HRVATSKO DRUŠTVO FIZIOLOGA

HDF CPS

CROATIAN PHYSIOLOGICAL SOCIETY

17th Annual Symposium of the Croatian Physiological Society



Program and Abstract book

Cres, September 20th – 21st, 2024

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Graphical design

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Venue: Palace Moise, University of Rijeka, Zagrad 6, 51557 Cres, Croatia

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Final program

Friday, September, 20th 2024

10,00-10,15: Opening ceremony

10,15-13,00: Session 1

Chairs: Ines Mrakovčić-Šutić, Zrinka Mihaljević

25' Invited speaker: Aleksandra Dugandžić (Zagreb, Croatia): The role of thermovision in the assessment of thermogenesis in clinical and preclinical research

25' Invited speaker: Bojan Polić (Rijeka, Croatia):
Effect of strong, non-lethal viral infection on glucose metabolism and immune response

25' Invited speaker: Lana Kralj (Ljubljana, Slovenia):
The effect of acute hyperglycemia on microvascular reactivity challenged by iontophoresis

25' Invited speaker: Ines Drenjančević (Osijek, Croatia): miRNA control of oxidative stress in vascular function

Selected oral presentations:

10' Josip Miljković (Zagreb, Croatia): Brain fatty acid composition in two species of wall lizard – a preliminary study

10' Božena Ćurko Cofek (Rijeka, Croatia): Osteoarthritis in patients with spondyloarthritis reflects metabolic and inflammatory components of the disease

10' Marijančić Verner (Rijeka, Croatia): Gender differences in relationship between physical activity, sedentary behaviour and non- specific low back pain in college students

13,00-14,30: Lunch
Restoran Nono Frane

14,30-17,00: Session 2

Chairs: Bojan Polić, Aleksandra Dugandžić

25' Invited speaker: Zlatko Dembić (Oslo, Norway): Defending and Integrating an organism by the Immune System

25' Invited speaker: Akos Koller (Budapest, Hungary): The mechanosensitive and permeability function of microvascular glycocalyx

25' Invited speaker: Ines Mrakovčić-Šutić (Rijeka, Croatia): Clinical significanses of enzymes matrix metalloproteinases and their tissue inhibitors in atherogenesis, malignancies and environmental diseases

Selected oral presentations:

10' Ivo Krešić (Mostar, Bosnia and Hezegovina): Functional and phenotypic characteristics of peripheral blood monocyte subsets

10' Tomislav Smoljo (Zagreb, Croatia): The Influence of Human Bone Marrow Stromal Cells on AICAr-Induced Differentiation of Acute Myeloid Leukemia Cells

17,00-17,45: Coffee break

17,45-19,00: Poster session

Chairs: Hrvoje Lalić, Ivana Jukić

Posters have to be prepared in pdf forms with 3 minutes oral presentations

1. *P. Babula, Z. Nováková, X. Budínská, P. Štursová, M. Nováková: Simulation Centre of the Faculty of Medicine of Masaryk University and innovations in teaching physiology. Brno, Czech Republic.*
2. *Nikolino Žura, Porin Perić, Marinko Vilić, Silvijo Vince, Krešimir Malarić, Marina Vajdić, Ana Shek Vugrovečki, Suzana Milinković Tur, Nina Poljičak Milas, Ivona Žura Žaja: Effect of the 5G exposure at 700 MHz on humans' erythrocytes morphometric parameters after a short-term in vitro exposure. Zagreb, Croatia.*
3. *P. Štursová, P. Babula: Antioxidant capacity and the healing of pressure ulcers in patients with spinal cord lesions. Brno, Czech Republic.*
4. *X. Budínská, O. Pírek, P. Babula, Z. Nováková. Effects of peroral hormonal contraception on cardiovascular system: a pilot project. Brno, Czech Republic.*
5. *J. Novák, Z. Nováková, H. Poloczková, J. Fialová Kučerová, P. Hruška, J. Kučera, J. Bienertová Vašků, J. Krejčí: Extracellular matrix protein changes in plasma reflects left ventricular remodelling in patients with recent onset heart failure: proteomic perspective. Brno, Chech Republic.*
6. *Tea Frković, Ivana Šutić, Vanda Piškur, Aleksandar Bulog: Concentrations of THMS in pool waters of the Primorsko-goranska County and their impact on the health of bathers. Rijeka, Croatia.*
7. *Damir Grebić, Tamara Gulić, Sara Bilić Knežević: The role of metalothionein in pathogenesis of breast cancer. Rijeka, Croatia.*
8. *Tihana Nađ, Ana Stupin, Nikolina Kolobarić, Zrinka Mihaljević, Ines Drenjančević, Martina Kos, Ivana Jukić: The effect of omega-3 PUFAS-enriched chicken meat consumption on microvascular reactivity in young healthy people. Osijek, Croatia.*
9. *Z. Nováková, N. Rafčíková, J. Šťastná, L. Dostalová Kopečná, P. Babula: Monitoring the health status of children and adolescents at the Ambulance of Obesity in Brno, Czech Republic.*
10. *Gordana Blagojević Zagorac, Natalia Jug Vučko, Valentino Pavišić, Hana Mahmutefendić Lučin, Tamara Gulić and Pero Lučin: Effet of smalll interfering RNA-mediated knockdown of ARF guanine nucleotide exchange factors on cytomegalovirus infection. Rijeka, Croatia.*
11. *Mateo Tićac, Kristina Franjić, Verner Marijančić, Marina Bubonja Šonje, Tanja Grubić Kezele: Prognostic evaluation of the APACHE II score and the Charlson Comorbidity Index in septic patients in the Intensive Care Unit. Rijeka, Croatia.*

12. *Iva Uravić Bursać, Vedrana Drvar, Vesna Pehar Pejčinović, Tatjana Kehler, Viktor Peršić, Gordana Laškarin: Monocyte chemoattractant protein-1 links inflammation and classical cardiovascular risk factors. Rijeka, Croatia.*
13. *Ivona Žura Žaja, Ana Shek Vugrovečki, Antun Kostelić, Monica Darrer, Gordan Šubara, Suzana Milinković Tur, Stefani Fruk, Sven Menčik, Jadranka Pejaković Hlede, Denis Cvitković, Dražen Đuričić: Comparison of some erythrocyte parameters in Istrian goats determined manually or automatically. Zagreb, Croatia.*

19,30: Galla dinner
Restoran Nono Frane

Saturday, September, 21st 2024

9,00-9,30: Meeting of the CPS

9,30-12,30: Session 3

Chairs: Ivana Jukić, Helena Lenasi

25' Invited speaker: Igor Pantić (Beograd, Serbia): Application of artificial intelligence methods based on supervised machine learning in experimental physiology

25' Invited speaker: Gordana Laškarin (Rijeka, Croatia): Immuno- ethiopathogenesis of spondyloarthritis, as a basis for new therapeutic options

25' Invited speaker: Lana Pađen (Zagreb, Croatia): Fatty acid compositionanalysis of different tissues and body fluids-methods, challenges and physiological perspective

25' Invited speaker: Sara Tajnikar (Ljubljana, Slovenia): Strategies for the management of opportunistic microorganisms in drinking water

10' Ana Đorđević (Rijeka, Croatia): Molecular characterization of disease-causing genes and modifier genes and genotype-phenotype correlation in thalassemia syndromes

12,30-13,00: Awards, Closing Ceremony

BOOK OF ABSTRACTS

INVITED LECTURE -1

The role of thermovision in the assessment of thermogenesis in clinical and preclinical research

Aleksandra Dugandžić

Laboratory of cellular neurophysiology, Croatian Institute for Brain Research, School of Medicine, University of Zagreb, Zagreb, Croatia;

In the past few years, thermovision has found its application not only in the military (border control) and construction (energy efficiency), but also in biological professions. In medicine, in addition to measuring body temperature remotely, thermovision can determine changes in surface blood circulation (inflammation or sympathetic activation). Thermovision is recently used for determining thermogenesis in humans and laboratory animals by measuring activity of brown adipose tissue (BAT) instead of previously used, but unsuitable, positron emission tomography computed tomography (PET-CT). The infrared camera software calculates the object's temperature using distance from the object, skin emissivity, reflected room temperature, air temperature, and relative humidity. Changes in BAT activity measured by infrared thermography, a noninvasive and more sensitive method, were shown to be sex, age, and phase of the estrous cycle dependent in laboratory animals. This method is also a variable tool for determining possible effects of drugs that could rejuvenate BAT activity which will be important for obese, elderly or diabetic patients.

This study was financed by the ERDF (KK.01.1.1.01.0007) and by the CSF (IP-2018-01-7416).

INVITED LECTURE -2

The impact of a strong, non-lethal viral infection on glucose metabolism and immune response

Marko Šestan[1,6], Sanja Mikašinović[1], Ante Benić[1], Stephan Wueest[2], Christoforos Dimitropoulos[3], Karlo Mladenić[1], Mia Krapić[1], Lea Hiršl[4], Yossef Glantzspiegel[5], Ana Rasteiro[6], Maria Aliseychik[6], Đurđica Cekinović Grbeša[7], Tamara Turk Wensveen[8,9], Marina Babić[1,3], Irit Gat-Viks[5], Henrique Veiga-Fernandes[6], Daniel Konrad[2], Felix M. Wensveen[1], Bojan Polić[1]

[1] Department of Histology and Embryology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia
[2] Division of Pediatric Endocrinology and Diabetology and Children's Research Centre, University Children's Hospital, University of Zurich, Zurich, Switzerland
[3] Innate Immunity, German Rheumatism Research Centre, Leibniz Institute, Berlin, Germany.
[4] Center for Proteomics, Faculty of Medicine, University of Rijeka, Rijeka, Croatia.
[5] School of Molecular Cell Biology and Biotechnology, George S. Wise Faculty of Life Sciences, Tel Aviv University, Tel Aviv, Israel.
[6] Champalimaud Research, Champalimaud Centre for the Unknown, Lisbon, Portugal
[7] Department of Infectious Diseases, Clinical Hospital Center Rijeka, Rijeka, Croatia
[8] Center for Diabetes, Endocrinology and Cardiometabolism, Thallassotherapia, Opatija, Croatia
[9] Department of Internal Medicine, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

Viral infection causes changes to our metabolism that are relative to the severity of disease. To what extent blood glucose levels are subject to infection-induced changes is mostly unknown. Here we show that strong, non-lethal infection causes restriction of systemic glucose availability which promotes the antiviral IFN-I response. Following systemic viral infection of mice, we find that IFNγ produced by γδ T cells directly stimulates pancreatic β-cells to increase glucose-induced insulin release. Subsequently, hyperinsulinemia lessens endogenous glucose output by the liver. Glucose restriction enhances type-I interferon production by curtailing lactate-mediated inhibition of IRF3 and NF-κB signaling. Induced hyperglycemia constrained IFN-I production and increased mortality upon infection. These findings identify glucose restriction as a physiological mechanism to bring the body into a heightened state of responsiveness to viral pathogens. This immune-endocrine circuit is disrupted in hyperglycemia, which explains why people with metabolic disease are more susceptible to viral infection.

INVITED LECTURE -3

The effect of acute hyperglycemia on microvascular reactivity challenged by iontophoresis

Lana Kralj and Helena Lenasi

Institute of Physiology, University of Ljubljana, Faculty of Medicine, Ljubljana, Slovenia

Introduction

While the long-term negative effects of chronic hyperglycemia on microvascular function in healthy individuals are well known, the effects of acutely elevated plasma glucose levels on microvascular reactivity remain less elucidated.

Aim

We investigated the effects of oral glucose loading (OGL) on microvascular endothelial function in healthy subjects *in vivo* using laser Doppler flowmetry (LDF) coupled with iontophoresis of acetylcholine (Ach) as a perfusion quantification technique, and wavelet analysis (WA) as an interpretative tool.

Methods:

Ten healthy volunteers participated in a test protocol in which they drank a standard glucose solution (75 g of glucose dissolved in 250 ml water) and a control protocol in which they drank the same amount of water.
LDF recordings of Ach iontophoresis response in each protocol were acquired before, 45 minutes, and 120 minutes after each intervention.

Acquired signals were decomposed into their frequency spectra using WA. The relative power (RP = median power of each frequency interval / median power of the total spectrum) was calculated to compare the contributions of different physiological mechanisms to the regulation of microcirculatory responses.

Results:

WA detected periodic oscillations with frequencies corresponding to cardiac, respiratory, myogenic, neurogenic, endothelial NO-dependent, and endothelial NO-independent influences.
Acute hyperglycemia affected the microcirculation differently than water. Significant differences in spectral components were observed between the pre-load and post-load periods.

Conclusion:

Acute hyperglycemia significantly alters the skin microcirculation reactivity. Possible mechanisms involve, but are not limited to, modulation of low-frequency intervals related to vascular endothelial function.

INVITED LECTURE -4

miRNA control of oxidative stress in vascular function

Ines Drenjančević

Dept of Physiology and Immunology, Faculty of Medicine Osijek, J. Hutlera 4, 31000 Osijek

Email: ines.drenjancevic@mefos.hr

Oxidative stress affects vascular reactivity and is considered to be the one of the most important causes of endothelial dysfunction, underlying all cardiometabolic diseases, such as hypertension, diabetes mellitus, obesity, chronic kidney disease and similar. Oxidative stress occurs due to inbalance of pro-oxidative and antioxidative defence mechanisms.

MicroRNAs (miRNAs) are highly conserved RNAs found in all biological fluids, which mediate post-transcriptional gene silencing and are emerging as master regulators of gene expression. Individual miRNA molecules, such as miRNA-335-5p, miR-92a, miR-92a-3p are related to endothelial dysfunction. Recently, the role of miRNA in oxidative stress has also been investigated. Of particular interest is regulation of function or expression of genes that code for antioxidative enzymes, such as superoxide dismutase or catalase. It has been shown that catalase is inhibited by miR-30b, miR-146a and miR511b, superoxide dismutase (Cu/Zn SOD and MnSOD) is inhibited by miR-21 and miR-206, and glutathione peroxidase and glutathione reductase are affected by miR-144.

Altogether, this opens new diagnostic and therapeutic possibilities and requires further research in the field of cardiovascular and cardiometabolic diseases. More in vivo and clinical research is necessary in animal and human models in order to exploit the full potential of this novel technology. Hereby, recent knowledge on the role of miRNA in the regulation of oxidative stress and vascular function will be presented.

INVITED LECTURE -5

Defending and Integrating an organism by the Immune System

Zlatko Dembić

INVITED LECTURE -6

The mechanosensitive and permeability function of microvascular glycocalyx

Akos Koller

INVITED LECTURE -7

Clinical significanses of enzymes matrix metalloproteinases and their tissue inhibitors in atherogenesis, malignancies and environmental diseases

Ines Mrakovčić-Šutić[1,2]

[1]Department of Physiology and Immunology, Medical Faculty, University of Rijeka
[2]Department of Basic Medical Sciences, University of Rijeka, Faculty of Health Studies, Rijeka, Croatia

Background: Matrix metalloproteinases (MMPs) play a key role in the physiology of connective tissue development, morphogenesis and wound healing. Their unregulated activity has been implicated in numerous disease processes including arthritis, tumor cell metastasis and atherosclerosis. Immunological activity and vascular inflammation during atherosclerosis can be modul ated by autoimmune responses against self-antigens, according to changeable risk factors (cholesterol, oxidized low-density lipoprotein (ox-LDL) in the vascular wall, fatty acids, etc.) and accompanied by accumulation of leucocytes and proinflammatory cytokines, which stimulate the transcription of matrix-metalloproteinases (MMPs), whose concentration are increased in foam cell rich regions. High concentration of MMP 2 and 9 enzymes followed by diminished values of Tregs in atherosclerotic patients highlights the importance of regulatory T immunity in atherosclerotic etiopathogenesis and indicated determination of MMPs as an easy markers for the monitoring of the development of atherosclerosis. The family of matrix metalloproteinases (MMPs) and their tissue inhibitors (TIMPs) play very important role in colon carcinogenesis. Subjects and methods: The expression of matrix metalloproteinase 2 and 9 (MMP-2 and 9) enzymes and their tissue inhibitors (TIMP 1 and 2) were detected in urine by ELISA method in patients with atherosclerotic changes (A patients) and in patients with carotid arteries stenosis (CAS patients)) before the surgical procedure. The same method was used to examine this expression in subjects near industrial areas and in rural fields.
Results: The concentrations of the enzyme MMP-9 were significantly elevated in the urban population in comparisson wih rural, as well as, in the occupationally exposed group. Incresed levels of MMPs and TIMPs were found in CAS patients in comparison with people with mild atherosclerosis.
These data pointed that MMPs monitoring may be new non specific early marker for tissue damages.

Acknowledgement**:** This investigation was support by grants of the University in Rijeka (uniri-biomed-18-220, 23-288 and 23-303).

INVITED LECTURE -8

Application of artificial intelligence methods based on supervised machine learning in experimental physiology

Department of Medical Physiology, Faculty of Medicine, University of Belgrade, Visegradska 26/II, 11129, Belgrade, Serbia.

University of Haifa, 199 Abba Hushi Blvd, Mount Carmel, 3498838, Haifa, Israel.

Department of Physiology and Cell Biology, Faculty of Health Sciences, Ben Gurion University of the Negev, 84105, Be'er Sheva, Israel.

Email: igor.pantic@med.bg.ac.rs; igorpantic@gmail.com

The introduction of artificial intelligence and machine learning in fundamental medicine has opened numerous opportunities to automate and enhance research methodologies. Supervised machine learning (SML), in particular, has proven to be highly effective for the classification and prediction of physiological and biochemical variables and phenomena. In this approach, machines learn to associate input and output data by being trained on a series of correctly labeled examples. Advanced SML models in experimental physiology, such as those based on artificial neural networks, support vector machines, and decision tree algorithms, have gained prominence. In this paper, we discuss the advantages and limitations of these models with regard to their predictive power, modeling capabilities of physiological processes, and their interpretability and reproducibility. Additionally, we present our recent research on developing SML models using the random forest algorithm to identify damaged cells exposed to toxic chemical agents and adverse environmental conditions.

Keywords: AI, Machine Learning, Neural Networks, Random Forest, Decision Trees

INVITED LECTURE -9

IMMUNO-ETIOPATHOGENESIS OF SPONDYLOARTHRITIS, AS A BASIS FOR NEW THERAPEUTIC OPTIONS

Gordana Laskarin[1,2], Ana-Marija Laškarin[3], Stjepan Špalj[4], Vedrana Drvar[5], Tatjana Kehler[2,6], Nikša Dulčić[7]

[1]Department of Physiology, Immunology and Pathophysiology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia; [2]Hospital for Medical Rehabilitation of Hearth and Lung Diseases and Rheumatism "Thalassotherapia-Opatija", Opatija, Croatia; [3]PhD student, School of Dental Medicine University of Zagreb, Zagreb, Croatia; [4]Department of Orthodontics, School of Dental Medicine, University of Rijeka, Rijeka, Croatia; [5]Clinical Department of Laboratory Diagnostics, Clinical Hospital Centre Rijeka, Rijeka, Croatia; [6]Department of Medical rehabilitation, Faculty of Medicine, University of Rijeka, Rijeka, Croatia; [7]Department of Removable Prosthodontics, School of Dental Medicine, University of Zagreb, Zagreb, Croatia.

Introduction: Spondyloarthritis (SpA) is a group of rheumatic diseases caused by gut dysbiosis, with diverse clinical manifestations, including Temporomandibular internal derangements (TIDs). Dysbiosis damages epithelial barrier and stimulates intestinal dendritic cells to secrete interleukin (IL)-23, which supports T helper (Th) 17 response. IL-17 producing lymphocytes leave the intestine and populate joint structures via circulation, causing inflammation, tissue damage and comorbidities.

The aim was to investigate the characteristics of SpA in patients with TIDs.

Patients and methods: Patients with SpA (n200) were examined for TIDs using Diagnostic Criteria for Temporomandibular Disorders and were divided into three groups (symptomatic TIDs, asymptomatic TIDs and healthy temporomandibular joints- control). Magnetic resonance of spine, Ankylosing Spondylitis Disease Activit Score (ASDAS), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), subjective patient's global assessment of SpA activity and pain (scale 1-10), analysis of salivary IL-23p40, IL-17, TNF-α (ELISA) and alpha-amylase (automatic analyzer) were applied. Statistics were performed with Chi2 test for multiple groups and Yates correction, Fisher exact test or One-way ANOVA with Turkey post-hoc test and Bonferroni adjustments.

Results: Patients with TIDs expressed significantly control group- control group- control group- control group- control group-more salivary IL-17, unlike IL-23p40 and TNF-α, and suffered significantly more from gastritis and inflammatory bowel disease than the control. They showed increased ASDAS, subjectively assessed SpA activity and axial pain, when compared with the control. Patients with symptomatic TIDs additionally showed earlier age at onset of SpA, higher frequency of treated depression, genitourinary infections and anemia of chronic disease, increased BASDAI, total pain intensity, serum alpha-amylase then in the control. Patients with asymptomatic TIDs expressed more often spondylitis, arterial hypertension and hyperlipoproteinemia then the control.

Conclusion: Patients with symptomatic and asymptomatic TIDs are presented with exacerbated axial disease, as evidenced by comorbidities, clinical, radiological and laboratory signs of disease activation and deserve active treatment of SpA, possibly with anti-IL-17 antibodies.

Acknowledgement: University of Rijeka supported the study by the grant Uni-ri-biomed-18-160.

Key words: spondyloarthritis; temporomandibular disorders; temporomandibular joints

INVITED LECTURE -10

Fatty acid composition analysis of different tissues and body fluids – methods, challenges and physiological perspective

Lana Pađen[1], Jelena Filipović[2], Jasna Aladrovć[1]

[1] Department of Physiology and Radiobilogy, University of Zagreb Faculty of Veterinary Medicine, Heinzelova 55, 10000 Zagreb, Croatia Address
[2] PhD student at University of Zagreb Faculty of Veterinary Medicine, General hospital "Tomislav Bardek" Koprivnica, 48000 Koprivnica, Hrvatska

Fatty acids (FA) are the building blocks of structurally and functionally important lipid molecules found in all organisms. Fatty acid composition of different tissues and body fluids can be determined by gas chromatography. The instrument, gas chromatograph, separates individual components and determines composition of volatile organic compounds and some inorganic gases from a sample mixture. The gas chromatography system consists of a gas source with manometer, injector, column, thermostat, detector and processing unit. As the mobile phase (carrier gas), gases such as helium, nitrogen and hydrogen are mostly used, while as a stationary phase organic polymers or high boiling fluids applied to a solid carrier are used. Samples such as liver, muscle, adipose tissue, blood, follicular fluid, milk, semen and seminal plasma can be used for the analysis. Analysis of FA composition can provide insight into feeding habits, information on the immune and reproductive status, and can also provide an individual and population health assessment. Fatty acid composition of tissues, especially adipose, is based on the physiological incorporation of food FA. However, due to endogenous modification, FA tissue composition is not entirely determined by food. Furthermore, in some ecosystems, some FA, such as *trans* FA, are only available in a few types of food and can be used as a nutritional marker. In all vertebrate organisms FA such as polyunsaturated (PUFA), are known to have key physiological functions. Presence of essential FA, as well as determination of specific ratios such as arachidonic FA/docosahexaenoic FA, or n-6/n-3 PUFA or PUFA/saturated FA are important for neurological development and function, visual acuity, cardiovascular health, reproduction, the immune system growth, and maintenance of fluidity and structure in cell membranes. Analysis of FA composition of samples is time consuming and not cheap but useful tool in health and disease assessment.

Key words: gas chromatography, fatty acids composition, body fluids, tissues

INVITED LECTURE -11

Strategies for the management of opportunistic microorganisms in drinking water

[1]Sara Tajnikar, [1]Aleš Krulec, [2]Andrej Ovca, [2]Martina Oder, [3]Ivana Gobin

[1]Institute of Public and Environmental Health, Ljubljana, Slovenia
[2] University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenia
[3] University of Rijeka, Faculty of Medicine, Rijeka, Croatia

Introduction: Opportunistic microorganisms pose a risk in water supply systems, especially in healthcare facilities, where the quality of drinking water is of critical importance. This study investigated the risks of microbiological contamination caused by pipe corrosion and biofilm formation in water supply of a healthcare facility. One of the primary strategies for managing opportunistic microorganisms is the implementation of Water Safety Plans (WSPs). Business intelligence (BI) tool was used to support decision-making through data analysis.

Objectives: The aim of the study was to assess and reduce the risks associated with corrosion and biofilm. These factors caused mechanical damage to the pipes and the results of the microbiological tests were inadequate according to the legal requirements. The new pipelines were not properly cleaned, allowing the growth of biofilm, including *Legionella spp*.

Methods: The approach included inspecting the internal water supply system, repairing damaged pipes, cleaning, degreasing, and disinfecting the pipelines. It also included maintaining appropriate water temperatures, biofilm control, regular maintenance, and monitoring over a six-month period. Data tracking was done using Microsoft Power BI. We conducted risk assessments of the internal water supply and implemented a WSP. Staff training on water safety was conducted.

Results: The data analysis with Microsoft Power BI showed that the measures were effective. The visualized microbiological quality indicators revealed: 1) A reduction in *Legionella* spp. and *Pseudomonas aeruginosa* after six months; 2) Stability of microbiological quality over time, confirming the effectiveness of maintenance and monitoring.

Conclusion: A comprehensive approach to the cleaning, disinfection, and maintenance of water supply systems by highly qualified environmental health professionals, along with proper staff training is essential for safe drinking water. Effective strategies for managing opportunistic microorganisms in drinking water are key to ensuring the long-term safety of water systems. BI visualizations and reports allow accurate tracking and quick adjustments based on current results.

ORAL -1

Brain fatty acid composition in two species of wall lizard – a preliminary study

Josip Miljković[1], Aladrović J[1], Shek Vugrovečki A[1], Blažević S A[2], Lisičić D[2], Pađen L[1]

[1]Department of Physiology and Radiobiology, Faculty of Veterinary Medicine, University of Zagreb, Zagreb, Croatia

[2]Department of Animal Physiology, Faculty of Science, University of Zagreb, Croatia

Introduction: The Italian wall lizard (*Podarcis siculus,* PS) and the Dalmatian wall lizard (*Podarcis melisellensis,* PM) are two phylogenetically, morphologically and ecologically similar sympatric species from the coastal region of Croatia. Species PS shows an invasive potential and a preference for urbanized areas, compared to PM. The main long-chain n-3 polyunsaturated fatty acids (PUFA) include alpha linolenic (ALA), eicosapentaenoic (EPA), and docosahexaenoic acid (DHA), while the long-chain n-6 PUFAs primarily involve arachidonic acid (AA); all are involved in brain development, biochemistry, physiology and behaviour. In the mammalian brain DHA is quantitatively most important, but that knowledge is scarce in lizards. The aim of this study was to determine the FA composition in the brain of the mentioned lizard species, especially regarding long chain PUFA and their ratios.

Methods: Brain samples were collected from males of both species (PM, n=6; PS, n=6) that were caught on the island of Pag, Croatia. Brain samples were homogenized and after FA extraction, FA composition was determined by gas chromatography.

Results: In PS brain samples, PUFA was predominant (40.9 ±18.1% vs. 26.4 ± 9.0%), while in PM brain samples saturated FAs (SFAs) dominated (39.0 ± 4.2% vs. 35.8 ± 14.2%). In both species, monounsaturated FAs (MUFAs) were second in abundance, being significantly higher in PM (34.6 ± 5.1% vs. 23.3 ± 7.4%). AA was represented with 4.2 ± 5.2% in PM, while it comprised 2.3 ± 0.7% in PS ($p>0.05$). Furthermore, EPA and DHA were significantly higher in PS (2.2 ± 1.2% vs.0.5 ± 0.1%; 3.6 ± 1.2% vs. 2.2 ± 0.3%), while n-6/n-3 ratio was higher in PS, but not significantly (4.8 ± 3.9% vs.3.0 ± 1.1%).

Conclusion: Males from two lizard species showed differences in brain FA composition. Further research should comprise larger sample size, and take into account the effect of sex, geographical location, season and other tissues.

Key words: brain, fatty acid, gas chromatography, lizard, genus *Podarcis*

ORAL -2

OSTEOARTHRITIS IN PATIENTS WITH SPONDYLOARTHRITIS REFLECTS METABOLIC AND INFLAMMATORY COMPONENTS OF THE DISEASE

Božena Ćurko-Cofek[1], Ana-Marija Laškarin[2], Tatjana Kehler[3,4] Viktor Peršić [3,4], Vedrana Drvar[5], Gordana Laškarin[1,3]

[1]Department of Physiology, Immunology and Pathophysiology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia. [2]PhD student, School of Dental Medicine, University of Zagreb, Zagreb, Croatia. [3]Hospital for Medical Rehabilitation of Hearth and Lung Diseases and Rheumatism "Thalassotherapia-Opatija", Opatija, Croatia. [4]Department of Medical Rehabilitation, Faculty of Medicine, University of Rijeka, Rijeka, Croatia.[5]Clinical Department of Laboratory Diagnostics, Clinical Hospital Centre Rijeka, Rijeka, Croatia.

Introduction: Osteoarthritis (OA) is often painful and disabling comorbidity in patients with spondiloarthritis (SpA), which express characteristic alterations as analyzed with radiological imaging. The aim of this investigation was to analyze and compare laboratory and clinical characteristics of patients with SpA with and without OA of peripheral joints and correlate peripheral pain with metabolic and inflammatory parameters.

Patients and methods: 197 patients without developmental anomalies and previous traumas were diagnosed with SpA according to the Assessment of SpondyloArthritis International Society criteria. We recorded the age, onset and duration of SpA, pain in peripheral joints on visual analog scale from 0-10, morning stiffness, patient's self-assessment of disease activity and ASDAS (Axial Spondyloarthritis Disease Activity Score). We performed routine laboratory analyses. The patients with SpA were divided into two groups - with or without OA, according to the diagnosis of OA of hands, hip or knee using X-rays. Statistics ware performed in accordance with type and distribution of data (Student T test, Chi^2 test and Spearman Correlation).

Results: Patients with OA were mostly older women with statistically significant increase in erythrocyte sedimentation rate, serum glucose concentration and longer duration of SpA, when compared with patients without OA, whereas the onset of SpA, pain in peripheral joints and urate concentration were of borderline significance. Lipidogram, lipoprotein a, apolipoprotein A, C-reactive protein, serum albumin, immunoglobulin A, alpha-amylase and vitamin D did not differ between the groups. Pain in peripheral joints statistically significantly positively correlated with C-reactive protein, glucose concentration, morning stiffness, duration of SpA, self-estimated patient's activity of SpA and ASDAS, whereas negatively with HDL concentration.

Conclusion: OA in patients with SpA reflects metabolic and inflammatory components of the disease.

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ORAL -3

Gender differences in relationship between physical activity, sedentary behaviour and non-specific low back pain in college students

Verner Marijančić[1], Gordana Starčević-Klasan[2], Stanislav Peharec[1], Tanja Grubić Kezele[3,4]

[1]*Department of Physiotherapy, Faculty of Health Studies, University of Rijeka, Rijeka, Croatia*
[2]*Department of Basic Medical Science, Faculty of Health Studies, University of Rijeka, Rijeka, Croatia*
[3]*Department of Physiology, Immunology and Pathophysiology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia*
[4]*Department of Clinical Microbiology, Clinical Hospital Rijeka, Rijeka, Croatia*

Introduction: University students are a particularly vulnerable population as they spend increasing amount of time sitting, which poses a major threat to their musculoskeletal health.
Aim: The aim of this cross-sectional study was to investigate the gender differences in the relationships between physical activity (PA), sedentary behaviour and possible presence of non-specific low back pain (NS-LBP) in young adults aged 18–25 years.
Participants and Methods: A total of 139 university students (f:59%,m:41%) completed all required tests. Primary outcome measures included the following: PA and sedentary behaviour calculated by the long form of the International PA Ques-tionnaire (IPAQ-LF) and NS-LBP measured using the visual analogue scale (VAS). To compare parametric variables (age, BMI, PA, sitting time) between genders, we used the Student t-test, and to compare the non-parametric variable VAS, we used the Mann-Whitney U-test. The relationships between PA, sitting time and NS-LBP were analyzed using Pearson correlation. The significance level of the statistical analyses was set at $p < 0.05$.
Results: Male students engage in significantly more PA associated with recreation, sport and leisure than female students. Female students practiced more PA related to household and work. Female students in our study spend more time sitting than male students, but without statistically significant differences. Both genders reported they have experienced NS-LBP even to the level of 8/strong pain according to VAS, although we haven't found any correlation between the pain, PA or time spent sitting. Female generally had higher levels of NS-LBP than male students.
Conclusion: Our results suggest that female students practise less PA and spend more time sitting, in contrast to male students who practise more PA and sitt less. Our findings suggest that more PA needs to be encouraged but implemented with caution and as an individualized gender-specific approach to prevent chronic musculoskeletal disorders, including NS-LBP.

Keywords: college students; low back pain; sedentary behavior; physical activity.

ORAL -4

Functional and phenotypic characteristics of peripheral blood monocyte subsets

I. Krešić[1], M. Ikić Matijašević[2] , S. Aničić[3], P, Planinić[1], K. Zrinski Petrović[3],

D. Grčević[3], A. Šućur[3]

[1]*University of Mostar School of Medicine, Mostar, Bosnia and Herzegovina,*

[2]*"Sveti Duh" University Hospital, Zagreb, Croatia,*

[3]*University of Zagreb School of Medicine, Croatian Institute for Brain Research, Zagreb, Croatia*

Introduction: Monocytic lineage is crucial in pathogenesis of autoimmune diseases, including inflammatory arthritides, as monocytes can differentiate into macrophages and dendritic cells (DC). Macrophages are main proinflammatory cytokine producers, while DC are hallmark antigen-presenting cells. Thus, both cells contribute to inflammatory arthritis onset and progression by activation of effector cells - lymphocytes and osteoclasts.

Aim: We aimed to analyze expression of macrophage and dendritic markers on peripheral blood monocytes, measure their change upon stimulation with inflammatory mediators, and assess differentiated macrophage or DC functionality.

Methods: Healthy individuals were sampled for blood and PBMC were isolated from buffy coat after centrifugation in Ficoll gradient. Cells were stained for monocytic (CD14,CD16), dendritic (CD1a,CD1c,CD209), macrophage (CD206,CD163), costimulatory (CD80,CD86) and antigen presentation (MHCII,CD40) markers at baseline. Classical monocytes (CD3-CD19-CD56-CD14+) were isolated with FACS and cultured in vitro no stimulus, MCSF, LPS, IFN-y or a combination (MCSF+TNF-α+IL-4) for 5 days, then analyzed for expression of noted markers and functionally tested for phagocytic ability using pHrodo dye.

Results: Freshly isolated classical monocytes (CD14+CD16-) generally did not express noted activation and differentiation markers, with exception of highly expressed CD1a (58%), HLAII (79%) and CD86 (46%) ,while non-classical monocytes (CD14-CD16+) had notable but lower expression of all three markers. In vitro culture resulted in increased expression of all analyzed markers, with several markers expressed on almost all cells (80-90%) (namely CD1a, CD206, CD209, CD40, HLAII). Inflammatory stimulation with TNF-alpha resulted in an increase of CD86 expression with reduced CD1a expression. Phagocytosis was inhibited by IFN-γ or TNF-α stimulation (30% and 47% of nonstimulated), whereby LPS enhanced it (120% of nonstimulated). We plan to expand this preliminary work by enrolling rheumatoid and psoriatic arthritis patients to assess presence and disease-specificity of activation and differentiation marker expression, as well as test antigen presenting functionality.

ORAL -5

The Influence of Human Bone Marrow Stromal Cells on AICAr-Induced Differentiation of Acute Myeloid Leukemia Cells

Tomislav Smoljo[1], Hrvoje Lalić[1,2], Vilma Dembitz[1], Barbara Tomić[1], Josip Batinić[3,4], Radovan Vrhovac[3,4], Dora Višnjić[1]

[1] Laboratory for Cell Biology, Department of Physiology, Croatian Institute for Brain Research, University of Zagreb School of Medicine, Zagreb, Croatia

[2] Department of Laboratory Immunology, Clinical Department of Laboratory Diagnostics, University Hospital Center Zagreb, Zagreb, Croatia

[3] Division of Hematology, Department of Internal Medicine, University Hospital Centre Zagreb, Zagreb, Croatia

[4] Department of Internal Medicine, University of Zagreb School of Medicine, Zagreb, Croatia

Introduction

Acute myeloid leukemia (AML) represents a diverse group of hematologic cancers characterized by a blockade in cellular differentiation, frequent relapses, and an overall poor prognosis. Our previous research has shown that 5-aminoimidazole-4-carboxamide ribonucleoside (AICAr), an AMP-activated protein kinase (AMPK) agonist, induces AML cell differentiation by inhibiting pyrimidine synthesis, similar to the dihydroorotate dehydrogenase inhibitor brequinar. While it is known that the bone marrow (BM) stroma offers protection to AML cells against cytotoxic agents, its role in modulating AML differentiation remains less clear.

Aim

This study aims to investigate the impact of stromal cells on the differentiation of AML cell lines induced by AICAr.

Materials and methods

To mimic the BM microenvironment, human stromal cell lines HS-5 and HS-27, as well as adherent cells isolated from the BM of a healthy donor and patients with AML or essential thrombocythemia, were utilized. Human AML cell lines U937 or THP-1 were cultured on these stromal layers. The effects of AICAr and brequinar on viability and differentiation of AML cells were assessed by multiparametric flow cytometry. Cell morphology was analyzed via microscopy, and the nuclear/cytoplasmic ratio was determined using Fiji (ImageJ) with the Trainable Weka Segmentation plugin.

Results

Stromal cells significantly enhanced the expression of the differentiation markers CD11b and CD64 in AML cells treated with both AICAr and brequinar. Importantly, these pyrimidine synthesis inhibitors did not adversely affect the viability or morphology of the stromal cells.

Conclusion

Our findings underscore the supportive role of human BM stromal cells in amplifying the differentiation effects of AICAr on AML cells. These results suggest that therapeutic strategies using pyrimidine synthesis inhibitors to promote differentiation could hold promise for the treatment of AML.

ORAL -6

Molecular characterization of thalassemia syndromes in the population of the Croatian Littoral and Istria

[1]Ana Đorđević, [2] Milena Ugrin, [2]Sonja Pavlovic, [3,4]Jelena Roganovic, [5,6]Ines Mrakovcic-Sutic

[1]Jadran Galenski Laboratorij, Rijeka, Croatia
[2]Institute of Molecular Genetics and Genetic Engineering, University of Belgrade, Belgrade, Serbia.
[3]Children's Hospital Zagreb, 10000 Zagreb, Croatia.
[4]Faculty of Biotechnology and Drug Development, University of Rijeka, 51000 Rijeka, Croatia.
[5]Department of Physiology, Immunology and Pathophysiology, University of Rijeka, Faculty of Medicine Rijeka, Croatia
[6]Department of Basic Medical Sciences, University of Rijeka, Faculty of Health Studies, Rijeka, Croatia

Introduction: Thalassemia syndromes are common monogenic disorders that represent a significant global health issue. There are no systematic epidemiological and molecular investigations on thalassemias in the Croatian population untill now.

Subjects and methods: This study included 70 children with a presumptive diagnosis of thalassemia, and their 42 first-degree relatives. Direct sequencing and gap-PCR methods were used for molecular characterization.

Results: We identified 46 (30 children and 16 first-degree relatives) β-thalassemia heterozygous carriers from 24 unrelated families, carrying 8 different mutations and one hemoglobin variant. Five variants account for approximately 85% of all affected β-globin alleles: Hb Lepore-Boston-Washington (32.6%), HBB:c.93-21G>A (19.6%), HBB:c.315+1G>A (13.1%), HBB:c.92+1G>A (10.9%), and HBB:c.92+6T>C (8.7%) variants.

Conclusions: β-thalassemia carriers need genetic profiling since genetic modifiers can significantly impact their phenotype ina n adult age. Our study provides important new insights into the relevance of β-thalassemia heterozygosity in pediatric clinical practice.

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POSTER -1

Simulation Centre of the Faculty of Medicine of Masaryk University and innovations in teaching physiology

P. Babula[1,2], Z. Nováková[1], X. Budínská[1], P. Štursová[1], M. Nováková[1]

[1]Department of Physiology and [2]Department of Simulation Medicine, Faculty of Medicine, Masaryk University, Brno, Kamenice 5, Brno, CZ-625 00, Czech Republic

Computer simulations with virtual patients represent a modern trend in medical education. Skills training simulators offer a variety of sophisticated scenarios for simulations in combination with a realistic simulation center environment and allow you to practice communication skills (soft skills) not only with the patient, but also with colleagues, teamwork or the process of diagnosis and treatment. Within the teaching of physiology, we are constantly looking for ways to bring the subject of the "theoretical field" as close as possible to the students for a better understanding of the functioning of the human body. In this contribution we present two simulations focused on integrative physiology and on the body's response to exercise and bleeding.

Acknowledgments

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POSTER -2

Effect of the 5G exposure at 700 MHz on humans' erythrocytes morphometric parameters after a short-term *in vitro* exposure

Nikolino Žura[1,2], Porin Perić[1,3], Marinko Vilić[4], Silvijo Vince[5], Krešimir Malarić[6], Marina Vajdić[1], Ana Shek Vugrovečki[4], Suzana Milinković Tur[4], Nina Poljičak Milas[7], Ivona Žura Žaja[4]

[1]*University Hospital Center Zagreb, Department of Rheumatology and Rehabilitation, Zagreb, Croatia*
[2]*University of Applied Health Sciences, Zagreb, Croatia*
[3]*Faculty of Medicine, University of Zagreb, Croatia*
[4]*Unit of Physiology and Radiobiology, Faculty of Veterinary Medicine, University of Zagreb, Croatia*
[5]*Clinic for Obstetric and Reproduction, Faculty of Veterinary Medicine, University of Zagreb, Croatia*
[6]*Department of Communication and Space Technologies, Faculty of Electrical Engineering and Computing University of Zagreb, Croatia*
[7]*Unit of Pathological Physiology, Faculty of Veterinary Medicine, University of Zagreb, Croatia*

The mechanisms and effects of radiofrequency electromagnetic radiation (RF-EMR) of 5G network frequencies on morphometric indicators of erythrocytes after exposure to human and/or *in vitro* human blood are not yet known and/or insufficiently studied. The aim of this study is to determine the effects of 5G RF-EMR at 700 MHz on the morphometry of erythrocytes after short-term *in vitro* exposure to human blood. Blood samples were collected from 30 clinically healthy volunteers (15 women and 15 men) aged 25 to 40 years. One EDTA tube from each volunteer was exposed to 5G RF-EMR (experimental group), the other remained unexposed (control group). Immediately after collection, the experimental blood samples were placed in a Gigahertz transversal electromagnetic (GTEM) cell and exposed to 5G RF-EMR at 700 MHz with an electric field strength of 10 V/m for 2 hours at room temperature. The blood smears of both groups were stained and subjected to morphometric analysis using the "SFORM" programme. The morphometric indicators for size and shape of the erythrocytes were determined. The values for surface area, outline, minimum and maximum radius, convex area, length, width and contour index were significantly higher in the experimental group than in the control group and significantly lower for the solidity and form factor values. Cluster analysis revealed two erythrocyte subpopulations based on the morphometric indicators of erythrocytes. The first subpopulation of erythrocytes (ES1) consisted of smaller and mostly circular, solid and compactly shaped erythrocytes and the second subpopulation (ES2) consisted of larger erythrocytes with irregular borders. The experimental groups had a significantly higher proportion of ES2 and a lower proportion of ES1 compared to the control group. Human male and female erythrocytes exposed *in vitro*

significantly enlarged, bulged and their membrane roughness increased. Exposure to 5G RF-EMR at 700 MHz significantly increased the proportion of larger erythrocytes with irregular borders.
Keywords: 5G electromagnetic radiation, *in vitro* exposure, humans' blood, erythrocyte morphometry, erythrocytes subpopulations

POSTER -3

Antioxidant capacity and the healing of pressure ulcers in patients with spinal cord lesions

P. Štursová, P. Babula

Department of Physiology, Faculty of Medicine, Masaryk University

Introduction

Pressure ulcers represent a potencial lifelong complication for plegic patients. Optimal surgical treatment can lead to healing up of this chronic wound. Sharp surgical debridement and hydro-debridement are very effective tools.

Wound healing can be complicated by increased levels of oxidative stress, increased production of free radicals and decreased antioxidant capacity.

Aim

The aim of this study is to determine total antioxidant capacity in plasma and tissue samples.

Methods

In this study we included 16 patients. Surgical sharp method of debridement (sample B) and hydrosurgery debridement with Versajet (sample A) in one particular wound – pressure ulcer in plegic patient were performed. First, samples from plasma (P1) and two parts of wound (A1, B1) were collected. Other samples of plasma (P2) and wound (A2, B2) were collected 7th day after the debridement done by both methods.

The tissue extraction to DPBS followed. BCA protein Assay Kit II (Cat. No. ab287853; Abcam) was used to measure protein concentrations in plasma and tissue extracts. The absorbance readings were measured at 562 nm.

The total antioxidant levels in the plasma and tissue extracts were studied using the total antioxidant capacity assay kit (Cat. No. ab65329; Abcam). The absorbance readings were measured at 570 nm.

Results

Statistically significant differences were observed in following samples: A1 and B1 ($p<0,05$); B1 and B2 ($p<0,01$). Total antioxidant capacity was significantly higher in B1 samples.

Conclusion

Surgical sharp method can cause increased total antioxidant capacity in tissue samples (B1). Our preliminary results must be compared with other indicators, such as production of reactive oxygen species (ROS) and reactive nitrogen species (RNS).

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POSTER -4

Effects of peroral hormonal contraception on cardiovascular system: a pilot project

X. Budínská, O. Pírek, P. Babula, Z. Nováková

Introduction

Since 1960, oral contraceptive pills (OCPs) have undergone decades of intense pharmaceutical development, and current formulas are well optimized; however, a handful of negative side effects still remain.

Aim

The aim of this study was to measure the cardiovascular parameters in young women and find any significant differences of these parameters following OCPs use.

Methods

In this study we included 24 females: control group (CTRL, 10 women; age: 21.4±1.5 y; BMI: 22.08±3.05 kg/m2), and OCPs using group (OCP, 14 women; age: 20.6±1.3 y; BMI: 20.16±1.46 kg/m2; duration of OCPs use: 3.6±1.2 y). All OCP respondents were using monophasic combined hormonal contraception while all CTRL respondents have not taken OCPs in the past. The following cardiovascular parameters were measured: pulse wave velocity (PWV), baroreflex sensitivity (BRS), systolic (SBP) and diastolic (DBP) blood pressure, RR interval (RRI).

PWV was measured by applanation tonometry (Sphygmocor; AtCor Medical, Australia). The measurements were performed on the radial artery of respondents' dominant hand and on their ipsilateral carotid artery.

In all subjects, continuous beat-to-beat noninvasive blood pressure was recorded for 5 minutes using photoplethysmography (Finometer; FMS, The Netherlands). The cuff was placed on the third finger of the dominant hand. Using spectral analysis, the following parameters were analyzed: RRI, SBP, DBP, BRS.

Result

Statistically significant differences between OCP and CTRL were observed in the following parameters: crPWV ($p<0.05$), DBP ($p<0.01$), BRS ($p<0.01$).

Conclusion

Based on our results, we can conclude that OCPs use has a negative impact on the cardiovascular system, more specifically on the peripheral parts of the arterial tree.

Acknowledgments

This work was funded by grant project no. MUNI/A/1547/2023

POSTER -5

Extracellular Matrix Protein Changes in Plasma Reflects Left Ventricular Remodelling in Patients with Recent Onset Heart Failure – Proteomic Perspective

Novák Jan[1,2], Nováková Z[2], Poloczková H.[3], Fialová Kučerová J.[2], Hruška P.[2], Kučera J.[2], Bienertová Vašků J.[2], Krejčí J.[3]

[1] 2nd Department of Internal Medicine, St. Anne's University Hospital in Brno and Faculty of Medicine, Masaryk University, Brno, Czechia

[2] Department of Physiology, Faculty of Medicine, Masaryk University, Brno, Czechia

[3] 1st Department of Internal Medicine - Cardioangiology, St. Anne's University Hospital in Brno and Faculty of Medicine, Masaryk University, Brno, Czechia

Introduction: In patients with recently diagnosed heart failure with reduced ejection fraction (HFrEF) due to dilated cardiomyopathy (DCM), reverse ventricle remodeling may occur, resulting in improved left ventricular ejection fraction (LVEF) over time from the diagnosis. Processes underlying reverse ventricular remodeling are complex and still not completely understood.

Aim: We aimed to describe changes in levels of plasmatic proteins between patients with and without reverse left ventricle remodeling using untargeted proteomics.

Methods: A total of 30 consecutive patients with newly diagnosed (less than 6 months) HFrEF (LV EF < 40%) due to the DCM (coronary angiography negative for coronary artery disease) were included in the study. All patients underwent echocardiographic examination at the time of diagnosis and after six months (6M) – based on the changes in LVEF, patients were divided into the recovery group (EF at 6M > 50%, n=7) and non-recovery group (EF at 6M remain < 40%, n=23). Untargeted plasma proteomics was performed using mass spectrometry (MS/MS).

Results: We have identified a set of differentially expressed proteins between the recovery and non-recovery group, including (top 5 altered proteins): vinculin, leucine-rich alpha-2-glycoprotein (LRA2GP), serglycin, cholinesterase, and lumican. Vinculin and LRA2GP are cytoskeletal matrix proteins, and lumican represents the only known intracellular proteoglycan.

Conclusion: Within our study, we identified a group of proteins reflecting reverse ventricular remodeling in plasma. Most of the identified protein functions are linked to the function of the extracellular matrix, while none of the top identified proteins were linked to the function of

cardiomyocytes, suggesting that the process of reverse ventricular remodeling may be driven dominantly by the extracellular matrix.

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POSTER -6

CONCENTRATIONS OF THMS IN POOL WATERS OF THE PRIMORSKO - GORANSKA COUNTY AND THEIR IMPACT ON THE HEALTH OF BATHERS

Tea Frković, Ivana Šutić, Vanda Piškur, Aleksandar Bulog

INTRODUCTION

The quality of water in pools is essential to avoid risks to the health of bathers therefore disinfection treatments are critical to keep the water safe from microorganisms. Chlorine compounds are the most often used due to their easy use, disinfecting power, residuality and low cost. During disinfection, the reaction between the disinfectants (e.g. chlorine) with organic and inorganic matter present in pool waters, mainly brought by bathers, results in formation of disinfection by-products (DBPs). In pool waters chlorination produces mostly common DBPs such as haloacetaldehydes (HALs), haloacetic acids (HAAs) and trihalomethanes (THMs).

Other DBPs such as haloacetonitriles (HAN), haloamines and nitrosamines have also been detected. DBPs are toxic, bioaccumulative and carcinogenic compounds.

The formation of THMs save from concentration of the disinfectant, contact time, type of organic matter also depends on factors such as temperature and pH. There are scientific evidence that some of THMs could cause short – term issues such as dizziness, headache, sleepiness, incoordination and dull chest pain). However, there is insufficient evidence to indicate that THMs cause cancer in people but long - term exposure could slightly increase the risk of cancer (bladder, colon and rectal) and destruction of organs (liver and kidney).

The WHO has highlighted that some of the THMs (i.e. chloroform and bromodichloromethane) are classified as possibly carcinogenic to humans. Cancers have been detected in some studies in which animals (i.e. mice and rats) were exposed to high doses. More research is needed to fully understand any health effects in humans.

The focus of this study is the concentration of trihalomethane (THMs) in pool waters of the Primorsko – Goranska County (Rijeka, Krk, Cres, Lošinj, Rab, Crikvenica and Opatija) in the period from January to July 2024. Mainly because of their impact on the health of bathers according to according to recommendations of World Health Organization (WHO).

Figure 1. Major THMs exposure routes and potential risks to humans

MATERIALS AND METHODS

Pool water samples were collected from indoor and outdoor pools of hotel complexes and villas in the mentioned area. The samples for THM analysis were collected in 20 mL glass bottles, with teflon lined screw caps. Samples were analyzed immediately or within 24 hours.

Sample analysis was performed using Thermo Scientific Trace 1300 series gas chromatograph (GC) with electron capture detection (ECD). Chromatographic separations were completed using a TG-624 column (30 m × 1,4 μm film thickness). Normative used for analysis was HRN EN ISO 10301:2002, No. 3.

RESULTS

In a period from January to July 2024. a total of 508 pool water samples from indoor pools and 407 pool water samples from outdoor pools have been analyzed. This study presents the results of concentration of THMs that are higher than maximum allowed concentration, MAC (100 μg/L) and their connection and correlation with parameters: water temperature, concentration of free chlorine and pH.

Figure 2. Pool waters analysed in outdoor and indoor pools from January to July 2024.
Figure 3. Percentage of THMs concentration higher than MAC from unacceptable analysed pool waters
Figure 4. Connection and correlation between concentration of THMs and free chlorine in indoor pools from January to July 2024.
Figure 5. Connection and correlation between concentration of THMs and free chlorine in outdoor pools from January to July 2024.

CONCLUSIONS

The results showed that in the pool waters concentration of THMs are present in increased values in the summer months. Comparing the obtained values for indoor and outdoor pools it shows that the concentrations of THMs are generally higher in indoor pools. Between free chlorine and increased THMs concentrations was established moderatly correlation (0,62) in indoor pools. In outdoor pools correlation between free chlorine and concentration of THMs was negligible correlation (0,19). Low positive correlation has been established between other parameters (pH, water temperature and free chlorine) and concentration of THMs.

POSTER -7

THE ROLE OF METALOTHIONEIN IN PATHOGENESIS OF BREAST CANCER

Damir Grebić[1], Tamara Gulić[2], Sara Bilić Knežević[3]

[1]Department of General and Oncological Surgery, Clinical Hospital Center Rijeka, School of Medicine, University of Rijeka, Medical Faculty of Rijeka, Braće Branchetta 20, 51000 Rijeka, Croatia

[2]Department of Physiology and Immunology, University of Rijeka, Medical Faculty of Rijeka, Braće Branchetta 20, 51000 Rijeka, Croatia

[3]Division of Oncology and Radiotherapy, Zadar General Hospital, Zadar, Croatia.

INTRODUCTION: Breast carcinoma is the most common malignant disease in the female population and one of the leading causes of death among women worldwide. Hormone receptors-positive carcinomas are the less malignant and have a better clinical prognosis, whereas HER-2 positive and triple negative carcinomas are more aggressive with greater malignancy and a poorer prognosis. Metallothionein is the main protein that deliver the tissue metal, especially zink and is support to be a new predictive factor for breast cancer.

MATERIAL AND METHODS: We conduct an observational retrospective study, processing and analysing patient tissue samples from the archives of the Department of Pathology and Pathological Anatomy (University Hospital Rijeka). The onset of analysis began, with previously immunophenotyped tissue biopsies of the various groups of carcinomas (Luminal A, Luminal B HER2-, Luminal B HER2+, HER2+, triple negative), using "tissue microarray" (TMA) and later, immunohistochemistry staining of these samples was be performed (using metallotionein monoclonal antibodies). After that the number of metalothionein positive cells was quantified microscopically and the statistical analysis was done using student-t test. These results were compared with clinical data associated with the course and outcome of the disease.

RESULTS: We have found the lowest metallothionein expression in the Luminal A and Luminal B HER2- breast cancers group, the highest metallothionein expression was in HER2+ and tripple negative breast cancers group among the molecular subtypes. The statistical analysis of the results have shown the statistical significance difference among the metallothionein expression in the HER-2 positive and triple negative breast cancers compared to hormonal positive breast cancers (luminal A group) – $p<0,05$. The women in group of HER-2 positive and triple negative breast cancers had poor prognosis (short time to metastasis and recurrence of the disease) when compared to group of luminal A breast cancers that had better clinical outcome.

CONCLUSION: The goal of this study was to show the difference in the expression of metallothionein among the different groups of breast carcinomas and to incorporate the

obtained results with the clinical course and disease outcome in order to gain a better understanding of the pathological behaviour of various breast cancer immunophenotypes.

This work has been fully supported by the University of Rijeka under the project number (uniri-iskusni-prirod-23-93.)

POSTER -8

THE EFFECT OF OMEGA-3 PUFAS-ENRICHED CHICKEN MEAT CONSUMPTION ON MICROVASCULAR REACTIVITY IN YOUNG HEALTHY PEOPLE

Tihana Nađ[1,2], Ana Stupin [3,4], Nikolina Kolobarić[3,4], Zrinka Mihaljević[3,4], Ines Drenjančević[3,4], Martina Kos[1,2] , Ivana Jukić [3,4*]

[1]Clinic of Pediatrics, University Hospital Centre Osijek, J. Huttlera 4, HR-31000 Osijek, Croatia;

[2]Department of Pediatrics, Faculty of Medicine Osijek, University Josip Juraj Strossmayer Osijek, J. Huttlera 4, HR-31000 Osijek, Croatia;

[3]Department of Physiology and Immunology, Faculty of Medicine Osijek, University Josip Juraj Strossmayer Osijek, J. Huttlera 4, HR-31000 Osijek, Croatia;

[4]Scientific Centre of Excellence for Personalized Health Care University of Osijek, Trg Sv. Trojstva 3, HR-31000-Osijek, Croatia;

*Corresponding Author: Ivana Jukić, ivana.jukic@mefos.hr

Introduction: We have previously shown that n-3 polyunsaturated fatty acids (n-3 PUFAs)-enriched hen eggs intake had favorable effect on endothelium-dependent vasodilation. The present study aimed to determine the effect of n-3 PUFAs-enriched chicken meat consumption on microvascular reactivity in young healthy people.

Methods: A total of 39 young healthy people were included in this randomized placebo-controlled interventional study. All paticipants consumed 500 g of quick-roasted chicken meat for three weeks, and were divided in two groups: Control group (N=20) – regular chicken meat and Omega-3 group (N=19) – chicken meat enriched with n-3 PUFAs.

Laser Doppler flowmetry (LDF) was used to examined the forearm skin microvascular reactivity in responses to vascular occlusion (post-occlusive reactive hyperemia, PORH), local skin heating (local thermal hyperemia, LTH), and iontophoretic application of acetylcholine (ACh) and sodium nitroprusside (SNP). All measurements were performed before and after each dietary protocol.

Results: After a 3-week dietary protocol, microvascular endothelium-dependent responses to PORH, LTH and ACh were significantly increased in the Omega-3 group, whereas there were no differences in the Control group. Also, there were a differences in PORH, LT and

ACh between the groups after the three-week protocol. On the other hand, in both examined groups, microvascular response to SNP was not changed compared to the basal values, and no difference was observed between the groups.

Conclusion: Our study results indicate a beneficial effect of n-3 PUFAs-enriched chicken meat consumption on microvascular endotelium-dependent vasodilation in young healthy people. Clinical Trial Registration: NCT04564690.

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POSTER -9

Monitoring the health status of children and adolescents at the Ambulance of Obesity in Brno, Czech Republic

Z. Nováková[1], N. Rafčíková[1], J. Šťastná[2], L. Dostalová Kopečná[2], P. Babula[1]

[1]Department of Physiology, Faculty of Medicine, Masaryk University, Brno, Czech Republic
[2]Department of Paediatrics, Faculty of Medicine, Joint workplaces with the University Hospital Brno – workplaces Children's Hospital, Brno, Czech Republic

Introduction

Childhood obesity has become is a serious public health problem in most developed countries of the world. In our previous study (Budínská X, et al, Children 2022, 9, 1610) we reported the childhood obesity effect on the cardiovascular system.

Aim

Now the aim was to analyse the basic parameters from blood sampling and the effectiveness of visits to the Ambulance.

Methods

The data were obtained retrospectively. Thirty patients were selected, aged 8 to 18 years. Inclusion criteria: body mass index (BMI) at the initial check-up of 30 kg/m^2 and taller; exclusion criteria: genetic diseases and endocrinopathies.
Patients visited the Ambulance at regular intervals à 2-4 months. Their weight and height were measured at each check-up; effectiveness of visits here has been established using changes in BMI over time.
At one-year follow-up, laboratory blood tests were performer to determine glycaemia, hemoglobin A1c (HbA1c), lipid spectrum and 25-hydroxycholecalciferol (25-OHD).

Results

The significant difference compared to the reference population was recorded in elevation of triacylglycerols (TG), lower HDL cholesterol levels and an increased TG/HDL ratio. The average concentration of 25-OHD was 44.7 nmol/l. A significant decrease in BMI occurred only at the check-up after one year.

Conclusion

Obese children have significant changes in the lipid spectrum, which are associated with increased cardiovascular risk; vitamin D concentration is reduced.
In summary, the issue of childhood obesity is very complex, affecting almost all paediatric disciplines.

Acknowledgments

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POSTER -10

EFFECT OF SMALL INTERFERING RNA–MEDIATED KNOCKDOWN OF ARF GUANINE NUCLEOTIDE EXCHANGE FACTORS ON CYTOMEGALOVIRUS INFECTION

Gordana Blagojević Zagorac[1,2], Natalia Jug Vučko[1,3], Valentino Pavišić[4], Hana Mahmutefendić Lučin[1,2], Tamara Gulić[1], and Pero Lučin[1,2]

[1]*Department of Physiology, Immunology and Pathophysiology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia*

[2]*Nursing Department, University North, University Center Varaždin, Varaždin, Croatia*

[3] *Oktal Pharma, Zagreb, Croatia*

[4]*Institute of Public Health of the Primorje-Gorski Kotar County, Rijeka, Croatia*

Cytomegaloviruses (CMVs) are widespread DNA viruses that can cause life threatening conditions in immunocompromised individuals. We previously showed that Arf proteins play an important role in the pathogenesis of CMV infection, and our results obtained using small inhibitors suggested that Arf guanine nucleotide exchange factors (Arf GEFs) from the Big, Gbf and Brag2 families could play an important role in regulating Arf protein activity during immediate early and early phase of MCMV infection.

Since chemical inhibitors can have off target effects and can affect activity of more than one Arf GEF at the same time, the aim of this study was to specify the role of each single Arf GEF in progression of CMV infection by using small interfering RNA–mediated knockdown.

Balb 3T3 murine fibroblasts transfected with siRNA targeting Big1, Big2, Gbf1, BRAG2, Psd or cytohesin Arf GEFs were infected with Δm138 or C3X-GFP murine CMV (MCMV). Viral load (intensity of green fluorescence) and percentage of infected cells (GFP positive cells) was determined by flow cytometry while expression of viral proteins was determined by Western blot.

In cells transfected with siRNA targeting Gbf1, Big2, BRAG2 and Psd viral load as well as percentage of infected cells were significantly lower and expression of E1, m06 and m25 viral proteins was reduced. Knock-down of cytohesin expression decreased viral load and expression of m06 and m24 while it didn't influence percentage of infected cells or expression of E1 viral protein. Viral load, percentage of infected cells and expression of viral proteins E1, m06 and m25 were not affected by siRNA targeting Big1. Our results shown that Gbf1, Big2, BRAG2 and Psd Arf GEF proteins have significant role in pathogenesis of immediate early and early phase of MCMV infection.

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POSTER -11

Prognostic evaluation of the APACHE II score and the Charlson Comorbidity Index in septic patients in the Intensive Care Unit

Mateo Tićac[1,2], Kristina Franjić[3,4], Verner Marijančić[5], Marina Bubonja Šonje[3,4] Tanja Grubić Kezele[3,5]

1 Department of Anestesiology and Intensive Care, Clinical Hospital Center Rijeka, Rijeka, Croatia
2 Department of Anesthesiology, Reanimatology, Intensive Care and Emergency Medicine, Faculty of Medicine, University of Rijeka, Rijeka, Croatia
3 Department of Clinical Microbiology, Clinical Hospital Center Rijeka, Rijeka, Croatia
4 Department of Microbiology and Parasitology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia
5 Department of Physiotherapy, Faculty of Health Studies, University of Rijeka, Rijeka, Croatia
6 Department of Physiology, Immunology and Pathophysiology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

Introduction and aim: Different predictive scoring systems are used to assess disease severity and outcome in septic patients in Intensive Care Unit (ICU). The aim of this study was to evaluate the prognostic tools: the Acute Physiology and Chronic Health Evaluation (APACHE II) score at admission and on days 7 and 14, and the Charlson Comorbidity Index (CCI) in patients admitted to the ICU at the Clinical Hospital Center Rijeka.
Methods: In a retrospective cohort study, we enrolled 418 adult septic patients admitted to the ICU between January 2020 and December 2022 and divided them into 2 groups: survivors and deceased during their ICU stay. All patients were selected according to the Sepsis- 3 clinical criteria. The APACHE II score was used to evaluate organ function and the CCI was used to analyze mortality prediction.
Results: Of 418 patients, 234 (56%) died. Patients had a similar distribution of age and gender. The deceased group had higher APACHE II scores on admission and at days 7 and 14. However, a statistically significant difference was found only on the day of admission (23.9±6.7 vs. 19.2±7.4, $p<0.001$). Although not statistically significant, decedents had a worse 10-year survival rate according to CCI, i.e. 155 of 234 patients (66.2%) had an estimated 10-year survival rate of 53% or less, as opposed to survivors (109/184, 59.2%). Moreover, those who died had significantly more cardiovascular diseases ($p=0.035$).
Conclusion: Although only the APACHE II score at admission showed statistical significance, all results taken together should be considered clinically significant. Thus, the APACHE II score performed on the day of sepsis and the CCI could help to predict the prognosis of critically ill septic patients. Moreover, the combination of CCI and APACHE II score can help clinicians decide how aggressively to treat a condition.

POSTER -12

Monocyte chemoattractant protein-1 links inflammation and classical cardiovascular risk factors

Iva Uravić Bursać[1], Vedrana Drvar[2], Vesna Pehar Pejčinović[1], Tatjana Kehler[3,4], Viktor Peršić[1,4], Gordana Laškarin[3,5]

[1] Department of cardiology, Hospital for Medical Rehabilitation of Hearth and Lung Diseases and Rheumatism "Thalassotherapia-Opatija", M. Tita 188, 51420 Opatija, Croatia; [2] Clinical Department of Laboratory Diagnostics, Clinical Hospital Centre Rijeka, Tome Strižića 3, Rijeka, Croatia; [3] Department of rheumatology, Hospital for Medical Rehabilitation of Hearth and Lung Diseases and Rheumatism "Thalassotherapia-Opatija", M. Tita 188, 51420 Opatija, Croatia ; [4]Department of Medical Rehabilitation and [5]Department of Physiology, Immunology and Pathophysiology, Faculty of Medicine, University of Rijeka, B. Branchetta 20, 51000 Rijeka, Croatia

Introductions: Monocyte Chemoattractant Protein-1 (MCP-1) is a chemokine that is expressed in psoriatic skin lessions, joint synovial tissue and plasma of patients with psoriatic arthritis (PsA) in a higher concentration than in healthy subjects [1]. Patients with PsA show multiple cardiovascular (CV) risk factors of which leads CV morbidity and mortality [2]. Beside CV diseases high prevalence of CV factors deterioration PsA [3, 4].

Aim: to correlate serum concentration of MCP-1 and classical CV risk factors in patients with PsA.

Patients and methods: Sixty-three patients with axial and peripheral PsA who were treated by rheumatologist were recruited in study, and signed Informed Consent. Blood pressure, pulse and pulse pressure were measured by cardiology who took date on cigarette smoking, measured the waist circumference, body mass index, and noted gender, age, value of cholesterol, glucose and triglycerides in the plasma (Table 1). ELISA metod was used for measure MCP-1 concentration.

Results: The concentration of MCP-1 has a statistically significant positive correlation with the concentration of total cholesterol ($P = 0,01$; $r = 0.406$), low density lipoprotein - cholesterol ($P = 0,03$; $r = 0.368$) and glucose ($P = 0,01$; $r = 0.37$) in the plasma and cigarette smoking ($P = 0.02$), Figure 1. The concentration of MCP-1 has no statistically significant correlation with blood pressure, pulse, pulse pressure waist circumference, body mass index, gander, age, high density lipoprotein - cholesterol and triglycerides.

Conclusion: MCP-1 appears to be a link between inflammatory and metabolic parameters underlying CV damage, particularly in cigarette smoking patients with PsA.

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Key words: cardiovascular risk factors; MCP-1; psoriatic arthritis

POSTER -13

Comparison of some erythrocyte parameters in Istrian goats determined manually or automatically

Ivona Žura Žaja[1], Ana Shek Vugrovečki[1], Antun Kostelić[2], Monica Darrer[2], Gordan Šubara[3], Suzana Milinković Tur[1], Stefani Fruk[1], Sven Menčik[4], Jadranka Pejaković Hlede[1], Denis Cvitković[5], Dražen Đuričić[6]

[1] *Department for Physiology and Radiobiology, Faculty of Veterinary Medicine, University of Zagreb, Croatia*

[2] *Department of Animal Science, Faculty of Agriculture, University of Zagreb, Croatia*

[3] *Agency for Rural Development of Istria, Croatia*

[4] *Department of Animal Breeding and Livestock Production, Faculty of Veterinary Medicine, University of Zagreb, Croatia*

[5] *Department of Veterinary Economics and Epidemiology, Faculty of Veterinary Medicine, University of Zagreb, Croatia*

[6] *Department of Poultry Diseases with Clinic, Faculty of Veterinary Medicine, University of Zagreb, Croatia*

Abstract

The Istrian goat is an endangered and protected indigenous Croatian breed. The determination of hematologic parameters is a routine method for diagnosis and monitoring of health status, and values may vary depending on age, sex of the animal, health status, but also on breed and method of determination. The aim of the study was to compare erythrocyte count and hematocrit (HCT) value in Istrian goats, determined manually and automatically, with the other determined hematologic parameters.

Twenty-eight adult Istrian goats (26 does and 2 bucks) aged between 2 and 9 years were used for this study. Blood samples were collected by jugular puncture and brought to the laboratory of the Faculty of Veterinary Medicine Zagreb, where the tests were performed according to the established protocols. The following parameters were determined using an automatic hematology analyzer: Erythrocytes, HCT, hemoglobin concentration (HGB), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) and red blood cell distribution width (RDW).

The mean values of the determined parameters did not differ depending on age, parity and gender ($p>0.05$) and were: HGB 75.93±9.62 g/L, MCV 16.29±1.18 fL, MCH 5.41±0.27 pg, MCHC 331.93±10.79 g/L and RDW 33.79%. All parameters were within the physiologic

range for goats, except that 13 goats had lower hemoglobin, two MCH and one erythrocyte. The mean number of manually determined erythrocytes was lower than the automatically determined ones and HCT values were higher ($p<0.05$) than the automatically determined values (erythrocytes 11.40±1.91 x 10^{12}/L *vs*. 14.09±1.93 x 10^{12}/L; and HCT 30% *vs*. 23%, respectively).

The results of this study show that it is more reliable to determine the HCT parameter manually, as the erythrocytes of goats are the smallest of all domestic animals and the use of an automatic hematology analyzer may lead to erroneous results.

Key words: hematocrit, hemoglobin, Istrian goat, red blood cell indices, red blood cell