in such cases.

Citation

Szostakowska B. Zoonotic nematodes originating from marine fish: risk assessment for consumers in Poland. Eur J Trans Clin Med. 2023;6(Suppl.4):97.

**Dzień 2, Sesja 1****Selected viral infections in the tropical zone**

Wybrane zakażenia wirusowe w strefie tropikalnej

Katarzyna Sikorska

Division of Tropical Medicine and Epidemiology, Department of Tropical Medicine and Parasitology, Institute of Maritime and Tropical Medicine, Faculty of Health Sciences, Medical University of Gdańsk, Gdynia, Poland

Abstract

The World Health Organization defined priority pathogens with a high potential to cause epidemics or pandemics and pose a significant threat to human health on a global scale due to the limitations in access to effective control tools – diagnostic tests, drugs and vaccinations.

The current list of priority diseases includes: COVID-19, Middle East Respiratory Syndrome, Severe Acute Respiratory Syndrome, viral diseases mainly from the tropical zone (Crimean-Congo haemorrhagic fever, Ebola virus disease and Marburg virus disease, Lassa fever, Nipah and henipaviral diseases, Rift Valley fever, Zika) and Disease.

In the last year, outbreaks of highly infectious and dangerous Ebola or Marburg Virus Disease were confirmed in: Equatorial Guinea, Tanzania, Uganda, Democratic Republic of the Congo, and Ghana. The risk of further spread and increasing threat for humans was assessed as high at the national level and low at the global level.

High Case Fatality Rate (50%) despite of limited number of cases was observed for Nipah virus disease in Bangladesh and Rift Valley River in Mauritania. Nigeria, which is endemic for Lassa fever, expected large outbreak of this disease with more than 4000 of cases and more than 150 deaths.

Dengue remains the undisputed leader among viral tropical diseases. It is caused by the virus transmitted to humans through the bite of infected mosquitoes. As a great part of the world's population is potentially exposed to this infection and environmental changes favour the growth of mosquito populations, the disease is spreading dynamically in the tropical zone with the estimated number of 100-400 million infections every year.

Citation

Sikorska K. Selected viral infections in the tropical zone. Eur J Trans Clin Med. 2023;6(Suppl.4):98.



Dzień 2, Sesja 1

Malaria – progress and challenges in treatment

Malaria – postępy i przeszkody w leczeniu

Anna Kuna

Department of Tropical and Parasitic Diseases, Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdynia, Poland

Abstract

Malaria is a parasitic disease transmitted by *Anopheles* spp. mosquitoes and occurs endemically in 84 countries worldwide. In the latest available data for the year 2021, there were 247 million reported cases and 619 thousand deaths due to this disease.

In recent years, a significant progress has been observed in the diagnosis and treatment of malaria. Rapid Diagnostic Tests (RDTs), initially developed for the use in developing countries, have been widely adopted in developed, non-endemic countries. Molecular studies are increasingly being performed in scientific centers to detect low-level parasitemia infections and identify the parasite species. Since 2006, the World Health Organization has recommended artemisinins as the first-line treatment, replacing quinine, which had various side effects. In 2018, the U.S. Food and Drug Administration approved tafenoquine, which could serve as an attractive alternative for both prevention and treatment of malaria.

Despite long-standing educational efforts in recognizing and treating tropical diseases in non-endemic countries, the diagnostic process for imported diseases is still relatively challenging due to healthcare professionals' lack of familiarity with these infections. Travelers, despite having access to reliable medical information, do not always adequately prepare for their trips. RDTs are not widely available in Poland and specialized laboratory diagnostics is also limited. The lack of registration for most antimalarial drugs in Poland poses a challenge. Currently, the price and the necessity for enzymatic testing are an obstacle to the wider use of tafenoquine.

Citation

Kuna A. Malaria – progress and challenges in treatment. *Eur J Trans Clin Med.* 2023;6(Suppl.4):99.

**Dzień 2, Sesja 1****Do we need a redefinition of acute and chronic schistosomiasis?****Ostra i przewlekła schistosomoza – czy potrzebna jest nowa definicja?****Małgorzata Sulima, Anna Roszko-Wysokińska**

Division of Tropical and Parasitic Diseases, University Centre of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdynia, Poland

Abstract

Human schistosomiasis is a parasitic disease caused by some species of blood flukes in the genus *Schistosoma*. People become infected when larval forms of parasite released by freshwater snails penetrate their skin during contact with infested water. The course of infection is usually divided into two phases, acute schistosomiasis (AS) and chronic schistosomiasis (CS). A precise timeframe between AS and CS has never been defined, with 10 up to 12 weeks after exposure being accepted as the transition from one phase to another. Reports about lung changes typical for AS, that were observed on computed tomography (CT) studies in the group of patients with CS, have been published recently. At the same time, there were reports of the occurrence of changes typical for the chronic phase in AS, even within 3 weeks from the time of infection. Additionally, the lung lesions that appear in the acute phase have the same origin and pathological mechanism, as those observed during the chronic phase. These observations lead to reflection whether the current division into AC and CS is still appropriate. Perhaps, it would be more reasonable to categorize schistosomiasis depending on the response to treatment, as “reversible” and “irreversible” phase of the disease. Defining this, is of clinical importance, as it determines the decision on the treatment and re-treatment with praziquantel, which is active mainly against the mature forms of the parasite. There is still a need for suitable stage specific tool allowing determination of the incidence of new infections, especially in endemic countries.

CitationSulima M, Roszko-Wysokińska A. Do we need a redefinition of acute and chronic schistosomiasis?. *Eur J Trans Clin Med.* 2023;6(Suppl.4):100.



Dzień 2, Sesja 1

Current challenges in the diagnosis of schistosomiasis

Aktualne wyzwania w diagnostyce schistosomozy

Beata Szostakowska

Department of Tropical Parasitology, Faculty of Health Sciences, Medical University of Gdańsk, Poland

Abstract

Schistosomiasis is a neglected tropical parasitic disease caused by flukes of the genus *Schistosoma* which is a serious health problem in the areas of occurrence, and a diagnostic challenge in non-endemic countries to which it may be dragged, e.g. by tourists or migrants. It is the second most dangerous parasitic disease in humans after malaria. The infection with these parasites occurs through contact with water contaminated with infectious larvae which penetrate the skin of the human host. The course of the disease varies between those who are infected for the first time and those who are infected repeatedly, which will be briefly discussed during the presentation.

A necessary condition to suspect schistosomiasis and to order proper diagnostics is to obtain an information from the medical history that the patient had contact with stagnant water during his stay in an endemic region.

Diagnostics for schistosomiasis should include: endoscopic examinations with taking samples for histopathological examination (may be supplemented with imaging tests), microscopic examination of feces and urine (for the presence of parasite eggs), serological test (to confirm the disease by detecting anti-*Schistosoma* antibodies), immunological tests for the presence of antigens – to confirm the ongoing infection and monitor the treatment process (more sensitive than microscopic tests for the presence of eggs, can be omitted if molecular tests are possible); the test does not allow identification of the parasite species, and molecular testing of relevant clinical material (detection of parasite DNA).

The above methods and their importance, advantages and disadvantages will be discussed in the presentation.

Citation

Szostakowska B. Current challenges in the diagnosis of schistosomiasis. *Eur J Trans Clin Med.* 2023;6(Suppl.4):101.

**Dzień 2, Sesja 1****Leishmaniasis in an immunocompromised patient –
difficulties in treatment****Leiszmanioza u chorego z zaburzeniami odporności –
trudności w leczeniu****Natalia Kulawiak, Katarzyna Sikorska**

Division of Tropical and Parasitic Diseases, Department of Tropical Medicine and Parasitology, Institute of Maritime and Tropical Medicine, Faculty of Health Sciences, Medical University of Gdańsk, Gdynia, Poland

Abstract

Leishmaniasis is a parasitic disease found in parts of the tropics, subtropics and southern Europe, where the temperature does not fall below 16 degrees C. The number of new cases may vary over time and is difficult to estimate. Currently, about 4-12 million people are infected in approximately 98 countries, with 2 million new cases and 20-50 thousand deaths occurring each year. Leishmaniasis is classified as a neglected tropical disease.

Leishmaniasis is caused by infection with Leishmania parasites, which are spread by the bite of infected female sand flies. There are 3 main forms of the disease: Visceral leishmaniasis (VL), Cutaneous leishmaniasis (CL) and Mucocutaneous leishmaniasis.

VL, also known as kala-azar, is the most severe form of leishmaniasis. Without proper diagnosis and treatment, it is fatal in over 95% of cases, if left untreated. It is characterized by a long-lasting, two-humped fever up to 40°C, with peaks occurring around noon and before midnight. Other symptoms include weight loss, enlargement of the spleen, liver, lymph nodes, and pancytopenia. An estimated 50-90 thousand new cases of VL occur worldwide annually, with only 25-45% reported to the WHO.

The gold standard for diagnosing leishmaniasis is visualization of the amastigotes in splenic aspirate or bone marrow aspirate. Serological tests can also be used. The treatment involves administration of pentavalent antimonials and, in some cases, amphotericin B.

In the presentation, a patient case, highlighting the difficulties in diagnosing and treating VL, will be presented.

Citation

Kulawiak N, Sikorska K. Leishmaniasis in an immunocompromised patient – difficulties in treatment. Eur J Trans Clin Med. 2023;6(Suppl.4):102.



Dzień 2, Sesja 3

***Dermatobia hominis* – an unpleasant souvenir from exotic travels**

Dermatobia hominis – nieprzyjemna pamiątka z egzotycznych podróży

Beata Biernat

Department of Tropical Parasitology, Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdynia, Poland

Abstract

Travels to tropical regions are becoming increasingly popular, which means that doctors from non-endemic areas are confronted with cases caused by parasitic flies.

The term “myiasis” refers to larval parasitism of flies in the tissues of vertebrates, including humans. Over 40 species of flies can cause myiasis. The genus *Dermatobia* (Diptera, Oestridae) includes only one species, *Dermatobia hominis* (Linnaeus, 1781) (the human botfly), which parasitizes on various vertebrates in the Neotropical region. This species most commonly causes skin lesions.

D. hominis is the most common cause of myiasis among travellers following visits to tropical regions, including South and Central America. As of 2019, 108 cases have been reported. In Poland, myiasis caused by *D. hominis* has been described only twice so far (Waśniowski and Rehlis 2006, Wegner et al. 1992), but it can be presumed that there have been many more cases. Often, patients with typical parasitic nodules do not seek medical help and remove the larvae themselves.

This species has an interesting life cycle: females attach eggs to blood-sucking arthropods. The eggs remain on the phoretic host until it takes a blood meal from a mammalian host. Then, the larvae leave the hematophagous arthropods and penetrate the host's skin. The larvae feed inside a subdermal cavity for a few weeks and, when mature, they emerge from the host, fall to the ground and pupate in the soil.

Prevention mainly involves protection against mosquito bites, as species belonging to this fly family are most commonly phoretic insects.

Citation

Biernat B. *Dermatobia hominis* – an unpleasant souvenir from exotic travels. Eur J Trans Clin Med. 2023;6(Suppl.4):103.

**Dzień 2, Sesja 3****Tropical arbovirus fevers as a threat to Europe**

Tropikalne gorączki arbowirusowe zagrożeniem dla Europy

Beata Biernat

Department of Tropical Parasitology, Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdynia, Poland

Abstract

For years, Europe has been struggling with invasive species of mosquitoes, which are vectors of arboviruses. In Europe, this translates into a risk of outbreaks of diseases hitherto considered typical of the tropical zone. The rate of spread of these species has increased with the intensification of international trade and tourism. Invasive species *Aedes aegypti* and *Ae. albopictus* are vectors of Dengue (DENV), Zika (ZIKV) and Chikungunya (CHIKV) viruses. Their global distribution has historically been associated with human activity (e.g. trade, transport). In Europe, *Ae. aegypti* is found on the Black Sea coast, and *Ae. albopictus* occurs in Southern and Western Europe. The latter has also been shown in countries neighbouring Poland, namely Slovakia, Czechia and Germany. It is a matter of time for the species to appear in Poland, and perhaps it already has. Infected patients returning to Europe from areas endemic for arbovirus fevers are noted every year, but indigenous cases of these diseases are becoming a new problem in Europe. In 2019, three cases of Zika virus infection were reported in France. Indigenous Chikungunya virus infections have occurred several times in Italy and France – a total of over 500 cases. Dengue fever has historically been found in southern Europe but in recent years has reappeared in France, Croatia, Portugal, Spain and Italy. Global warming may facilitate the northward expansion of both the vectors for diseases previously unseen in Europe and of the viruses themselves resulting in autochthonous cases of diseases previously only imported.

Citation

Biernat B. Tropical arbovirus fevers as a threat to Europe. Eur J Trans Clin Med. 2023;6(Suppl.4):104.



Dzień 2, Sesja 4

When a mountain traveler is an athlete

Kiedy podróżny w górach jest sportowcem

Robert K. Szymczak

Department of Emergency Medicine, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

Abstract

There are 100 million mountain travelers every year. The high altitude (> 2500m) travelers are mainly engaged in trekking and climbing, some take part in competitions. Although mountain activities have primarily characteristics of various forms of tourism (qualified, alternative, active, adventure, sports, and extreme), the sport phenomena, such as competition, training and sponsorship are also present at high altitude.

The aim of the study is to determine when a mountain traveler is defined as an athlete. The limitations, recommendations and effects (positive and negative) related to sport activity at high altitude are presented.

The characteristics of an athlete are training, focus on achieving the best results, and competition with others. As athletes should be considered top mountain runners, "sea level" athletes using altitude training and climbers who are the first to conquer the highest peaks, climb difficult peaks on new, technically difficult routes, make speed ascents or accomplish feats of a sporting nature. Other high altitude activities are different types of tourism: trekking (active), climbing (qualified), mountaineering > 5500m (extreme), competitions (sports).

Physical performance is reduced at high altitudes due to low tissue oxygen levels. Acclimatization (hyperventilation, haemoconcentration) improves submaximal exercise performance, but two-three week stay at the competition altitude is necessary to reach optimal level. Long-term stay > 5500m causes deterioration of physical functions (weight loss, detraining). Doping (amphetamine analogues, dexamethasone, sildenafil) and lack of fair-play were observed in the highest mountains.

Although mountain sport activities demand high degree of physical fitness only a few mountain travelers can be described as athletes.

Citation

Szymczak RK. When a mountain traveler is an athlete. Eur J Trans Clin Med. 2023;6(Suppl.4):105.

**Dzień 2, Sesja 4****When is a diver considered a sportsman?****Kiedy nurek jest sportowcem?****Jacek Kot**

National Centre for Hyperbaric Medicine, Clinic of Hyperbaric Medicine and Maritime Rescue, Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdynia, Poland

Abstract

A diver becomes an athlete when they utilise their skills for recreational or competitive purposes underwater. This physically demanding sport includes scuba and breath-hold diving, submerging to various depths, and specialised disciplines such as mixed-gas, deep, cave, or wreck diving. A sport diver requires in-depth knowledge of diving theory, safety, equipment, and breathing techniques.

On the one hand, diving demands excellent physical fitness, endurance, and the ability to cope with pressure and stress underwater. On the other hand, thanks to modern diving equipment, experienced instructional staff, and knowledge of contemporary physiology and diving medicine, individuals recently deemed unfit for this sport can now engage in various forms of it. This includes people with disabilities, those with chronic illnesses (excluding specific conditions), older individuals, or youth.

In recreational diving, the diver discovers the beauty of the underwater world, exploring coral reefs, tropical depths, and sunken wrecks. In competitive diving disciplines such as cave or deep diving, the athlete focuses on setting records and achieving exceptional feats.

Undertaking risks and challenges in sports diving requires a professional approach, continuous skill improvement, and the ability to assess risks based on understanding the impact of diving-related factors on the human body. These factors include immersion, pressure changes, breathing gases under increased ambient pressure, microgravity, sensory deprivation, and environmental factors.

In summary, divers become athletes when they transform their passion for diving into purposeful effort, developing skills, obtaining certifications, and engaging in competition or exploring the underwater world.

Citation

Kot J. When is a diver considered a sportsman?. Eur J Trans Clin Med. 2023;6(Suppl.4):106.



Dzień 2, Sesja 4

Traveling athlete – problems of Olympic athletes on the go

Podróżujący sportowiec – problemy sportowców olimpijskich w podróży

Jarosław Krzywański

National Center for Sports Medicine, Warsaw, Poland

Abstract

The immense popularity and worldwide reach of sports have led to sports competitions taking place across nearly all continents. Consequently, the number of countries applying to host these events is steadily increasing. Consequently, the expectations of event organizers, sponsors, television broadcasters, and fans are increasing. These expectations are tied to the growing desire to witness top athletes in action more frequently. As a result, high-performance athletes find themselves frequently traveling and competing. However, each journey puts a significant strain on the athletes' bodies and exposes them to various health risks. These risks include exposure to airborne diseases in crowded locations such as airports, the conditions within airplane cabins, adjustments to different time zones, and potential exposure to region-specific diseases. The nature of a professional athlete's itinerary often leaves little room for acclimatization or addressing potential symptoms. Therefore, even minor health problems can become problematic, as they might adversely impact an athlete's performance. This underscores the importance of ensuring that travel is well-organized and safe, as it plays a pivotal role in maintaining optimal physical condition during competition. Protecting athletes' well-being stands as a primary responsibility of sports medicine specialists. Among their responsibilities is adequately preparing athletes for frequent travel. In practice, these preparations encompass a range of measures, including planning and administering preventive vaccinations to thwart infections, strategies to combat jet lag fatigue and sleep disturbances, strategies to prevent gastrointestinal issues (including education and probiotic use), and protective measures against diseases transmitted by insects (like vaccinations and repellent use). Research findings highlight the safety of vaccinating athletes and reveal minimal disruption to their training schedules, mostly limited to the initial 3 days post-vaccination. Notably, the ability to exercise remains unaffected, and engaging in vigorous physical activity does not impede antibody production. Ideally, vaccinations should be scheduled during periods of reduced training activity, usually after the season. However, if the current epidemic situation requires it, vaccinations can be administered during the competitive season.

Citation

Krzywański J. Traveling athlete – problems of Olympic athletes on the go. Eur J Trans Clin Med. 2023;6(Suppl.4):107.

**Dzień 1****Pharmaceutical care in Poland****Opieka farmaceutyczna w Polsce****Agnieszka Skowron**

Department of Social Pharmacy, Faculty of Pharmacy, Jagiellonian University Medical College, Cracow, Poland

Abstract

Pharmaceutical care (PC) is a process of monitoring pharmacotherapy in cooperation with patients and health professionals to achieve an expected medication outcome and safety. PC was developed to answer the increasing evidence that the inappropriate use of medicines results in suboptimal medication outcomes and significant health damage for patients. PC has become one of the main activities of pharmacists all around the world.

Since 2020, also in Poland, PC has been defined as one of the main professional activities of pharmacists. According to Polish law, a PC consists of a service such as a medication review, individual pharmaceutical care plan, and pharmaceutical consultation. The services are mainly focused on identifying and solving drug-related problems (DRP). According to the PCNE definition, DRP is an event or circumstance involving drug therapy that actually or potentially interferes with the desired health outcome. The main DRPs are lack of effectiveness and adverse events.

PC services benefit all levels of the health care system, patients, health teams, and decision-makers. The main benefits are the safety and effectiveness of pharmacotherapy, but we cannot forget about the effective use of health system resources such as pharmacists, who can use their professional knowledge and skills to help both patients and other health team members.

The research and analysis in Poland showed that DRPs are common among patients who are chronic medication users. Our observations showed that almost every chronically ill patient is at risk of revealing DRP in the future and the risk increases with age and the number of medicines used.

Citation

Skowron A. Pharmaceutical care in Poland. Eur J Trans Clin Med. 2023;6(Suppl.4):108.



Dzień 1, Sesja I: Metabolomika, bioanalitika

Looking deep into the eyes with metabolomics

Spojrzenie głęboko w oczy przy pomocy metabolomiki

**Karolina Pietrowska¹, Patrycja Mojsak¹, Julia Jacyna², Adrian Godlewski¹,
Emil Tomasz Grochowski³, Paulina Klimaszewska¹, Joanna Konopinska³,
Adam Kretowski^{1,4}, Michal J. Markuszewski², Diana Anna Dmuchowska³,
Michal Ciborowski¹**

¹ Metabolomics Laboratory, Clinical Research Center, Medical University of Białystok, Białystok, Poland

² Department of Biopharmaceutics and Pharmacodynamics, Medical University of Gdańsk, Gdańsk, Poland

³ Department of Ophthalmology, Medical University of Białystok, Białystok, Poland

⁴ Department of Endocrinology, Diabetology and Internal Medicine, Medical University of Białystok, Białystok, Poland

Abstract

The eye is an organ of the visual system with a complex structure. Its largest constituent is the vitreous humor (VH), which fills the posterior segment of the eye. In turn, the anterior part (the space around the lens) is filled with the aqueous humor (AH). AH is a clear liquid that is responsible for maintaining proper intraocular pressure and the optical and refractive properties of the eye, while VH (gelatinous fluid) is responsible for transmitting light to the retina. Both fluids do not have blood vessels and are nourished by the vessels of adjacent structures. Their molecular composition may change in the case of eye diseases.

Metabolomics allows for a comprehensive measurement of small molecules in a biological sample. Mass spectrometry in combination with liquid chromatography (LC-MS) or gas chromatography (GC-MS) are often applied in clinical metabolomics studies. AH and VH are not typical biological samples, and detailed protocols for their preparation and analysis using GC-MS or LC-MS-based metabolomics have not been developed or are limited. We have optimized the protocols for preparing and analyzing AH and VH samples using LC-MS and AH samples using GC-MS analysis. The results of these optimizations will be shown. Moreover, the results obtained through the metabolomics analysis of AH samples collected from patients with different diseases like cataracts, myopia, pseudoexfoliation syndrome, retinal detachment, epiretinal membrane, or macular hole will also be presented.

Citation

Pietrowska K, Mojsak P, Jacyna J, Godlewski A, et al. Looking deep into the eyes with metabolomics. *Eur J Trans Clin Med.* 2023;6(Suppl.4):109.

**Dzień 1, Sesja I: Metabolomika, bioanalitka****Metabolomics approach to study (R,S')-4-methoxy-1-naphthylfenoterol antitumor activity****Analizy metabolomiczne w ocenie działania przeciwnowotworowego (R,S')-4-metoksy-1-naftylofenoterolu****Emil Kowalczyk¹, Irving W. Wainer², Michel Bernier³, Artur Wnorowski⁴, Krzysztof Jozwiak⁴, Danuta Siluk¹, Michał J. Markuszewski¹, Danuta Dudzik¹**¹ Department of Biopharmaceutics and Pharmacodynamics, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland² PAZ Pharmaceuticals, Washington, DC, USA³ National Institute on Aging, National Institutes of Health, Baltimore, Maryland, USA⁴ Department of Biopharmacy, Medical University of Lublin, Lublin, Poland**Abstract**

Metabolomics is a powerful tool that can identify complex interactions between metabolic and signaling pathways that contribute to carcinogenesis. It also allows for studying the molecular response of therapeutic interventions and underlying mechanisms of antitumor activity. We applied a multiplatform untargeted metabolomics analysis to elucidate the mechanism of action of (R,S')-4-methoxy-1-naphthylfenoterol (MNF), a novel inhibitor of the pro-oncogenic G protein-coupled receptor GPR55, in a xenograft mouse model of human PANC-1 pancreatic cancer.

Female Balb/c nude mice, 6-8 weeks old, 18-20 g, were inoculated subcutaneously with 5×10^6 PANC-1 cells. Mice received daily i.p. injections of vehicle (1% hydroxypropyl- β -cyclodextrin) or 40 mg/kg MNF. After tumor tissue homogenization, metabolites were extracted and analyzed using mass spectrometry coupled with liquid chromatography (LC-MS), gas chromatography (GC-MS) and capillary electrophoresis (CE-MS). Acquired raw data were processed and subjected to statistical analyses.

Tumor volume increased in vehicle-treated mice by ~700% ($142 \pm 8 \text{ mm}^3$ to $957 \pm 79 \text{ mm}^3$) and only ~250% in MNF-treated mice ($143 \pm 8 \text{ mm}^3$ to $259 \pm 27 \text{ mm}^3$). Significant differences related to pyrimidine biosynthesis, lipid metabolism, amino acids and fatty acid pathways were observed in the MNF-treated mice compared to the vehicle group.

The results provide insights into the molecular mechanisms related to the therapeutic potential of MNF that result in tumor metabolic remodeling.

Citation

Kowalczyk E, Wainer IW, Bernier M, Wnorowski A, et. al. Metabolomics approach to study (R,S')-4-methoxy-1-naphthylfenoterol antitumor activity. Eur J Trans Clin Med. 2023;6(Suppl.4):110.



Dzień 1, Sesja I: Metabolomika, bioanalitika

Assessment of the influence of ionic liquids on extraction process of doxorubicin from human plasma using dispersive liquid-liquid microextraction

Ocena wpływu cieczy jonowych na proces ekstrakcji doksorubicyny z osocza krwi ludzkiej z zastosowaniem dyspersyjnej ekstrakcji ciecz-ciecz

**Alina Plenis¹, Donata Troka¹, Marta Grynberg², Natalia Treder^{1,2},
Olga Maliszewska^{1,2}, Tomasz Bączek²**

¹ Department of Analytical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Recent years have seen the increased utilization of ionic liquids (ILs) in the development and optimization of analytical methods. Their unique and eco-friendly properties and the ability to modify their structure allow them to be useful both at the sample preparation stage and at the separation stage of the analytes. For example, in the literature, scientific papers can be found that focus on the method development for quantification of anthracycline antibiotics in biological samples. However, none of them were considered using ILs for extraction of these cytostatic agents using the dispersive liquid-liquid microextraction (DLLME) technique.

The subject of this work was the assessment of the influence of ILs on the DLLME process of doxorubicin from human plasma. Thus, series of experiments were carried out in which many ILs differing in structure and physico-chemical properties were used. The most optimal results were obtained using acetonitrile and 1-ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide [C2MIM][Nf2T] as a disperser and an extractant, respectively. The efficiency of this extraction process was significantly higher (82.5%) than that obtained with the use of classic organic solvents. Moreover, the conditions of chromatographic analysis with fluorescence detection (LC-FL) were also chosen. Finally, the developed DLLME-IL-LC-FL method was validated according to the FDA and ICH criteria. The linearity was in the range of 1-1000 ng/mL while the limit of detection (LOD) was 0.5 ng/mL.

The developed method can be considered as an interesting alternative to the previously developed methods for conducting pharmacokinetic studies and clinical investigations.

Citation

Plenis A, Troka D, Grynberg M, Treder N, et al. Assessment of the influence of ionic liquids on extraction process of doxorubicin from human plasma using dispersive liquid-liquid microextraction. Eur J Trans Clin Med. 2023;6 (Suppl.4):111.



Dzień 1, Sesja I: Metabolomika, bioanalitka

**Persistence of norfluoxetine in marine bivalves
and its biochemical consequences**Trwałość norfluoksetyny w małżach morskich i jej biochemiczne
konsekwencje**Anna Hallmann¹, Anna Roszkowska², Paulina Goździk¹, Katarzyna Smolarz³,
Adam Sokołowski³, Justyna Świeżak³, Neil Dube³, Magda Caban⁴**¹ Department of Pharmaceutical Biochemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland² Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland³ Department of Functioning of Marine Ecosystems, Faculty of Oceanography and Geography, University of Gdańsk, Gdynia, Poland⁴ Department of Environmental Analysis, Faculty of Chemistry, University of Gdańsk, Gdańsk, Poland**Abstract**

Coastal waters are facing increasing concentrations of pharmaceuticals due to population growth, elevated consumption of drugs, and their low removal efficacy. Antidepressant prescription medications, particularly selective serotonin reuptake inhibitors (SSRIs), are among the most frequently detected target compounds. Marine organisms like mussels, which are commercially used as food, are constantly exposed to pharmaceuticals in their surrounding waters. This study investigated bioaccumulation and depuration in *Mytilus trossulus* of norfluoxetine (NFLU), a prominent active metabolite of fluoxetine. Environmentally relevant concentrations (100 and 500 ng/L) were used during a six-day exposure phase followed by a five-day depuration phase at 10°C. The bioconcentration factor (BCF) on the final day of exposure was 8060, much higher than observed in other aquatic species. Even at the end of depuration, NFLU remained detectable in mussels at similar or slightly lower concentrations compared with those observed at the end of the exposure. This suggests that mussels do not metabolize NFLU efficiently, indicating potential risks for consumers of these organisms. In bivalves exposed to NFLU, serotonin levels decreased in the haemolymph and male gonads, whereas increased levels were observed in female gonads. Similar patterns were observed for estrogen levels, with decreasing concentration of 17β-estradiol in males and increasing concentration of 17β-estradiol in females. However, no significant differences in aromatase activity or testosterone levels were found in both NFLU-exposed females and males. These findings underline the potential risks associated with NFLU exposure for consumers of marine organisms and highlight the complex physiological effects of NFLU on bivalves.

Citation

Hallmann A, Roszkowska A, Goździk P, Smolarz K, et al. Persistence of norfluoxetine in marine bivalves and its biochemical consequences. Eur J Trans Clin Med. 2023;6(Suppl.4):112.



Dzień 1, Sesja I: Metabolomika, bioanalitika

Development and application of targeted metabolomics study of urinary nucleosides and deoxynucleosides

Opracowanie i zastosowanie celowanej analizy metabolomicznej w badaniu nukleozydów i deoksynukleozydów

**Wiktoria Struck-Lewicka¹, Małgorzata Artymowicz¹, Julia Jacyna¹,
Michał Jan Markuszewski¹, Marcin Markuszewski², Marcin Matuszewski²,
Danuta Siluk¹**

¹ Department of Biopharmaceutics and Pharmacodynamics, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of Urology, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland

Abstract

The targeted metabolomics study is based on the quantitative determination of metabolites isolated from various matrices using sensitive analytical instrumentation, often coupled with mass spectrometry detection. Such study is commonly conducted as a continuation of the untargeted metabolomics fingerprinting approach and its main use is to assess the role of metabolites as potential disease indicators.

Herein, the development of a quantitative method for the determination of eleven urinary nucleosides and deoxy-nucleosides was conducted. The quantitation method was validated according to EMA and FDA criteria and applied for analysis of 133 urine samples derived from bladder cancer patients before tumor resection and 24 h, 2 weeks, and 3, 6, 9, 12 months after the surgery. The metabolites were determined using high-performance liquid chromatography coupled with triple quadrupole mass spectrometry detection in positive ionization mode (LC-QqQ/MS). The obtained data sets were analyzed using a linear mixed-effect model. The analysis revealed that the concentration level of 2-methylthioadenosine was decreased, while for inosine, it was increased 24 h after tumor resection in comparison to the preoperative state. Moreover, the developed and validated quantitation method was used for assessing the role of nucleosides as potential metabolic indicators by analysis of 295 urine samples derived from different types of urogenital tract cancer patients (91 renal cancer, 111 prostate cancer, and 93 bladder cancer) as well as 178 healthy controls. As a result, three out of eleven nucleosides were statistically significant among studied groups ($pBH < 0.05$) which highlights the role of nucleosides as cancer-related metabolites.

Citation

Struck-Lewicka W, Artymowicz M, Jacyna J, Markuszewski MJ, et al. Development and application of targeted metabolomics study of urinary nucleosides and deoxynucleosides. *Eur J Trans Clin Med.* 2023;6(Suppl.4):113.

**Dzień 1, Sesja II****Bayesian-based population pharmacokinetic-
-pharmacodynamic modeling of rocuronium and
sugammadex in children****Bayesowskie modelowanie farmakokinetyki i farmakodynamiki
leków na przykładzie rokuronium i sugammadeksu u dzieci****Paweł Wiczling**

Department of Biopharmacy and Pharmacodynamics, Medical University of Gdańsk, Gdańsk, Poland

Abstract

There is a great interest in extrapolating the available pharmacokinetic-pharmacodynamic evidence to studies conducted in “special populations”. This poses the question of how one can combine different datasets or model parameters collected under different conditions. Here, I demonstrate the development of a Bayesian-based population pharmacokinetic-pharmacodynamic model of rocuronium and sugammadex in children that utilize external information reported in the literature. This analysis was motivated by the data collected from an observational cohort study of 30 children undergoing surgery requiring muscle relaxation. All patients received 0.6 mg/kg rocuronium, with sugammadex administered at the end of surgery in three different doses (0.5, 1.0, and 2.0 mg/kg) to reverse the neuromuscular blockade. The data comprised rocuronium and sugammadex plasma concentrations, and Train-of-Four ratio measurements. The data were analyzed using a population Bayesian-based approach using the model and priors elicited from literature (Kleijn HJ et al, Br J Clin Pharmacol. 2011;72(3):415–433). The developed model was used to simulate pharmacokinetic-pharmacodynamic profiles and probability of target attainment plots for different patient groups and dosing regimens. This analysis confirms that the population pharmacokinetic-pharmacodynamic models can be developed in connection with literature knowledge. The ‘information borrowing’ from other studies allows to use complex models to analyze sparse datasets.

Citation

Wiczling P. Bayesian-based population pharmacokinetic-pharmacodynamic modeling of rocuronium and sugammadex in children. Eur J Trans Clin Med. 2023;6(Suppl.4):114.



Dzień 1, Sesja II

The dosing optimisation in monoclonal antibody treatment

Optymalizacja dawkowania w terapii przeciwciałami monoklonalnymi

Tomasz Grabowski

Department of Inorganic Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

The utilization of monoclonal antibody (mAb) therapy in pharmacotherapeutic applications has a rich history, encompassing more than three decades. The Food and Drug Administration (FDA) has approved over 100 mAbs, with an increasing number becoming available. While this extensive experience has yielded many insights, certain events, such as the COVID-19 pandemic, have illuminated deficiencies in standard treatment protocols, inciting a renewed focus on optimizing dosing strategies. Evolving knowledge regarding the immunopharmacology of mAbs, along with accumulating clinical experience, is altering perspectives on patient necessities, healthcare system requirements, and therapeutic outcomes. These observations are firmly rooted in the progress of immunology over the past two decades.

Consequently, medical professionals and researchers are scrutinizing the necessity of employing relatively high doses of mAbs in clinical practice. Among the questions being posed is the feasibility of extending interval dosing (EID) of mAbs and under what conditions it may be viable.

These shifts are also perceptible within the pharmaceutical industry, as evidenced by the introduction of new mAbs characterized by innovative mechanisms of action, structural modifications, and extended dosing intervals. This trend is particularly pronounced in instances where drug administration carries inherent risks or necessitates the involvement of specialized personnel.

An array of studies substantiates the notion that the deployment of EID is a viable option for selected mAbs. The EID may not only curtail the financial burden of therapy but also maintain anticipated clinical efficacy, even over prolonged follow-up periods.

Citation

Grabowski T. The dosing optimization in monoclonal antibody treatment. Eur J Trans Clin Med. 2023;6(Suppl.4):115.

**Dzień 1, Sesja II****Fatty acid synthase as a potential target in breast cancer therapy – *in vitro* model**

Syntaza kwasów tłuszczowych jako potencjalny cel w terapii raka piersi w modelu *in vitro*

Aleksandra Czumaj

Department of Pharmaceutical Biochemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Recent data indicate that altered lipid metabolism is a crucial component in the development, progression, and metastasis of many types of cancer, including triple-positive (TP) and triple-negative (TN) breast cancer (BC). The studies focused on better understanding the BC carcinogenesis process and finding new molecular targets for effective therapeutic strategies are still needed. This study aimed to compare the effectiveness of fatty acid synthase (FASN) inhibitor on the proliferation and migration of TPBC and TNBC cells.

BT-474 (TPBC cell line), HCC-1143 (TNBC cell line), and HTB-125 cells (normal breast cell line) were cultured with orlistat (FASN inhibitor), cisplatin (a widely used anticancer drug), and combinations of these agents for 72 h in concentrations ranging from 1 μ M to 100 μ M. Cell viability and migration assays were performed to assess each agent's effectiveness. The effects of the inhibitors were compared to control cultures in which cells grew in the manufacturer's standard recommended media.

Each tested agent's negative effect on cell proliferation and migration was statistically greater in BC cells than in normal breast cells. Cisplatin had a greater negative effect on cell proliferation and migration in TNBC. Orlistat had a greater negative effect on cell proliferation and migration in TPBC. Agent combinations allow for reducing the dose while maintaining the same effect only for the TPBC.

The presented results suggest that FASN is a more prominent target in TPBC to potentially enhance the efficacy of cisplatin-based therapy.

Citation

Czumaj A. Fatty acid synthase as a potential target in breast cancer therapy – *in vitro* model. Eur J Trans Clin Med. 2023;6(Suppl.4):116.



Dzień 1, Sesja II

Comparative analysis of the chemical composition of plant raw materials used in traditional medicine in Africa and Southern America

Analiza porównawcza składu chemicznego surowców roślinnych stosowanych w medycynie tradycyjnej w Afryce i Ameryce Południowej

Paweł Koniecznyński, Alina Plenis, Edem Loïce Mpandzo Otiankouya

Department of Analytical Chemistry, Medical University of Gdańsk, Gdańsk, Poland

Abstract

The studies were performed on the elemental composition, also total flavonoid content was analyzed along with the antioxidant activity of medicinal raw plant materials in order to compare these materials used in traditional medicine in Congo and Ecuador. In the experimental part of the investigation, the concentration of selected microelements: Fe, Zn, Cu, and Mn, as well as macro-elements: P, Mg, Ca, K, and Na was assayed by FAAS technique for the samples of medicinal plants collected from nature in both countries. Additionally, the total flavonoid content (TFC) and antioxidant activity of plants' water and methanol/water extracts were determined by UV/Vis spectrometry.

Analyzing the obtained data, after application of principal component analysis, it was revealed that the factors responsible for the differentiation of studied plant samples are concentrations of Cu, P, Mn, as well as TFC in the water-methanol extract. Moreover, Student t-test results have shown a statistically significant difference between the mean level of Zn and Cu in the samples originating from Congo and Ecuador. The TFC in water-methanol extract for the samples collected in Ecuador appeared to be higher than that obtained for the samples from Congo. A high correlation ($r = 0.97$) was found between antioxidant activity determined by the FRAP method in both types of extracts. The application of cluster analysis allowed for identifying the groups of medicinal plant samples due to their similarity and differences in composition which were caused by the origin of specific botanical species and different continents – Africa and Southern America.

Citation

Koniecznyński P, Plenis A, Otiankouya ELM. Comparative analysis of the chemical composition of plant raw materials used in traditional medicine in Africa and Southern America. Eur J Trans Clin Med. 2023;6(Suppl.4):117.

**Dzień 1, Sesja II****Evaluation of mineralization potential of sol-gel derived bioglass in human serum****Badanie właściwości mineralizacyjnych bioszklą pochodzenia żelowego w surowicy ludzkiej****Adrian Szewczyk, Adrianna Skwira, Magdalena Prokopowicz**

Department of Physical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

The treatment of bone defects resulting from trauma, osteoporosis, bacterial infection, or bone tumors is one of the most commonly performed regenerative procedures. Modern treatment of bone defects involves the surgical insertion of bifunctional bone drug delivery systems which release the drug directly into bone tissue (e.g. bisphosphonates, antibiotics, cytostatic drugs) and support the biomineralization by stimulating the formation and growth of hydroxyapatite – a calcium phosphate that is the main mineral component of bone matrix.

The study aimed to obtain a sol-gel derived bioglass and evaluate its mineralization potential in human serum.

The bioglass composed of $\text{SiO}_2\text{-CaO-P}_2\text{O}_5$ was obtained via rapid one-pot sol-gel synthesis using tetraethyl orthosilicate, calcium chloride, and triethyl phosphate as the sources of silica, calcium, and phosphate, respectively. The bioglass powder was homogenized and immersed for 60 days in certified human serum obtained from healthy volunteers. After selected periods, bioglass was centrifuged, freeze-dried, and analyzed using FTIR, XRD, and SEM-EDX methods; whereas the changes in concentration of osteogenic ions in serum were monitored using Abbott Alinity C equipment. The cytocompatibility of bioglass towards human fetal osteoblast cell line hFOB 1.19 was examined using ISO 10993-5 procedure.

The progressive formation of hydroxyapatite onto the bioglass surface was observed during 60-day incubation in human serum with morphology and element composition similar to natural bone apatite. The cytocompatibility of obtained bioglass towards human osteoblasts was confirmed as well. Thus, the proposed bioglass might be considered as a biomineralization supporting agent in the formulation of bone drug delivery systems.

Acknowledgement: This research was funded in whole by National Science Centre, Poland, grant number: 2022/06/X/NZ7/0030 and supported by the Foundation for Polish Science (FNP).

Citation

Szewczyk A, Skwira A, Prokopowicz M. Evaluation of mineralization potential of sol-gel derived bioglass in human serum. Eur J Trans Clin Med. 2023;6(Suppl.4):118.



Dzień 2, Sesja I

Medicinal cannabis research and production in the hospital, is it even possible?

Badania i produkcja medycznej marihuany w szpitalu – czy to w ogóle możliwe?

Vaclav Trojan

Cannabis Facility International Clinical Research Centre St. Anne's University Hospital, Brno, Czech Republic

Abstract

It has been 10 years since the Czech Republic adopted the first legal standard for the possibility of treatment with medicinal cannabis. The first medicinal cannabis was prescribed in 2015 at the University Hospital of St. Anna in Brno (FNUSA). There are many questions and endless stories associated with cannabis, which from a scientist's point of view, must be put into perspective. An integral part of the hospital is the International Clinical Research Center (ICRC), where the cannabis research program has been developing since 2019. This program includes research on the properties of the plant itself, creation of new plant materials with a clearly defined profile of content substances, and ensures production due to in vitro technologies (plant explants). Moreover, application of cannabis extracts in the form of various medicinal forms at the level of cellular or animal models is being examined as well. Clinical studies of all phases are the pinnacle of the application of medical cannabis. A phase I clinical study on the question of when patients using cannabis can drive was carried out at the FNUSA ICRC.

From 2022, the legislation allows the commercial production of medicinal cannabis for patients, therefore, the hospital decided to use the facility that was primarily established for research purposes, also for the production of cannabis plants to treat patients. Can this combination of research and commercial cultivation work in a hospital setting? In my presentation, I would like to introduce to you the obstacles not only to cultivation, but also to other research possibilities here at FNUSA ICRC.

Citation

Trojan V. Medicinal cannabis research and production in the hospital, is it even possible?. Eur J Trans Clin Med. 2023;6(Suppl.4):119.

**Dzień 2, Sesja I****Optimization of analytical parameters for
SPME-LC-Q-TOF-MS analysis of phytocannabinoids
in plant material**

Optymalizacja parametrów analitycznych do oznaczenia
poziomu fitokannabinoidów w roślinach przy użyciu metody
SPME-LC-Q-TOF-MS

**Katarzyna Woźniczka¹, Krzysztof Urbanowicz², Vaclav Trojan³, Tomasz Bączek¹,
Anna Roszkowska¹**

¹ Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of Biochemistry, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland

³ Clinical Pharmacology Unit, Centre for Translational Medicine, International Clinical Research Centre, St. Anne's University Hospital, Brno, Czech Republic

Abstract

Solid-phase microextraction (SPME) is a minimally invasive and non-exhaustive sample preparation technique that facilitates the isolation of low molecular weight compounds directly from biological material. This extraction method is a useful tool in the analysis of phytocannabinoids (PCs) in plant material and can be applied not only for forensic purposes but also as a part of quality control in Cannabis-based products. In this study, SPME utilizing biocompatible probes along with liquid-chromatography coupled with quadrupole time-of-flight mass spectrometry (LC-Q-TOF-MS) is proposed as a novel strategy for extraction and analysis of 11 major and minor PCs, including acidic and neutral forms. For optimization of the SPME step, various parameters were tested, including the selection of extraction phase (coating), time of extraction and desorption, and desorption solvent composition. The optimization of separation and detection conditions of LC-Q-TOF-MS analysis comprised a selection of a type of chromatographic column, the composition of mobile phases, and working conditions of MS. The proposed SPME method utilizing small, biocompatible C18 fibers facilitated the efficient isolation of acidic and neutral forms of phytocannabinoids from plant material. In optimized conditions, the SPME technique along with the LC-Q-TOF-MS method provided a fast and efficient tool for the analysis of a panel of PCs and deuterated internal standards. The SPME-LC-Q-TOF-MS approach can be successfully applied for monitoring of PCs in plant material.

Citation

Woźniczka K, Urbanowicz K, Trojan V, Bączek T, et al. Optimization of analytical parameters for SPME-LC-Q-TOF-MS analysis of phytocannabinoids in plant material. Eur J Trans Clin Med. 2023;6(Suppl.4):120.

Dzień 2, Sesja I

Multifunctional collagen-silica-based scaffolds for local drug delivery and bone tissue regeneration

Wielofunkcyjne rusztowania na bazie kolagenu i krzemionki do miejscowego dostarczania substancji leczniczej i regeneracji tkanki kostnej

Adrianna Skwira¹, Adrian Szewczyk², Rafał Sądej¹, Magdalena Prokopowicz²

¹ Department of Molecular Enzymology and Oncology, Intercollegiate Faculty of Biotechnology, University of Gdańsk and Medical University of Gdańsk, Gdańsk, Poland

² Department of Physical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Treatment of osteomyelitis (bone or bone marrow inflammation, frequently caused by bacteria) remains a clinical challenge in orthopedic surgery. Local administration of antibiotics to bone tissue has become widely recognized as an effective adjuvant therapy for the treatment of osteomyelitis. In this study, collagen type I, bioglass (BG), and mesoporous silica were combined into collagen-silica scaffolds. Ciprofloxacin-loaded mesoporous silica was blended with polydimethylsiloxane (MCM-CIP-PDMS) to extend the release of a drug; whereas, BG was added as a remineralization agent. The collagen-silica scaffolds were fabricated via molding and freeze-drying methods and assessed for physicochemical parameters, drug release rate, mineralization potential, antimicrobial activity, osteoblast response *in vitro*, and biological properties using *in vivo* preclinical model – chick embryo chorioallantoic membrane (CAM). The collagen-silica scaffolds exhibited a cylindrical shape and macroporous structure with homogeneously distributed MCM-CIP-PDMS and BG in the three-dimensional collagen matrix. The progressive formation of hydroxyapatite on the scaffold surface was confirmed. Collagen-silica scaffolds demonstrated a prolonged release for up to 80 days and exhibited bactericidal activity against the sessile and planktonic population of *S. aureus*, preventing biofilm development. Microscopic analysis revealed the osteoblast attachment, proliferation, and infiltration throughout the scaffolds. It was also confirmed that CAM mesenchymal cells and blood cells infiltrated the scaffold pores, indicating their biocompatibility. The developed collagen-silica scaffolds have the potential to serve as multifunctional drug delivery systems with a unique set of features for bone tissue regeneration and osteomyelitis treatment.

Citation

Skwira A, Szewczyk A, Sądej R, Prokopowicz M. Multifunctional collagen-silica-based scaffolds for local drug delivery and bone tissue regeneration. Eur J Trans Clin Med. 2023;6(Suppl.4):121.



Dzień 2, Sesja I

Assessment of fipronil exposure among pet owners applying ectoparasiticides on household pets

Ocena ekspozycji na fipronil u osób stosujących preparaty przeciw pasożytom zewnętrznym u zwierząt domowych

**Wojciech Rodzaj¹, Małgorzata Waclawik¹, Joanna Jurewicz^{2,3},
Bartosz Wielgomas¹**¹ Department of Toxicology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland² Department of Chemical Safety, Nofer Institute of Occupational Medicine, Łódź, Poland³ Department of Toxicology, Medical University of Lodz, Łódź, Poland**Abstract**

Humans are exposed to a variety of man-made chemicals used in the surrounding environment. In order to monitor the exposure and assess the associated risk, suitable sampling approaches and analytical methods need to be developed. Fipronil is a phenylpyrazole insecticide often used in household pets (cats, dogs) to prevent infestations of mites, ticks, and other ectoparasites. In this work, an analytical method was developed, validated, and used to assess exposure to fipronil among pet owners applying ectoparasiticides on household pets. Urine samples were collected before and after the application of anti-ectoparasitic product containing fipronil. Moreover, study participants wore silicone wristbands, which were analyzed to obtain additional information about possible routes of exposure. Analytes quantified using the developed liquid chromatography-tandem mass spectrometry method (LC-MS/MS) included fipronil and its relevant degradation products/metabolites, such as fipronil sulfone, fipronil sulfide, and fipronil desulfinyl. Sample preparation of urine samples included enzymatic hydrolysis, solid phase extraction, and filtration. The instrumental analysis utilized a reversed-phase liquid chromatography separation, electrospray ionization, and mass spectrometric detection with a triple quadrupole mass analyzer (LC-ESI-MS/MS). Using the proposed approach, analytes could be quantified at sub-ng/mL levels. The results of this study show that the developed method is suitable for real-life scenarios and demonstrate that application of fipronil-based ectoparasiticides on household pets may act as a source of exposure to fipronil in humans.

Citation

Rodzaj W, Waclawik M, Jurewicz J, Wielgomas B. Assessment of fipronil exposure among pet owners applying ectoparasiticides on household pets. Eur J Trans Clin Med. 2023;6(Suppl.4):122.



Dzień 2, Sesja I

Silicone wristbands in exposure assessment – investigation of exposure to synthetic pyrethroids in a cross-sectional population study

Opaski silikonowe w ocenie ekspozycji – szacowanie narażenia
na syntetyczne pyretroidy w badaniu przekrojowym

Małgorzata Waclawik, Dominika Skwarło, Bartosz Wielgomas

Department of Toxicology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Synthetic pyrethroids are a group of pesticides used commonly in diverse settings: from forestry and crop-protecting pest control in agriculture, to veterinary and household use. The universality and frequency of their employment cause exposure to these compounds to be equally common among specific sub-populations (farmers, veterinarians), but also to be of growing concern to the general population. The use of silicone wristbands (WBs) as personal passive samplers to complement the traditional approach of assessing exposure to said compounds (biomonitoring) is a novelty in many respects. WBs are capable of capturing substances located in close proximity to their carrier, therefore allowing to investigate exposure that had taken place to the parent pyrethroid compounds, thus, aiding the process of determining potential sources of said exposure. In order to investigate the levels of exposure to synthetic pyrethroids among the general population, as well as to elucidate potential sources of exposure, a cross-sectional population study has been conducted. Throughout 7 consecutive days, 82 participants collected a total of 246 urine samples and had worn a silicone wristband on a dominant hand, in which metabolite concentrations with the use of Gas Chromatography–Mass Spectrometry (GC-MS) and concentrations of parent pyrethroid compounds with the use of Gas Chromatography–Electron Capture Detector (GC-ECD) have been quantified, respectively. Obtained results merged with questionnaire-derived information about the participants, allowed for investigation of potential sources of exposure to tested chemicals. Concentrations of urinary metabolites had shown a moderate positive correlation to WB levels of native pyrethroids.

Citation

Waclawik M, Skwarło D, Wielgomas B. Silicone wristbands in exposure assessment – investigation of exposure to synthetic pyrethroids in a cross-sectional population study. *Eur J Trans Clin Med.* 2023;6(Suppl.4):123.

**Dzień 2, Sesja II****Design, synthesis and biological evaluation of peptide-based immune checkpoint inhibitors of the immune system in cancer therapy**

Projektowanie, synteza i ocena biologiczna peptydowych inhibitorów punktów kontrolnych układu immunologicznego w terapii nowotworów

Marta Spodzieja, Katarzyna Kuncewicz, Magdalena Bojko, Emilia Sikorska, Paulina Stencel, Karolina Sławińska, Magdalena Lipińska, Adam Sieradzan, Sylwia Rodziewicz-Motowidło

Department of Biomedical Chemistry, Faculty of Chemistry, University of Gdańsk, Gdańsk, Poland

Abstract

Due to the increasing incidence of cancer (19.3 million new cases diagnosed in 2022), there is a constant need to search for and develop new anti-cancer therapies. Currently, high hopes in the fight against cancer are associated with immunotherapy. The idea of using the immune system to fight cancer cells was pioneered by Rudolf Virchow as early as 150 years ago. In contrast, in 2018, Tasuku Honjo and James P. Allison were awarded the Nobel Prize in Physiology or Medicine for the discovery of an anti-cancer therapy based on negative inhibition of the immune system and, in particular, on blocking the formation of a complex between the PD-1 and PD-L1 proteins. Both above-mentioned proteins are among the so-called immune system checkpoints. The PD-1 protein is a receptor (located on the surface of T lymphocytes) that forms a complex with its ligand, PD-L1 protein (found on the surface of antigen-presenting cells and tumor cells). Formation of the PD-1/PD-L1 complex results in inhibition of T-lymphocyte proliferation and the production of cytokines, causing the immune system's failure to fight and eliminate cancer cells. It has been shown that blocking the formation of the PD-1/PD-L1 complex leads to the activation of the immune response. Many other checkpoints act in a similar manner including, for example, BTLA/HVEM. Numerous studies are currently underway to find inhibitors of the binding of the above-mentioned proteins. These include antibodies, compounds with low molecular weight, or peptides.

The presentation will discuss the results of work on peptide inhibitors of PD-1/PD-L1 and BTLA/HVEM immune checkpoints.

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Citation

Spodzieja M, Kuncewicz K, Bojko M, Sikorska E, et al. Design, synthesis and biological evaluation of peptide-based immune checkpoint inhibitors of the immune system in cancer therapy. Eur J Trans Clin Med. 2023;6(Suppl.4):124.



Dzień 2, Sesja II

Lipid metabolism disorders in neoplastic diseases

Zaburzenia metabolizmu lipidów w chorobach nowotworowych

Tomasz Śledziński

Department of Pharmaceutical Biochemistry, Faculty of Pharmacy, Medical University of Gdańsk,
Gdańsk, Poland

Abstract

The changes in lipid metabolism are associated with cancer progression and could be one of the key factors associated with carcinogenesis. In our laboratory, we have examined the lipid metabolism of some cancer tissues and cancer cells. We have found alterations in the composition of fatty acids (FA), phospholipids (PL), triacylglycerols (TG), and the content of cholesterol in the cancer tissues of patients. We found that some cancer tissues contain much higher levels of very long FA. FAs in cancer tissue can be used for: (i) synthesis of cell membrane PLs that are needed for rapid proliferation of cancer cells; (ii) synthesis of TGs which are stored in lipid droplets; (iii) for FA oxidation which is a source of energy in cancer cells. All above-mentioned processes were studied by our research group. During the lecture, the obtained results, as well as those obtained by other research groups, will be presented. This research partly explains the significance of changes in FA composition in cancer tissue. Additionally, to discover the molecular mechanism of the formation of lipid composition in cancer tissue, the expression of genes of FA, cholesterol, PL, and TG syntheses have been studied. FA in cancer cells could also originate from circulation, so the serum FA composition was studied and compared to FA composition in cancer tissue as well as to the serum of healthy subjects. Some FAs seem to be a good predictor of various cancers. We have also evaluated the antiproliferative properties of lipid metabolism enzymes inhibitors obtaining promising results.

Citation

Śledziński T. Lipid metabolism disorders in neoplastic diseases. Eur J Trans Clin Med. 2023;6(Suppl.4):125.

Dzień 2, Sesja II

The impact of metal nanoparticle-drug conjugates on pancreatic cancer organoids and pancreatic cancer cells-induced platelets aggregation

Wpływ koniugatów nanocząstek metali z lekami na organoidy raka trzustki i indukowaną przez komórki raka trzustki agregację płytek krwi

Shaoshan Mai¹, Stanisław Hać², Elżbieta Megiel³, Michał Bieńkowski⁴, Anna M. Olszewska⁵, Michał A. Żmijewski⁵, Grzegorz Stasiłojć⁶, Magdalena Narajczyk⁷, Damian Drajewski¹, Christian Pilarsky⁸, Iwona Inkielewicz-Stępnia¹

¹ Department of Pharmaceutical Pathophysiology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of General, Endocrine and Transplant Surgery, University Medical Center in Gdańsk, Gdańsk, Poland

³ Faculty of Chemistry, University of Warsaw, Warsaw, Poland

⁴ Department of Pathomorphology, Medical University of Gdańsk, Gdańsk, Poland

⁵ Department of Histology, Medical University of Gdańsk, Gdańsk, Poland

⁶ Department of Cell Biology and Immunology, Medical University of Gdańsk, Gdańsk, Poland

⁷ Laboratory of Electron Microscopy, Faculty of Biology, University of Gdańsk, Gdańsk, Poland

⁸ Department of Surgery, Universitätsklinikum Erlangen, Friedrich-Alexander Universität, Erlangen-Nürnberg, Germany

Abstract

Pancreatic ductal adenocarcinoma (PDAC) is a deadly disease with limited treatments. We synthesized silver nanoparticles conjugated with gemcitabine to explore their potential as a novel therapy. Two types of nanoparticles were compared: Ag-PEG-Gem with increased biocompatibility using polyethylene glycol (PEG), and Ag-Cys-Gem with anisotropic shapes and near-infrared light (NIR) absorption. We evaluated their effects on 3D patient-derived organoids, blood platelets, pancreatic cancer cell lines, and normal pancreatic cells.

Characterizations of these nanoparticle conjugates were by transmission electron microscopy (TEM), UV-vis spectrometry, and dynamic light scattering. The viability of organoids treated with Ag-PEG-Gem or Ag-Cys-Gem was assessed by CellTiter-Glo 3D assay. Cytotoxicity on pancreatic cancer cells (PANC-1, MIA PaCa-2, and AsPc-1) and normal pancreatic cells (hTERT-HPNE) was compared using the CCK8 test. Organoid-platelet interactions with/without nanoparticle conjugates were captured in real-time cell tracking videos. Platelet aggregation was measured by light transmission aggregometry (LTA) and CD41/P-selectin expression on platelets was determined by immunofluorescence (IF). Apoptosis in cancer cells and organoids was assessed by flow cytometry. Relative protein expression was analyzed by Western blot.

Our findings revealed that both Ag-PEG-Gem and Ag-Cys-Gem exhibited a dose-dependent inhibition of pancreatic cancer organoids and cell lines. Furthermore, cancer organoids induced platelet aggregation, which was effectively suppressed by treatment with Ag-PEG-Gem or Ag-Cys-Gem. Notably, the use of AgNPs-PEG or AgNPs-Cys improved stability and selectivity, while reducing side effects on normal cells. These results suggest the potential of these novel nanoparticle conjugates as a promising treatment option for pancreatic cancer.

The work is supported by Marie Skłodowska-Curie grant PRECODE agreement N° 861196.

Citation

Mai S, Hać S, Megiel S, Bieńkowski M, et al. The impact of metal nanoparticle-drug conjugates on pancreatic cancer organoids and pancreatic cancer cells-induced platelets aggregation. *Eur J Trans Clin Med.* 2023;6(Suppl.4):126.

Dzień 2, Sesja II

The effect of selected peptide derivatives of CPNE7 on human adipose-derived mesenchymal (AS-DCs) and endothelial cells (ECs)

Wpływ wybranych peptydowych pochodnych białka CPNE7 na ludzkie komórki mezenchymalne i śródbłonkowe tkanki tłuszczowej

Agata Tymińska¹, Aneta Skoniecka¹, Natalia Karska², Karolina Kondej³, Jacek Zieliński⁴, Sylwia Rodziejcz-Motowidło², Michał Pikuła¹¹ Laboratory of Tissue Engineering and Regenerative Medicine, Division of Embryology, Department of Anatomy, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland² Department of Biomedical Chemistry, Faculty of Chemistry, University of Gdańsk, Gdańsk, Poland³ Department of Plastic Surgery, Medical University of Gdańsk, Gdańsk, Poland⁴ Department of Oncologic Surgery, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Nowadays, studies on mesenchymal and endothelial cells derived from subcutaneous adipose are of special scientific interest. These cells are easily obtainable as they are medical waste after surgical procedures. Moreover, such cells serve as valuable models for preclinical research, particularly in the field of reconstructive and regenerative medicine. Bioactive peptides with the potential to stimulate bone or cartilage formation are promising factors for enhancing tissue regeneration in various degenerative diseases (joint degeneration, bone and cartilage defects).

In our study, we investigated the pro-regenerative properties of peptide derivatives of the CPNE7 protein. Our results demonstrate that these compounds stimulate the proliferation, migration, and differentiation of mesenchymal cells into cartilage tissue. Importantly, these peptide derivatives exhibited no immunogenic or cytotoxic effects on human cells.

To assess the impact of the peptides on AD-SCs and ECs, we tested four derivatives by evaluating the biological properties of the cells. Proliferation analysis was performed after 48 and 72 h of incubation with UG28 peptide at a 0.01-150 µg/mL concentration. Among the peptides tested, UG28 (a ten-amino acid peptide) was selected at concentrations of 10 and 25 µg/mL which significantly stimulated the proliferation of AD-SCs and ECs.

Migration was evaluated using the scratch assay after 24 h of cultivation. Our research indicated that the UG28 peptide at a concentration of 25 µg/mL induced migration of AD-SCs by nearly 50% compared to the control, and it had an effect on ECs at both concentrations.

Differentiated AD-SCs, treated with the UG28 peptide at a concentration of 10 µg/mL, showed the ability to secrete glycosaminoglycans, revealing differentiated chondroblasts and collagen fibers formation.

In summary, our results showed that the UG28 peptide is a promising candidate for applications in tissue engineering and regenerative medicine. It exhibits the ability to promote the differentiation of AD-SCs into cartilage, and at the same time stimulates the proliferation and formation of capillary structures by ECs.

This work was supported by National Science Centre – Poland [grant 2019/33/B/NZ7/02676] and by National Centre for Research and Development [TECHMAT-STRATEG2/410747/11/NCBR2019].

Citation

Tymińska A, Skoniecka A, Karska N, Kondej K, et al. The effect of selected peptide derivatives of CPNE7 on human adipose-derived mesenchymal (AS-DCs) and endothelial cells (ECs). *Eur J Trans Clin Med.* 2023;6(Suppl.4):127.



Dzień 2, Sesja II

Searching for new substances with antimycobacterial activity among amidrazone derivatives of pyridine and pyrazine

Poszukiwanie nowych substancji o aktywności przeciwprątkowej wśród amidrazonowych pochodnych pirydyny i pirazyny

Dagmara Ziembicka¹, Katarzyna Gobis¹, Małgorzata Szczesio², Ewa Augustynowicz-Kopeć³, Agnieszka Głogowska³, Izabela Korona-Głowniak⁴, Krzysztof Bojanowski⁵

¹ Katedra i Zakład Chemii Organicznej, Gdański Uniwersytet Medyczny, Gdańsk, Polska

² Instytut Chemii Ogólnej i Ekologicznej, Politechnika Łódzka, Łódź, Polska

³ Zakład Mikrobiologii, Instytut Gruźlicy i Chorób Płuc, Warszawa, Polska

⁴ Katedra i Zakład Mikrobiologii Farmaceutycznej, Uniwersytet Medyczny w Lublinie, Lublin, Polska

⁵ Sunny BioDiscovery, Santa Paula, Stany Zjednoczone

Abstract

Intensified efforts to search for new antitubercular drugs have brought tangible results, breaking the stagnation in the pharmaceutical market that has been going on for several decades. Although three drugs (bedaquiline, delamanid, pretomanid) have been conditionally approved in the last decade, the result is unsatisfactory and the need for new drugs is still valid and urgent.

A popular trend is the design of hybrid drugs that combine several pharmacophores in one molecule. Compounds obtained by the hybridization technique, due to their design to interact with multiple molecular targets simultaneously, show a synergistic pharmacological effect. Moreover, they improve the pharmacokinetic profile and reduce susceptibility to resistance, the risk of side effects, and the likelihood of drug-drug interactions.

During the presentation, the relationship between the structure and activity of 96 compounds built on pyridine, pyrazine, and amidrazone pharmacophores derived from antitubercular drugs such as isoniazid, pyrazinamide, and delamanid will be discussed. Structural modifications include e.g. a change within the functional group, a change in the connection point of the functional group with the aromatic ring or the introduction of various substituents both in the side chain and the aromatic ring.

The study of the antimycobacterial activity of the derivatives was carried out *in vitro* on two strains of *Mycobacterium tuberculosis*: standard H₃₇Rv and clinical, isolated from patients Spec. 210, which is resistant to isoniazid, rifampicin, ethambutol and *p*-aminosalicylic acid. Extended microbiological tests against a panel of G(+), G(-) bacteria and yeast, as well as the study of the cytotoxic effect on the HaCaT cell line allowed to check the selectivity of the compounds. The result of the analysis was the identification of the leading structure.

Citation

Ziembicka D, Gobis K, Szczesio M, Augustynowicz-Kopeć E, et al. Searching for new substances with antimycobacterial activity among amidrazone derivatives of pyridine and pyrazine. Eur J Trans Clin Med. 2023;6(Suppl.4):128.



Dzień 2, Sesja II

Optimization of solid-phase microextraction (SPME) along with LC-MS/MS conditions for analysis of carbamazepine and its metabolites in *Chlamys islandica* tissue

Optymalizacja warunków mikroekstrakcji do fazy stałej (SPME) wraz z analizą LC-MS/MS do oznaczania karbamazepiny i jej metabolitów w tkankach małży *Chlamys islandica*

Dagmara Leszczyńska¹, Anna Roszkowska², Marcin Lipiński¹,
Maria Włodarska-Kowalczyk³, Joanna Legeżyńska³, Kajetan Deja³,
Katarzyna Smolarz⁴, Adam Sokołowski⁴, Anna Hallmann¹

¹ Department of Pharmaceutical Biochemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

³ Department of Marine Ecology, Institute of Oceanology, Polish Academy of Science, Sopot, Poland

⁴ Department of Marine Ecosystems Functioning, Faculty of Oceanography and Geography, University of Gdańsk, Gdynia, Poland

Abstract

Carbamazepine (CBZ) is metabolized in clams by CYP3A4 enzyme to carbamazepine-10,11-epoxide (CBZE) and 10,11-dihydrocarbamazepine (CBZD). Due to the constant discharge into the environment and low biodegradability, CBZ has been detected in marine reservoirs at levels up to 1 µg/L as well as in bivalve tissue (up to 11 ng/g of dry weight). Commonly used extraction methods to isolate CBZ from tissues, including pressurized liquid extraction (PLE), require relatively large volumes of organic solvents and are time-consuming. Solid-phase microextraction (SPME) utilizes low volumes of organic solvents, therefore, it is considered a green technique that can be applied to monitor pharmaceutical pollution. This study aimed to optimize SPME-LC-MS/MS conditions to extract and analyze CBZ, CBZE, and CBZD in both phosphate-saline buffer (PBS) and tissue homogenate. Several factors known to affect the extraction efficiency of SPME fibers such as stationary phase (fiber coating), desorption solution, extraction, and desorption time have been tested. The optimization of instrumental analysis comprised the selection of chromatographic column and mobile phase composition, among others. In optimized conditions, C18 fibers were used for 10 min extraction of CBZ from PBS and soft tissue homogenates of Icelandic scallop *Chlamys islandica* exposed to 1 µg/L of CBZ for 6 days and 10 min desorption to acetonitrile:water (80:20, V/V). LC-MS/MS analysis was performed on the Kinetex C18 column in a total time of 4.5 min. Obtained results showed the presence of CBZ, CBZE, and CBZD in *C. islandica* tissues, thus, SPME-LC-MS/MS approach can be successfully applied to extract CBZ and its metabolites from bivalves tissues.

Citation

Leszczyńska D, Roszkowska A, Lipiński M, Włodarska-Kowalczyk M, et al. Optimization of solid-phase microextraction (SPME) along with LC-MS/MS conditions for analysis of carbamazepine and its metabolites in *Chlamys islandica* tissue. Eur J Trans Clin Med. 2023;6(Suppl.4):129.



Dzień 2, Sesja II

Temporal differences in expression of selected genes in *Mytilus trossulus* from the vicinity of the purification plant "Dębogórze" outlet

Sezonowe zmiany ekspresji wybranych genów u małży *Mytilus trossulus* zebranych w okolicach kolektora oczyszczalni ścieków „Dębogórze”

Paulina Goździk¹, Anna Hallmann¹, Katarzyna Smolarz²

¹ Department of Pharmaceutical Biochemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of Functioning of Marine Ecosystems, Faculty of Oceanography and Geography, University of Gdańsk, Gdynia, Poland

Abstract

The water contaminants entering the marine ecosystems via water purification plants include bioactive compounds such as endocrine disruptors. Endocrine disruptors disturb the physiological functions of marine organisms, including the Baltic species *Mytilus trossulus*. Our recent research highlighted elevated levels of anti-androgenic compounds in the brackish water from the vicinity of the "Dębogórze" purification plant. Knowing that concentrations of chemicals may differ seasonally, our study aimed to assess temporal changes in the concentration of previously found anti-androgens and potentially related changes in the expression of genes associated with detoxification. For that purpose, water samples and blue mussels *M. trossulus* were seasonally collected from the vicinity of the purification plant. The water samples were analyzed using a genetically modified yeast assay. Real-time PCR was employed for analyzing *M. trossulus* gill tissue.

The water assessment revealed increased concentrations of anti-androgen equivalents in the autumn (36.47 μ M aAEQ) and winter (23.57 μ M aAEQ), and lower concentrations in the spring (4.48 μ M aAEQ) and summer (0.54 M aAEQ). The studies showed that in females expression of *CYP3AL2* was elevated in the summer and decreased in the autumn and winter. Lowered mRNA levels of *GST ζ 3* and *AOX* were observed in the autumn and winter. In males, several genes expression was increased: *CYP3AL1* and *ATPase* in the summer, *CYP1L1* in the autumn, and *MVP* in the winter. *PGY* expression decreased in the summer. Therefore, the alterations of the investigated genes expression may be related to the temporal changes of anti-androgenic compounds concentration.

Citation

Goździk P, Hallmann A, Smolarz K. Temporal differences in expression of selected genes in *Mytilus trossulus* from the vicinity of the purification plant "Dębogórze" outlet. Eur J Trans Clin Med. 2023;6(Suppl.4):130.



Dzień 2, Sesja III

Saliva, the diagnostics of the future

Ślina, diagnostyka przyszłości

Ewelina Dziurkowska

Department of Analytical Chemistry Medical University of Gdańsk, Gdańsk, Poland

Abstract

Introduction: Saliva is produced by three main pairs of salivary glands and other smaller glands. It performs numerous functions in the body, including maintaining oral health and homeostasis, wetting food, and participating in taste perception. Saliva is characterized by a non-invasive sampling method and under certain conditions, saliva can provide a convenient biological matrix for the determination of both endogenous compounds and xenobiotics. One of the aims of implementing saliva as an alternative diagnostic material to blood is drug concentration-monitored therapy. Such therapy implies the possibility of providing a more effective drug effect in a given patient with greater safety.

Methodology: In attempting to use saliva for Therapeutic Drug Monitoring (TDM), it is essential to determine the correlation between drug concentrations in saliva and blood. Amongst others, ethanol, which has a saliva/plasma ratio of essentially 1, fulfills this correlation. The TDM has also been used during therapy with antifungal drugs, paracetamol, or some antiepileptic drugs, among others. Currently, saliva is used in diagnostics for screening for cancer in the oral cavity, head and neck, breast, and ovarian cancer. Saliva has also found applications in the testing of steroid hormone levels, as well as in the diagnosis of certain diseases such as Sjögren's syndrome and burning mouth syndrome. It is also used during police drug checks.

Conclusion: Saliva can be an attractive and alternative diagnostic material to blood, however, this requires research and the development of procedures for sample collection and analysis. Some of these have already been developed, others require additional research.

Citation

Dziurkowska E. Saliva, the diagnostics of the future. Eur J Trans Clin Med. 2023;6(Suppl.4):131.

**Dzień 2, Sesja III****Determination of physicochemical properties of potential medicinal substances based on (bio)chromatographic and computational methods****Ocena właściwości fizykochemicznych potencjalnych substancji leczniczych w oparciu o metody (bio)chromatograficzne i obliczeniowe****Krzysztof Ciura**Department of Physical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland
QSAR Lab Ltd., Gdańsk, Poland**Abstract**

Discovering and developing new drugs is an expensive, demanding, and time-consuming process with an uncertain outcome in clinical trials. Therefore, many researchers focus on developing much cheaper preclinical trials to reduce both time and cost significantly. Optimizing lipophilicity is an essential process in drug discovery since it noticeably affects the diffusion of molecules through the biological membranes. Consequently, these physicochemical properties determine pharmacokinetic processes, including absorption, distribution, metabolism, excretion, and the toxicity of drug candidates.

Nowadays, the detailed experimental protocols proposed by the Organisation for Economic Cooperation and Development (OECD) and several procedures developed for academic and industrial institutions describe methods for lipophilicity assessment. Currently, methods based on solid-liquid partitioning, such as reversed-phase liquid chromatography, are mainly used for lipophilicity estimation. Chromatographic methods owe their popularity to numerous advantages. First, they are reproducible, easy to automate, rapid, and require small amounts of analytes that do not need to be pure because their impurities are readily separated during the chromatographic process. Consequently, the separation methods have become the primary approach to lipophilicity assessment and easily fit into a high-throughput approach.

Currently, more biosimilar alternatives to classical lipophilicity are available. The key concept of biomimetic chromatography is the application of high-performance liquid chromatography with stationary phases containing proteins and phospholipids or mobile phases, including micelles or microemulsions.

The main objective of the lecture is to present the experience and observations of the single-center laboratory regarding the development of new analytical methods and protocols allowing for the determination of the physicochemical properties of xenobiotics.

Citation

Ciura K. Determination of physicochemical properties of potential medicinal substances based on (bio)chromatographic and computational methods. Eur J Trans Clin Med. 2023;6(Suppl.4):132.



Dzień 2, Sesja III

Potential benefits of using the acyl-CoA oxidase 1 inhibitor in cyclophosphamide-based breast cancer therapy – an in-vitro study

Potencjalne korzyści z zastosowania inhibitora oksydazy acylo-CoA 1 w terapii raka piersi opartej na cyklofosfamidzie – badanie *in vitro*

Olga Rybak¹, Aleksandra Czumaj²

¹ Student scientific circle 'Biochemistry' of Department of Pharmaceutical Biochemistry, Medical University of Gdańsk, Gdańsk, Poland

² Department of Pharmaceutical Biochemistry, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Changes in metabolism, including lipid β -oxidation, are necessary to maintain proper function and cell growth in breast cancer cells (BC). This study aimed to test whether inhibition of the acyl-CoA oxidase 1 (ACOX-1) by 10,12-tricosadiynoic acid (TDYA) would significantly affect the inhibition of BC cell proliferation and migration and whether it would show synergistic effects with cyclophosphamide – one of the drugs used in BC pharmacotherapy. The MTT assay was used to test survival and proliferation, and the scratch assay to test the migration of HCC-1143 (triple-negative BC model).

All experimental agents were tested at concentrations ranging from 1 to 200 μ M. In the MTT assay for TDYA, the IC₅₀ = 70 μ M. The IC₅₀ for cyclophosphamide was obtained at 200 μ M. The IC₅₀ for the combination was determined for a mixture of 30 μ M TDYA and 160 μ M cyclophosphamide. Thus, the combination of cyclophosphamide with TDYA allowed a 20% reduction in the amount of the drug while maintaining the expected effect, which may be especially important given its possible side effects. In the scratch assay, cyclophosphamide did not show inhibition of migration. Although, in combination with TDYA, both experimental agents resulted in significant inhibition of migration.

The ACOX-1 inhibitor significantly affects BC cell survival, proliferation, and migration. Combined with cyclophosphamide, TDYA shows a synergistic effect and lowers the required concentration while maintaining the expected antiproliferation effect. Additionally, the studied combination allows cyclophosphamide to inhibit migration. After more studies, TDYA could become a valuable component of drug combinations in BC pharmacotherapy.

Citation

Rybak O, Czumaj A. Potential benefits of using the acyl-CoA oxidase 1 inhibitor in cyclophosphamide-based breast cancer therapy – an in vitro study. Eur J Trans Clin Med. 2023;6(Suppl.4):133.



Dzień 2, Sesja III

Optimization of microextraction approach for analysis of tryptophan and its metabolites in biological samples with the use of LC-MS/MS method

Optymalizacja etapu mikroekstrakcji do oznaczania poziomu tryptofanu i jego metabolitów w próbkach biologicznych przy użyciu metody LC-MS/MS

Julia Zadrożna¹, Anna Cich¹, Lena Jeżewska¹, Dominika Zapalska¹, Barbara Kwiecień¹, Julia Kasprowicz¹, Marcin Lipiński², Joanna Bogusiewicz³, Tomasz Bączek¹, Anna Roszkowska¹

¹ Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of of Pharmaceutical Biochemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

³ Department of Pharmacodynamics and Molecular Pharmacology, Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń, Bydgoszcz, Poland

Abstract

Tryptophan (Trp) is an exogenous amino acid supplied to the body with food. Trp undergoes rapid degradation in metabolic processes and is not stored in tissues. Trp metabolism involves two pathways: the kynurenine pathway, leading to the formation of kynurenine (Kyn), and the serotonin pathway, leading to the formation of 5-hydroxytryptamine (5-HT, serotonin). Trp and its metabolites formed in both pathways participate in numerous crucial physiological and pathological processes related to the development of cancer, neurodegenerative diseases, and cardiovascular diseases, among others. The purpose of this research was to develop an efficient extraction method for the isolation of Trp and its metabolites (i.e., Kyn, xanthurenic acid, kynurenic acid, 5-HT, 5-hydroxyindoleacetic acid, melatonin, and N-acetylserotonin) from urine and serum samples. For this purpose, two microsampling techniques, namely solid-phase microextraction (SPME) and dispersive liquid-liquid microextraction (DLLME) were tested. Instrumental analysis was performed with the use of liquid chromatography-tandem mass spectrometry (LC-MS/MS). Optimization of DLLME included the selection of organic mixture, the volume ratio of organic solvents, and sample pH. Optimization of SPME included the selection of extraction phase (coating), desorption mixture, and sample pH. SPME utilizing DVB coating showed the best performance towards the simultaneous extraction of 14 compounds (8 analytes and 6 deuterated internal standards) from urine and serum samples. In optimized conditions, the SPME-LC-MS/MS method enabled the analysis of even trace amounts of studied compounds in 8.50 min. The developed methodology can be applied in the monitoring of Trp and its metabolites in biological samples.

Citation

Zadrożna J, Cich A, Jeżewska L, Zapalska D, et al. Optimization microextraction approach for analysis of tryptophan and its metabolites in biological samples with the use of LC-MS/MS method. *Eur J Trans Clin Med.* 2023;6(Suppl.4):134.



Dzień 2, Sesja III

Qualitative and quantitative analysis of derivatized amino acids in non-invasive exhaled breath condensate samples (EBCs) using liquid chromatography with fluorescence detection

Jakościowa i ilościowa analiza aminokwasów w kondensatach wydychanego powietrza metodą chromatografii cieczowej z detekcją fluorescencyjną

**Piotr Struczyński¹, Tomasz Bączek¹, Eliza Wasilewska², Maciej Niedźwiecki³,
Lucyna Konieczna¹**

¹ Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of Allergology, Medical University of Gdańsk, Gdańsk, Poland

³ Department of Pediatrics, Hematology and Oncology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

The collection of exhaled breath condensates (EBCs) is a noninvasive method for obtaining samples from patients. This increased attention is due to the fact that EBC is simple, effort, independent, rapid, can be repeated frequently, and can be performed on young children and patients suffering from a variety of diseases (like asthma, cystic fibrosis, or bronchopulmonary dysplasia). By having a subject breathe tidally through a cooling system for 15-20 min, a sufficient amount of condensate is collected for analysis of biomarkers in clinical studies. However, bioanalysis of EBC involves an unavoidable sample preparation step due to the low concentration of its components. Thus, there is a need for a new and more sensitive analytical method of assessing EBC samples. The goal was to establish an analytical method for amino acids (AA) analysis in EBC samples obtained from children with Duchenne muscle dystrophy (DMD). It is a genetic disease that causes progressing and irreversible muscle dystrophy. In this study, we present the LC-FL method for the detection and quantification of AA in EBC samples after the derivatization process using the OPA/3MPA reagent. The chromatographic separation was performed using a Supelco Discovery C18 (150x4.6 mm; 5 µm), thermostated at 25°C. Mobile phase A was 0.05 M sodium acetate:methanol (95:5, v/v) phase B was methanol:water (70:30, v/v). The flow rate of the mobile phase was 0.5 mL/min. The developed assay is an attractive alternative to standard analytical methods because it allows for the non-invasive, fast, sensitive, and reliable analysis of AA after the derivatization step in EBC. This method can be successfully applied to patients with DMD.

Citation

Struczyński P, Bączek T, Wasilewska E, Niedźwiecki M, et al. Qualitative and quantitative analysis of derivatized amino acids in non-invasive exhaled breath condensate samples (EBCs) using liquid chromatography with fluorescence detection. Eur J Trans Clin Med. 2023;6(Suppl.4):135.

**Dzień 2, Sesja III****Quantitative determination of ketamine in human saliva by dispersive liquid-liquid microextraction followed by liquid chromatography coupled with tandem mass spectrometry**

Ilościowe oznaczanie ketaminy w ludzkiej ślinie metodą dyspersyjnej mikroekstrakcji ciecz-ciecz (DLLME), a następnie chromatografii cieczowej sprzężonej z tandemową spektrometrią mas

Piotr Struczyński, Juliusz Zdulski, Tomasz Bączek, Lucyna Konieczna

Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Recently, ketamine, besides its analgesic effect, has been proven to be an effective antidepressant and in March of 2019 received Food and Drug Administration (FDA) approval for treatment-resistant depression (TRD). Up to this point, to measure serum levels of ketamine after administration, blood collection was necessary. We propose a less invasive method of sample collection, by extracting the analyte from saliva. Collecting saliva does not require skin puncturing, which is important in patients with some comorbidities eg. hemophilia. Two methods of extracting the analyte from the saliva matrix were investigated – dispersive liquid-liquid microextraction (DLLME) and solid phase microextraction (SPME). Both methods qualify as microextractions, because of small sample volume and frugal use of hazardous solvents. These were chosen over many other analytical methods since they are the least labor-intensive, cheap, and easy to conduct in any analytical laboratory. Our study allowed us to select the optimal extraction conditions, which allowed us to determine such and lower concentrations of ketamine that occur among patients taking it. In conclusion, the proposed LC-MS method with an effective sample procedure of extraction has been optimized, fully validated according to bioanalytical requirements, and could be applied for the analysis of ketamine levels among patients with TRD.

Citation

Struczyński P, Zdulski J, Bączek T, Konieczna L. Quantitative determination of ketamine in human saliva by dispersive liquid-liquid microextraction followed by liquid chromatography coupled with tandem mass spectrometry Eur J Trans Clin Med. 2023;6(Suppl.4):136.



Poster Sessions 1 & 2 – Young Scientists

Looking for a model to study *in vitro* the erosion rate of a gel administered to the oral cavity with a new device

Poszukiwanie modelu do badania *in vitro* szybkości erozji żelu stosowanego w jamie ustnej za pomocą nowego urządzenia

Suhail Alghanem¹, Ewelina Dziurkowska², Małgorzata Sznitowska¹

¹ Department of Pharmaceutical Technology, Medical University of Gdańsk, Gdańsk, Poland

² Department of Analytical Chemistry, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Introduction: Medical devices with a drug reservoir placed in the oral cavity can eliminate the problem of the short residence time of drugs in contact with the mucosa. The reservoir can be filled with different formulations, e.g. gels slowly releasing the active substance. In the presented experiments the rate of gel erosion was tested.

Material and methods: The gels with different viscosity and rheology were prepared with hypromellose, hydroxyethylcellulose or carbomer. In order to better demonstrate gel erosion, the 0.5% iron oxide was dispersed in the gel. Two models simulating the flow of saliva and mechanical forces were tested: (a) flow-through apparatus with a chamber designed for testing semisolids, (b) gel layers in contact with water in a thermostated shaker. A nylon membrane with the size of pores 80-200 μm was used in the model (a) and model (b) was membrane-free were tested. The observation was carried out for 6 h and the gels and dissolution media were inspected visually and under the microscope for the presence of pigment particles.

Conclusion: No significant erosion of the hydrogel occurred in the model (a) which indicates that stronger mechanical and hydrodynamic forces should be applied. In the next step of the project, an *in vivo* experiment will be performed to determine the residence time of the gel in the oral cavity when exposed to the natural mechanical forces.

Citation

Alghanem S, Dziurkowska E, Sznitowska M. Looking for a model to study *in vitro* the erosion rate of a gel administered to the oral cavity with a new device. Eur J Trans Clin Med. 2023;6(Suppl.4):137.



Poster Sessions 1 & 2 – Young Scientists

Effect of *ELOVL1* gene silencing on the transcriptome and lipid profile in CRC cell lines HT-29 and WiDrWpływ wyciszenia genu *ELOVL1* na transkryptom oraz profil lipidowy komórek linii CRC HT-29 i WiDr**Anthony Andrieu, Tomasz Śledziński, Adriana Mika**

Department of Pharmaceutical Biochemistry, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Lipids are a diverse group of hydrophobic and amphipathic molecules that exhibit a wide range of biological activities. The basic components of almost every lipid group are fatty acids (FA). Abnormal fatty acid composition underlies many pathological phenomena. Fatty Acid Elongase 1 (*ELOVL1*) is an enzyme responsible for elongating very long chain FA in eukaryotic organisms. Numerous studies indicate that abnormalities in *ELOVL1* function resulting from overexpression of the gene encoding it are associated with the development of various pathophysiological changes, including human colorectal cancer (CRC). At present, there is limited precise information about the impact of *ELOVL1* mutations on the pathophysiology of CRC. The aim of the present study is to demonstrate the effect of silencing *ELOVL1* gene expression in CRC cells on the transcriptome of these cells and their lipid profile, with particular emphasis on the membrane FA profile. During the first part of the experiment conducted, two colon cell lines, HT-29 and WiDr, were used and transfected with Lipofectamine™ and siRNA silencing the human *ELOVL1* gene. RT-PCR analysis showed that the relative expression level of *ELOVL1* was significantly decreased in the case of both siRNA-treated CRC cell lines (WiDr and HT-29) and in the control groups (untreated CRC cells and CRC cells treated with siRNA not silencing the gene).

Citation

Andrieu A, Śledziński T, Mika A. Effect of *ELOVL1* gene silencing on the transcriptome and lipid profile in CRC cell lines HT-29 and WiDr. Eur J Trans Clin Med. 2023;6(Suppl.4):138.



Poster Sessions 1 & 2 – Young Scientists

Impact of linear and cyclic siloxanes on the conformational change of lipids in the stratum corneum

Wpływ liniowych i cyklicznych siloksanów na zmiany konformacyjne lipidów w warstwie rogowej naskórka

Dagmara Bazar, Krystyna Mojsiewicz-Pieńkowska

Department of Physical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Cyclic and linear siloxanes (named silicones) are used in the production of polymers and can be found in daily use items such as household, dermatological, and medicinal products. These compounds are considered cosmetic ingredients of versatile uses, hence, they are present in most skin products. More than 50% of all new cosmetics launched in the last 10 years contain at least one type of silicone. Due to a growing number of studies and evidence that are focused on the toxicological impacts of silicones (particularly concerning the environment or in vitro silicone-estrogen receptor interactions based on a review of the toxicity of endocrine-disrupting chemicals), it is essential to monitor the safety of silicones use. One aspect is the study of the ability of these compounds to overcome the human skin barrier and verification of potential effects on stratum corneum (SC) which is mainly responsible for barrier functions. So far, no such studies have been conducted.

Aim: This work aimed to investigate the impact of some cyclic and linear siloxanes on the conformational changes of SC lipids.

Materials and methods: The study was conducted comparatively using test groups that were ex vivo human skin samples after siloxane application and a control group without siloxane application. The ATR-FTIR technique combined with the tape-stripping fractionation technique was chosen as a specific method for siloxanes and skin lipids. The following SC layers were selected to observe the interaction: 4th, 10th, and 19th.

Conclusion: Comparing the test samples with control samples, changes were identified after fractionation with the tape-stripping technique in 4th, 10th, and 19th SC layers based on the obtained differences: (i) shifts of 5 bands with wavenumbers around 2920, 2852, 1745, 1464, 1402 [cm⁻¹]; (ii) values of areas [a.u.] of the above bands, (iii) the absorbance ratios of the 2 selected bands with wavenumbers around 2920/2852 cm⁻¹.

Changes in the lamellar and lateral organization were identified, focusing attention on both the observation of orthogonal, hexagonal, liquid-crystalline (fluid) conformation and the lipid chains transformation from trans to gauche conformation (where trans means the parallel, "ordered", arrangement of chains and gauche means that alkyl chains are located further apart). The above mentioned changes resulted in the formation of a looser arrangement so that the molecule occupies more space for the diffusion of compounds.

Acknowledgments: This study was financially supported by the Polish National Science Centre, OPUS Program, Grant no. DEC-2018/31/B/NZ7/02801.

Citation

Bazar D, Mojsiewicz-Pieńkowska K. Impact of linear and cyclic siloxanes on the conformational change of lipids in the stratum corneum. Eur J Trans Clin Med. 2023;6(Suppl.4):139.



Poster Sessions 1 & 2 – Young Scientists

LC-MS based untargeted metabolomics approach to study (R,R')-4'-methoxy-1 naphthylfenoterol activity on human-derived U87MG glioblastoma tumor xenograft model in mice

Niecelowana analiza metabolomiczna przy użyciu LC-MS wpływu (R, R')-4'-metoksy-1-naftyfenoterolu na ludzki model glejaka U87MG u myszy.

Izabela Borowska¹, Emil Kowalczyk¹, Irving W. Wainer², Michel Bernier³, Artur Wnorowski⁴, Krzysztof Jozwiak⁴, Danuta Siluk¹, Michał J. Markuszewski¹, Danuta Dudzik¹

¹ Department of Biopharmaceutics and Pharmacodynamics, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² PAZ Pharmaceuticals, Washington, DC, USA

³ National Institute on Aging, National Institutes of Health, Baltimore, Maryland, USA

⁴ Department of Biopharmacy, Medical University of Lublin, Lublin, Poland

Abstract

Brain tumor is one of the deadliest cancers, in which glioblastoma is globally recognized as the most common primary brain tumor. Despite advances in the treatment, the life expectancy is still less than one year. Metabolomics has already shown its potential in the assessment of new prognostic and diagnostic tools, as well as in the identification and recognition of new therapeutic targets.

We aim to apply global untargeted metabolomics analysis to evaluate the activity of (R,R')-4'-methoxy-1-naphthylfenoterol (MNF), b2-adrenergic receptor agonist and antagonist of GPR55-mediated pro-oncogenic responses, in a xenograft model of human-derived glioblastoma cells in mice.

Female Balb/c nude mice were inoculated subcutaneously with 5×10^6 U87MG cells for tumor development and were administered a single i.p. injection of either vehicle (1% hydroxypropyl- β -cyclodextrin) or 40 mg/kg (R,R')-MNF for 5 days per week for 3 treatment cycles. Plasma samples were collected and analyzed using liquid chromatography mass spectrometry (LC-QTOF/MS) operated in positive and negative ionization modes. The raw data were processed and evaluated for batch effect or other spurious fluctuations. Univariate and multivariate analyses were applied to perform statistical evaluation of acquired data with the annotation of compounds using available metabolite databases.

The analysis revealed alterations in the metabolic profiles of mice that received MNF. The most significant changes were associated with conjugated bile acids, carnitine derivatives, and phospholipids. A decrease in the concentration of L-lactic acid (a product in the main energy pathway of cancer cells) was also observed.

The data indicate a positive effect of MNF treatment against glioblastoma.

Citation

Borowska I, Kowalczyk E, Wainer IW, Bernier M, et al. LC-MS based untargeted metabolomics approach to study (R,R')-4'-methoxy-1 naphthylfenoterol activity on human-derived U87MG glioblastoma tumor xenograft model in mice. Eur J Trans Clin Med. 2023;6(Suppl.4):140.



Poster Sessions 1 & 2 – Young Scientists

Antiproliferative potential of Opioid Growth Factor conjugate against pancreatic cancer cells

Potencjał antyproliferacyjny koniugatu opioidowego czynnika wzrostu wobec komórek raka trzustki

Justyna Budka, Iwona Inkielewicz-Stępnia

Department of Pharmaceutical Pathophysiology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Background: Pancreatic cancer presents an unfavorable prognosis, with a mortality rate of 94%, primarily attributed to treatment resistance, challenging early detection, and aggressive disease advancement. In response to these obstacles, scientists are investigating Opioid Growth Factor (OGF), a compound that specifically targets the growth factor opioid receptor (OGFr). The objective is to develop novel OGF derivatives and combine them with established chemotherapeutic agents to enhance the targeted cytotoxic impact on pancreatic cancer cells.

Aim: The research focused on assessing the antiproliferative effects of both a newly designed and synthesized conjugate of OGF and gemcitabine against pancreatic cancer cells (MIA PaCa-2, PANC-1, AsPC-1 cell lines). The study compared the efficacy of this novel conjugate with individual components, namely OGF and gemcitabine, used separately.

Results: The study revealed that the newly synthesized OGF conjugate exhibits significant antiproliferative activity against all three tested pancreatic cancer cell lines. The analog effectively regulates crucial cellular processes within these cancer cells, leading to cell cycle arrest in the S phases. Moreover, the OGF conjugate induces notable alterations in the concentration of proteins involved in the cell cycle and regulatory checkpoints. Additionally, the conjugate prompts tumor cell senescence across all three pancreatic cancer lines.

Conclusions: The combination of a pentapeptide structure with a conventional chemotherapeutic agent holds promise as a strategy to develop compounds with potential antitumor effects in the treatment of pancreatic cancer.

Acknowledgments: This work was supported by the Grant OPUS18 2019/35 / B / NZ7 / 04212 from the National Science Center and the Medical University of Gdańsk grant: ST54.

Citation

Budka J, Inkielewicz-Stępnia I. Antiproliferative potential of Opioid Growth Factor conjugate against pancreatic cancer cells. Eur J Trans Clin Med. 2023;6(Suppl.4):141.



Poster Sessions 1 & 2 – Young Scientists

New derivatives of *N*-(4-chloro-2-arylmethylthio-5-methylphenylsulfonyl)cinnamamide: synthesis and evaluation of antibacterial activity

Nowe pochodne *N*-(4-chloro-2-arylometylotio-5-metylofenylosulfonylo)cynamonamidu: synteza i ocena aktywności przeciwbakteryjnej

Anita Bułakowska¹, Jarosław Sławiński¹, Rafał Hałasa²

¹ Department of Organic Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of Pharmaceutical Microbiology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Nowadays, antibiotic resistance is a global problem of modern medicine that causes around 25 000 deaths every year in Europe. Microbes become more and more resistant to drugs through acquired mechanisms. In the latest GLASS report from 2022, the prevalence of resistant strains increased from 9% to 72%. The World Health Organization reports that 1.27 million people died of resistance in 2019. However, approximately 10 million people may die by 2050 and it is more than combined deaths due to cancer and diabetes. Six pathogens are responsible for most deaths: *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Streptococcus pneumoniae*, *Acinetobacter baumannii*, and *Pseudomonas aeruginosa*. Increasing drug resistance makes basic antibiotic therapy ineffective and increases the cost of polytherapy which is why scientists become interested in hybrid molecules.

As part of the continuation of research conducted by our research team on new substances with potential antibacterial activity, new derivatives of *N*-(4-chloro-2-arylmethylthio-5-methylphenylsulfonyl)cinnamamide were designed and synthesized with phenyl in position 2 on the sulfur atom as a pharmacophore group and the structure of cinnamic acid.

Initial microbiological analysis was performed by TLC bioautography. The antibacterial activity of the obtained compounds was confirmed *in vitro* against Gram-positive bacteria: *S. aureus*, *S. epidermidis*, *E. hirae*, *E. faecalis*, and *B. subtilis*. In the next stage, the microbiological activity of selected compounds against clinical strains of MRSA, CNS, and MRSE together with the effect of derivatives on bacterial biofilm and hemolytic activity was also investigated.

Citation

Bułakowska A, Sławiński J, Hałasa R. New derivatives of *N*-(4-chloro-2-arylmethylthio-5-methylphenylsulfonyl)cinnamamide: synthesis and evaluation of antibacterial activity. Eur J Trans Clin Med. 2023;6(Suppl.4):142.



Poster Sessions 1 & 2 – Young Scientists

Physical attributes of orodispersible films containing macrogols and poorly soluble active pharmaceutical ingredient

Ocena właściwości fizycznych lamelek rozpadających się w jamie ustnej zawierających makrogole i słabo rozpuszczalną substancję czynną

Katarzyna Centkowska, Małgorzata Sznitowska

Department of Pharmaceutical Technology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Orodispersible films (ODFs) are thin single- or double-layer polymeric dosage forms intended for use in the oral cavity. Although the active substance is most often soluble in the polymer matrix, the ODFs suspension type offers new possibilities. The study aimed to evaluate the physical properties of ODFs with suspended hydrocortisone (HC) and various types of macrogols as plasticizers.

The ODFs were prepared by the casting method. HC suspensions 20% w/w (according to the dry mass of the polymer) in hypromellose solution (Pharmacoat 606, 15% w/w) were prepared with a Thinky planetary mixer. Liquid and solid macrogols: PEG 200, 400, and 1000, 4000 were added in concentrations of 20% and 40%. A disintegration time test was carried out using a pharmacopeial apparatus with a special holder. The TA.XT texture analyzer was used for the mechanical properties test. The dissolution test was conducted in two apparatus: a paddle over disk and a flow-through.

It was possible to obtain homogeneous HC dispersion. ODFs were characterized by short disintegration times depending on the film weight and thickness. In comparison to solid macrogols PEG 1000 and 4000, the addition of liquid macrogols changed the mechanical properties of the ODF films to a greater extent, resulting in a significant increase in flexibility with a simultaneous reduction in mechanical strength. The presence of PEG in the polymer matrix did not significantly change the rate of release of HC from the ODFs. It was advantageous to use a flow-through apparatus over the paddle over disc apparatus.

Citation

Centkowska K, Sznitowska M. Physical attributes of orodispersible films containing macrogols and poorly soluble active pharmaceutical ingredient. Eur J Trans Clin Med. 2023;6(Suppl.4):143.



Poster Sessions 1 & 2 – Young Scientists

Effect of suramin on proteinuria in rats with long-term streptozotocin-induced diabetes

Wpływ suraminy na białkomocz u szczurów z długoterminową cukrzycą indukowaną streptozotocyną

Gabriela Chyła-Danił, Kornelia Sałaga-Zaleska, Ewelina Kreft, Olaf Stumski, Aleksandra Krzesińska, Agnieszka Kuchta, Maciej Jankowski

Department of Clinical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Introduction: Diabetic nephropathy is the most common chronic complication of diabetes characterized by increased glomerular permeability to proteins. Increased urinary protein concentration induces nephrotoxicity. Suramin, a drug used in the clinic as an antiparasitic and anticancer agent, has been found to prevent the progression of diabetic kidney disease.

Aim: The aim of this study was to investigate whether suramin leads to a reduction in urinary protein excretion in the long-term diabetes model.

Methods: The study group was 28 Wistar rats. Diabetes was induced by a single administration of streptozotocin (60 mg/kg b.w., *i.p.*). Suramin was administered weekly (10 mg/kg b.w., *i.p.*) for 11 weeks of the experiment. Albumin and total protein concentrations in urine from daily collections were determined by ELISA and Lowry methods, respectively. Data are presented as mean \pm standard error. Differences were assessed by ANOVA and multiple comparisons tests ($p < 0.05$). The study received an approval from the LKE in Bydgoszcz (44/2019, 12/12/2019).

Results: Eleven-week diabetes resulted in a significant increase in urinary total protein excretion, but only in the group without suramin (non-suramin 164 ± 10 vs. 242 ± 13 mg/24 h, $p = 0.002$; suramin 175 ± 13 vs. 228 ± 22 mg/24 h, $p = 0.081$). However, urinary albumin excretion was significantly higher in both diabetic suramin-treated and suramin-untreated rats (0.47 ± 0.06 vs. 1.79 ± 0.48 mg/24 h $p = 0.013$; 0.44 ± 0.04 vs. 2.29 ± 0.62 mg/24 h, $p = 0.052$, respectively).

Conclusions: Suramin may affect renal protein turnover at the tubular level but not at the glomerular level. Reducing the amount of protein excreted in the urine may protect the kidneys and slow down the development of diabetic nephropathy.

Citation

Chyła-Danił G, Sałaga-Zaleska K, Kreft E, Stumski O, et al. Effect of suramin on proteinuria in rats with long-term streptozotocin-induced diabetes. Eur J Trans Clin Med. 2023;6(Suppl.4):144.



Poster Sessions 1 & 2 – Young Scientists

Modern imaging and therapy of prostate cancer with radiolabeled ligands of prostate-specific membrane antigen (PSMA)

Nowoczesne obrazowanie i leczenie radioizotopowe raka prostaty z użyciem ligandów specyficznego dla prostaty antygenu błonowego (PSMA)

Wojciech Cytawa

Department of Nuclear Medicine, Faculty of Health Sciences, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Prostate cancer (PCa) is the second most common (first in developed countries) malignancy in men worldwide and a leading cause of cancer-related death. The aim of this work was to present a review of the newest achievements concerning prostate-specific membrane antigen (PSMA) directed radionuclide imaging and therapy of PCa. PSMA positron emission tomography/computed tomography (PET/CT) is now a well-established imaging modality detecting recurrent PCa, even at very low levels of prostate-specific antigen (PSA), 0.2-0.5 ng/ml after radical treatment. In the context of primary staging of PCa there is a growing body of evidence that PSMA PET/CT outperforms conventional imaging based on computed tomography (CT) and bone scan, especially in high-risk disease (according to d'Amico classification). In metastatic castration resistant prostate cancer (mCRPC) – a lethal form of disease – PSMA radioligand therapy (RLT) proved effective in prospective clinical trials and is expected to be used in wider patient populations. PSMA targeted alpha therapy, due to high linear energy transfer of alpha particles is another promising method of treatment of mCRPC, showing high response rates in experimental studies.

Citation

Cytawa W. Modern imaging and therapy of prostate cancer with radiolabeled ligands of prostate-specific membrane antigen (PSMA). Eur J Trans Clin Med. 2023;6(Suppl.4):145.



Poster Sessions 1 & 2 – Young Scientists

Rearrangements of tissue Fatty Acid Profile in papillary thyroid cancer with Hashimoto's thyroid

Wpływ stanu zapalnego na profil kwasów tłuszczowych w tkance tarczycy pacjentów z rakiem PTC

Monika Czapiewska¹, Andrzej Hellmann², Agata Zwara³, Oliwia Weryszko¹, Justyna Korczyńska¹, Aleksandra Taciak², Tomasz Śledziński³, Adriana Mika^{1,3}¹ Department of Pharmaceutical Biochemistry, Medical University of Gdańsk, Gdańsk, Poland² Department of General, Endocrine and Transplant Surgery, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland³ Department of Environmental Analytics, Faculty of Chemistry, University of Gdańsk, Gdańsk, Poland**Abstract**

Papillary thyroid cancer (PTC) and Hashimoto's thyroiditis (HT) are the two most common thyroid diseases but with different pathomechanisms. The study aimed to determine the changes in the profile of fatty acids (FA) caused by HT accompanying cancer in thyroid tissue.

Tissue from 29 PTC patients without HT (PTC0) and 38 PTC patients with HT (PTC1) was examined. Gas chromatography coupled with mass spectrometry was used to analyze the FA profile. Subsequently, mRNA levels of lipogenic enzymes were measured by real-time PCR and oxylipin concentrations were determined by ELISA test.

Lipid concentrations were higher in the PTC1 tissues than in the PTC0 tissues. The most significant changes were observed in polyunsaturated FA (PUFA), which levels were higher in the PTC1 group. As the carbon chain lengthened in PUFA, the difference in FA levels increased. This is probably related to the increased activity of the FA desaturase 2 whose expression level was increased in PTC1 patients. We also observed changes in the expression of 15-lipoxygenase (15-LOX), cyclooxygenase-2 (COX-2), and the concentration of catalyzed reaction products. LOX-15 expression was lower in PTC1 than in PTC0 tissue, as reflected by lower concentrations of resolvin D2 (4.55 ± 1.71 pg/ml vs 7.19 ± 2.89 pg/ml, $p = 0.016$) and lipoxin A (89.8 ± 16.0 pg/ml vs 129 ± 52.6 pg/ml, $p = 0.016$). COX-2 expression was lower in PTC1, but prostaglandin E2 concentration did not differ between PTC1 and PTC0 ($p = 0.913$).

HT in tissue with PTC interferes with both the metabolism of PUFA and the activity of enzymes associated with the oxylipins production.

Citation

Czapiewska M, Hellmann A, Zwara A, Weryszko O, et al. Rearrangements of tissue Fatty Acid Profile in papillary thyroid cancer with Hashimoto's thyroid. Eur J Trans Clin Med. 2023;6(Suppl.4):146.

Poster Sessions 1 & 2 – Young Scientists

Simulation-based assessment of remifentanil pharmacokinetics in women and neonates during labor

Symulacyjna ocena farmakokinetyki remifentanylu u kobiet i noworodków w trakcie porodu

Anna Czarkowska¹, Szymon Czarkowski², Paweł Wiczling¹

¹ Katedra Biofarmacji i Farmakodynamiki, Zakład Biofarmacji i Farmakokinetyki, Gdański Uniwersytet Medyczny, Gdańsk, Polska

² Oddział Ginekologiczno-Położniczy Szpitala Powiatowego im. dra A. Majkowskiego w Kartuzach, Powiatowe Centrum Zdrowia Sp. z o.o., Kartuzy, Polska

Abstract

Background: Remifentanil is often used in obstetrics as a labor pain relief drug. Therefore, there are concerns about the association between the use of opioids and the postnatal condition of the newborn. This work aims to assess the pharmacokinetics of continuous intravenous infusion of remifentanil in parturients and neonates during labor.

Materials and methods: The allometric PK/PD model of Eleveld et al. was used for simulations. It was modified to include a mother-child distribution clearance. Free software R, Rtools, and RStudio were used to develop the model, process, and visualize the data.

Results: Both maternal and child pharmacokinetics were simulated for the following doses: 0.025, 0.05, 0.075, 0.1, 0.125, and 0.15 $\mu\text{g}/\text{kg}/\text{min}$. Two scenarios were considered. The first scenario considered an infusion of remifentanil stopped 15 minutes before delivery and the second scenario considered an infusion of remifentanil stopped at the time of delivery. The probability of target attainment was estimated for a target defined as a concentration of less than 1 ng/mL 2 minutes or less postpartum.

Conclusion: It is possible to minimize the risk of adverse effects in both the mother and the newborn due to predictable remifentanil pharmacokinetics. From the perspective of neonatal safety, it seems preferable to stop the remifentanil infusion several minutes before the delivery. The concentration of remifentanil in women and children during labor should be measured to validate the obtained results.

Citation

Czarkowska A, Czarkowski S, Wiczling P. Simulation-based assessment of remifentanil pharmacokinetics in women and neonates during labor. Eur J Trans Clin Med. 2023;6(Suppl.4):147.



Poster Sessions 1 & 2 – Young Scientists

Fatty acid ethyl esters as plasma indicators of ethanol intake

Estry etylowe kwasów tłuszczowych jako osoczowe wskaźniki spożycia alkoholu etylowego

Joanna Dawidowska^{1,2}, Julia Jacyna¹, Michał Kaliszan², Michał J. Markuszewski¹¹ Department of Biopharmaceutics and Pharmacodynamics, Medical University of Gdańsk, Gdańsk, Poland² Department of Forensic Medicine, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Aim and scope of the study: Forensic toxicology looks for compounds whose presence in the body would indicate ethanol abuse. Due to the rapid rate of ethanol metabolism in the human body, in about half of the deaths of people who consumed ethanol before death its concentration may be below the limit of quantification. Quantifying ethanol metabolites would be a valuable tool for diagnosing and determining the cause and mechanism of death.

Materials and methods: The biological material used in the study was collected at the Department of Forensic Medicine of the Medical University of Gdańsk. Targeted metabolomic analysis of plasma samples was performed using GC-QqQ-MS, focusing on six fatty acid ethyl esters determined from the available literature. Biological samples were prepared for analysis using the liquid-liquid extraction method and the dry supernatant residue was dissolved in pure heptane.

Main conclusions: Using a targeted metabolomic approach, we determined statistically significant differences between ethanol-abusing and abstinent patient groups. The patients' plasma ester concentrations correlated with the post-mortem determination of ethanol and also coincided with the information available in the patients' medical records. The results obtained are promising and give a hope for a wider application of the developed method, including implementation to other types of biological material, such as liver sections and brain tissue fragments.

Citation

Dawidowska J, Jacyna J, Kaliszan M, Markuszewski MJ. Fatty acid ethyl esters as plasma indicators of ethanol intake. Eur J Trans Clin Med. 2023;6(Suppl.4):148.

Poster Sessions 1 & 2 – Young Scientists

Hydrazones derived from substituted methyl picolinimides: synthesis, structure and antimicrobial activity evaluation

Hydrazony pochodzące od podstawionych pikolinoimidanów metylu: synteza, struktura i ocena działania przeciwdrobnoustrojowego

**Katarzyna Gobis¹, Dagmara Ziembicka¹, Małgorzata Szczesio²,
Izabela Korona-Głownia³, Ewa Augustynowicz-Kopec⁴, Agnieszka Głogowska⁴**

¹ Department of Organic Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Institute of General and Ecological Chemistry, Faculty of Chemistry, Technical University of Lodz, Łódź, Poland

³ Department of Pharmaceutical Microbiology, Faculty of Pharmacy, Medical University of Lublin, Lublin, Poland

⁴ Department of Microbiology, National Institute of Tuberculosis and Lung Diseases, Warsaw, Poland

Abstract

In 2016, over 10 million people fell ill with tuberculosis. One of the reasons for this epidemiological problem is the spreading drug resistance of *Mycobacterium tuberculosis*. This phenomenon also applies to other pathogenic strains. As a continuation of the research on new substances with potential antimicrobial activity carried out in our research team, the synthesis of new hydrazones derived from methyl and picolinimides substituted with either methyl or methoxy group was taken.

The starting compounds for the synthesis of methyl imidates were commercially available 4-chloropicolinonitrile and 4-methyl- or 6-methylpicolinonitrile. These compounds were simply converted into the designed iminoesters by the reaction with sodium methanolate or DBU. In the case of 4-chloropicolinonitrile, conducting the reaction in methanol provided a substitution of the chlorine atom at the C-4 position with a methoxy group.

The next step in the work was to obtain imine compounds, possessing an azomethine group. By condensation reaction of iminoesters with hydrazine hydrate in methanol, 4-methyl-, 6-methylpicolinamidrazone, and 4-methoxypicolinamidrazone were obtained, respectively. The 6-methylpicolinimide was also converted into hydrazide. The synthesis of eight final products in the condensation reaction used 5-nitro-2-furaldehyde and 5-nitro-2-thiophenecarboxaldehyde with previously obtained amidrazones and hydrazide.

The structure of the obtained compounds was confirmed by elemental analysis and IR and NMR spectroscopic methods. X-ray crystallography was also performed. The final hydrazones were tested against *M. tuberculosis* strains as well as other bacterial and fungal strains. Here we report the results of these studies, among others SAR analysis.

Citation

Gobis K, Ziembicka D, Szczesio M, Korona-Głownia I, et al. Hydrazones derived from substituted methyl picolinimides: synthesis, structure and antimicrobial activity evaluation. Eur J Trans Clin Med. 2023;6(Suppl.4):149.



Poster Sessions 1 & 2 – Young Scientists

Stability of parenteral emulsions containing lipid soluble vitamins after repackaging to polypropylene syringes

Trwałość pozajelitowych emulsji zawierających witaminy rozpuszczalne w tłuszczach w strzykawkach polipropylenowych

Dominika Grabowska¹, Małgorzata Sznitowska¹, Ewelina Lubieniecka-Archutowska², Wioletta Kaliszan², Marcin Płaczek¹¹ Department of Pharmaceutical Technology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland² Hospital Pharmacy, University Clinical Centre, Gdańsk, Poland**Abstract**

The objective of this study was to evaluate the physical stability of two commercial parenteral emulsions: Vitalipid Adult (VA) and Vitalipid Infant (VI) repacked to polypropylene (PP) syringes.

Methods: Emulsions VA and VI in glass containers (used as reference) and repacked to PP syringes were stored in climate chambers at 25°C/60% RH or 40°C/75% RH and refrigerated at 4°C. A physical analysis of emulsions performed at days: 0, 1, 7, 14, and 28 of storage included visual and microscopical inspection together with determination of pH, zeta potential, and size distribution of lipid droplets.

Results and conclusion: No change in the visual properties of the emulsions during storage was observed. Microscopic analysis of all tested samples revealed the presence of agglomerated particles sized up to about 15 µm, however, agglomerates had no tendency of expanding, interfusing, and subsequently destabilizing the emulsions. Smaller changes in pH values of the emulsions stored at 40°C were noticed when glass containers were used (7.4-7.5) compared to 7.0-7.1 (PP syringes). The mean droplet diameter for all tested emulsions was in the range of 191-245 nm while the Pdl value amounted to 0.1-0.2 only. Zeta potential measured for all emulsions was in the range of -32.8 to -48.2 mV and -44.2 to -54.5 mV at T0 and T28, respectively. After repackaging to PP syringes, VA and VI emulsions should be stored in the fridge for the shortest time possible, not exceeding 24-48 hours.

Citation

Grabowska D, Sznitowska M, Lubieniecka-Archutowska E, Kaliszan W, et al. Stability of parenteral emulsions containing lipid soluble vitamins after repackaging to polypropylene syringes. Eur J Trans Clin Med. 2023;6(Suppl.4):150.



Poster Sessions 1 & 2 – Young Scientists

Met-enkephalin analogues as potential anticancer compounds against pancreatic ductal adenocarcinoma

Analogi met-enkefalin jako potencjalne związki o działaniu przeciwnowotworowym w gruczolaku przewodowym trzustki

Eliza Iwicka¹, Krystyna Dzierzbicka², Iwona Inkielewicz-Stępnia¹

¹ Department of Pharmaceutical Pathophysiology, Medical University of Gdańsk, Gdańsk, Poland

² Department of Organic Chemistry, Gdańsk University of Technology, Gdańsk, Poland

Abstract

Pancreatic cancer, although it constitutes only 5% of all cancers, is characterized by the highest mortality rate among all cancers and an exceptionally poor prognosis. This is the reason why effective treatment methods are still being sought. One of the promising compounds is met-enkephalin (OGF) which has undergone phase 1 and 2 clinical trials and offers new possibilities for safe and effective anti-cancer therapy, however, it has some limitations. The aim of our research is to design and synthesize met-enkephalin analogs with effective cytotoxicity against pancreatic cancer cells and a longer serum half-life. The first stage of the work focuses on the chemical synthesis of met-enkephalin analogs and their combination with muramic acid and nor-muramic acid. Peptide synthesis was carried out using the Boc (tert-butyloxycarbonyl) group strategy for the protection of the N α -amino group. Fourteen compounds were synthesized and subjected to biological study. MTT toxicity tests were conducted on three pancreatic cancer cell lines: MIA PaCa-2, PANC-1, and AsPC-1, as well as on the non-cancerous HEK293 line. Studies were also conducted with PBMC cells and with blood platelets to assess both the immunostimulatory properties and inhibition of pancreatic tumor cells-induced platelets aggregation (TCIPA). Preliminary studies revealed compounds that act selectively cytotoxic against pancreatic cancer cells. Moreover, we identified compounds with immunostimulatory properties and ability to inhibit TCIPA on PBMC cells and met-enkephalin analogs were examined for their effect on platelet aggregation.

The study was funded by the National Science Centre, OPUS 18 2019/35/B/NZ7/04212.

Citation

Iwicka E, Dzierzbicka K, Inkielewicz-Stępnia I. Met-enkephalin analogues as potential anticancer compounds against pancreatic ductal adenocarcinoma. *Eur J Trans Clin Med.* 2023;6(Suppl.4):151.



Poster Sessions 1 & 2 – Young Scientists

Photodegradation of API contained within commercial products for skin

Fotodegradacja API w produktach leczniczych stosowanych na skórę

Marzena Jamrógiewicz, Adam Bray

Department of Physical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

This work examined the direct possibility of monitoring photochemical changes in medicinal products applied on the skin (containing API from the NSAID group) after light exposition. According to ICH stability monitoring procedures, the assumption of the work was to detect the earliest physicochemical changes of API. For such purpose, the FTIR and DSC analyses were performed for the gel with 10% naproxen (NPX) and aerosol with 1% indomethacin (IND). The novelty of the work is developing the method of API separation from the product so removing polymers and other ingredients.

Characteristic ranges of the IND FTIR spectra are significantly changed during photoirradiation of its liquid preparation. Interestingly, after Ind isolation from the liquid phase, a polymorphic change of IND from © to ® (shift from 1716 cm^{-1} to 1691 cm^{-1}) was observed. The spectral shift of the band characteristic for the C=O group at wavenumber 1691 cm^{-1} disappeared in the IND (liq.) sample after 24 h of irradiation. Further changes approving degradation were noticed as spectral shifts at 1358 (as O-H group), 1319 and 1308 (-C-O- group), 1232 and 1224 (-C-O-C), 1147 (-C-N-) and 862-800 cm^{-1} (C-Cl). Degradation of IND was observed also in the DSC curves as either a change in melting temperature (from 161.96 to 158.83°C) or a peak disappearing. In the case of NPX (gel), after its photo exposition, only the subtle shifts without degradation were observed in both FTIR and DSC data. Lastly, IND disappeared from the medicine after 24 h.

The usefulness of the FTIR and DSC methods was directly applied to the photostability testing of pharmaceutical products for the first time.

Citation

Jamrógiewicz M, Bray A. Photodegradation of API contained within commercial products for skin. Eur J Trans Clin Med. 2023;6(Suppl.4):152.



Poster Sessions 1 & 2 – Young Scientists

Tetrameric lipopeptides rich in lysine residues: study on antimicrobial activity and hemolysis

Tetrameryczne lipopeptydy bogate w reszty lizyny: badanie aktywności przeciwdrobnoustrojowej i hemolitycznej

Maria Jąder, Damian Neubauer, Wojciech Kamysz

Department of Inorganic Chemistry, Medical University of Gdańsk, Gdańsk, Poland

Abstract

The development of new antimicrobial agents is fundamental, especially when considering the growing challenge of antimicrobial resistance. Cationic lipopeptides and their dimeric counterparts are classes of powerful antimicrobials. The aim of the study was to evaluate the impact of tetramerization of lipopeptides rich in lysine residues on biological properties.

Lipopeptides were synthesized on solid support using the Fmoc/tBu method. Each of the peptides had multiple lysine residues and fatty acids differ in the carbon chain length (C_8 , C_{10} , C_{12}). Two series of compounds were examined – dimeric ones (lipopeptide conjugated to N^{α} and N^{ϵ} amino groups of lysine in KC-NH₂ dipeptide) and their tetrameric analogues (disulfide bridge). The MICs were determined by the broth microdilution method against reference strains. While being examined with fungus, *C. albicans* and *C. glabrata*, both compounds with an acid chain of eight carbons showed little to no inhibition, however, substantially better results were exhibited for longer chains, ten and twelve carbons, for both tetrameric and dimeric lipopeptides. With gram-positive bacteria species, such as different *S. aureus* strains, the antimicrobial activity of all lipopeptides was moderate. Regarding gram-negative bacteria, *K. pneumoniae* and *K. aerogenes*, both species showed high resistance to all compounds, except for tetrameric lipopeptide with C_{10} fatty acid chain. Similarly, tetramer with C_{10} chains was the most active against *A. baumannii* and *P. aeruginosa*. In general, gram-negative strains were more susceptible to tetramers than to dimers. Importantly, no hemolysis was observed except for dimer with C_{12} chains, which can prove useful in future research.

Citation

Jąder M, Neubauer D, Kamysz W. Tetrameric lipopeptides rich in lysine residues: study on antimicrobial activity and hemolysis. Eur J Trans Clin Med. 2023;6(Suppl.4):153.



Poster Sessions 1 & 2 – Young Scientists

Influence of imidazolium-based ILs with different anions on the separation of clinically relevant biogenic amines and their metabolites by the MEKC method**Wpływ imidazoliowych cieczy jonowych z różnym anionem na rozdzielanie klinicznie istotnych amin biogennych oraz ich metabolitów metodą MEKC****Natalia Kaczmarczyk, Anna Roszkowska, Piotr Kowalski, Tomasz Bączek, Ilona Olędzka**

Department of Pharmaceutical Chemistry, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Biogenic amines (BAs) are organic compounds that act as neurotransmitters and they are important due to the number of physiological functions they perform in the human body. BAs are excreted in the urine and a several-fold increase in concentration may indicate a disease state. The determination of free catecholamines in the urine is used in the diagnosis of pheochromocytoma, neuroblastoma, and other catecholamine-secreting tumors. In recent years, attempts have been made to design and create alternative solvents for traditional organic solvents. Due to their diverse and unique properties, ionic liquids (ILs), which are designable solvents, are an interesting alternative. Appropriate selection of ions that build the liquid enables modification of the final solvent properties. In my research, I checked the effectiveness of ILs application both at the level of extraction of selected analytes and in electrophoresis.

The main goal of this study was the evaluation of the influence of ILs as flow modifiers in the micellar electrokinetic chromatography (MEKC) analysis of selected BAs in the biological matrix of oncological patients. Imidazole-based ILs can be used to prevent the sorption of analytes onto the quartz walls of the capillary. Coating the capillary wall with a cation layer increases its surface stability, consequently improving the repeatability of the separation process. In our research, we used MEKC to evaluate how ILs, as a background electrolyte (BGE) component, affect the separation efficiency of BAs. Specifically, the experiments focused on 13 ILs containing a cation consisting of an imidazole ring with different alkyl substituents and anions. In addition, one tested ILs contained a pyridinium cation. All analyzed ILs were added to the BGE in concentrations ranging from 1 to 20 mM for improving the electrophoretic separation of selected BAs: homovanillic acid (HVA), vanillin-mandelic acid (VMA), dihydroxyphenyl glycol (DHPG), normetanephrine (NM), metanephrine (M), dihydroxyphenylacetic acid (DOPAC), 3-methoxy-4-hydroxyphenyl glycol (MHPG).

The results presented in this study revealed that alkylimidazole ILs containing hydrophilic anions dissolve very well in the BGE and can stabilize and dynamically modify the capillary wall surface. ILs that contain a hydrophobic anion dissolve poorly in the BGE and, even at low concentrations (5 mM), disturb a flow of the current through the capillary, which worsens the separation process. For further research steps including analysis of BAs in the samples from oncological patients, we chose chloride anion as the best anion-building ILs which were used as an additive component of BGE. Additionally, the effect of IL with the pyridinium cation was compared. We observed that only the IL concentration of 1mM provided good separation efficiency for all tested compounds with no significant increase in peak height. On the other hand, a further increase in the concentration resulted in a deterioration of the separation efficiency, the lack of the HVA and NM peak. That is why we chose imidazolium cation as the best cation build of IL additive to BGE.

Acknowledgments: POWR.03.02.00–00-I014/17–00**Citation**

Kaczmarczyk N, Roszkowska A, Kowalski P, Bączek T, et al. Influence of imidazolium-based ILs with different anions on the separation of clinically relevant biogenic amines and their metabolites by the MEKC method. Eur J Trans Clin Med. 2023;6(Suppl.4):154.



Poster Sessions 1 & 2 – Young Scientists

Optimization of a SPE-LC-MS/MS method for the determination of β -estradiol and its metabolites in biological samples

Optymalizacja metody oznaczania β -estradiolu i jego metabolitów w próbkach biologicznych techniką SPE-LC-MS/MS

Anna Kaliszewska, Tomasz Bączek, Lucyna Konieczna

Department of Pharmaceutical Chemistry, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Background: β -Estradiol and its metabolites are of great analytical importance as potential biomarkers of cancer and neurodegenerative diseases. Low concentrations of these analytes in biological samples force scientists to research extraction techniques with good efficiency. The aim of the study was to develop a method for the determination of β -estradiol and its methoxy and hydroxy metabolites in biological samples after solid phase extraction in order to compare SPE to the most commonly used liquid-liquid extraction (LLE).

Material and methods: In this study, we present a SPE-LC-MS/MS method for the determination of β -estradiol and its metabolites in biological samples. The chromatographic analysis was preceded by the extraction of analytes from biological material by SPE using HLB sorbent and methanol with 0.1% formic acid as the extraction solvent. The chromatographic separation was performed using a Poroshell 120 EC-C18 column (3.0 x 100 mm; 2.7 μ m), thermostated at 40°C. Mobile phase A was water with 0.1% formic acid, phase B was methanol with 0.1% formic acid. The flow rate of the mobile phase was 0.5 mL/min. The mass detector was operating in positive ionization mode.

Results: SPE shows many advantages as compared to a widely-used liquid-liquid extraction, as it allows for the minimalization of organic solvents usage, time-saving, and shows better extraction efficiency.

Conclusion: The proposed ESI-LC-MS/MS method was validated and could be successfully applied to the study of β -estradiol and its metabolites level in biological samples.

Citation

Kaliszewska A, Bączek T, Konieczna L. Optimization of a SPE-LC-MS/MS method for the determination of β -estradiol and its metabolites in biological samples. Eur J Trans Clin Med. 2023;6(Suppl.4):155.

**Poster Sessions 1 & 2 – Young Scientists****Application of statistical decision theory for method development in liquid chromatography**

Zastosowanie statystycznej teorii podejmowania decyzji przy doborze warunków rozdzielania w chromatografii cieczowej

Agnieszka Kamedulska, Paweł Wiczling

Department of Biopharmacy and Pharmacokinetics, Medical University of Gdańsk, Gdańsk, Poland

Abstract

The method development in liquid chromatography is usually carried out using a trial-and-error approach. This approach is often based on the experience and intuition of the analyst. Occasionally, method development is done following Quality by Design principles. In this approach, one builds a model based on a set of carefully designed preliminary experiments. The model is then used to support the search for optimal chromatographic conditions. In this work, we demonstrate the application of Bayesian-based hierarchical model and statistical decision theory for this task. Specifically, we will use the model developed based on liquid chromatography retention data of small molecules measured under gradient conditions in both acetonitrile and methanol at different mobile phase pH, temperature, and gradient durations. This model allows to predict retention along with uncertainty for analytes with different physicochemical properties and for a wide range of chromatographic conditions. Upon specification of utility function associating some notion of “utility” to predictions and reflecting the analyst’s goal, the standard expected-value decision theory can be used to find the optimal chromatographic conditions. This will be illustrated based on several typical problems encountered in the practice.

Citation

Kamedulska A, Wiczling P. Application of statistical decision theory for method development in liquid chromatography. Eur J Trans Clin Med. 2023;6(Suppl.4):156.

Poster Sessions 1 & 2 – Young Scientists

Synthesis, structure and biological activity of novel 2-[1-(arylsulfonyl)-4,5-dihydro-1*H*-imidazol-2-yl]phthalazin-1(2*H*)-one derivatives and their copper (II) complexes**Synteza, struktura i aktywność biologiczna nowych pochodnych 2-[1-(arylosulfonylo)-4,5-dihydro-1*H*-imidazol-2-ylo]ftalazyn-1(2*H*)-onu i ich kompleksów z miedzią (II)****Jakub Kokoszka¹, Łukasz Balewski¹, Małgorzata Szczesio², Andrzej Olczak², Izabela Korona-Głowniak³, Katarzyna Suśniak³, Anita Kornicka¹**¹ Department of Chemical Technology of Drugs, Medical University of Gdańsk, Gdańsk, Poland² Institute of General and Ecological Chemistry, Faculty of Chemistry, Lodz University of Technology, Łódź, Poland³ Department of Pharmaceutical Microbiology, Medical University of Lublin, Lublin, Poland**Abstract**

In the field of medicinal chemistry, it has been confirmed that complexes of transient metals may possess higher biological activity, selectivity, and lower toxicity than free ligands. Among the transition metals, copper occupies a unique position with respect to its biological role. Therefore, considerable research has been conducted on copper compounds with anticancer, SOD-mimicking, antimicrobial, antiparasitic, and anti-inflammatory activities.

As a continuation of our previous investigations aimed at the synthesis of novel heterocyclic compounds and their copper (II) complexes with potential pharmacological properties, we have prepared compounds based on a phthalazinone scaffold and imidazoline ring. Initially, imidazoline-2-thione (1) was reacted with iodomethane to yield 2-(methylthio)-4,5-dihydro-1*H*-imidazole hydroiodide (2), which was converted to 2-hydrazinyl-4,5-dihydro-1*H*-imidazole hydroiodide (3) with hydrazine hydrate. In the next step, intermediate 3 was transformed into hydrazone derivative (4). Condensation of compound 4 gave 2-(4,5-dihydro-1*H*-imidazol-2-yl)phthalazin-1(2*H*)-one hydroiodide (5). Compound 5, upon treatment with aryl sulfonyl chlorides, formed a series of 2-[1-(arylsulfonyl)-4,5-dihydro-1*H*-imidazol-2-yl]phthalazin-1(2*H*)-ones (6). Subsequently, the obtained bidentate ligands 6 were subjected to a reaction with copper (II) chloride, yielding the corresponding tetra-coordinated copper (II) complexes (7).

The structure of the prepared compounds was confirmed by elemental analysis, mass spectrometry, and spectroscopic methods. Single crystal X-ray analysis of copper (II) complexes was performed at the Faculty of Chemistry, Lodz University of Technology, while the antimicrobial activity of ligands and copper (II) complexes was tested at the Department of Pharmaceutical Microbiology, Medical University of Lublin. Moreover, the synthesized compounds will be screened for their antiproliferative effects on human cancer cell lines.

Citation

Kokoszka J, Balewski K, Szczesio M, Olczak A, et al. Synthesis, structure and biological activity of novel 2-[1-(arylsulfonyl)-4,5-dihydro-1*H*-imidazol-2-yl]phthalazin-1(2*H*)-one derivatives and their copper (II) complexes. Eur J Trans Clin Med. 2023;6(Suppl.4):157.

**Poster Sessions 1 & 2 – Young Scientists****Medicated chewing gum – modern but underestimated drug formulation**

Lecznicza guma do żucia – nowoczesna, lecz niedoceniana postać leku

Klaudia Kołodyńska, Karol Sikora, Wojciech Kamysz

Department of Inorganic Chemistry, Medical University of Gdańsk, Gdańsk, Poland

Abstract

The origins of chewing gum date back to ancient Greece, where chewable resin was obtained from trees called mastic. It has been known to mankind for a long time – as an easily accessible and simple way to freshen breath and clean teeth. However, the food sector does not fully utilize the huge potential of chewing gum. The first medicated chewing gum (MCG), containing acetylsalicylic acid, was marketed in the United States (Aspergum®) in 1924. Despite this, MCG was not the preferred form of medicine for a long time – until the 1970s, when a preparation that revolutionized the treatment of nicotine addiction was launched – MCG containing nicotine (Nicorette®). From this breakthrough moment, a systematic increase in interest in chewing gum as a potential drug delivery system has been observed. MCG has numerous advantages, including the attractive form of administration (especially for children), no need to drink (drug form not intended to be swallowed), fast absorption of the drug through the oral mucosa, the possibility of achieving local (within the oral cavity) and general effect with a limited number of side effects. The medical use of chewing gum is broad – from caries prevention through analgesic effect to amelioration of ileus after colorectal surgery. A wide range of applications combined with the possibility of controlled API release makes MCG an extremely attractive form of drug administration.

Citation

Kołodyńska K, Sikora K, Kamysz W. Medicated chewing gum – modern but underestimated drug formulation. Eur J Trans Clin Med. 2023;6(Suppl.4):158.



Poster Sessions 1 & 2 – Young Scientists

On-line preconcentration techniques for the electrophoretic quantification of thyroid hormones with LIF detection

Techniki prekoncentracji on-line stosowane do
elektroforetycznego oznaczania hormonów tarczycy z użyciem
detektora LIF

**Piotr Kowalski¹, Michał Pieckowski¹, Ilona Olędzka¹, Anna Roszkowska¹, Alina
Plenis², Tomasz Bączek¹**

¹ Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk,
Gdańsk, Poland

² Department of Analytical Chemistry, Faculty of Pharmacy Medical University of Gdańsk, Gdańsk, Poland

Abstract

The aim of the study was to find a strategy for the signal amplification of the selected thyroid hormones (THs) using high-throughput separation techniques combined with on-line preconcentration methods. THs, including diiodothyronine (T₂), 3,3,5-triiodo-L-thyronine (T₃), 3,5,3,5-tetraiodo-thyronine (T₄), 3,3,5-triiodothyronine (rT₃) and L-tyrosine were separated by micellar electrokinetic capillary chromatography with laser induced fluorescence detection (MEKC-LIF). These hormones are necessary for the regulation of many processes in the human body, thus, reliable methods of accurately monitoring the levels of these substances in serum and tissue samples are crucial for assessing overall health.

The research methodology included the optimization of the simultaneous reaction derivatization for analytes (time, pH conditions, organic solvents, and reagents) and electrophoretic separation parameters (voltage, type, and composition of the separation buffer and dispensed sample together with injection parameters) allowing for the detection at picograms/mL levels. While maintaining the appropriate parameters, electrokinetic and hydrodynamic dosing can be used at the same time, which in turn allows for a several dozen-fold signal enhancement effect. Analytes before electrophoretic separation were derivatized at basic conditions with fluorescein isothiocyanate (FITC). Separation parameters: buffer electrolyte composed with 20 mM sodium tetraborate decahydrate and 20 mM sodium dodecyl sulfate (SDS) (pH 9.3), fused silica capillary (I.D. 50 μm and length 50 cm), 25 kV of voltage was applied.

Moreover, the developed method for THs quantification can be used for further optimization procedures, which would enable their determination at even lower levels in biological samples.

Citation

Kowalski P, Pieckowski M, Olędzka I, Roszkowska A, et al. On-line preconcentration techniques for the electrophoretic quantification of thyroid hormones with LIF detection. *Eur J Trans Clin Med.* 2023;6(Suppl.4):159.



Poster Sessions 1 & 2 – Young Scientists

Antimicrobial activity and hemolysis of dimeric and tetrameric lipopeptides with 2,4-diaminobutyric acid residues

Aktywność przeciwdrobnoustrojowa oraz hemolityczna dimerycznych i tetramerycznych lipopeptydów zawierających reszty kwasu 2,4-diaminobutanowego

Maciej Kozak, Damian Neubauer, Wojciech Kamysz

Department of Inorganic Chemistry, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Cationic lipopeptides are a class of compounds that consist of basic amino acid residues and at least one fatty acid chain. Lipopeptides have outstanding antimicrobial properties, thus, they are promising candidates for studies on new antibiotics.

This study aimed to evaluate the biological characteristics of dimers and tetramers rich in 2,4-diaminobutyric acid (Dab) residues with different fatty acid chain length (C_8 , C_{10} , C_{12}). Lipopeptides were synthesized on solid support using the Fmoc/tBu method. Lipopeptides contained C-terminal cysteine and lysine residues (KC-NH₂). Both amino groups of lysine were engaged to bind lipopeptides units – N-terminal fatty acid and two Dab residues. Tetramers were obtained through intermolecular disulfide formation.

The MICs were determined by broth microdilution method against reference strains of *S. aureus*, *E. faecium*, *A. baumannii*, *K. pneumoniae*, *K. aerogenes*, *P. aeruginosa*, *C. albicans*, and *C. glabrata*. Lipopeptides were ineffective against *E. faecium* and most gram-negative strains. Lipopeptides containing C_8 chains were the only exception with moderate activity against *P. aeruginosa*. Furthermore, compounds were considerably more effective against remaining strains, however, there was no significant difference between dimers and tetramers. Lipopeptides with C_{10} were the most potent against both *Candida* strains, whereas tetramer-containing C_8 chains exhibited excellent antibacterial properties against *S. aureus*. The hemolytic activity of dimers and their tetrameric analogs was similar. The elongation of fatty acid chains seems to be correlated with increasing hemolytic activity. Therefore, lipopeptides with C_8 chains were the most selective and therefore should be included in further studies with a broad panel of strains.

Citation

Kozak M, Neubauer D, Kamysz W. Antimicrobial activity and hemolysis of dimeric and tetrameric lipopeptides with 2,4-diaminobutyric acid residues. Eur J Trans Clin Med. 2023;6(Suppl.4):160.

Poster Sessions 1 & 2 – Young Scientists

Evaluation of the quality of herbal products containing the lungwort herb (*Pulmonariae herba*)Ocena jakości produktów ziołowych zawierających ziele
miodunki (*Pulmonariae herba*)**Julia Krajewska¹, Gabriela Jedlikowska¹, Barbara Sparzak-Stefanowska², Rafał Hałasa³, Sylwia Godlewska², Mirosława Krauze-Baranowska²**¹ Students' Scientific Circle of Department of Pharmacognosy, Department of Pharmacognosy, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland² Department of Pharmacognosy, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland³ Department of Pharmaceutical Microbiology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Lungwort herb (*Pulmonariae herba*, *Pulmonaria officinalis* L., *Boraginaceae*) is a plant raw material known in traditional medicine and used primarily in lung diseases and colds. Its importance as a medicinal plant raw material was successively decreasing due to the reduction of its natural occurrence. Currently, several species of lungwort are cultivated (the "Lubelskie Zioła" company) and they are a source of some herbal products available on the herbal market.

A comparative pharmacognostic evaluation of two herbal products, constituting the lungwort herb, was carried out, including anatomical and morphological analysis, assessment of the phytochemical profile by 2D TLC and HPLC-DAD-ESI-MS methods in terms of polyphenolic compounds, simple phenols, and lignans. In addition, the content of tannins, mucilage, and flavonoids was determined. Using the TLC bioautography methods, the antioxidant potential (DPPH free-radical scavenging activity) of methanol extracts and their antibacterial activity (against e.g. *Staphylococcus aureus*, *Escherichia coli*, *Streptococcus pneumoniae*) were compared.

Significant qualitative and quantitative differences were found between the analyzed herbal products of *Pulmonariae herba*. Of these, one probably contains only lungwort leaves and the other contains the above-ground parts of the flowering herb. The analyzed leaf extracts showed antimicrobial activity against both *Staphylococcus aureus* and *Streptococcus pneumoniae* and showed a stronger antioxidant effect. They were also characterized by a higher content of the analyzed secondary metabolites compared to the flowering herb.

Citation

Krajewska J, Jedlikowska G, Sparzak-Stefanowska B, Hałasa R, et al. Evaluation of the quality of herbal products containing the lungwort herb (*Pulmonariae herba*). Eur J Trans Clin Med. 2023;6(Suppl.4):161.



Poster Sessions 1 & 2 – Young Scientists

Hairy and excised roots of *Salvia apiana* as *in vitro* systems for rosmarinic acid production

Systemy wzrostowe *in vitro* korzeni odciętych i transformowanych *Salvia apiana* z przeznaczeniem do produkcji kwasu rozmarynowego

Agata Król¹, Adam Kokotkiewicz¹, Aleksandra Królicka², Anna Badura³, Andżelika Lorenc³, Urszula Marzec-Wróblewska³, Adam Buciński³, Maria Łuczkiwicz¹

¹ Department of Pharmacognosy, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Laboratory of Biologically Active Compounds, Department of Institute of Biotechnology, Intercollegiate Faculty of Biotechnology of University of Gdańsk and Medical University of Gdańsk, Gdańsk, Poland

³ Department of Biopharmacy, Faculty of Pharmacy, Nicolaus Copernicus University in Torun – Collegium Medicum in Bydgoszcz, Bydgoszcz, Poland

Abstract

White sage (*Salvia apiana* Jepson) is a flowering plant of the Lamiaceae family that is endemic to the chaparral plant formation, commonly found in coastal plains in California and Baja California in the USA. *S. apiana* is a traditional medicinal and ritual plant used by the Native North American Chumash people. Its roots have been confirmed as the source of biologically active terpenoids, including tanshinones. However, further research into the chemical composition and bioactivity of the plant is limited due to its endemic nature and lack of effective cultivation methods. *S. apiana* root *in vitro* cultures are considered to be an alternative source of bioactive compounds, which allow for the production of polyphenolic compounds in a controlled way, independently of climatic conditions and seasonality. The study was aimed at initiating and scaling up *S. apiana* hairy and excised root cultures as a source of rosmarinic acid. The phytochemical investigation included qualitative and quantitative HPLC-DAD-ESI/MS analyses of methanolic extracts from the *in vitro* biomasses of the bioreactor root cultures.

As a part of biotechnological research, for the first time, using various growth media, *in vitro* transformed and excised root cultures of *S. apiana* were initiated and scaled up in the prototype spray and basket bubble bioreactor systems. The largest biomass accumulation (fresh weight = 396.0 g L⁻¹, growth index = 1453.4%, dry weight = 14.5 g L⁻¹) and rosmarinic acid productivity (9.66 ± 0.14 mg g⁻¹ DW L⁻¹ d⁻¹) were achieved with the application of the prototype spray bioreactor with hairy roots grown for 60 days.

The study was supported by the project POWR.03.02.00-00-I014/17-00 co-financed by the European Union through the European Social Fund under the Operational Programme Knowledge Education Development 2014-2020.

Citation

Król A, Kokotkiewicz A, Królicka A, Badura A, et al. Hairy and excised roots of *Salvia apiana* as *in vitro* systems for rosmarinic acid production. Eur J Trans Clin Med. 2023;6(Suppl.4):162.



Poster Sessions 1 & 2 – Young Scientists

Self-emulsifying oils as modern eye drops for water-sensitive substances: cefuroxime sodium and vancomycin hydrochloride

Samoemulgujące oleje z cefuroksymem sodowym i chlorowodorkiem wankomycyny jako nowoczesne krople oczne dla substancji nietrwałych w wodzie

Katarzyna Krzemińska, Małgorzata Sznitowska

Department of Pharmaceutical Technology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Self-emulsifying oils (SEO) are isotropic mixtures of oils and surfactants, which in aqueous phase have ability to form easily emulsion. Vancomycin HCl (VAN) and cefuroxime Na (CEF) are freely soluble antibiotics but they are unstable in aqueous environment. The main objective of the current project is focusing on the development of ocular suspensions of antibiotics in SEO, in order to achieve moisture protection during storage.

Materials and methods: SEO carriers were prepared by dissolving surfactants (5% w/w): Tween 20 or Span 80 in three oils: Miglyol, castor oil or olive oil. The content of CEF and VAN in SEO-suspensions was evaluated using HPLC. Directly after preparation and during storage the systems were examined visually, microscopically (suspension particle size) and physicochemically (pH, Zeta potential and emulsion droplet size).

Results: In contact with water the drug particles suspended in SEO dissolve rapidly with no solid particles left undissolved. VAN emulsion was characterized by pH: 5.4-6.0, zeta potential from -30 to -55 mV and emulsion median droplet size (d_{50}) < 15 μm . The pH of CEF emulsions was 6.4-6.9, zeta potential (from -40 to -65 mV) and median droplet size (d_{50}) < 17 μm . The physicochemical parameters remained unchanged during the storage. After 1-year of accelerated aging test at 40°C the content of VAN and CEF did not change in the Miglyol and olive oil SEO suspensions, regardless of the type of the surfactant.

Conclusion: The developed formulations proved to be physically and chemically stable over storage and seem feasible to serve as the effective carriers for water-sensitive antibiotics intended for ocular delivery.

Citation

Krzemińska K, Sznitowska M. Self-emulsifying oils as modern eye drops for water-sensitive substances: cefuroxime sodium and vancomycin hydrochloride. Eur J Trans Clin Med. 2023;6(Suppl.4):163.



Poster Sessions 1 & 2 – Young Scientists

Concentrations of purine nucleotides and endogenous metabolites in pharmaceutical-contaminated tissues of the Iceland cockle *Ciliatocardium ciliatum* and the Arctic Sea star *Urasterias lincki* from the Svalbard fjords

Stężenia nukleotydów purynowych i endogennych metabolitów w zanieczyszczonych farmaceutykami tkankach małży *Ciliatocardium ciliatum* i rozgwiazd *Urasterias lincki* z fiordów Svalbardu

Julia Lisowska¹, Aleksandra Biezuńska¹, Natalia Kilijan¹, Anastasiya Buben¹, Aleksandra Pawlak¹, Dagmara Leszczyńska², Anna Hallmann², Maria Włodarska-Kowalczyk³, Joanna Legeżyńska³, Kajetan Deja³, Magda Caban⁴, Ida Beathe Overjordet⁵, Ewa Wielogórska⁵, Katarzyna Smolarz⁶, Adam Sokołowski⁶

¹ Student Scientific Society “Biochemists”, Department of Pharmaceutical Biochemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of Pharmaceutical Biochemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

³ Department of Marine Ecology, Institute of Oceanology, Polish Academy of Science, Sopot, Poland

⁴ Department of Environmental Analysis, Faculty of Chemistry, University of Gdańsk, Gdańsk, Poland

⁵ SINTEF, Trondheim, Norway

⁶ Department of Functioning of Marine Ecosystems, Faculty of Oceanography and Geography, University of Gdańsk, Gdynia, Poland

Abstract

The PHARMARINE project studied benthic organisms from the Svalbard fjords: Kongsfjorden (K) and Hornsund (H). Analysis of the bivalves *Ciliatocardium ciliatum* and starfish *Urasterias lincki* revealed the presence of analgesics, antibiotics, and purine and pyrimidine alkaloids in their tissues. Biochemical studies focused on characterizing these animals based on selected endogenous metabolites. The analysis included purine nucleotides, derivatives, and key metabolites from major biochemical pathways. Bivalves from both fjords exhibited a reduced ATP/ADP ratio (K = 0.63 and H = 0.39), low adenylate energy charge (AEC) (K,H = 0.4), and high glycogen concentration (K,H = 23 mg/gram wet weight (ww)). The bivalve muscles showed elevated levels of glucose-6-phosphate (K = 0.81 µg/g ww, H = 1.26 µg/g ww) and succinate (K = 8.27 µmol/g ww, H = 7 µmol/g ww) indicating anaerobic glycolysis and anoxic conditions. In contrast, starfish collected from both fjords displayed a high ATP/ADP concentration ratio (K = 13.84 and H = 16.01), high AEC (K = 0.7 and H = 0.8), and low glycogen content (K = 2.32 mg/g ww, H = 1.96 mg/g ww), indicating efficient energy production and favorable oxygen and nutritional conditions. The observed inter-species differences in metabolite concentrations reflect distinct biochemical strategies and sensitivity to adverse environmental conditions of the bivalves and starfish. There were also statistically significant differences in the concentrations of certain nucleotides and metabolites in the tissues of both bivalves and starfish collected from the two fjords.

Citation

Lisowska J, Biezuńska A, Kilijan N, Buben A, et al. Concentrations of purine nucleotides and endogenous metabolites in pharmaceutical-contaminated tissues of the Iceland cockle *Ciliatocardium ciliatum* and the Arctic Sea star *Urasterias lincki* from the Svalbard fjords. Eur J Trans Clin Med. 2023;6(Suppl.4):164.



Poster Sessions 1 & 2 – Young Scientists

Profiling docetaxel in plasma and urine samples from a pediatric cancer patient using UA-DLLME combined with LC-MS/MS

Monitorowanie profilu stężeń docetakselu w próbkach osocza i moczu od pacjenta onkologicznego techniką UA-DLLME-LC-MS/MS

Olga Maliszewska^{1,2}, Anna Roszkowska², Marcin Lipiński³, Natalia Treder^{1,2}, Ilona Olędzka², Piotr Kowalski², Tomasz Bączek², Alina Plenis¹

¹ Department of Analytical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

³ Department of Pharmaceutical Biochemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Docetaxel (DOC), belonging to the taxane family, is widely used as a single agent or as part of polytherapy in the treatment of various cancers, including cardiac angiosarcoma (AS) – one of the rarest childhood cancers. However, the narrow therapeutic window and high inter-individual variability of DOC make therapeutic drug monitoring (TDM) recommended for this drug in clinical practice. It involves the development of methods capable of precisely isolating and quantifying DOC in biological samples.

The aim of this study was the development of an accurate and precise method based on dispersive liquid-liquid microextraction (DLLME) coupled to liquid chromatography with tandem mass spectrometry (LC-MS/MS) for the determination of DOC in human plasma and urine samples. In the study, various chromatographic conditions and extraction procedures based on DLLME were tested. Finally, the best extraction results were obtained using ultrasound-assisted (UA) DLLME based on the mixture of chloroform and ethanol as extraction and disperser solvent, respectively.

Chromatographic separation was performed on the Phenomenex C-18 Kinetex column with gradient elution of a mixture of 0.1% formic acid and acetonitrile as a mobile phase. The total analysis time was 3.5 min. The analytes were monitored by positive ionization in MS/MS mode. The developed method was validated following the requirements of the FDA and ICH and then used for the monitoring of DOC in plasma and urine samples obtained from a pediatric patient with cardiac AS.

To sum up, the proposed UA-DLLME-LC-MS/MS protocol can be considered as a useful tool for the routine monitoring of DOC levels in plasma and urine samples as a part of pharmacotherapy in oncological patients.

Citation

Maliszewska O, Roszkowska A, Lipiński M, Treder N, et al. Profiling docetaxel in plasma and urine samples from a pediatric cancer patient using UA-DLLME combined with LC-MS/MS. Eur J Trans Clin Med. 2023;6(Suppl.4):165.

**Poster Sessions 1 & 2 – Young Scientists****Advanced microscopic techniques for research
and development of dosage forms – *FarmMikroTech*
core facility****Zaawansowanie techniki mikroskopowe w badaniach
i formulacji postaci leku – *FarmMikroTech* core facility****Barbara Mikolaszek, Marcin Płaczek, Małgorzata Sznitowska**Department of Pharmaceutical Technology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk,
Poland**Abstract**

The complicity of the performance of the dosage forms intended for drug delivery requires a deep understanding of the physical state of active substances and the excipients used to formulate the final product. Moreover, estimation of the critical parameters of the manufacturing process in the early stage of pharmaceutical development enables to improve and assure the quality and safety of the product. In recent years, as imaging techniques have grown far more than basic optical microscopy, detailed characterisation of the surface and inner structure expands the understanding of the experimental data and allows to fully embrace the potential of newly formulated products. Detailed characteristics of the morphology of active substances, excipients, and dosage forms are being performed at the *FarmMikroTech* core facility and further correlated eg. with in vitro/in vivo dosage form performance.

Scanning electron microscopy (SEM) combined with Raman spectroscopy allowed to correlate the inner structure of transdermal patch formulations caused by excipients to improve the in vitro performance of the patch, including drug release. A combination of these methods showed a specific distribution of excipients in tablets, depending on the fluctuation of the mixing process parameters.

Digital microscopy with SEM and Raman not only showed the mucoadhesive oral discs' inner structure dependence on lyophilisation parameters but also suggested that in vivo performance might be related to the altered surface of the disc.

Citation

Mikolaszek B, Płaczek M, Sznitowska M. Advanced microscopic techniques for research and development of dosage forms – *FarmMikroTech* core facility. *Eur J Trans Clin Med.* 2023;6(Suppl.4):166.



Poster Sessions 1 & 2 – Young Scientists

Pharmacokinetics of vancomycin in paediatric patients with leukaemias and lymphomas

Farmakokinetyka wankomycyny u pacjentów pediatrycznych leczonych na białaczki i chłoniaki

**Paulina Okuńska¹, Anna Małecka², Joanna Renke², Ninela Irga-Jaworska²,
Paweł Wiczling¹**

¹ Department of Biopharmaceutics and Pharmacodynamics, Medical University of Gdańsk, Gdańsk, Poland

² Department of Paediatrics, Haemathology & Oncology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

The aim of this study was to analyze the existing historical, clinical, and laboratory data on vancomycin concentrations and serum creatinine in hematological patients. The developed model was used to propose the safest and most effective vancomycin dosing strategy in this group of patients.

The current data is limited. It was collected for 15 cycles of therapy in 9 subjects. The through vancomycin concentrations were measured along with creatinine concentration (SCr). Basic demographic and clinical parameters were available, including weight, age, gender, and several other covariates. The data were analyzed using Bayesian hierarchical modeling. Informative healthy adult-based priors were elicited from literature (Aljutayli A., DOI: 10.1007/s40262-020-00866-2).

Two one-compartment models with shared clearance were used to describe the pharmacokinetics of vancomycin and creatinine. The model parameters (volume of distribution, clearance, and creatinine production rate) were allometrically scaled to account for size-related differences across subjects. The commensurate priors were used to control 'information borrowing' from adults' data. The developed model described data well and can be used for therapeutic drug monitoring. It was illustrated by predicting the next vancomycin dose given various historical data (i.e. dosing, vancomycin, and SCr concentration measurements) for the particular patient.

A single model was proposed to describe vancomycin and SCr concentrations. The Bayesian approach allowed the inclusion of the existing prior knowledge and quantifying uncertainty of model parameters and predictions. The proposed methodology seems suitable for developing vancomycin therapeutic drug monitoring strategies in special populations.

Citation

Okuńska P, Małecka A, Renke J, Irga-Jaworska N, et al. Pharmacokinetics of vancomycin in paediatric patients with leukaemias and lymphomas. *Eur J Trans Clin Med.* 2023;6(Suppl.4):167.



Poster Sessions 1 & 2 – Young Scientists

Activity of short lipopeptides combined with conventional antimicrobials against ESKAPE pathogens

Aktywność krótkich lipopeptydów w połączeniu z konwencjonalnymi środkami przeciwdrobnoustrojowymi wobec patogenów z grupy ESKAPE

Nina Pękalska¹, Alena Shchuka¹, Małgorzata Lesiuk², Katarzyna Greber³, Małgorzata Paduszyńska¹¹ Department of Inorganic Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland² Polygen Sp. z o.o., Gliwice, Poland³ Department of Physical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

ESKAPE constitutes a group of nosocomial pathogens (*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter* spp.) that can evade commonly used antibiotics due to their increasing multi-drug resistance (MDR).

Despite continuous progress in medical and pharmaceutical sciences, the effectiveness of antibiotic therapy is not sufficient. One promising alternative are antimicrobial peptides (AMPs) and their derivatives such as short lipopeptides characterized by a high antimicrobial activity against drug-resistant microbes and low risk of resistance development. An interesting approach is the use of AMPs in combination therapy which aims to broaden the spectrum of activity and/or increase the efficacy of antibiotics.

The goal of this study was to test short lipopeptides as potential tools to boost the action of conventional antimicrobials in the fight against ESKAPE pathogens.

Lipopeptides ((C₁₀)₂-K₄KK-NH₂, C₁₆-KK-NH₂) were obtained via the solid phase synthesis method and their minimum inhibitory concentrations (MIC) and fractional inhibitory concentrations (FIC) with conventional antimicrobials (benzalkonium chloride, erythromycin, tetracycline) were determined against bacteria belonging to the ESKAPE group. The FIC index was calculated to evaluate the type of interaction between the compounds.

Based on the results, a clear synergism was demonstrated between the compounds against gram-negative bacteria. No synergistic effect was observed for *S. aureus*. However, the lipopeptides applied alone demonstrated high antistaphylococcal activity. The obtained results confirmed that combination therapy with AMPs may be an effective approach to combat resistant bacterial species and encourage performing further studies in this field.

Citation

Pękalska N, Shchuka A, Lesiuk M, Greber K, et al. Activity of short lipopeptides combined with conventional antimicrobials against ESKAPE pathogens. Eur J Trans Clin Med. 2023;6(Suppl.4):168.



Poster Sessions 1 & 2 – Young Scientists

Chromatographic analysis of leaf buds from some species and hybrids of the genus *Populus* with determination of their antioxidant activity

Analiza chromatograficzna pączków liściowych z niektórych gatunków i odmian rodzaju *Populus* z oznaczeniem ich aktywności antyoksydacyjnej

Loretta Poblócka-Olech¹, Valery A. Isidorov², Mirosława Krauze-Baranowska¹

¹ Department of Pharmacognosy with Medicinal Plants Garden, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Institute of Forest Sciences, Białystok Technical University, Białystok, Poland

Abstract

Poplar buds (*Populi gemmae*) are most often used in traditional medicine to soothe skin irritations and to decrease the inflammation of the upper respiratory tract. This plant material has a rich chemical composition, similar to the chemical composition of propolis, thus, can be its cheaper and more easily available alternative. A significant limitation, however, is the observed high variability of the chemical composition of buds of various species and varieties of poplar. Therefore, it is necessary to select and determine the species that can be a source of medicinal plant raw material and to develop standardization methods in terms of the content of compounds responsible for the therapeutic effect.

GC-MS analysis of poplar bud extracts included plant raw materials from four species and cultivars growing in Poland, namely: *Populus balsamifera*, *P. × berolinensis*, *P. × canadensis* 'Marilandica', and *P. wilsonii*. The presence of 163 compounds has been demonstrated, mainly belonging to flavonoids, derivatives of phenolic acids, glycerides, and terpenes. In addition, the separation conditions of compounds present in the analyzed buds were optimized by two-dimensional thin-layer chromatography (2D-TLC). The developed chromatographic system was used in bioautographic studies of the antioxidant properties of the tested extracts. The content of flavonoids and phenols was determined by spectrophotometry, and the antioxidant potential was determined using the DPPH, ABTS, and FRAP tests. The highest antioxidant activity characterized the extract of *P. × berolinensis* buds.

Citation

Poblócka-Olech L, Isidorov VA, Krauze-Baranowska M. Chromatographic analysis of leaf buds from some species and hybrids of the genus *Populus* with determination of their antioxidant activity. Eur J Trans Clin Med. 2023;6(Suppl.4):169.



Poster Sessions 1 & 2 – Young Scientists

New benzenesulfonamides as IRE1 α inhibitorsNowe benzenosulfonamidy jako inhibitory IRE1 α **Aneta Pogorzelska¹, Jarosław Sławiński¹, Sylwia Bartoszewska²,
Magdalena Gebert³, Rafał Bartoszewski⁴**¹ Department of Organic Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland² Department of Inorganic Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland³ Department of Clinical Analytics, Division of Medical Laboratory Diagnostics, Faculty of Pharmacy,
Medical University of Gdańsk, Gdańsk, Poland⁴ Department of Biophysics, Faculty of Biotechnology, University of Wrocław, Wrocław, Poland**Abstract**

Cellular dysfunction is strongly associated with an increase in protein misfolding or the cell's inability to handle this condition. This kind of dysfunction leads to many pathological disorders resulting in various diseases, including both systematic and organ-specific. As the unfolded protein response (UPR) is responsible for a cell fate during endoplasmic reticulum stress (ER stress), it is considered as a new therapeutic target, especially for searching for new agents for the treatment of cancer, neurodegenerative disorders, and diabetes. The most evolutionarily conserved sensor of the UPR is IRE1. Mammalian cells consist of two IRE1 isoforms: IRE1 α (which is commonly found in cells) and IRE1 β , the presence of which is limited to epithelial cells of the gastrointestinal tract and lungs. Due to the widespread presence of IRE1 α , it is considered as the most relevant isoform in the context of cancer and other pathological conditions.

Our research revealed that new benzenesulfonylguanidines could be potential anticancer agents with a mechanism of action related to the inhibition of IRE1 α activity, which stops the formation of highly active spliced XBP1 (XBP1s) transcription factor responsible for cell survival under ER stress. *N*-{4-Chloro-2-[(4-fluorophenyl)methylthio]-5-methylbenzenesulfonyl}-*N'*-[(5-benzylamino)-1*H*-1,2,4-triazol-3-yl]guanidine has been selected as the most potent IRE1 inhibitor. This derivative is highly cytotoxic against cervical cancer HeLa cells ($IC_{50} = 3.25 \mu\text{M}$) and inhibits IRE1 activity through the inhibition of XBP1 splicing. The qRT-PCR analysis showed that this compound significantly decreases the level of XBP1s RNA during ER stress. The investigation of protein levels by Western Blot confirmed that both XBP1s and phosphorylated IRE1 levels decreased after the treatment of cells with *N*-{4-chloro-2-[(4-fluorophenyl)methylthio]-5-methylbenzenesulfonyl}-*N'*-[(5-benzylamino)-1*H*-1,2,4-triazol-3-yl]guanidine.

Citation

Pogorzelska A, Sławiński J, Bartoszewska S, Gebert M, et al. New benzenesulfonamides as IRE1 α inhibitors. Eur J Trans Clin Med. 2023;6(Suppl.4):170.

Poster Sessions 1 & 2 – Young Scientists

Application of untargeted and targeted metabolomics for evaluation of metabolome changes in women with polycystic ovary syndrome

Zastosowanie niecelowanej oraz celowanej analizy metabolomicznej do oceny zmian w metabolomie pacjentek z zespołem policystycznych jajników

Anna Rajska¹, Joanna Raczak-Gutknecht¹, Wiktoria Struck-Lewicka¹, Magdalena Buszewska-Forajta², Paweł Wityk¹, Phaedra Verding³, Agnieszka Kowalewska⁴, Danuta Siluk¹, Dominik Rachoń⁵, Michał Jan Markuszewski¹

¹ Department of Biopharmaceutics and Pharmacodynamics, Medical University of Gdańsk, Gdańsk, Poland

² Institute of Veterinary Medicine, Nicolaus Copernicus University in Toruń, Toruń, Poland

³ Department of Analytical Chemistry, Applied Chemometrics and Molecular Modelling, Vrije Universiteit Brussel, Brussels, Belgium

⁴ Private Outpatient Clinic, Gdańsk, Poland

⁵ Department of Clinical and Experimental Endocrinology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Despite extensive research, the pathogenesis of polycystic ovary syndrome (PCOS) is not clearly understood. PCOS is a common, endocrine disorder connected with ovulatory dysfunction, the presence of polycystic ovaries, and hyperandrogenism.

Application of the untargeted metabolomic approach to serum and urine samples obtained from 35 PCOS women and 35 healthy controls allowed to identify specific metabolites and biochemical pathways affected during the PCOS development. Untargeted metabolomic analyses were conducted with the use of two complementary analytical techniques: LC-TOF/MS and GC-QqQ/MS. The selection of statistically significant metabolites was performed with the application of univariate and multivariate statistical analyses. The second aim was to determine concentrations of four classic androgens: androstenedione, testosterone, 5 α -dihydrotestosterone, and androsterone selected as the most significant during the untargeted approach. Targeted metabolomics was performed with the use of developed and validated liquid chromatography coupled with the mass spectrometry (HPLC-QqQ/MS) method.

Results of our research indicated that few biochemical pathways were disturbed in PCOS women such as elevated steroid hormones synthesis, alteration in fatty acids, sphingo- and phospholipids metabolism, as well as an alteration in the citric acid cycle, vitamin B metabolism, γ -glutamyl cycle, and amino acids like alanine, phenylalanine, histidine, and tryptophan. Concentrations of all androgens were significantly elevated in the PCOS group of patients, and the largest difference in the mean concentration was found for 5 α -dihydrotestosterone. The results of ROC analysis showed that the combination of three androgens together: androstenedione, testosterone, and 5 α -dihydrotestosterone with AUC = 0.91 was the best predictor of PCOS diagnosis.

Citation

Rajska A, Raczak-Gutknecht J, Struck-Lewicka W, Buszewska-Forajta M, et al. Application of untargeted and targeted metabolomics for evaluation of metabolome changes in women with polycystic ovary syndrome. Eur J Trans Clin Med. 2023;6(Suppl.4):171.



Poster Sessions 1 & 2 – Young Scientists

The alterations of lipid metabolism in endometrial cancer

Zmiany metabolizmu lipidów w raku macicy

Yelyzaveta Razghonova¹, Anna Abacjew-Chmyłko³, Adriana Mika^{1,2},
Tomasz Śledziński¹

¹ Department of Pharmaceutical Biochemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of Environmental Analytics, Faculty of Chemistry, University of Gdańsk, Gdańsk, Poland

³ Department of Gynaecology, Obstetrics and Neonatology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Endometrial cancer (EC) is a prevalent gynecological malignancy. While the exact etiology of EC remains multifactorial and complex, emerging evidence suggests that alterations in lipid metabolism play a crucial role in its pathogenesis and progression.

Materials and methods: Patients from whom the clinical material was collected were surgically treated at the Department of Surgical Oncology and Division of Gynaecology and Obstetrics of the Medical University of Gdańsk. The alterations of lipid metabolism in EC were achieved through polymerase chain reaction (PCR) and gas chromatography-mass spectrometry (GC-MS).

Results: Fatty acid (FA) profiling in tissue samples revealed an increase in the levels of n-6 polyunsaturated fatty acids (PUFAs): dihomo-gamma-linolenic, eicosadienoic, docosapentaenoic acids; n-3 PUFAs: eicosapentaenoic, docosahexaenoic, docosapentaenoic acids and monounsaturated fatty acids (MUFAs): palmitoleic, heptadecenoic, eicosenoic, gondoic, erucic, nervonic acids. There was also a significant decrease in the levels of arachidonic acid (n-6 PUFA) and myristoleic acid (MUFA) compared to the control group. The increased expression of stearoyl-CoA desaturase (SCD), fatty acid desaturase 2 (FADS2), fatty acid synthase (FASN) in EC highlights the altered lipid metabolism.

Conclusion: Our research showed alterations in lipid metabolism at the level of FA profile and the expression of genes related to FA metabolism and opens avenues for further investigations into lipid metabolism as a potential target for future therapeutic interventions.

Citation

Razghonova Y, Abacjew-Chmyłko A, Mika A, Śledziński T. The alterations of lipid metabolism in endometrial cancer. *Eur J Trans Clin Med.* 2023;6(Suppl.4):172.



Poster Sessions 1 & 2 – Young Scientists

Novel functionalized metal nanoparticles as potential agents in breast cancer therapy

Swathy Krishna Reghukumar¹, Elżbieta Megiel², Iwona Inkielewicz-Stępnik¹

¹ Department of Pharmaceutical Pathophysiology, Medical University of Gdańsk, Gdańsk, Poland

² Faculty of Chemistry, University of Warsaw, Warsaw, Poland

Abstract

Background and purpose: Nanotechnology offers a conducive platform for developing conjugated-drug delivery systems, resulting in improved drug efficacy and safety outcomes for cancer therapy. This study aims to investigate the selective cytotoxic effects of novel functionalized metal nanoparticles on breast cancer cells, as well as their potential in inhibiting metastasis through tumor cell-induced platelet aggregation mechanism (TCIPA).

Materials and methods: We synthesized and characterized 5-nanocomposites composed of doxorubicin, silver or gold nanoparticles conjugated with a bioactive polymer such as lipoic acid-PEG (polyethylene glycol) and polyethyleneimine (PEI) as a linker. Preliminary cytotoxicity evaluation via MTT-cell viability assay in breast cancer cell lines, MCF-7, MDA-MB-231, and a non-cancer cell line, HEK-293 was performed. The antiproliferative effect and cellular uptake analysis were performed by BrdU assay and transmission electron microscopy (TEM), respectively. Reactive oxygen species generation and cell membrane integrity was determined by flow cytometry and LDH assay. The inhibition of TCIPA was determined by light-transmission platelet aggregometry using MDA-MB-231 cells.

Results and discussion: Among five nanocomposites tested, three of them showed specific and potential anti-tumor activity in breast cancer cell lines MCF-7 and MDA-MB-231, while displaying minimal impact on the non-cancer HEK-293 cells. Moreover, all three nanocomposites demonstrated the antiproliferative effect on MDA-MB-231 cells. Additionally, the silver nanocomposites exhibited inhibition of PA induced by MDA-MB-231 tumor cells.

Conclusion: Our findings indicate that nanocomposites comprising bioactive polymers containing gold/silver nanoparticles coated with doxorubicin-PEG conjugates linked via PEI exhibit potential anticancer activity against breast cancer cells.

Funding: This research was supported by the ST-54 and grant for Young Scientist (Project-01-50022) from Medical University of Gdańsk.

Citation

Reghukumar SK, Megiel E, Inkielewicz-Stępnik I. Novel functionalized metal nanoparticles as potential agents in breast cancer therapy. *Eur J Trans Clin Med.* 2023;6(Suppl.4):173.



Poster Sessions 1 & 2 – Young Scientists

The effect of psychogenic hyperventilation on the result of capillary blood gas analysis obtained on POCT – the case study

Wpływ hiperwentylacji psychogennej na wynik gazometrii krwi włośniczkowej uzyskany w POCT – studium przypadku

Kornelia Sałaga-Zaleska¹, Ewelina Kreft¹, Małgorzata Dąbrowska²,
Maciej Jankowski¹

¹ Department of Clinical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Central Clinical Laboratory, University Clinical Centre in Gdańsk, Gdańsk, Poland

Abstract

Background: Point of care testing (POCT) – blood gas analysis (BGA) – can determine acid-base balance, the state of maintaining an optimal concentration of cations and anions in the body's tissues. Healthcare professionals performing POCT tests should receive ongoing training on the impact of errors in the preanalytical phase on the results obtained.

Method: A 6-year-old patient underwent capillary BGA performed several times on an ABL 835 analyzer (Radiometer) during his stay at the Clinical of Paediatrics, Nephrology, and Hypertension of the University Clinical Centre in Gdańsk in August 2020 for the diagnosis of renal diseases.

Results: The result of the BGA obtained (pH = 7.426; pCO₂ = 31.6 mmHg; pO₂ = 103.0 mmHg; O₂SAT = 98.2%) raised doubts in the mind of the laboratory diagnostician about the correctness of the clinical sample collection. A telephone call to the ward revealed that the patient was not receiving oxygen therapy and no significant changes in his clinical condition were noted, but the child was crying at the time of the capillary blood collection. However, it was decided to repeat the sampling. The results obtained (pH = 7.389; pCO₂ = 35.7 mmHg; pO₂ = 83.9 mmHg; O₂SAT = 96.5%) did not raise any questions.

Conclusion: Taking blood for a BGA from a crying baby gives unreliable results. During crying, the child breathes quickly and deeply, causing psychogenic hyperventilation, which is not reflected in the body when the child calms down. Medical personnel should be aware that taking blood for BGA from a crying child is pointless and has no diagnostic value, but only traumatizes the child and duplicates the situation in the future.

Citation

Sałaga-Zaleska K, Kreft E, Dąbrowska M, Jankowski M. The effect of psychogenic hyperventilation on the result of capillary blood gas analysis obtained on POCT – the case study. Eur J Trans Clin Med. 2023;6(Suppl.4):174.



Poster Sessions 1 & 2 – Young Scientists

Metabolite-associated changes in Intrauterine Growth Restricted Very Premature Babies

Charakterystyka profilu metabolomicznego u noworodków urodzonych skrajnie przedwcześnie

Ewa Magdalena Sokołowska^{1, 2}, Isabel Iglesias Platas³, Montserrat Izquierdo Renau³, Carla Balcells Esponera³, Beatriz del Rey Hurtado de Mendoza³, Coral Barbas⁴, Danuta Dudzik¹

¹ Department of Biopharmaceutics and Pharmacodynamics, Faculty of Pharmacy, Medical University of Gdańsk, Poland

² Scientific Students' Circle, Division of Neonatology, Medical University of Gdańsk, Gdańsk, Poland

³ Neonatal Unit, BCNatal, Hospital Sant Joan de Déu i Clínic, Barcelona University, Barcelona, Spain

⁴ Centro de Metabolómica y Bioanálisis, Universidad San Pablo-CEU, Madrid, Spain

Abstract

Intrauterine Growth Restriction (IUGR) compromises fetal growth and associates not only immediate complications but also a higher risk of adult-onset conditions. Infants born prematurely are characterized by low birth weight (BW) and might experience long-term metabolic consequences. IUGR and prematurity frequently coexist. We investigated the metabolic signature specifically associated with preterm-IUGR when compared with non-growth-restricted preterm infants.

We applied untargeted capillary electrophoresis mass-spectrometry-based metabolomics to urine and plasma of Very Preterm Infants (VPI): an IUGR group (n = 7) and a control group (VPI with adequate weight at birth and over 10th centile at term-equivalent age (n = 29)). Acquired data were processed, aligned, filtered, corrected for analytical signal drift, and normalized for variability in urine concentration. Metabolites were identified using an advanced CEU Mass Mediator tool with appropriate statistical evaluation performed.

There were statistically significant differences in 16 metabolic features in plasma and 29 in urine between the groups. Certain metabolic pathways seemed to be specifically altered in association with IUGR: lysine degradation (with depletion of urine lysine, hydroxylysine, pipercolic and aminoadipic acids, and saccharopine); arginine biosynthesis; arginine and proline metabolism; and glycine, serine, and threonine metabolism. Interestingly, we confirmed an increase in methoxykynurenate, a compound related to tryptophan metabolism that has been recently described within the metabolic signature of birthweight.

There is little data available on the metabolic profile of preterm IUGR babies. Although our study is limited by sample size, our findings have the potential to offer new directions for further research that could have implications for improved neonatal care.

Citation

Sokołowska EM, Iglesias Platas I, Izquierdo Renau M, Balcells Esponera C, et al. Metabolite-associated changes in Intrauterine Growth Restricted Very Premature Babies. *Eur J Trans Clin Med.* 2023;6(Suppl.4):175.



Poster Sessions 1 & 2 – Young Scientists

Analysis of prenylated flavonoids in various hop cultivar varieties with the assessment of antioxidant activity**Analiza prenylowanych flawonoidów w różnych odmianach chmielu zwyczajnego z oceną aktywności przeciwutleniającej****Barbara Sparzak-Stefanowska, Katarzyna Krajewska,
Mirosława Krauze-Baranowska**

Department of Pharmacognosy, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Cones are the most valuable plant raw material obtained from hops (*Humulus lupulus* L., *Cannabaceae*). They are a rich source of numerous chemical compounds, including prenylated chalcones and flavanones, (e.g. xanthohumol, isoxanthohumol, and 6- or 8-prenylnaringenin), which possess multidirectional biological activity – antioxidant, anti-inflammatory, anticancer, estrogenic, antimicrobial, and hypoglycemic.

The aim of the study was to analyze the presence of xanthohumol and isoxanthohumol in dried leaves, cones, and granules of cones from 14 cultivar varieties of hops. Phytochemical studies were carried out using chromatographic methods, namely TLC and HPTLC (qualitative analysis) and HPLC-UV (quantitative analysis). Research also included analysis of the antioxidant activity of the tested plant raw material by bioautography TLC with DPPH reagent (qualitative analysis) and spectrophotometric methods – FRAP, DPPH, and ABTS tests (quantitative analysis).

The presence of xanthohumol was confirmed in all analyzed plant samples. Quantitative analysis using the developed and validated HPLC-UV method showed that xanthohumol content was in the range of 0.05 mg/g DW up to 6.23 mg/g DW. The highest concentration was found in the granules of the 'lunga' cultivar variety. TLC-bioautography revealed that not only xanthohumol but also several other compounds are responsible for the total antioxidant effect of the tested plant samples. The strongest antioxidant activity in the DPPH test was found for the extract from cones of the 'Magnum' cultivar variety and the extract from granules of the 'lunga' variety, which also showed the highest antioxidant potential in the ABTS test.

Citation

Sparzak-Stefanowska B, Krajewska K, Krauze-Baranowska M. Analysis of prenylated flavonoids in various hop cultivar varieties with the assessment of antioxidant activity. *Eur J Trans Clin Med.* 2023;6(Suppl.4):176.



Poster Sessions 1 & 2 – Young Scientists

The anti-inflammatory properties of silver nanoparticles

Właściwości przeciwzapalne nanocząstek srebra

Karol P. Steckiewicz^{1,2}, Elżbieta Megiel³, Iwona Inkielewicz-Stępnia²

¹ Department of Anesthesiology and Intensive Therapy, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland

² Department of Pharmaceutical Pathophysiology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

³ Faculty of Chemistry, University of Warsaw, Warsaw, Poland

Abstract

Introduction: Autoimmune diseases are emerging epidemiological issues with limited therapeutic options. Novel achievements of nanotechnology may provide interesting therapeutic options. Thus, silver nanoparticles may be interesting drug delivery platforms with anti-inflammatory properties. In this work, we aimed to assess the anti-inflammatory properties of silver nanoparticles conjugated with hydrocortisone (AgNPs-HC).

Methods: We used murine macrophages (RAW264.7) to determine the anti-inflammatory properties of AgNPs. RAW264.7 cells were stimulated with lipopolysaccharide (LPS) to mimic inflammation. In order to determine anti-inflammatory effects, intracellular reactive oxygen species (ROS) production was determined by flow cytometry and secretion of proinflammatory cytokines: tumor necrosis factor α (TNF α) and interleukin-6 (IL-6) were determined by commercially available ELISA test.

Results: After stimulation of RAW264.7 cells with LPS, increased intracellular production of ROS was observed. Also, we measured increased secretion of TNF α and IL-6. If RAW264.7 cells were treated with AgNPs-HC before LPS stimulation, we observed a less prominent increase in ROS production. Moreover, the amount of secreted TNF α and IL-6 decreased significantly.

Conclusion: AgNPs-HC presented anti-inflammatory properties in the in vitro model, which makes them interesting candidates for future pharmaceuticals.

This work was supported by the PRELUDIUM grant 2020/37/N/NZ7/01430 from the Polish National Science Centre (PI of the grant – KS, Scientific supervisor of the grant – IIS).

Citation

Steckiewicz KP, Megiel E, Inkielewicz-Stępnia I. The anti-inflammatory properties of silver nanoparticles. Eur J Trans Clin Med. 2023;6(Suppl.4):177.



Poster Sessions 1 & 2 – Young Scientists

Capillary electrophoresis as a tool for the heterogeneity assessment and identification of extracellular vesicles

Elektroforeza kapilarna jako narzędzie do oceny heterogeniczności oraz identyfikacji pęcherzyków zewnątrzkomórkowych

Aleksandra Steć¹, Kamil Klocek¹, Grzegorz Czyrski², Andrea Heinz², Agata Płoska³, Leszek Kalinowski^{3,4}, Krzysztof Waleron⁵, Bartosz Wielgomas¹, Szymon Dziomba¹¹ Department of Toxicology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland² LEO Foundation Center for Cutaneous Drug Delivery, University of Copenhagen, Denmark³ Department of Medical Laboratory Diagnostics – Fahrenheit Biobank BBMRI.pl, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland⁴ BioTechMed Centre, Department of Mechanics of Materials and Structures, Gdansk University of Technology, Gdańsk, Poland⁵ Department of Pharmaceutical Microbiology, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Extracellular vesicles (EVs) are a heterogeneous group of spherical particles that are released by prokaryotic and eukaryotic cells in various biological processes. Due to their ability to transport proteins, lipids, nucleic acids, and metabolites, EVs exhibit biological activity and utility in diagnosis and monitoring of pathophysiological states in the body. Unfortunately, currently used techniques for EVs characterization show a low selectivity and their performance in EVs heterogeneity assessment is insufficient.

In the presented study, both prokaryotic and eukaryotic EVs were used. The former (outer-membrane vesicles from *Escherichia coli*) were provided by a commercial vendor. The latter were isolated from Citrus lemon and Citrus aurantifolia juice samples in accordance with the method described in. EVs were characterized with nanoparticle tracking analysis (NTA), total protein concentration (BCA test), microscopic analysis (Cryo-EM) and capillary electrophoresis (CE) with UV and LIF detection. The CE was able to detect heterogeneity of EVs in all analyzed samples. In the case of samples obtained from Citrus aurantifolia and *Escherichia coli*, two well-resolved signals were observed. Significant differences in the electrophoretic mobility and the shape of the peak characteristic for nanoparticles indicate the presence of two subpopulations of EVs in analyzed samples.

In the case of Citrus lemon, the heterogeneity of the EVs was reflected in a significant asymmetry of the signal. Selective dyes and LIF detection were used to confirm the identity of signals detected in CE. The gathered data was compared and the perspective of a future development of the presented method was discussed.

This work was supported by the Polish Ministry of Education and Science (grant 533 No. 71-01419-0004717) and National Science Centre (grant 2022/45/N/NZ7/01417).

Citation

Steć A, Klocek K, Czyrski G, Heinz A, et al. Capillary electrophoresis as a tool for the heterogeneity assessment and identification of extracellular vesicles. *Eur J Trans Clin Med.* 2023;6(Suppl.4):178.



Poster Sessions 1 & 2 – Young Scientists

New analytical approach for quantification of amino acids combining derivatization and ion-pair LC-MS/MS method

Nowe podejście analityczne do oznaczania aminokwasów w połączeniu z upochodnieniem i chromatografią par jonowych techniką LC-MS/MS

Piotr Struczyński, Anna Kaliszewska, Tomasz Bączek, Lucyna Konieczna

Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Time-efficient and comprehensive quantification of amino acids (AA) continues to be a challenge. In this study, a sensitive and precise method for quantitative analysis of AA from very small plasma and serum volumes was proposed. The combination of precipitation, derivatization, and chromatographic separation effectively avoids ion suppression and coelution. Chromatographic separation occurred on Agilent Zorbax SB-C18 columns, 2.1 mm × 50 mm, 1.8 μm. Anionic ion-pair reagent HFBA was added to the mobile phase to improve analyte interaction with the stationary phase. An aqueous solution of HFBA (ca. 0.5 mol/L) was diluted in water (mobile phase A) and methanol (mobile phase B) respectively to a final concentration of 0.5 mmol/L. The method was validated for sensitivity, linearity, precision and accuracy, matrix effects, and stability, referring to selected guidelines. Ion pair chromatography and derivatization to butyl esters have been combined into a new methodology for the determination of proteinogenic plasma AA by LC-MS/MS. In conclusion, the proposed method was ideally suited for cost-effective high-throughput analysis of large numbers of biological samples in clinical studies.

Citation

Struczyński P, Kaliszewska A, Bączek T, Konieczna L. New analytical approach for quantification of amino acids combining derivatization and ion-pair LC-MS/MS method. Eur J Trans Clin Med. 2023;6(Suppl.4):179.



Poster Sessions 1 & 2 – Young Scientists

Synthesis and anticancer activity of novel benzenesulfonamide derivatives containing 1,3,4-thiadiazole moiety**Synteza i aktywność przeciwnowotworowa nowych pochodnych benzenosulfonamidu zawierających ugrupowanie 1,3,4-tiadiazolu****Krzysztof Szafrąński¹, Jarosław Sławiński¹, Anna Kawiak²**¹ Department of Organic Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland² Department of Biotechnology, Intercollegiate Faculty of Biotechnology, University of Gdańsk and Medical University of Gdańsk, Gdańsk, Poland**Abstract**

All of our previous investigations focused on the anticancer activity of arylsulfonamide derivatives showed that (*E*)-4-chloro-5-(5-(2-arylethenyl)-1,3,4-oxadiazol-2-yl)benzenesulfonamides, exhibit remarkable in vitro anticancer activity. On the other hand, the replacement of oxygen atom with sulphur often leads to analogues with higher lipophilicity, and what is more, thiadiazole moiety may be used as a bioisosteric replacement for oxadiazole. Thus, we decided to synthesize analogous benzenesulfonamide derivatives containing 2-(2-arylethenyl)-1,3,4-thiadiazole substituents. Eleven target compounds were obtained in the multistep reactions starting from 4-(hydrazinocarbonyl)benzenesulfonamide or 2,4-dichloro-5-(hydrazinocarbonyl)benzenesulfonamide and next were characterized with spectroscopic methods: ¹H NMR, ¹³C NMR, IR, and elemental analysis. Obtained compounds were subjected to anticancer evaluation on 3 cancer cell lines: MCF-7 (breast), HCT116 (colon), and HeLa (cervical cancer) in a 5-dose MTT assay.

Comparing the new compounds with the previously reported ones, it turned out that replacing 1,3,4-oxadiazol with a ring with 1,3,4-thiadiazole significantly increased the activity, up to 650 times. The new compounds showed cytotoxic activity, measured as IC₅₀, against tested cell lines in the range of 0.25-90 μM.

Citation

Szafrąński K, Sławiński J, Kawiak A. Synthesis and anticancer activity of novel benzenesulfonamide derivatives containing 1,3,4-thiadiazole moiety. Eur J Trans Clin Med. 2023;6(Suppl.4):180.

Poster Sessions 1 & 2 – Young Scientists

Gender-dependent effect of 17 β -estradiol on metallothioneins genes expression in adipose tissue

Zależny od płci wpływ 17 β -estradiolu na ekspresję genów kodujących metalotioneiny w tkance tłuszczowej

Sylwia Szrok-Jurga, Jacek Turyn, Ewa Stelmanska

Department of Biochemistry, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Metallothioneins (MTs) are small-molecular proteins consisting of 30% of cysteine. Four distinct MTs isoforms designated MT-1 through MT-4 exist in mammals. By binding heavy metals (e.g., cadmium, lead), MTs participate in systemic detoxification processes and significantly regulate zinc and copper levels. Furthermore, MTs are a potent antioxidant and play a putative role in cancer cell proliferation and apoptosis.

The present study demonstrates that depending on gender, 17 β -estradiol exerts different effects on the MTs gene expression in rats' inguinal white adipose tissue (WATi). Administration of 17 β -estradiol to the ovariectomized female rats resulted in approximately 3-fold higher MT-1 and MT-2 mRNA levels in WATi versus not treated-female controls and almost 8-fold and 4-fold increased levels of MT-1 and MT-2 respectively, compared to the ovariectomized group. In addition, there was no indication of a change in the MT-3 mRNA level. The enhanced expression of the MT-1 and MT-2 genes in the WATi of female rats was strongly correlated with the concentration of 17 β -estradiol determined in the serum. On the contrary to females, increased serum concentration of 17 β -estradiol did not change the expression of MTs genes in male rats. Moreover, it was also detected that orchidectomy did not alter the MTs gene levels in males' WATi.

Our results indicate that 17 β -estradiol significantly affects the expression of MT-1 and MT-2 genes in the WATi, but only in females, which may result, for instance, from the different levels of estradiol receptors between the sexes in WATi.

Citation

Szrok-Jurga S, Turyn J, Stelmańska E. Gender-dependent effect of 17 β -estradiol on metallothioneins genes expression in adipose tissue. *Eur J Trans Clin Med.* 2023;6(Suppl.4):181.

**Poster Sessions 1 & 2 – Young Scientists****Thermoplastic composite including C18-modified silica and its application in the analysis of samples containing medicinal substances**

Termoplastyczny kompozyt zawierający krzemionkę modyfikowaną łańcuchami C18 i jego zastosowanie w analizie próbek zawierających substancje lecznicze

Dagmara Szynkiewicz, Szymon Ulenberg, Paweł Georgiev, Tomasz Bączek, Mariusz Belka

Department of Pharmaceutical Chemistry, Medical University of Gdańsk, Gdańsk, Poland

Abstract

There are multiple tools for sample preparation, however, they still do not meet all of the needs of analysts. There is a demand for customized methods for sample extraction and clean-up, which can be easily fulfilled by the endless possibilities given by 3D printing technologies. The lack of appropriate materials limits the development of advanced applications involving directly 3D-printed devices with intrinsic chemical activity. In this study, we present a novel composite material by incorporating C18-functionalized silica particles dispersed in the polymer matrix made out of chemically inert polypropylene and ABS (acrylonitrile-butadiene-styrene) which acts as a porogen. C18-modified silica particles are a popularly used sorbent within the field of pharmaceutical analysis and separation. The obtained filament allows to freely shape it with the use of a 3D printer in an easy and inexpensive way. The composite material presents porosity that results from the removal of ABS through acetone rinsing and has been also examined and confirmed with SEM, mercury porosimetry, and argon adsorption. The 3D-printed sorbent devices with the presented novel filament proved to be suitable for satisfactory extraction of exemplary medicinal small-molecular analytes: imipramine, carbamazepine, and glimepiride. There are multiple concepts for further applications of the presented composite material.

Citation

Szynkiewicz D, Ulenberg S, Georgiev P, Bączek T, et al. Thermoplastic composite including C18-modified silica and its application in the analysis of samples containing medicinal substances. *Eur J Trans Clin Med.* 2023;6(Suppl.4):182.



Poster Sessions 1 & 2 – Young Scientists

Characterization of saliva metabolic profile with the use of gas chromatography-mass spectrometry untargeted analysis

Zastosowanie chromatografii gazowej sprzężonej
ze spektrometrią mas w identyfikacji charakterystycznych
składników śliny

**Małgorzata Waszczuk-Jankowska¹, Danuta Dudzik¹, Danuta Siluk¹, Beata Graff²,
Krzysztof Narkiewicz², Miachał J. Markuszewski¹**

¹ Department of Biopharmacy and Pharmacodynamics, Medical University of Gdańsk, Gdańsk, Poland

² Department of Hypertension and Diabetology, Medical University of Gdańsk, Gdańsk, Poland

Abstract

Saliva consists of a complex mixture of fluids secreted by major and minor salivary glands. This clear, slightly acidic fluid is composed of water (99%), proteins (0.3%), inorganic compounds (0.2%), and residual organic substances. Metabolomics is a systematic study of metabolites or small molecules generated by the process of metabolism. Salivary metabolites reflect the health status of not only the patient's salivary glands and oral cavity but also of the whole body. The use of saliva samples compared to blood/plasma/serum has many advantages, including an inexpensive, simple, and non-invasive collection method and easy, low-cost storage of this biofluid. The proposed metabolomics approach to saliva samples is based on untargeted analysis using gas chromatography separation technique with mass spectrometry detection in order to identify the human salivary metabolome of unhealthy patients. The GC-EI-MS method of untargeted metabolomics has been applied to a pilot study of saliva samples obtained by passive drool from patients with hypertension and from healthy controls. The analysis was characterized by high precision, verified by quality control and quality assurance procedures. The obtained experimental data were processed, including peak detection, deconvolution, and metabolite identification, which was done by using the commercial spectral library NIST (National Institute of Standards and Technology) and Fiehn GC/MS Metabolomics RTL Library. As a result, a broad spectrum of compounds belonging to various chemical classes was reported, which provides complementary information about saliva composition.

Citation

Waszczuk-Jankowska M, Dudzik D, Siluk D, Graff B, et al. Characterization of saliva metabolic profile with the use of gas chromatography-mass spectrometry untargeted analysis. *Eur J Trans Clin Med.* 2023;6(Suppl.4):183.

**Poster Sessions 1 & 2 – Young Scientists****Modification of gradient HSA-HPLC method for
determination of small molecules affinity to human
serum albumin into column-safety conditions**

Udoskonalenie gradientowej metody HSA-HPLC do oceny
powinowactwa substancji drobnocząsteczkowych do albuminy
surowicy ludzkiej, minimalizujące ryzyko uszkodzenia kolumny
chromatograficznej

**Mateusz Woziński¹, Katarzyna Ewa Greber¹, Monika Pastewska¹, Piotr
Kolasiński¹, Weronika Hewelt-Belka², Beata Żołnowska³, Daniel Szulczyk⁴,
Wiesław Sawicki¹, Krzesimir Ciura^{1,5}**

¹ Department of Physical Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

² Department of Analytical Chemistry, Chemical Faculty, Gdańsk University of Technology, Gdańsk, Poland

Department of Organic Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland

⁴ Chair and Department of Biochemistry, Medical University of Warsaw, Warsaw, Poland

⁵ QSAR Lab Ltd., St. Gdańsk, Poland

Abstract

Nowadays, the proper selection of the most promising structures in the drug discovery pipeline is an essential step. According to statistics, only one out of eight compounds that enter clinical trials meets the required criteria. Besides biological activities, pharmacokinetics properties determine the success or failure during the clinical phase stage. Therefore, high-throughput methods that assist in predicting the pharmacokinetic behavior of potential therapeutic agents are highly desirable.

Among investigated endpoints, plasma protein binding (PPB) is now considered essential at an early stage of drug development. In most cases, PPB has a crucial impact on drug pharmacokinetics properties, particularly on parameters like volume of distribution, half-life, and clearance.

Currently, there is no standard procedure to evaluate drug affinity to PPB. Among available methods, HPLC offers noticeable advantages like time reduction for sample preparation, full automatization, ability to analyze substances with high affinity to PPB with simultaneous indication of differences in such analytes even in the decimal part of percent.

In this work, we proposed and investigated a method operating into column-safe conditions that allowed us to extend the lifetime of the column. The reproducibility of the proposed method was assessed, including inter-day and intra-day variations. Additionally, the robustness of the method was tested using the DoE approach. The proposed method was evaluated using model substances and three groups of antibiotic-oriented substances: fluoroquinolones, sulfonamides, and tetrazole-thiourea derivatives. Furthermore, based on the reversed-phase chromatography and immobilized artificial membrane chromatography, the workflow of pilot studies was proposed to select molecules that have high affinity to HSA and can not be eluted from the HSA column using the elaborated method.

Citation

Woziński M, Greber KE, Pastewska M, Kolasiński O, et al. Modification of gradient HSA-HPLC method for determination of small molecules affinity to human serum albumin into column-safety conditions. *Eur J Trans Clin Med.* 2023;6(Suppl.4):184.

Poster Sessions 1 & 2 – Young Scientists

Uncertainty of postmortem time estimation based on potassium ion determination in vitreous humour using potentiometric ion-selective electrode and microwave-induced plasma with optical emission spectrometry methods

Niepewność oszacowania czasu zgonu na podstawie oznaczania jonów potasu w cieple szklistym przy użyciu potencjometrycznej elektrody jonoselektywnej i optycznej spektrometrii emisyjnej sprzężonej z plazmą indukowaną mikrofalowo

Sonia Zięba¹, Marek Wiergowski¹, Bartłomiej Michał Cieślik², Jacek Sein Anand^{3,4}, Marta Krzyżanowska¹

¹ Department of Forensic Medicine, Faculty of Medicine, Medical University of Gdańsk, Gdańsk, Poland

² Department of Analytical Chemistry, Faculty of Chemistry, Gdańsk University of Technology, Gdańsk, Poland

³ Division of Clinical Toxicology, Faculty of Health Sciences with the Institute of Maritime and Tropical Medicine, Medical University of Gdańsk, Gdańsk, Poland

⁴ Pomeranian Center of Toxicology, Gdańsk, Poland

Abstract

One of the biochemical methods of estimation of the time since death is the examination of potassium ions concentration in the vitreous humor (VH). This study aimed to estimate the uncertainty of the determination of potassium ion concentration using direct potentiometric ion-selective electrode (ISE) and microwave-induced plasma with optical emission spectrometry (MIP-OES).

During an autopsy at the Department of Forensic Medicine of the Medical University of Gdańsk in 2021-2022, VH samples were collected from 42 deceased people. The uncertainty for the potassium ion determination in VH was based on the guideline EA-4/02 M:2022.

The type A of expanded uncertainties for 2, 10, and 25 mg/L potassium ions concentrations were 1.2%, 2.2%, and 2.5% for the MIP-OES and 12.2%, 6.1%, and 3.1% for the ISE method, respectively. In the case of type B uncertainty, the MIP-OES method was characterized by almost two times lower expanded uncertainty than for the ISE method. All components of type B uncertainty estimation of the ISE and MIP-OES methods did not exceed 1%, except for the temperature fluctuation and measurement noise component for the ISE method.

The postmortem concentration of potassium ions in the VH has a limited PMI time window range and may be influenced by interfering factors. Uncertainty of types A and B should be considered, as it generally has a significant effect on the estimation of PMI. Both A and B estimates give similar results, which may prove the usefulness of both methods.

Citation

Zięba S, Wiergowski M, Cieślik MB, Sein Anand J, et al. Uncertainty of postmortem time estimation based on potassium ion determination in vitreous humour using potentiometric ion-selective electrode and microwave-induced plasma with optical emission spectrometry methods. Eur J Trans Clin Med. 2023;6(Suppl.4):185.



Poster Sessions 1 & 2 – Young Scientists

Synthesis of *N*-(4-acryloylphenyl)-2,4-dichloro-5-sulfamoylbenzamides with anticancer activity**Synteza pochodnych *N*-(4-akryloilofenylo)-2,4-dichloro-5-sulfoamiloobenzamidu o aktywności przeciwnowotworowej****Beata Żołnowska¹, Jarosław Sławiński¹, Anna Kawiak²**¹ Department of Organic Chemistry, Faculty of Pharmacy, Medical University of Gdańsk, Gdańsk, Poland² Department of Biotechnology, Intercollegiate Faculty of Biotechnology, University of Gdańsk – Medical University of Gdańsk, Gdańsk, Poland**Abstract**

Breast, cervical, and colorectal cancers are the most common female cancer types worldwide. One important approach in the search for chemotherapeutic agents is the combination of different building blocks, fragments from known drugs, leading structures, or “hit” structures into a single molecule. This strategy involves creating hybrid compounds that aim to achieve a synergistic effect and enhanced efficacy compared to the individual starting compounds.

The main aim of this research was to synthesize new *N*-(4-acryloylphenyl)-2,4-dichloro-5-sulfamoylbenzamide derivatives with potential anticancer activity. The compounds were designed as molecular hybrids, incorporating fragments of chalcone and benzenesulfonamide. The structures of the compounds were confirmed using elemental analysis, spectroscopic techniques such as (IR, ¹H NMR, ¹³C NMR), and mass spectrometry.

MTT assays were performed on three cancer cell lines: MCF-7 (breast cancer), HCT-116 (colorectal cancer), and HeLa (cervical cancer). Results showed that all compounds 6-9 and 11-13 are highly active against all three cell lines and their IC₅₀ values are between 3 μM to 13 μM. The highest sensitivity shows the HCT-116 cell line with IC₅₀ values from 3 μM to 4 μM for all tested compounds. The highest cytotoxic activity is presented by compounds 8 and 11 with IC₅₀ = 3 μM. The activity of compounds 6-9 and 11-13 is also high against cell lines MCF-7 and HeLa with IC₅₀ = 4.5-9 μM (MCF-7) and IC₅₀ = 4-13 μM (HeLa). Compound 9 shows the best results with an average IC₅₀ = 4 μM.

Citation

Żołnowska B, Sławiński J, Kawiak A. Synthesis of *N*-(4-acryloylphenyl)-2,4-dichloro-5-sulfamoylbenzamides with anticancer activity. Eur J Trans Clin Med. 2023;6(Suppl.4):186.



Sesja 7: Medycyna pola walki

Tamowanie masywnych krwotoków na polu walki

Paweł Jastrzębski

Katedra Ratownictwa Medycznego, Szkoła Ratownictwa Medycznego, Uniwersytet Warmińsko-Mazurski
w Olsztynie

Abstract

The speech concerns effective strategies for stopping massive haemorrhages as a part of advanced field science of Tactical Combat Casualty Care (TCCC). The topic is important to the treatment outcomes that are delivered on the battlefield, as well as to civilian units that are available in the events of a mass occurrence, where the presence of soldiers can be registered quickly and effectively. Presentation shows the newest methods, technologies and protocols used in TCCC, including the use of hemostatic bandages, including coagulation agents, as well as methods of mechanical stoppage of hemorrhages. Challenges related to providing appropriate medical training and access to advanced medical equipment in the field are also discussed. Presented events and analyses illustrate the effectiveness of strategies to stop massive hemorrhages. Conclusions included in the presentation are intended to underline the necessity of continuous adapting and improving techniques of TCCC in order to reduce results of hemorrhages on the battlefield.

Citation

Jastrzębski P. Tamowanie masywnych krwotoków na polu walki. Eur J Trans Clin Med. 2023;6;(Suppl.4):187.

**Sesja 7: Medycyna pola walki****Urazy czaszkowo-mózgowe na polu walki****Tadeusz Miłowski**

Katedra Medycyny Ratunkowej, Uniwersytet Warmińsko-Mazurski w Olsztynie

Abstract

The presentation concerns the epidemiology, causes, effects and effective methods of treating traumatic brain injuries resulting from combat conditions. In current armed conflicts, means of destruction prohibited by international conventions are used, the combat potential of the enemy is different, which means that the scope and severity of cranio-cerebral injuries significantly differ from those previously encountered. The experience of battlefield medicine and the guidelines of the TCCC committee as well as the latest reports and research constitute an important contribution to modifying the initial treatment of brain injuries also in civilian conditions. Compliance with recommendations can significantly affect not only the survival of patients with traumatic brain injury, but also the prognosis of their recovery. The presentation covers strategies for preventing secondary brain injuries caused by hypoxia and hypovolemia, as well as recommendations for pain treatment and infection prevention.

Citation

Miłowski T. Urazy czaszkowo-mózgowe na polu walki. Eur J Trans Clin Med. 2023;6;(Suppl.4):188.

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