

COMENIUS UNIVERSITY IN BRATISLAVA  
JESSENIUS FACULTY OF MEDICINE IN MARTIN



# ABSTRACTS

from

44th Students' Scientific Conference

April 26, 2023  
Martin, Slovak Republic

# ABSTRACTS

from  
44th Students' Scientific Conference

---

## SPONSORS

---



**martinus**





## CONGRESS COMMITTEE

**Prof. Andrea Čalkovská, MD., DrSc.**

Dean

Jessenius Faculty of Medicine, Comenius University, Martin

**Assoc. Prof. Štefan Sivák, MD., PhD.**

First Vice-Dean and Vice-Dean for Research, Science Development  
and Postgraduate Study

Jessenius Faculty of Medicine, Comenius University, Martin

**Assoc. Prof. Michal Šimera, RNDr., PhD.**

Chairman of Organization Committee of Students' Scientific Conference

## ORGANIZATION COMMITTEE

Lubica Bánovčinová, MS., PhD.

Tomáš Buday, MD., PhD.

Ivan Farský, MS., PhD.

Assoc. Prof. Jozef Hatok, RNDr., PhD.

Prof. Juraj Mokrý, MD., MS., PhD.

Assoc. Prof. Michal Šimera, RNDr., PhD.

Ivana Kumičková, MD.

Marcel Veterník, M.Eng., PhD.

*Gradual improvement is better than delayed perfection.*

*Mark Twain*

Friends, participants  
of the students' scientific conference.

The first conference was held at our faculty in 1972. Mathematically speaking, today we should have completed more than 50 years. At the onset of democracy in Slovakia, society and higher education had other problems that resulted in the decline in the scientific student activities. Fortunately, after few years the tradition of student science returned back and the number of registered presentations gradually increased. Sometimes it seemed that the organizers and tutors were more enthusiastic than the students themselves. It was worth it and now, as a part of the 44<sup>th</sup> conference, we have registered 44 talks. Thanks to everyone – presenters, tutors and organizers. Once again, the participants have something to look forward to. The atmosphere of healthy competition, but also a strong sense of belonging between students and their teachers, is unforgettable. I can say this from my own experience, because the emotions from my student years and scientific activity are still strong and come back in moments like this.

As the classic encourages us, let's work on ourselves, let's gradually improve, because even student science gives space for that. As elsewhere in our life, perfection itself is not important here, but the path to it. And it is long and bumpy...



**Andrea Čalkovská**  
The Dean

## PROGRAM AT GLANCE

**Date:** April 26, 2023

**Place:** Aula A – Novomeského 9, Martin  
Aula B – Novomeského 9, Martin

**Registration:** April 26, 2023, from 7.30 or before the beginning of your section

**Opening ceremony:** Aula A – Novomeského 9, Martin ..... **08.00 – 08.10**

### Aula A

Section of Clinical Disciplines 1 ..... 08.10 – 9.45

– *coffee break*

Section of Pre-clinical Disciplines ..... 10.00 – 11.15

Section of Non-medical Study Programmes ..... 11.25 – 13.10

### Aula B

Section of Clinical Disciplines 2 ..... 08.10 – 09.45

– *coffee break*

Section of Theoretical Disciplines 1<sup>st</sup> part ..... 10.00 – 11.15

– *coffee break*

Section of Theoretical Disciplines 2<sup>nd</sup> part ..... 11.25 – 12.25

**Award ceremony:** Aula A – Novomeského 9, Martin ..... **13.30**

.....  
**Duration of lectures: 8 minutes, discussion – 4 minutes**

**Language: Slovak, Czech or English**  
.....

# CONTENTS

## Section of Clinical Disciplines 1 (Aula A, 8.10 – 9.45)

- 1. GENE EXPRESSION CHANGES IN SIGNALLING PATHWAYS RELEVANT IN CELIAC DISEASE..... 15**  
**Kristián Demčík, Zuzana Kolková<sup>1,2</sup>, Zora Lasabová<sup>3</sup>**  
<sup>1</sup>Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava  
<sup>2</sup>Clinic of Children and Adolescents, University Hospital Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava  
<sup>3</sup>Department of Molecular Biology and Genomics, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava
  
- 2. OLFACTORY DYSFUNCTION IN PARKINSON'S DISEASE..... 16**  
**Simona Holkovičová, Milan Grofik<sup>1</sup>, Natália Huňarová<sup>2</sup>, Martin Kolísek<sup>2</sup>, Egon Kurča<sup>1</sup>**  
<sup>1</sup>Clinic of Neurology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava, University Hospital Martin  
<sup>2</sup>Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava
  
- 3. ANTIBIOTIC PROPHYLAXIS BEFORE MINI-INVASIVE PROCEDURES IN KIDNEY TRANSPLANT RECIPIENTS – YES OR NO..... 17**  
**Andrej Kollár, Ivana Dedinská, Patrícia Kleinová**  
Department of Internal Medicine I, University Hospital Martin and Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava
  
- 4. EVALUATION OF COGNITIVE DYSFUNCTION IN PATIENTS WITH SCLEROSIS MULTIPLEX ..... 18**  
**Nina Kováčiková, Ema Kantorová, Egon Kurča, Ján Grossman**  
Clinic of Neurology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava, University Hospital Martin
  
- 5. EFFECT OF THE 6-FOOD ELIMINATION DIET ON THE VARIOUS ASPECTS OF METABOLISM AND WELLBEING IN HEALTHY VOLUNTEERS ..... 19**  
**Sophia Christine Lilgová, Peter Lipták<sup>1</sup>, Eva Baranovičová<sup>2</sup>**  
<sup>1</sup>Clinic of Gastroenterological Internal Medicine, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava, University Hospital Martin

<sup>2</sup>Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

**6. EXPRESSION OF TdT PROTEIN IN DIFFUSE LARGE B-CELL LYMPHOMA  
AND HIGH-GRADE B-CELL LYMPHOMA WITH DOUBLE/TRIPLE  
REARRANGEMENTS OF MYC, BCL2 AND/OR BCL6 GENE ..... 20**

**Andrej Štefák, Katarína Lešková**

Department of Pathological Anatomy, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

**7. FOREIGN BODY ASPIRATION IN CHILDREN:  
MULTIVARIATE ANALYSIS OF THE PROGNOSTIC VALUE  
OF CLINICAL AND RADIOLOGICAL FINDINGS ..... 21**

**Tomáš Bernát<sup>1</sup>, Irina Goljerová, Dimitrios Paouris<sup>2</sup>**

<sup>1</sup>Faculty of Medicine, Comenius University in Bratislava

<sup>2</sup>Department of Paediatric Otorhinolaryngology MF and NICHD

**8. RESULTS OF CORRECTIVE OSTEOTOMY  
FOR MALUNITED DISTAL RADIUS FRACTURES ..... 22**

**Adéla Kolářová<sup>1</sup>, Ján Palčák<sup>2</sup>**

<sup>1</sup>Faculty of Medicine and Dentistry, Palacky University Olomouc

<sup>2</sup>Department of Traumatology, Faculty of Medicine and Dentistry,  
Palacky University Olomouc and University Hospital Olomouc

*coffee break*

**Section of Pre-clinical Disciplines (Aula A, 10.00 – 11.15)**

**1. PARTICIPATION OF BITTER TASTE RECEPTORS (TAS2R)  
IN MAST CELL SIGNALING PATHWAYS..... 23**

**Lucia Cipková, Martina Šutovská, Jozef Mažerik**

Department of Pharmacology, Biomedical Center Martin,  
Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

**2. MENTAL „WELL-BEING“ – THE EFFECT OF NEUROFEEDBACK ..... 24**

**Andrea Geregová, Nikola Ferencová, Zuzana Višňovcová**

Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

- 3. INDUCED PLURIPOTENCY, CELL ENGINEERING AND LITTLE HEROES DONATING BLOOD MAKE IT POSSIBLE TO MODEL DUCHENNE MUSCULAR DYSTROPHY IN VITRO ..... 25**  
**Martin Reháč<sup>1</sup>, Dominika Hajdúchová<sup>2</sup>, Stanislava Suroviaková<sup>3</sup>, Ján Strnádel<sup>1</sup>,**  
<sup>1</sup>Laboratory of Flow Cytometry, Cell Phenotyping and Engineering (Cellphie), Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava  
<sup>2</sup>Department of Pathophysiology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava  
<sup>3</sup>Department of Pediatric Neurology, University Hospital Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava
- 4. IN VITRO MODULATION OF THE MITOCHONDRIAL PHYSIOLOGY IN INITIAL STAGES OF NEURODEGENERATION ..... 26**  
**Rebeka Rovňaniková, Michal Pokusa**  
 Department of Pathophysiology, Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava
- 5. ANALYSIS OF NEURODEGENERATIVE CHANGES IN THE BRAIN OF PATIENTS WITH MIYOSHI-TYPE DYSFERLINOPATHY ..... 27**  
**Katharina Maria Šebáková, Petra Hnilicová**  
 Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava
- 6. SMOKELESS TOBACCO PRODUCTS USE IN MEDICAL STUDENTS ..... 28**  
**Monika Zjavková, Tibor Baška**  
 Department of Public Health, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

*coffee break*

**Section of Non-Medical Study Programmes (Aula A, 11.25 – 13.10)**

- 1. KANGAROO MOTHER CARE FOR THE PRETERM INFANTS ..... 29**  
**Katarína Baránková, Lucia Mazúchová**  
 Department of Midwifery, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava



<b>2. TEAMWORK IN NURSING.....</b>	<b>30</b>
<b>Žaneta Hrbková, Dominika Kohanová</b>	
Department of Nursing, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava	
<b>3. MISSED NURSING CARE IN NEONATOLOGY .....</b>	<b>31</b>
<b>Branislav Malý, Dominika Kohanová</b>	
Department of Nursing, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava	
<b>4. PROFESSIONALISM IN COMMUNITY CARE .....</b>	<b>32</b>
<b>Viktória Maslišová, Katarína Žiaková</b>	
Department of Nursing, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava	
<b>5. CARE OF THE CENTRAL VENOUS CATHETER AT A STANDARD TREATMENT UNIT .....</b>	<b>33</b>
<b>Paulína Miháliková, Edita Hlinková</b>	
Department of Nursing, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava	
<b>6. THE MENTAL HEALTH QUALITY OF SELECTED HEALTH SCIENCES STUDENTS .....</b>	<b>34</b>
<b>Patrícia Neupauerová, Viera Švihrová</b>	
Department of Public Health, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava	
<b>7. BARRIERS TO NURSES REPORTING ADVERSE EVENTS .....</b>	<b>35</b>
<b>Martin Petruščák, Dominika Kohanová</b>	
Department of Nursing, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava	
<b>8. EFFECTIVITY OF PSYCHOEDUCATION FOR PATIENTS WITH SCHIZOPHRENIA .....</b>	<b>36</b>
<b>Liliana Valachovičová, Martina Tomagová</b>	
Department of Nursing, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava	

9. **ADHERENCE IN A PATIENT WITH POLYPHARMACOTHERAPY**..... 37  
**Miroslava Výboštková, Ivana Bóriková**  
Department of Nursing, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

**Section of Clinical Disciplines 2 (Aula B, 8.10 – 9.45)**

1. **PHARMACOGENETICS OF RIVAROXABAN** ..... 38  
**Vladimír Doboš, Juraj Sokol, Jana Žolková**  
Department of Haematology and Transfusion Medicine,  
National Centre of Haemostasis and Thrombosis, Jessenius Faculty of Medicine  
in Martin, Comenius University in Bratislava
2. **EARLY AND LATE ONSET OF SCLEROSIS MULTIPLEX  
AND ITS IMPACT ON THE DISEASE DEVELOPMENT** ..... 39  
**Sára Dudášová, Ema Kantorová, Egon Kurča**  
Department of Neurology, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava, University Hospital Martin
3. **SELECTED METABOLIC ABNORMALITIES ASSOCIATED  
WITH OBSTRUCTIVE SLEEP APNEA**..... 40  
**Terézia Kozáková, Jarmila Vojtková**  
Clinic of Children and Adolescents, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava, University Hospital Martin
4. **RESIDUAL SLEEP APNEA IN CHILDREN** ..... 41  
**Alžbeta Majtanová, Anna Ďurdíková, Peter Ďurdík**  
Clinic of Children and Adolescents, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava, University Hospital Martin
5. **MOLECULAR HETEROGENITY OF THE BREAST CARCINOMA** ..... 42  
**Michaela Mihalková, Lukáš Plank**  
Department of Pathological Anatomy, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava
6. **ENERGY METABOLISM IN CRITICAL ILLNESS**..... 43  
**Tereza Ščurová, Milan Minarik**  
Department of Anesthesiology and Intensive Care Medicine, Jessenius Faculty  
of Medicine in Martin, Comenius University in Bratislava, University Hospital Martin

- 7. METABOLOME CHANGES IN HEALTHY VOLUNTEERS AND IN PATIENTS WITH GASTROESOPHAGEAL REFLUX DISEASE ..... 44**  
**Jana Vnučáková, Martin Ďuríček**  
Clinic of Gastroenterological Internal Medicine, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava, University Hospital Martin

- 8. PATHOLOGICAL FINDINGS OF KIDNEY TISSUE IN DECEASED COVID-19 PATIENTS..... 45**  
**Vanessa Seibert, Pavel Babál**  
Institute of Pathological Anatomy, Medical Faculty, Comenius University in Bratislava

*coffee break*

**Section of Theoretical Disciplines 1<sup>st</sup> part (Aula B, 10.00 – 11.15)**

- 1. THE ROLE OF GABA-A RECEPTORS IN THE NUCLEUS OF SOLITARY TRACT IN REGULATION OF COUGHING ..... 46**  
**Valeria Budošová, Michal Šimera, Ivan Poliaček**  
Department of Medical Biophysics, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

- 2. HIGH METHIONINE DIET AND ITS POSSIBLE INFLUENCE ON THE GUT-BRAIN AXIS..... 47**  
**Michaela Fábryová, Mária Kovalská**  
Department of Histology and Embryology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

- 3. PREDICTING THE RESPONSE OF CHRONIC MYELOID LEUKEMIA PATIENTS TO TREATMENT WITH TYROSINE KINASE INHIBITORS: IN VITRO ANALYSIS OF SELECTED SIGNALING MOLECULES OF BCR::ABL<sub>1</sub> POSITIVE LEUKEMIA CELLS ..... 48**  
**Michal Lacek<sup>1</sup>, Vladimír Divoký<sup>2</sup>, Edgar Faber<sup>2</sup>**  
<sup>1</sup>Department of Biology, LF UP in Olomouc  
<sup>2</sup>Department of Hemato-Oncology FNOL

- 4. BYSTANDER EFFECT ON THE BRAIN AND LIVER AFTER FRACTIONATED SPINAL CORD IRRADIATION OF AGING RATS ..... 49**  
**Mihailo Mijatović, Soňa Báľentová**  
Department of Histology and Embryology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

5. **COGNITIVE ASPECTS OF EMOTIONAL REGULATION IN THE CONTEXT OF BILINGUAL LANGUAGE PROCESSING: A NEUROPSYCHO-LINGUISTIC PILOT STUDY** ..... 50  
**Kevin Ľuboslav Patráš, Anna Barnau**  
 Department of Foreign Languages, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava
6. **HYPERHOMOCYSTEINEMIA AND ITS EFFECT ON THE VASCULAR SYSTEM OF SELECTED ORGANS** ..... 51  
**Katarína Poliaková, Mária Kovalská**  
 Department of Histology and Embryology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

*coffee break*

**Section of Theoretical Disciplines 2<sup>nd</sup> part (Aula B, 11.25 – 12.25)**

7. **MEASUREMENT OF THE ELECTROMAGNETIC FIELD DISTRIBUTION IN THE ENVIRONMENT OF THE CELL CULTURE INCUBATOR** ..... 52  
**Petra Sakslová, Jakub Mišek, Ján Jakuš**  
 Department of Medical Biophysics, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava
8. **BUDESONIDE DELIVERED BY HIGH-FREQUENCY OSCILLATORY VENTILATION AS A POTENTIAL TREATMENT OF ACUTE RESPIRATORY DISTRESS SYNDROME** ..... 53  
**Jakub Topolan, Nikolett Nemcová, Pavol Mikolka**  
 Department of Physiology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava
9. **EVALUATION OF ANTINEOPLASTIC EFFECTS OF PLANT NATURAL SUBSTANCES IN BREAST CANCER MODEL** ..... 54  
**Ester Vlčková, Lenka Koklesová, Peter Kubatka**  
 Department of Medical Biology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

<b>10. MAGNETIC RESONANCE SCANNING VS. COMPUTED TOMOGRAPHY AND THEIR USE IN CLINICAL MEDICINE.....</b>	<b>55</b>
<b>Michal Vyparina<sup>1</sup>, Nadežda Višňovcová<sup>1</sup>, Oliver Štrbák<sup>2</sup></b>	
<sup>1</sup> Department of Medical Biophysics, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava	
<sup>2</sup> Laboratory of Metabolomics, Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava	
<b>11. CLINICAL ANATOMY OF THE THYROID GLAND, ADJACENT STRUCTURES AND ITS CLINICAL CORRELATIONS .....</b>	<b>56</b>
<b>Iryna Zavorodnia, Gabriela Hešková, Desanka Výbohová</b>	
Department of Anatomy, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava	

# **ABSTRACTS**

Book of abstracts is available at <https://svoc.jfmed.uniba.sk>

## GENE EXPRESSION CHANGES IN SIGNALLING PATHWAYS RELEVANT IN CELIAC DISEASE

Kristián Demčík, Zuzana Kolková<sup>1,2</sup>, Zora Lasabová<sup>3</sup>

<sup>1</sup>Biomedical Centre Martin,

Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

<sup>2</sup>Clinic of Children and Adolescents, University Hospital Martin,

Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

<sup>3</sup>Department of Molecular Biology and Genomics,

Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutors: RNDr. Zuzana Kolková, PhD., doc. RNDr. Zora Lasabová, PhD.

*E-mail contacts: demcik2@uniba.sk, zuzana.snahnicanova@uniba.sk, zora.lasabova@uniba.sk*

**Introduction:** Celiac disease, a chronic autoimmune disorder that affects the small intestine, is triggered by the oral intake of gluten in individuals with a genetic predisposition, which includes HLA-DQ2 and/or HLA-DQ8 positive haplotypes. The pathogenesis of celiac disease involves dysregulated immune response and changes in the expression of genes in various signalling pathways. The purpose of this study was to investigate the expression changes of genes belonging to the inhibitor of apoptosis gene family - *BIRC3* and *BIRC5*.

**Material and methods:** RNA was extracted from duodenal biopsies obtained from 18 paediatric patients diagnosed with celiac disease, 7 paediatric patients diagnosed with celiac disease on gluten-free diet (GFD) and 26 healthy controls, in whom this chronic autoimmune disease was ruled out. RNA was transcribed into cDNA that was used for RT-qPCR reactions with specific TaqMan probes to quantify expression of *BIRC3* and *BIRC5* genes relative to *GAPDH* used as a housekeeping gene. Relative quantification was analysed by  $\Delta\Delta Ct$  method.

**Results:** Our results showed significant overexpression of *BIRC3* gene in patients diagnosed with celiac sprue, compared to the control group, as well as in the celiac disease group compared to the patients on GFD. These changes were consistent with the dysregulated immune responses and the inflammatory process in celiac disease, since this gene takes part in their modulation in the small intestine. Significant change in *BIRC5* gene expression was detected in celiac patients compared to the control group. Comparing the GFD group to the control group, no significant change in *BIRC5* expression was observed, which may indicate a state, when the duodenal epithelium is still regenerating.

**Conclusion:** Our study provides new insights into the changes of *BIRC3* and *BIRC5* expression in patients diagnosed with celiac disease and identifies several potential therapeutic targets for the treatment of this disorder. To validate our findings and to elucidate the functional and clinical significance of these gene expression changes, further studies are essential.

## OLFACTORY DYSFUNCTION IN PARKINSON'S DISEASE

Simona Holkovičová<sup>1</sup>, Milan Grofík<sup>1</sup>, Natália Huňarová<sup>2</sup>, Martin Kolísek<sup>2</sup>, Egon Kurča<sup>1</sup>

<sup>1</sup>Clinic of Neurology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava, University Hospital Martin

<sup>2</sup>Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutors: MUDr. Milan Grofík, PhD., doc. RNDr. Martin Kolísek, Dr.rer.nat., prof. MUDr. Egon Kurča, PhD., FESO

*E-mail contacts: simona.holkovicova@gmail.com, milangrofik@gmail.com, martin.kolisek@uniba.sk, egon.kurca@uniba.sk*

**Introduction:** Deterioration of olfactory functions is a prominent non-motor symptom of Parkinson's disease (PD). Hereby, the aim was to determine the incidence of deviated smelling ability (hyposmia and anosmia) among patients with PD and compare it with the incidence in the control group (CG).

**Material and methods:** The PD cohort included 56 patients (16 women, 40 men; mean age of 65.5 years) and 67 healthy probands (21 women and 46 men; mean age of 64.0 years). The smell of all participants was examined with the large panel (40 odours) University of Pennsylvania Smell Identification Test (UPSIT), which is one of the few standardized tests. The tested odours were from the following olfactory groups: fragrant, fruity, citrus, woody & resinous, chemical, sweet, minty, toasty & nutty, pungent & decayed.

**Results:** Our data clearly indicate that PD patients in comparison to healthy probands have markedly reduced ability to smell odours in every tested olfactory group. The smallest differences were observed in citrus olfactory group (smell of lime and orange). Interesting enough, the smell of turpentine was correctly recognized more frequently by PD patients than by healthy probands. The score of the smell test clearly correlated with the age of patients (27/40 points at the age of 40 vs. 17.5 /40 points at the age of 70) resp. probands (33/40 points at the age of 40 vs. 27/40 points at the age of 70).

**Conclusion:** Smell disorders are more severe in patients and more common compared to CG, however the age-dependent decline of smelling ability could be recorded in both cohorts. UPSIT is a meaningful tool in diagnostics of PD, however it is questionable whether the large panel UPSIT is necessary to test for olfactory decline in PD patients.



## ANTIBIOTIC PROPHYLAXIS BEFORE MINI-INVASIVE PROCEDURES IN KIDNEY TRANSPLANT RECIPIENTS – YES OR NO

**Andrej Kollár, Ivana Dedinská, Patrícia Kleinová**

Department of Internal Medicine I, University Hospital Martin  
and Jessenius Medical Faculty in Martin, Comenius University in Bratislava

Tutors: prof. Ivana Dedinská MD, PhD., Patrícia Kleinová MD

*E-mail contacts: andrej.kollar.01@gmail.com, ivana.dedinska@uniba.sk,  
kleinova.pata@gmail.com*

**Introduction:** The use of antibiotic prophylaxis in invasive procedures is generally accepted and highly recommended. The question is the need to apply antibiotic prophylaxis even in the case of mini-invasive procedures in the post-transplantation period. The aim of the study was to determine the occurrence of infectious complications during mini-invasive procedures (pig-tail extraction, protocol biopsy) without the use of antibiotic (ATB) prophylaxis. The secondary aim was to identify risk factors for a positive urine culture finding at the time of mini-invasive procedures.

**Material and methods:** The use of antibiotic prophylaxis in invasive procedures is generally accepted and highly recommended. The question is the need to apply antibiotic prophylaxis even in the case of mini-invasive procedures in the post-transplantation period. The aim of the study was to determine the occurrence of infectious complications during mini-invasive procedures (pig-tail extraction, protocol biopsy) without the use of antibiotic (ATB) prophylaxis. The secondary aim was to identify risk factors for a positive urine culture finding at the time of mini-invasive procedures.

**Results:** Patients in group without ATB prophylaxis had a significantly higher tacrolimus value at the time pig-tail extraction ( $P = 0,0274$ ) and a significantly higher dose of mycophenolic acid at the time of protocol biopsy ( $P = 0,0429$ ). We did not confirm significant difference in occurrence of positive urine findings at the time of pig-tail extraction or at the time of protocol biopsy. We completed a univariate (logistic regression) in order to identify a potential risk predictor for a positive urine findings at the time of pig-tail extraction and protocol biopsy. None of the monitored parameters, including ATB prophylaxis, was confirm as risky, or protective factor.

**Conclusion:** The use of antibiotic prophylaxis during mini-invasive procedures (pig-tail extraction, protocol biopsy) in the post transplantation period had no effect on positive culture findings at our department. Based on our analysis, we therefore do not use antibiotic prophylaxis in the case of these procedures at our centrum.

## EVALUATION OF COGNITIVE DYSFUNCTION IN PATIENTS WITH SCLEROSIS MULTIPLEX

Nina Kováčiková, Ema Kantorová, Egon Kurča, Ján Grossman

Clinic of Neurology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava, University Hospital Martin

Tutor: doc. MUDr. Ema Kantorová, PhD.

*E-mail contacts: nina.kovacikov@gmail.com, ema.kantorova@gmail.com, egon.kurca@uniba.sk, jan.grossmann@gmail.com*

**Introduction:** Cognitive decline is recognized as a frequent symptom of multiple sclerosis (MS). The study was aimed to find differences between healthy volunteers (HV) and patients with MS (MSP) using a battery of psychological tests.

**Material and methods:** Twenty patients with relapsing MS and twenty age- and gender-matched healthy volunteers were recruited. Both groups were tested using the following psychological tests: Paced Auditory Serial Addition Test (PASAT), Brief Visuo-spatial Memory Test-Revised (BVMTR), Benton lines, Singe Digit Modalities Test (SDMT), California Verbal Learning Test (CVLT), Test of Fonetic and Semantic fluention, and Patient Health Questionnaire measuring depressive score (PHQ-9, PHQ-15). In the MSP group neurological deficit was tested using Expanded Disability Status Score (EDSS).

**Results:** MSP presented with mild mean overall neurological deficit measured by EDSS ( $3,72 \pm 1,075$ ). However, results of cognitive tests helped to discriminate MPS against HV significantly. In the MSP group, CVLT (test of verbal learning) was 14% lower in MSP than in HV (51,9 points in MSP vs 60,1 points in HV,  $p = 0,0064$ ). Results of PASAT (assessing working memory, divided attention, and information processing speed) showed 37% decline in MSP compared with HV (28,6 points in MSP vs 45,5 points in HV,  $p = 0,0064$ ). Scoring of executive functions (fonetic fluency) showed 26% decline of performance in MSP compared with HV (39,7 points MSP vs 53,45 points in HV,  $p = 0,0064$ ). Similar outcomes were revealed using Semantic Fluency (decline of 27% in MSP/ 41,9 points in MSP vs 57,5 points in HV,  $p = 0,0064$ ), and SDMT tests (decline of 38% in MSP/ 36,7 points in MSP vs 59,5 points in HV,  $p = 0,0064$ ). In BVMTR MS patients scores were 11 % lower ( 28,6 points in MSP vs 32 points in HV,  $p = 0,0064$ ). In Benton lines MSP showed decline 15 % ( 22 points in MSP vs 25,9 points in HV,  $p = 0,0064$ ). In PHQ-9 and PHQ-15 MSP achieved higher score by 45 % resp 33% than HV ( 11 ..8.9 points in MSP vs 6,1..6,0 points in HV,  $p = 0,0064$ .. $p = 0,0064$ ).

**Conclusion:** Based on the presented results, we can conclude that MS patients are cognitively impaired independently of their age category. In clinical practice the cognitive changes might have been omitted. Moreover, they could have been influenced by depression. We suggest, the battery of cognitive tests including test of depression should be used for testing of MSP in routine clinical practice.

## EFFECT OF THE 6-FOOD ELIMINATION DIET ON THE VARIOUS ASPECTS OF METABOLISM AND WELLBEING IN HEALTHY VOLUNTEERS

Sophia Christine Lilgová, Peter Lipták<sup>1</sup>, Eva Baranovičová<sup>2</sup>

<sup>1</sup>Clinic of Gastroenterological Internal Medicine, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava, University Hospital Martin

<sup>2</sup>Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutors: MUDr. Peter Lipták, PhD., Ing. Eva Baranovičová, PhD.

*E-mail contacts: lilgovaz3@uniba.sk, peter.liptak@gmail.com, eva.baranovicova@uniba.sk*

**Introduction:** Eosinophilic esophagitis is a chronic, immune-mediated inflammatory disease of esophagus characterized by significant mucosal eosinophilia. The cause of eosinophilic esophagitis remains unknown. One of the most probable enteropathogenic factors is abnormal response of immune system to various types of food. Therefore, one of the therapeutic options is so called 6-food elimination diet. These 6 food groups are most commonly associated with food allergies: eggs, dairy products, seafood/shellfish, nuts, wheat, and soy. Although widely used, there is surprisingly a lack of data evaluating its effect on metabolism of the patients and their well-being. The aim of this study was to evaluate possible changes in metabolomic and anthropometric parameters in healthy individuals pre and after 4 weeks of elimination diet.

**Material and Methods:** We performed a prospective single center study on healthy volunteers (>18 years). For metabolomic analysis of blood serum and urine we used the NMR Bruker Avance III. Anthropometric analysis was performed by bioelectrical impedance. All volunteers also filled validated questionnaires considering various aspects of well-being (WHOQOL-BREF, PROMIS-10 and PHQ-15). The statistical analysis was processed by unparametric tests (Mann-Whitney U-test) for comparison of equality of medians and unparametric paired Wilcoxon-signed-rank test.

**Results:** Twelve (12) healthy volunteers finished the study (11 women with median age 34,5 years and 1 man aged 35 years). In the metabolomic profile, significant increase of acetate, succinate and 3-hydroxybutyrate after the diet were identified. No statistically significant differences were observed considering anthropometric parameters (BMI, percentage of fat and muscles) and in the questionnaires assessing quality of life. Standard biochemical evaluation showed significant elevations of the levels of uric acid and creatinine.

**Conclusion:** The 6-food elimination diet seems to have only minor effect on the metabolomic profile of healthy volunteers which suggest it could be safely used for the treatment of eosinophilic esophagitis.

## EXPRESSION OF TdT PROTEIN IN DIFFUSE LARGE B-CELL LYMPHOMA AND HIGH-GRADE B-CELL LYMPHOMA WITH DOUBLE/TRIPLE REARRANGEMENTS OF MYC, BCL<sub>2</sub> AND/OR BCL6 GENE

Andrej Štefák, Katarína Lešková

Department of Pathological Anatomy, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: MUDr. Katarína Lešková, PhD.

*E-mail contacts: stefak5@uniba.sk, leskova45@uniba.sk*

**Introduction:** According to WHO classification of hematolymphoid tumours from 2017, we can classify B-cell neoplasms into precursor lymphoid neoplasms and mature B-cell neoplasms. Both groups have their own specific immunophenotype. Although TdT protein is a marker typically expressed in precursor lymphoid neoplasms, such as acute lymphoblastic leukaemia, recent case reports have shown that also some mature lymphoid neoplasms may express TdT protein. In this study we looked closer to this phenomenon in group of most diagnosed lymphoid neoplasms called diffuse large B-cell lymphomas and their histomorphologically similar variants which nowadays belong to the separate group of aggressive lymphomas called High-grade B-cell lymphomas with double or triple rearrangements of MYC, BCL<sub>2</sub> and/or BCL6 gene (HGBL-DH/TH).

**Material and methods:** We worked with 124 cases of patients who were diagnosed with diffuse large B-cell lymphoma and HGBL-DH/TH between years 2008 – 2020. All these cases were tested for TdT presence by immunohistochemical methods and then carefully examined and analysed under the microscope.

**Results:** Out of 124 cases from which were 48 diffuse large B-cell lymphomas and 76 HGBL-DH/TH we found 2 TdT positive samples which belonged to HGBL-DH/TH category. We have not found any positive cases in diffuse large B-cell lymphoma category. In percentual scale there was 1,613% TdT positivity out of all cases and 2,632% TdT positivity out of all HGBL-DH/TH cases.

**Conclusion:** Our study confirmed although rare, but still true expression of immature TdT marker in one category of mature B-cell neoplasms - HGBL-DH/TH. The presence of TdT protein in diffuse large B-cell lymphoma cases was not confirmed. To date there is no specific category in WHO classification for such aggressive lymphomas with overlapping features of mature and immature lymphoid neoplasms.

# FOREIGN BODY ASPIRATION IN CHILDREN: MULTIVARIATE ANALYSIS OF THE PROGNOSTIC VALUE OF CLINICAL AND RADIOLOGICAL FINDINGS

Tomáš Bernát<sup>1</sup>, Irina Goljerová<sup>2</sup>, Dimitrios Paouris<sup>2</sup>

<sup>1</sup>Faculty of Medicine, Comenius University in Bratislava

<sup>2</sup>Department of Paediatric Otorhinolaryngology MF and NICHD

Tutors: MUDr. Irina Goljerová, CSc., MPH, MUDr. Dimitrios Paouris

*E-mail contacts: bernat16@uniba.sk, irina.goljerova@fmed.uniba.sk, dimitrios.paouris@fmed.uniba.sk*

**Introduction:** Aspiration of a foreign body is an acute condition typical for toddlers. The aim of the study was to evaluate the significance of three predictive factors: anamnesis, auscultation finding and X-ray finding for the indication of bronchoscopy in a paediatric patient. In addition, we evaluated selected data on aspirated foreign bodies and performance techniques.

**Material and methods:** The group consists of 117 paediatric patients (CH: 60.68%, D: 39.32%) who underwent bronchoscopy at DORLK LF UK and NUDCH for suspicion of foreign body aspiration in 2017-2021. As part of the statistical analysis, we evaluated: age, sex, anamnestic data: presence / absence of aspiration moment, occurrence of cyanosis, dyspnoea, fever, auscultation, and X-ray lung findings, in case of positive bronchoscopy, foreign body location, time of its presence in lower respiratory tract and extraction method.

**Results:** One-dimensional analysis: the body was present in 54.7% of cases, organic foreign bodies in 44.4%, most often located in the right bronchus (31.62%), removed mainly by a flexible bronchoscope (58.5%). The presence of a foreign body correlates with the presence of pathological findings on X-ray of the lungs, especially emphysema and auscultation, especially lateral difference, and stridor. The presence of pneumonia does not affect the auscultation and X-ray findings of patients when the patient is indicated for bronchoscopy. Multivariate analysis: positive predictive value (auscultation / history / X-ray): + / + / + (72%), + / - / + (72%) + / - / - (55%).

**Conclusion:** Multivariate analysis confirmed the predictive value of the monitored parameters used as indication for bronchoscopy in case of suspected foreign body aspiration.

## RESULTS OF CORRECTIVE OSTEOTOMY FOR MALUNITED DISTAL RADIUS FRACTURES

Adéla Kolářová<sup>1</sup>, Ján Palčák<sup>2</sup>

<sup>1</sup>Faculty of Medicine and Dentistry, Palacky University Olomouc

<sup>2</sup>Department of Traumatology, Faculty of Medicine and Dentistry, Palacky University Olomouc and University Hospital Olomouc

Tutor: MUDr. Ján Palčák

*E-mail contacts: ady.kolarova@email.cz, jan.palcak@fnol.cz*

**Introduction:** Distal radius fractures can be complicated by healing in the deformity, which is associated with limited motion, weakened muscle strength, pain, and other symptoms. The aim of this study was to evaluate the benefit of the treatment of malunited distal radius fractures by corrective osteotomy.

**Material and methods:** A group of 32 patients, aged 19 to 73 years, 8 male and 24 female, who underwent a surgery at the Traumatology clinic in the University Hospital in Olomouc between 2008-2020, were included. In this group, a hand grip strength and a range of motion of the wrist were measured objectively and compared to the measurement of the unaffected contralateral limb. Comparative radiographs of both wrists were taken in standard projections and evaluated subsequently. A subjective assessment of the patient's final functional status was obtained using a standardised DASH questionnaire.

**Results:** The average hand grip strength of the affected limb was 26 kg (82 % of the force of the contralateral limb). Compared to the unaffected wrist, the most prominent recovery of the range of motion was observed in pronation (98.2 %), followed by volar flexion (93.2 %), dorsal flexion (92.9 %), and ulnar duction (92.5 %), the least in supination (91.4%) and radial duction (85.4%). When analysing the radiographs, an average height of the radius (preoperatively 9.86 mm, postoperatively 14.73 mm), radial inclination (preoperatively 17.7°, postoperatively 26.5°), ulnar variance (preoperatively 5.35 mm, postoperatively 1.33 mm), and volar tilt (preoperatively 3.6°, postoperatively 3.8°) were established. The DASH score was 15.26 on average (median 8.33). All of the 32 patients inquired stated an improvement after the corrective surgery.

**Conclusion:** In general, corrective osteotomy of the distal radius post malunion fractures results in good functional results and alleviation of patient's symptoms.

## PARTICIPATION OF BITTER TASTE RECEPTORS (TAS2R) IN MAST CELL SIGNALING PATHWAYS

Lucia Cipková, Martina Šutovská, Jozef Mažerik

Department of Pharmacology, Biomedical Center Martin,  
Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutors: prof. MUDr. Martina Šutovská, PhD., Mgr. Jozef Mažerik

*E-mail contacts: cipkova14@uniba.sk, martina.sutovska@jffmed.uniba.sk,  
mazerik1@uniba.sk*

**Introduction:** Mast cells (MC) are key players in an inflammatory response. During degranulation, asthma symptoms occur (bronchoconstriction, oedema, lung obstruction). This study aimed to confirm the possible influence of TAS<sub>2</sub>R agonists on MCs activation. We want to partially clarify the intracellular consequences of TAS<sub>2</sub>R activation and the possible participation of TRPM<sub>4</sub> ion channels.

**Materials and methods:** *Cell line:* We used a commercial LUVA MC line.

*In silico:* In this analysis, we used the open-access database BitterX, which provides a platform for the initial screening of potential ligands of TAS<sub>2</sub>R.

*In vitro:* To establish the amount of released histamine by colorimetric analysis, we measured the activity of  $\beta$ -hexosaminidase. The inhibitory effect of TAS<sub>2</sub>R on degranulation was detected using amarogentin at seven increasing concentrations.

*In vitro:* Fluorescence imaging of intracellular Ca<sub>2</sub><sup>+</sup> level was performed using Fura 2AM (340/510, 380/510). The effect of the TAS<sub>2</sub>R agonist was examined using amarogentin (100  $\mu$ M). Ca<sub>2</sub><sup>+</sup> release was induced by the addition of thapsigargin (1  $\mu$ M) and Ca<sub>2</sub><sup>+</sup> signalling was terminated by the addition of EGTA (4 mM).

*Immunocytochemistry:* The presence of TAS<sub>2</sub>R and Fc $\epsilon$ RI (receptor for IgE) was examined by using primary antibodies (TAS<sub>2</sub>R<sub>14</sub> polyclonal antibody and Anti Fc epsilon RI/ Fc $\epsilon$ R1A antibody) and secondary antibodies (Goat anti-Rabbit IgG AlexaFlour 555, Anti-mouse IgG AlexaFlour 647).

**Results:** In silico analysis demonstrated the potential interaction of amarogentin with 13 TAS<sub>2</sub>R subtypes, while the highest for subtype TAS<sub>2</sub>R<sub>14</sub>. The presence of TAS<sub>2</sub>R<sub>14</sub> was confirmed by immunocytochemical analysis.  $\beta$ -hexosaminidase release assay revealed that amarogentin inhibited LUVA degranulation. Amarogentin used in Ca<sub>2</sub><sup>+</sup> imaging analysis partially reduced thapsigargin-induced intracellular calcium release.

**Conclusion:** In conclusion, TAS<sub>2</sub>R agonists have an impact on cytosolic levels of Ca<sub>2</sub><sup>+</sup> and histamine release. In taste buds, TAS<sub>2</sub>R and TRPM<sub>4</sub> ion channels cooperate for a taste sensation. We assume that similar cooperation of TAS<sub>2</sub>R and TRPM<sub>4</sub> is essential for the effects of TAS<sub>2</sub>R agonists on MCs. However, further experiments are needed to elucidate the exact components in the intracellular cascade of TAS<sub>2</sub>R.

## MENTAL „WELL-BEING“ – THE EFFECT OF NEUROFEEDBACK

Andrea Geregová, Nikola Ferencová, Zuzana Višňovcová

Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutors: MUDr. Nikola Ferencová, PhD., Ing. Zuzana Višňovcová, PhD.

*E-mail contacts: geregova7@uniba.sk, nikola.ferencova@uniba.sk,  
zuzana.visnovcova@uniba.sk*

**Introduction:** Electroencephalography (EEG) neurofeedback (NFB) represents a variation of biofeedback which records the various metrics of brain function and provides real-time feedback of brain activity to the participant. NFB training is based on operant conditioning with the aim to train the participants to control their brain activity toward a desired state and thus help individuals improve emotional, behavioural and cognitive functioning in everyday life. We aimed to assess mental “well-being” in medical students during rest and exam periods as well as to study the effect of NFB training to cope with exam-related stress.

**Material and methods:** Ten healthy young students (4 females; age  $23.2 \pm 0.1$  yrs.) were repeatedly examined three times (i.e. baseline, stress period before the exam, and stress period before the exam after NFB training). A continuous EEG signal (Deymed, Czech Republic) was recorded at rest and during mental arithmetic test (MAT). Evaluated parameters: individual EEG frequency bands from Cz electrode – theta (4-8 Hz), alpha (8-12 Hz), sensorimotor rhythm (SMR, 13-15 Hz), beta1 (19-23 Hz) and beta2 (23-36 Hz); MAT - average reaction time and error rate. State anxiety, trait anxiety, and depressive symptoms were evaluated using standardized questionnaires.

**Results:** Depressive symptoms were significantly higher during the stress period before the exam compared to baseline ( $p=0.046$ ). Increased trait anxiety symptoms were significantly associated with increased activity in beta1 during the stress period before the exam ( $p=0.033$ ). Increased state as well as trait anxiety and depressive symptoms were significantly associated with increased activity in beta2 during the stress period before the exam ( $p=0.016$ ,  $p=0.008$ ,  $p=0.002$ , respectively). These findings were not observed during the stress period before the exam after NFB training, indicating that NFB training can enhance mental “well-being” during periods of increased stress.

**Conclusion:** The present study has shown that NFB training can represent a non-invasive, non-pharmacological and easily available technique beneficial for stress management in medical students usable in coping with future mentally demanding profession.



## INDUCED PLURIPOTENCY, CELL ENGINEERING AND LITTLE HEROES DONATING BLOOD MAKE IT POSSIBLE TO MODEL DUCHENNE MUSCULAR DYSTROPHY IN VITRO

Martin Reháč<sup>1</sup>, Dominika Hajdúchová<sup>2</sup>, Stanislava Suroviaková<sup>3</sup>, Ján Strnádel<sup>1</sup>

<sup>1</sup>Laboratory of Flow Cytometry, Cell Phenotyping and Engineering (Cellphie),  
Biomedical Centre Martin,

<sup>2</sup>Department of Pathophysiology, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

<sup>3</sup>Department of Pediatric Neurology, University Hospital Martin,  
Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: Ing. Ján Strnádel, PhD.

*E-mail contacts: rehakmartin@outlook.sk, jan.strnadel@uniba.sk*

**Introduction:** Duchenne muscular dystrophy (DMD) is a X-linked recessive genetic disorder associated with progressive muscle degradation. It primarily affects boys, with its first symptoms shown at 2-4 years of age. Currently this disease is not treatable, only symptomatic treatment is available. Thus, the new *in vitro* models are needed for future therapy research. Here, we present a generation of a novel *in vitro* model (abbreviated as iDMD-2), prepared from blood sample by technology of induced pluripotency.

**Material and methods:** PBMCs (peripheral blood mononuclear cells) were isolated from blood of pediatric patient by density gradient centrifugation and reprogrammed into induced pluripotent stem cells with Sendai-virus based vector. Feeder-free and xeno-free culture conditions were used for further expansion of reprogrammed cells. iPSc colonies with typical morphology were then analysed by ICC and intracellular and extracellular flow cytometry. ICC images were prepared and analysed in ImageJ software.

**Results:** Typical stem cell morphology was found in iDMD-2 iPSc cell colonies and these cells showed high level of pluripotent stem cell marker expression. Pluripotency test performed *in vitro* supported successful reprogramming of PBMCs as differentiated cells expressed typical germ layer markers.

**Conclusion:** With the technology of induced pluripotency, we generated the 4<sup>th</sup> Slovak pluripotent stem cell line and only the 2<sup>nd</sup> cell line for modelling Duchenne muscular dystrophy disease *in vitro*. When characterized, this cell line will be registered in Human pluripotent stem cell registry (hPSCreg, *Charité, Berlin*) and made available for researchers in the field.

**Acknowledgement:** We would like to thank Associate Professor Vladimír Nosál, PhD. and Prof. Egon Kurča, from Clinic of Neurology, Martin for their support. This work was supported by APVV-17-0037 research grant.

## IN VITRO MODULATION OF THE MITOCHONDRIAL PHYSIOLOGY IN INITIAL STAGES OF NEURODEGENERATION

Rebeka Rovňaníková, Michal Pokusa

Department of Pathophysiology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava, Biomedical Center Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: RNDr. Michal Pokusa, PhD.

*E-mail contacts: rovnanikova6@uniba.sk, michal.pokusa@uniba.sk*

**Introduction:** The modulation of mitochondrial as well as surface ATP-sensitive potassium channels (KATP) by glibenclamide as an antagonist shows increasing potential in managing of neurodegeneration or other pathological conditions related to the nervous system. Several experimental studies on animal models have brought evidence about beneficial effects of the drugs in motoric symptomatology of Parkinson's disease. However, the precise mechanism of this phenomenon with potential for human health has not been described, yet. Furthermore, the controversy of several studies in the identification of benefits in the use of KATP modulators presents a research challenge in the way of approaching to patients. We believe that the controversy of the published results of individual studies is due to the nature of the model used (neuronal vs. non-neuronal experimental models) as well as the timing of exposure of modulators in experimental models. Based on these findings, we decided to monitor the neurotransmitter release potential of KATP modulation during time in two types of cell model mimicking neuronal vs. non-neuronal environment.

**Material and Methods:** In our experiments, we worked with human SH-SY5Y neuroblastoma cells in non-differentiated as well as differentiated form. The process of neurodegeneration was induced by the toxic effect of rotenone, which is substance with inhibitory effect on the mitochondrial respiratory complex I. Subsequently, we monitored the potentially neuroprotective effect of glibenclamide and diazoxide in initial stage of neurodegeneration by the MTT test. For the purpose of evaluation of neurotransmitter release potential, we decide to measure cytosolic  $Ca^{2+}$  oscillation after stimulation of the cell culture by  $K^+$  concentration increase after different time exposure to KATP modulators in control conditions as well after rotenone treatment. Intracellular calcium elevation was recorded by using the calcium imaging method.

**Results:** MTT test revealed different sensitivity of normal vs. differentiated SH-SY5Y cells to KATP modulators after 24h exposure. Calcium imaging revealed no effect of any substance in 15min treated cells on  $Ca^{2+}$  response to  $K^+$  stimuli. Exposure for 24h to glibenclamide indicates enhanced  $Ca^{2+}$  response to  $K^+$  stimuli compared to other experimental groups. Effect of glibenclamide was significantly diminished by 24h co-treatment with rotenone. Effect of KATP modulation after 24h in differentiated SH-SY5Y cells seems to have different tendency, however at least 2 biological replicates need to be analyzed to test statistical significance.

**Conclusion:** In vitro study has shown that modulation of mitochondrial and surface KATP has potential to change the robustness of neurotransmitter release. To support these preliminary results, more biological replicates of differentiated cells remain to be elucidated by calcium imaging technique. Further experiments must be addressed to measure dopamine concentration secreted by both SH-SY5Y cell based model after stimulation of  $Ca^{2+}$  response.

## ANALYSIS OF NEURODEGENERATIVE CHANGES IN THE BRAIN OF PATIENTS WITH MIYOSHI-TYPE DYSFERLINOPATHY

Katharina Maria Šebáková, Petra Hnilicová

Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: Ing. Petra Hnilicová, PhD.

*E-mail contacts: sebakova6@uniba.sk, petra.hnilicova@uniba.sk*

**Introduction:** Dysferlin, as a membrane protein, is not only related to skeletal muscles but can also be found in other tissues such as the cardiac muscle, lungs, spinal cord, and brain. Dysfunctional dysferlin causes muscular dystrophy called dysferlinopathy, with the most common phenotype – Miyoshi myopathy (MM), typically manifesting as distal muscular weakness. In MM, amyloid deposits in the brain were further observed, contributing to the development of Alzheimer's disease.

**Material and methods:** The study included 9 family members with an incidence of MM (4 patients: 2M/2F, age:  $35 \pm 5$  years; 5 healthy controls: 3M/2F, age:  $45 \pm 16$  years). An MR-volumetry was performed on all of the respondents by using a 1.5 Tesla MR scanner (Siemens Magnetom Symphony) to acquire three-dimensional sagittal  $T_1$ -weighted MRI scans (time to repeat/echo = 2080/3.93ms, the field of view =  $250 \times 250$  mm<sup>2</sup>, 192 slices per slab with the slice thickness of 1 mm, in-plane resolution =  $256 \times 256$  mm<sup>2</sup>, the total scan time of 9 min). The results were subsequently processed, and the volume of various brain segments was evaluated using FreeSurfer software (version 2.0.; <http://surfer.nmr.mgh.harvard.edu>). Finally, differences in the brain structure volumes between patients and controls were statistically analyzed using a Students' two-tailed unpaired t-test.

**Results:** This study showed a significant increase ( $p = 0.009$ ) in the volume of the right inferior lateral ventricle of patients (mean  $\pm$  SD =  $470.0 \pm 27.6$  mm<sup>3</sup>) compared to controls (mean  $\pm$  SD =  $243.6 \pm 123.5$  mm<sup>3</sup>).

**Conclusion:** This study showed an entirely new impact of the dysferlin gene mutation, which manifests in pathological changes of the distal skeletal muscles but also significantly enlarges the volume of the right inferior lateral ventricle. According to scientific reviews, this specific part of the human brain is also known to be closely related to Alzheimer's disease development. Although, at the time of the study realization, any neighboring tissues did not show signs of atrophy.

**Acknowledgments:** This study was supported by APVV grant no. SK-AT-20-0010. I could not have undertaken this journey without Ing. Petra Hnilicová, PhD. and her knowledge, expertise, patience, and guidance. I am also grateful to doc. RNDr. Martin Kolísek Dr.rer.nat. for his advice and suggestions, and the Biomedical centre in Martin for the opportunity to execute SVOC. Lastly, I would like to thank my mummy for always trusting me and my friends for their support.

## SMOKELESS TOBACCO PRODUCTS USE IN MEDICAL STUDENTS

**Monika Zjavková, Tibor Baška**

Department of Public Health, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutor: prof. MUDr. Tibor Baška, PhD.

*E-mail contacts: zjavkova3@uniba.sk, tibor.baska@uniba.sk*

**Introduction:** The diploma thesis analyses the use of heated and smokeless tobacco products among medical students by selected socio-demographic determinants (gender, year of study, nationality).

**Material and methodology:** A cross-sectional questionnaire study was carried out during winter semester of the academic year 2022 / 2023 among medical students at the Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava. Reports on the use of smokeless tobacco products at least once a month were analyzed. The sample included 189 first year students (117 Slovak and 72 English study program) and 207 fourth year students (109 Slovak and 98 English study program).

**Results:** 16,9 % of all students stated that they use cigarettes and/or heated tobacco products at least once a month. 28,0 % of students reported current use of heated and smokeless tobacco products. These products were more frequently used among English study program respondents, moreover, women prevailed over men (78,0 % vs. 66,0 %).

**Conclusion:** The results indicate that the smokeless tobacco products have become rather popular among students. The preventive public health measures, beside traditional tobacco products, should be effectively extended to this issue. Moreover, the issue should be included also into the curricula in undergraduate education of future health professionals.

## KANGAROO MOTHER CARE FOR THE PRETERM INFANTS

Katarína Baránková, Lucia Mazúchová

Department of Midwifery, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutor: Mgr. Lucia Mazúchová, PhD.

*E-mail contacts: barankova31@uniba.sk, lucia.mazuchova@uniba.sk*

**Introduction:** Kangaroo mother care (KMC) is considered an effective and simple method in promoting the health and well-being of preterm infants. It is an evidence-based approach that incorporates skin to skin contact. The aim was to investigate women's experiences of maternal kangaroo care for preterm infants.

**Material and methods:** A cross-sectional quantitative study design was chosen. The study population consisted of 63 female respondents, with a mean age of 34.62 ( $\pm 5.39$ ), who had a preterm baby. A self-designed questionnaire was used focusing on awareness of KMC, practicing KMC in the home environment, perception of KMC, breastfeeding experience and women's support for KMC. Descriptive statistics were used to analyze the data collected.

**Results:** We found low awareness of women about KMC before child birth and sufficient knowledge of mothers about KMC. 44.44% of women disagreed with the awareness of mothers by health care providers about the benefits of KMC and 42.86% of women disagreed about the procedure of KMC. Majority of the women were aware of the effects of KMC for themselves and their newborn. The majority found practicing KMC easy and 12.69% found it difficult, with the most common reasons being difficulty in cooperation from health professionals (66.67%) and being time consuming (33.33%). The majority of women reported positive feelings while practicing KMC. 25.4% of mothers breastfed and majority fed the baby with their breast milk. 30.16% of women disagreed with the support in breastfeeding by the health workers. We found that majority of the mothers had support from their partner (90.47%) as well as health workers (73.01%).

**Conclusion:** Considering the results shown, it is important to improve women's awareness about KMC especially from health care professionals. It is important that health professionals are not a barrier but instead are the main supporters of KMC, which is significant for the implementation of KMC as well as for the overall quality of care for preterm babies.

## TEAMWORK IN NURSING

Žaneta Hrbková, Dominika Kohanová

Department of nursing, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava,

Tutor: Mgr. Dominika Kohanová, PhD.

*E-mail contacts: hrbkova3@uniba.sk, dominika.kalankova@uniba.sk*

**Introduction:** Effective teamwork in nursing minimizes the occurrence of adverse events and brings benefits to the hospital, nursing managers, members of the nursing team, as well as the patient. In ineffective teams, we observe the presence of barriers and threats that impact the provision of quality and safe nursing care. Therefore, our study aimed to determine the level of team cooperation in the nursing team in selected departments in a particular university hospital and identify factors that affect the assessment of the level of team cooperation.

**Material and methods:** Data collection was carried out in 2022, from April to July, using the Nursing Teamwork Survey (NTS), which contains 33 items grouped into five subscales. The research group consisted of members of the nursing teams (N = 292). Data were processed through descriptive and inferential statistics.

**Results:** The average composite team cooperation score was  $2.88 \pm 0.57$  (out of a possible 4), which indicates the occurrence of ideal team cooperation less than 75% of the time. The subscale Shared mental model ( $3.23 \pm 0.76$ ) was the best rated, followed by Support ( $3.09 \pm 0.67$ ). Conversely, the Team Orientation subscale ( $2.38 \pm 0.75$ ) achieved the lowest score in the evaluation. Significant differences in the evaluation of teamwork were present based on age, education, job position, working hours, years of experience in the position and current workplace, intention to leave the workplace, number of overtime hours, perceived staff adequacy, and the number of missed shifts. Several variables significantly predicted the overall level of teamwork ( $p \leq 0.05$ ).

**Conclusion:** The evaluation of teamwork can point out the different perceptions among team members, identify weaknesses and subsequently help implement effective techniques to improve teamwork and the quality of nursing care.

## MISSED NURSING CARE IN NEONATOLOGY

**Branislav Malý, Dominika Kohanová**

Department of Nursing, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutor: Mgr. Dominika Kohanová, PhD.

*E-mail contacts: maly32@uniba.sk, dominika.kalankova@uniba.sk*

**Introduction:** Measurement of missed nursing care in neonatal settings is considered essential for safe and quality care, as neonatal patients are vulnerable and more sensitive to the negative consequences of withholding any necessary nursing care activities, such as infections or prolonged hospitalizations. Therefore, our study aimed to investigate the prevalence, patterns, and reasons for missed nursing care in neonatal setting.

**Material and methods:** A descriptive cross-sectional study included 121 registered nurses working in neonatal care units in four teaching hospitals in different regions of Slovakia. Data were collected between May and September 2022 using the MISSCARE Survey-NICU questionnaire. Data were analyzed using descriptive and inferential statistics in IBM SPSS 25.0.

**Results:** The mean composite score of the MISSCARE Survey instrument was 2.66 (SD=0.78), indicating that missed care is a prevalent problem, as reported by neonatal nurses. Overall, 100% of Slovak neonatal nurses missed at least one or more nursing care activities during their last working shift. Neonatal nurses also reported that they most frequently omitted emotional support provided to parents/family (92.6%). The most frequently reported reason for missed nursing care was frequent interruptions (99.2%). Significant associations were found between missed nursing care and nurse education, specialization training, overall nurse experience, current nurse experience, perceived staff adequacy, and overall level of patient safety ( $p < 0.05$ ).

**Conclusion:** The evaluation of missed care in neonatal care units is often neglected, although the prevalence of missed nursing care is alarmingly high, indicating a serious problem in this setting. Further research should focus on a detailed analysis of contributing factors to missed nursing care in neonatal care units and increase the awareness of nurse managers of the regular evaluation of missed nursing care to improve child and family outcomes.

## PROFESSIONALISM IN COMMUNITY CARE

Viktória Maslišová, Katarína Žiaková

Department of Nursing, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutor: prof. Mgr. Katarína Žiaková, PhD.

*E-mail contacts: maslisova1@uniba.sk, katarina.ziakova@uniba.sk*

**Introduction:** The increasing demands for high-quality and safe health care face the reality of an aging population, an increasing number of chronic diseases, increasing costs of the provided health care, and a shortage of nurses. Also, as a result of these changes, the orientation toward providing care in the community is emphasized. The role and activities of community nurses are becoming more and more important and are associated with the adoption of highly-professional behavior and a strong commitment to the profession. Professionalism is a multidimensional concept, and its interpretation varies across different professions and sociocultural contexts. Therefore, our study aimed to investigate how community nurses interpret professionalism in our sociocultural context.

**Material and methods:** A qualitative study was conducted between January 2022 and July 2022. Data were collected using individual face-to-face semi-structured interviews. The sample consisted of ten nurses working in community care in Slovakia. The interviews were recorded on an audio recorder and transcribed verbatim into the text as soon as possible. Data were analyzed by thematic analysis.

**Results:** Through thematic analysis, we identified four main themes: Professional socialization; Providing community service; Violation of professionalism; Strengthening and challenges of professionalism. Nineteen subthemes further specified main themes.

**Conclusion:** We gained a unique insight into how community nurses interpret professionalism in Slovakia. Although community nurses may seem invisible in the healthcare system, their roles and responsibilities are irreplaceable. Professionalism in community care faces many problems and challenges that need to be urgently addressed, especially in connection with demographic changes and the increasing number of patients with chronic diseases. At the same time, it is necessary to focus on strengthening professionalism in nursing at several levels.

**Acknowledgement:** Supported by the project KEGA 00UK-4/2021 Professionalism and ethics in nursing.



## CARE OF THE CENTRAL VENOUS CATHETER AT A STANDARD TREATMENT UNIT

**Paulína Miháliková, Edita Hlinková**

Department of Nursing, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutor: Mgr. Edita Hlinková, PhD.

*E-mail contacts: mihalikova118@uniba.sk, edita.hlinkova@uniba.sk*

**Introduction:** Central venous catheter is used not only in nursing treatment of critically ill patients but as well for application of pharmacotherapy. Care of catheter demands certain experience from nurses, because high risk of infection is present. Indication of application of central venous catheter is above all complicated surgery, however it is also used in therapy of oncological patients. Nowadays in nursing care, nurses regularly manipulate with CVC, particularly at surgical and intensive care units.

**Methodology:** Thesis has a character of descriptive qualitative study. To collect empiric data, semi-structured interviews were created in advance, which were conducted with eight participants. The participants were nurses, which are working at University hospital in Martin at surgical clinic at septic and aseptic standard treatment unit. From each interview sound recording was recorded into application. Before the start of the interview, each participant was instructed about the research and their informed consents were acquired. To evaluate the interviews, thematic analysis was used.

**Results:** After evaluation of thematic analysis we specified 7 characteristic themes: *Safety of the patient, Nursing intervention in manipulation with CVC, Management of the department/clinic, Prevention of complications, Benefits of CVC, Implementation of changes and Disadvantages of CVC*. Each theme consists of 16 individual subthemes, which describe statements of respective participants.

**Conclusion:** Themes and subthemes, which were gathered in subject matter of CVC at standard treatment unit are assigned to important clauses with intention of further education of medical personnel and also nursing students.

## THE MENTAL HEALTH QUALITY OF SELECTED HEALTH SCIENCES STUDENTS

Neupauerová Patrícia, Švihrová Viera

Department of Public Health, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutor: prof. MUDr. Viera Švihrová, CSc.

*E-mail contacts: neupauerova15@uniba.sk, viera.svihrova@uniba.sk*

**Introduction:** The burden of mental disorders is increasing worldwide, especially in young adulthood. Health students are particularly at risk. The goal of the study was to analyze the quality of their mental health, perceived anxiety and depression, and to evaluate the possible effects of selected sociodemographic characteristics.

**Material and methods:** A cross-sectional study analyzed a sample of medical (general medicine, dentistry) and non-medical (midwifery, nursing, public health) students. Out of 1120 students, 200 (17.9%) filled out an online questionnaire (81.5% women and 77.5% medical students). Standardized questionnaires were used: PHQ-9 (Patient Health Questionnaire) to detect depression and GAD-7 (General Anxiety Disorder) to detect anxiety disorder, with an answer score from 0 to 3 on the Likert scale. Perception of mental health was evaluated on a scale from 1 to 5: poor, sufficient, good, very good, and excellent, respectively. The chi-square test was used to compare the data, with statistically significant values  $p < 0.05$ .

**Results:** The prevalence rate of anxiety was 66.0%, moderate to severe anxiety was 31.5%. Women (69.3%) perceived anxiety significantly more often than men (51.4%). Depression of varying severity occurred in 69.5% of students, moderately severe to severe depression in 14.0% of students. The incidence was higher among 1st-year students, medical majors, living with parents, and women. No significant differences were found concerning the year of study, the field of study, the type of housing or gender (depression). Totally 7.5% of students had suicidal or self-harm thoughts. Totally 8.5% rated their mental health as poor, 23.0% as sufficient, 33.5% as good, 26.0% as very good, and only 9.0% as excellent. Sufficient and poor mental health was indicated more often by women (33.1%) than men (24.3%) and by students in their final year (30.2%), compared to the 1st-year (27.5%).

**Conclusions:** The results showed a high incidence of mental problems among health sciences students, indicating a deteriorated quality of their mental health.

## BARRIERS TO NURSES REPORTING ADVERSE EVENTS

**Martin Petruščák, Dominika Kohanová**

Department of Nursing, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutor: Mgr. Dominika Kohanová, PhD.

*E-mail contacts: [petruscak1@uniba.sk](mailto:petruscak1@uniba.sk), [dominika.kalankova@uniba.sk](mailto:dominika.kalankova@uniba.sk)*

**Introduction:** Nurses represent the largest group of healthcare professionals and are responsible for advancing patient safety, including adverse events and near-miss reporting. However, adverse events are underreported due to several barriers threatening hospital patient safety. Therefore, our study aimed to explore the barriers to adverse events underreporting.

**Material and methods:** A descriptive qualitative study included ten advanced practice nurses from intensive care units who worked in a selected university hospital in the Slovak Republic. Data were collected between September 2022 and February 2023 using semi-structured interviews. Data were transcribed verbatim and analyzed by thematic analysis.

**Results:** Based on the thematic analysis, we identified five meaningful themes, as follows: Adverse events in ICU; Reasons for adverse events occurrence; Adverse events reporting; Barriers to adverse events reporting; Preventive strategies. Themes were further specified by several subthemes. Based on our results, it is clear that nurses were afraid to share their opinions and experiences with adverse events reporting. Only one subtheme represents barriers to reporting adverse events. The main barriers were identified as follows: negative attitude to reporting, lack of reporting awareness, fear of reporting, and lack of knowledge and experience with adverse events reporting.

**Conclusion:** Unfortunately, insufficient research on the barriers to reporting near-misses, incidents, and adverse events altogether with low reporting awareness calls for further research. Effective and regular reporting lead to minimizing the occurrence of adverse events, of which more than 50 percent are preventable. An establishment of educational and managerial procedures to overcome barriers to reporting is needed to improve hospital patient safety.

## EFFECTIVITY OF PSYCHOEDUCATION FOR PATIENTS WITH SCHIZOPHRENIA

Liliana Valachovičová, Martina Tomagová

Department of nursing, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: doc. Mgr. Martina Tomagová, PhD.

*E-mail contacts: valachovicova8@uniba.sk, martina.tomagova@uniba.sk*

**Introduction:** Schizophrenia is a serious mental illness with a chronic course. It causes many difficulties in patient's life because it reduces the mindfulness, causes disability, low insight, loss of social skills, and continues with relapses. Psychoeducation is an approach focused on various problems of patients with schizophrenia, such as reduced quality of life, problems with interpersonal relationships, non-compliance with treatment, impaired self-care. A nurse is an active member of the interdisciplinary team implementing psychoeducation for patients with schizophrenia.

**Material and methods:** The aim of the narrative review was to identify what effect does psychoeducation have on patients with schizophrenia in different areas of their life. The literature search was performed in November 2022 in electronic databases: PubMed, ScienceDirect, Web of Science and Scopus. In all databases, the same combination of keywords were used in a search query using the Boolean operators AND and OR: effectivity, effectiveness, effect, efficiency, nursing, psychoeducation, psychoeducational, patients. 383 studies were identified from this search. The process of sorting identified studies was carried out according to the recommendations of PRISMA. In total, 13 papers met the reviewers' inclusion criteria and criteria for methodological structure of the studies. The Quality appraisal scale and six descriptive criteria related to methodological structure of the studies were used to evaluate the quality of identified studies.

**Results:** 5 areas in which the psychoeducational programs were proven to be effective were detected in all 13 identified studies: symptoms of schizophrenia, adherence and compliance in medication, reduction of rehospitalization and length of hospitalization, knowledge and insight into schizophrenia, quality of life and social functioning.

**Conclusion:** Evidence from the analyzed studies indicates that psychoeducational approaches as part of comprehensive care for people with schizophrenia are effective in solving several problems of these patients. Therefore, it is necessary to systematically and purposefully implement these approaches also within the nursing care of patients with schizophrenia.

## ADHERENCE IN A PATIENT WITH POLYPHARMACOTHERAPY

Miroslava Výboštoková, Ivana Bóriková

Department of Nursing, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutor: doc. Mgr. Ivana Bóriková, PhD.

*E-mail contacts: vybostokovag@uniba.sk, ivana.borikova@uniba.sk*

**Introduction:** Adherence to treatment is multifactorial conditioned and is a fundamental prerequisite for successful treatment of chronic diseases. The complexity of treatment and the number of medications used are largely related to patient adherence. Polypharmacotherapy, associated mainly with low adherence, is a growing problem in society.

**Material and methods:** A descriptive, correlational study was aimed at determining the adherence rate in patients with polypharmacotherapy ( $\geq 5$  medications) and identifying the relationship between socio-demographic items and the adherence rate. The research protocol contained socio-demographic items, items related to pharmacotherapy and the 5-item measurement tool Medication Adherence Report Scale (validated Slovak version, reliability MARS-SK Cronbach's Alpha coefficient was 0.69). Items are scored 1-5, total score is 5-25; high adherence  $\geq 23$ , low adherence  $\leq 22$ . The Ethics Committee and the management of the Internal Clinic of UHM approved the research protocol. The sample consisted of  $n = 60$  respondents, men  $n = 33$  (55%), women  $n = 27$  (45%), and an average age of  $67.1 \pm 15.9$  years (min. 24, max. 93). Respondents with a secondary education (57%), living in a married union (55%), with family members (70%), living in a city (52%) prevailed. We determined statistical significance at the significance level of  $p < 0.05$ .

**Results:** The average number of medications used in the sample was  $8.7 \pm 3.78$  (min 5, max. 25). The most used were antihypertensive (92%) and up to 60% of patients use over-the-counter drugs. The average MARS-SK score in the sample was  $22.8 \pm 3.4$  (min. 10, max. 25). High adherence was observed in 70% of respondents, low adherence in 30%. We did not find a statistically significant correlation between gender, age, education, number of medications and adherence rate.

**Conclusion:** Interventional studies suggest that investments in adherence support are fully recovered within a few years. The influence of socio-demographic factors is quite complicated; they may not be truly independent factors influencing adherence, because they are related to the patient's various socio-economic and cultural background.

## PHARMACOGENETICS OF RIVAROXABAN

Vladimír Doboš, Juraj Sokol, Jana Žolková

Department of Haematology and Transfusion Medicine,  
National Centre of Haemostasis and Thrombosis,  
Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutors: doc. MUDr. Juraj Sokol, PhD., RNDr. Jana Žolková, PhD.

*E-mail contacts: vladimirdobos@icloud.com, juraj.sokol@uniba.sk*

**Introduction:** Rivaroxaban belongs to the group of medication referred to as direct oral anticoagulants (DOACs) and acts as selective, reversible factor Xa inhibitor. Due to their efficacy, ease of use, and favourable safety profile these agents have achieved popularity among both patients and providers. Nevertheless, serious bleeding and thromboembolic events of DOAC users have been reported. Interindividual variation in the plasma levels of DOACs is well known fact and the effect of genetic factors on the pharmacokinetics of DOACs has been investigated in several studies.

**Material and methods:** Blood samples were taken 24 hours after a previous drug dose administration for the assessment of the trough level and 2 hours after the drug dose administration for the assessment of the peak level. Anti-Xa activity (ng/L) of rivaroxaban was assessed using rivaroxaban calibrated anti-Xa chromogenic assays. High-resolution melting analysis (HRM analysis) on LightCycler 480 II (Roche) was used for single nucleotide polymorphism (SNP) genotyping. One-way analysis of variance (ANOVA) was used for comparison among groups. P values less than 0.05 were considered statistically significant. Data were analysed with SPSS 22.0.0.0.

**Results:** Our study includes 40 patients (15 women, 25 men) with atrial fibrillation treated in Martin University Hospital with rivaroxaban. Beside rivaroxaban activity we also monitored renal and liver function, weight, chronic medication. Our results showed that the presence of two SNPs (rs1155002 and rs11572191) located within exon of CYP2J2 gene has a significant effect on the rivaroxaban concentration. In addition, patients (n=10) with selected SNP (rs28365095) within CYP3A5 gene had higher rivaroxaban concentration compared to patients without this mentioned polymorphism.

**Conclusion:** The presence of three selected SNPs (rs1155002, rs11572191 and rs28365095) localized in exon region of CYP2J2 or CYP3A5 gene is associated with higher rivaroxaban concentration. Our findings could have some important clinical implications (risk of bleeding, dosage...).

## EARLY AND LATE ONSET OF SCLEROSIS MULTIPLEX AND IT'S IMPACT ON THE DISEASE DEVELOPMENT

Sára Dudášová, Ema Kantorová, Egon Kurča

Department of Neurology, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutor: doc. MUDr. Ema Kantorová, PhD.

*E-mail contact s: ema.kantorova@uniba.sk, egon.kurca@uniba.sk  
saradudasovazoo@gmail.com*

**Introduction:** The severity and progression of multiple sclerosis (MS) can vary between individuals and over time. MS patients with late-onset (LO) are known to have severe disease course. We hypothesised, MS patients with early-onset (EO) may experience an adverse course also.

**Methods:** We performed retrospective analyses of patients records from MS Centre in Martin. We included 13 patients with EO MS (mean age at onset 16.5 years +/- 1.19), 19 patients with LO MS (53.7 +/- 6.5), and 32 patient with common age (CA) at MS onset (27.4 +/- 5. 8). The groups did not differ in disease duration. We compared neurological disability among groups using Expanded Disability Status Scale (EDSS) and additionally adjusted for disease duration by Multiple Sclerosis Severity Scale (MSSS).

**Results:** Patients with both EO and LO had higher EDSS (4.0 +/- 2.1 vs 4.1 +/-1.6; p = 0.9) than CA MS (3.1 +/-1.5). The difference was strongly significant for LO MS (p = 0.018). The difference between EO a and CA MS showed trends (p = 0.065). MSSS confirmed the highest MS burden in LO MS when compared with CA MS (5.8 +/- 2.4 vs 3.9 +/- 1.7, p = 0.003). The difference between MSSS of EO and CA MS was not proved. LO MS patients presented with the most serious MS symptoms. EO MS patients experienced more serious MS symptoms than common-age MS, however, the difference was not significant. Treatment strategy did not differ between groups also.

**Conclusions:** Early onset MS patients presented with medium level of disease burden. They have worsen disease course than common-onset MS and milder one than late-onset MS patients.

## SELECTED METABOLIC ABNORMALITIES ASSOCIATED WITH OBSTRUCTIVE SLEEP APNEA

Terézia Kozáková, Jarmila Vojtková

Clinic of Children and Adolescents, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: MUDr. Jarmila Vojtková PhD.

*E-mail contacts: kozakova68@uniba.sk, jarmilavojtkova@gmail.com*

**Introduction:** Obstructive sleep apnea (OSA) is the most common sleep-disordered breathing in children. Obesity, tonsil and adenoid hypertrophy are potential risk factors for paediatric OSA. The relationship between OSA and obesity is reciprocal; the presumption of OSA increases in obesity due to fat deposited around the upper airway, and repeated desaturations associated with OSA may contribute to obesity.

**Material and methods:** 44 children (35 males, 9 females) at the age 6 – 18 years (average  $10,79 \pm 4,46$  years) were enrolled to our prospective study. The inclusion criterion was suspected sleep-disordered breathing (history of snoring) with a recommendation for overnight polysomnography (PSG). In all children, anthropometric parameters (weight, height, body mass index, neck circumference) and selected metabolic parameters (glycaemia, insulin, C-peptide, glycated haemoglobin – HbA<sub>1c</sub>) were followed. Sleep parameters as time spent in different stages of sleep, sleep efficiency, apnea/hypopnea index (AHI), blood saturation and arousals from sleep were evaluated based on PSG.

**Results:** Children with obesity (n=24) had significantly lower mean saturations during sleep ( $93.04 \pm 2.88$  vs.  $95.28 \pm 1.36\%$ ,  $p=0.002$ ), significantly higher incidence of obstructive hypopnea ( $13.89 \pm 13.34$  vs.  $7.97 \pm 9.61$ ,  $p=0.05$ ), snoring ( $33.33 \pm 27.92$  vs.  $18.27 \pm 26.39$  minutes,  $p=0.039$ ) and higher wakefulness after sleep onset ( $14.28 \pm 11.01$  vs.  $7.59 \pm 7.01\%$ ,  $p=0.016$ ) compared to children without obesity (n=20). Children with obesity had also significantly higher insulin ( $23.88 \pm 19.22$  vs.  $7.08 \pm 6.11$  mU/l,  $p=0.0002$ ), C-peptide ( $3.5 \pm 1.51$  vs.  $1.3 \pm 0.80$  µg/l,  $p<0.0001$ ) and HbA<sub>1c</sub> ( $4.00 \pm 0.67$  vs.  $3.44 \pm 0.38$  % DCCT,  $p=0.023$ ). In subgroup of children with obesity, moderate statistically significant correlation between AHI and insulin concentration ( $r=0.475$ ), AHI and C-peptide ( $r=0.403$ ) and strong correlation between obstructive events and C-peptide ( $r=0.614$ ) were found.

**Conclusion:** Metabolic abnormalities related to insulin resistance are associated with sleep-disordered breathing in obese children. OSA and obesity are chronic inflammatory diseases that interact and magnify each other, so child with OSA and obesity requires a multidisciplinary approach.



## RESIDUAL SLEEP APNEA IN CHILDREN

Alžbeta Majtanová, Anna Ďurdíková, Peter Ďurdík

Clinic of Children and Adolescents, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava, University Hospital Martin

Tutors: MUDr. Anna Ďurdíková, PhD., MUDr. Peter Ďurdík, PhD.

*E-mail contacts: betmajtanova@gmail.com, annasujanska@gmail.com*

**Introduction:** Residual obstructive sleep apnea is defined as persistence of AHI index  $\geq 1$  respiratory event (obstructive apnea, hypopnea) per hour of sleep after otorhinolaryngology intervention. The issue of residual symptoms in children with obstructive sleep apnea (OSA) after adenotonsillectomy (ATE) is current, often discussed and open question in the management of this disease.

**Material and methods:** We aimed to study 34 patients (29 boys, 5 girls, age  $9,24 \pm 4,36$ , BMI  $27,11 \pm 11,87$ ) with OSA diagnosed by polysomnography (PSG) in sleep laboratory for children. Based on the result of PSG we indicated ATE to all 34 patients. After 3 months we invited patients to sleep laboratory to provide second control PSG after otorhinolaryngology intervention. These OSA patients were divided according to clinical phenotype into 2 groups: classic phenotype (14 patients; 41,18%) and adult phenotype (20 patients; 58,82%).

**Results:** Residual sleep apnea was diagnosed in 24 patients (70,59%) with mean AHI  $6,67 \pm 9,17$  after procedure. Incidence of severe residual OSA was 25%; moderate residual OSA 29,17%; mild residual OSA 45,83%. Residual OSA (mean AHI  $6,96 \pm 7,94$ ) in group of children with classic phenotype was present in 8 patients (57,1%). In 16 patients with adult phenotype of OSA (80,0%) were diagnosed with residual OSA mean AHI  $10,39 \pm 10,72$ ). Residual OSA prevalence was significantly higher in children with adult phenotype ( $p \leq 0,001$ ). Sleep architecture during pre-treatment PSG was significantly impaired in patients with residual OSA, achieving prolonged REM latency, higher WASO, longer NREM stage 1 and lower deep sleep efficiency.

**Conclusion:** We concluded that there is a higher risk of residual OSA in children with adult phenotype. Obesity is an important risk factor for residual OSA in children. Monitoring children with OSA after therapy should be considered as an important part of management. Individualized approach to patients with residual OSA could improve quality of life in pediatric patients.

## MOLECULAR HETEROGENITY OF THE BREAST CARCINOMA

Michaela Mihalková, Lukáš Plank

Department of Pathological Anatomy, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutor: Prof. MUDr. Lukáš Plank, CSc.

*E-mail contacts: lukas.plank@uniba.sk, mihalkova13@uniba.sk*

**Introduction:** Breast carcinoma is the most common malignant disease in women. A major disadvantage of the disease from the point of view of treatment is tumour heterogeneity and changes taking place at the molecular level of carcinoma. Carrying out recurring biopsies in patients can reveal these changes in time and adjust the treatment. In the process of repeated interventions, it is important to consider the medical, human, and economic factors. The thesis aimed to prove that changes in breast carcinoma occur, they occur often, and therefore carrying out recurring biopsies is significant for patients.

**Material and methods:** Based on the criteria, 582 patients who underwent at least 2 breast carcinoma biopsies were selected from the UNM and JLFUK pathological anatomy patient database. According to the time difference between the individual biopsies and the breast on which the carcinoma occurred, they were divided into 3 groups. In individual groups, the change in HR expression and HER2 amplification of two consecutive biopsies of each patient was compared. The results of the changes were clearly recorded using tables and graphs.

**Results:** In each group, there was a change in HR expression in more than 50% of patients. The longer the time period between individual biopsies, the more significant changes occurred. Changes in HER2 amplification were also present but less frequent. Their incidence also increased with increasing time interval between individual biopsies. In patients with an interval between individual biopsies of more than 3 months, the change in HER2 amplification was present in up to 10%. Present change of HR expression and HER2 amplifications was noted in 10 patients.

**Conclusion:** In breast carcinoma, indeed, there are changes at the molecular level, which often require a change in treatment. Carrying out recurring biopsies can improve diagnosis at the molecular level, thereby making the treatment of the disease itself much more efficient and providing the patient with a better vision for the future.

## ENERGY METABOLISM IN CRITICAL ILLNESS

Tereza Ščurová, Milan Minarik

Department of Anesthesiology and Intensive Care Medicine,  
Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: doc. MUDr. Milan Minarik, PhD.

*E-mail contacts: terezka.scurova@gmail.com, minarikm@yahoo.com*

**Introduction:** Critical illness changes human energy metabolism secondary to neuro-endocrine system activation. According to the theory, a critical event is immediately followed by catabolic suppression of metabolism, the ebb phase, and followed by anabolic flow phase with increasing energy expenditure for recovery. This theory has not been properly validated with a clearly defined duration or magnitude of metabolic changes.

**Patients and methods:** The study included 20 patients hospitalized at the Department of anesthesia and intensive care medicine, University Hospital Martin, between October 15, 2022 and February 28, 2023. Patients were divided into two groups: the first group included patients during the acute phase of illness, who were sedated and mechanically ventilated. The second group of patients was in the weaning period after cessation of sedation. Measurements were obtained by indirect calorimetry. Continuous O<sub>2</sub> consumption, CO<sub>2</sub> production, respiratory quotient, and energy expenditure have been recorded from respiratory gasses. Data for processing were acquired from four 20-minute measurements during a 24-hour interval. Results were displayed as mean and SD, for analysis we used nonparametric Mann-Whitney test and descriptive statistics.

**Results:** In the acute period, the energy expenditure was between 1700 and 2100 kcal/day, without any significant diurnal variation, and widely varied between calculated basal and total energy expenditure. There was a slight trend toward increase in O<sub>2</sub> consumption and CO<sub>2</sub> production. Initial RQ has been in 0,8 - 0,85 interval. In the weaning period, the energy expenditure showed an increase from day 4 above calculated values, associated with equivalent increase in O<sub>2</sub> consumption and CO<sub>2</sub> production. RQ displayed a trend to decrease below 0,8 level during this period.

**Conclusion:** We have not observed any significant changes in energy expenditure during the acute phase of critical illness. Weaning and recovery phases have been associated with increased energy requirements above calculated values. RQ in the initial period is suggesting mainly protein breakdown and at the end of weaning a switch to lipid utilization. Variability in global energy expenditure suggests high interindividual variation in energy metabolism.

## METABOLOME CHANGES IN HEALTHY VOLUNTEERS AND IN PATIENTS WITH GASTROESOPHAGEAL REFLUX DISEASE

Jana Vnučáková, Martin Ďuriček

Clinic of Gastroenterological Internal Medicine, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: MUDr. Martin Ďuriček, PhD.

*E-mail contacts: vnucakova5@uniba.sk, martin.duricek@gmail.com*

**Introduction:** Various symptoms, such as cough, throat clearing, globus sensation as well as chronic inflammatory conditions of upper airways are often attributed to gastroesophageal reflux disease (GERD). As they are nonspecific and could often reflect other diseases, one struggles to establish causal relationship linking symptoms and reflux, which precludes initiation of reflux treatment. Metabolomic analyses of saliva may offer the identification of biomarkers for the diagnosis and characterization of extraoesophageal symptoms of GERD. Recent studies have identified biomarkers of airway inflammation and lung injury in GERD patients exhibiting extraoesophageal symptoms. Here we hypothesized differences of saliva metabolome in healthy volunteers and in patients with extraoesophageal GERD.

**Material and methods:** We collected saliva from 13 healthy volunteers and 11 patients with extraoesophageal GERD. Both healthy volunteers and patients did not have any respiratory disease for 3 months and were non-smokers. GERD patients had extraoesophageal reflux episodes confirmed by 24-hour pH/impedance monitoring and positive reflux symptom index (RSI>13). Samples were stored at  $-80^{\circ}\text{C}$ . Samples were analyzed using the Bruker Avance III 600 MHz NMR spectrometer. We compared the differences of nuclear magnetic resonance (NMR) metabolomics analysis to find differences between the patient group and control group.

**Results:** After the application of normalization tests the following differences in the saliva metabolome were observed in extraoesophageal GERD patients compared to healthy controls: increase of succinate ( $p<0.0001$ ), decrease of acetate ( $p<0.01$ ), decrease of trimethylamine ( $p<0.01$ ) and increase of glutamine ( $p<0.01$ ).

**Conclusion:** Significant differences of several metabolites were observed between healthy volunteers and extraoesophageal GERD patients. Salivary metabolomics might provide new insights into understanding physiological and pathophysiological processes in patients with extraoesophageal symptoms of GERD.

## PATHOLOGICAL FINDINGS OF KIDNEY TISSUE IN DECEASED COVID-19 PATIENTS

**Vanessa Seibert, Pavel Babál**

Institute of Pathological Anatomy, Medical Faculty Comenius University, Bratislava

Tutor: Prof. MUDr. Pavel Babál, CSc.

*E-mail contacts: seibert1@uniba.sk, pavel.babal@fmed.uniba.sk*

**Introduction:** The COVID-19 pandemic triggered by SARS-CoV-2 is concerning millions of people worldwide. The dominant clinical manifestation is related to pulmonary tissue affection, but several other organ systems can be disturbed. Pathological changes in tissues are caused by direct viral infection, the immune system reaction and the applied therapeutic interventions. The aim of the presented research is to evaluate morphological changes in renal tissue of COVID-19 patients in relation to clinical data.

**Methods:** Kidney tissue samples from 42 patients who died due to COVID-19 in the 1<sup>st</sup> and 2<sup>nd</sup> wave in Slovakia between April 2020 and February 2021 have been histopathologically evaluated by light microscopy. The morphological changes were correlated with clinical data (diabetes mellitus, arterial hypertension, acute and chronic renal disease) as well as laboratory data such as creatinine levels and hospitalization period. Associations were evaluated by analysis of variance.

**Results:** Among 42 patients (mean age 74,4; 22 females; 20 males) morphological changes which can be associated with clinical data refer to canalicular necrosis and Death-autopsy interval ( $p < 0,01$ ), arteriosclerosis of large vessels and maximum Creatinine levels ( $p < 0,01$ ), interstitial inflammatory infiltrate and maximum Creatinine levels ( $p < 0,05$ ). Acute and chronic renal insufficiency can both be linked to glomerulosclerosis ( $p < 0,05$ ), obesity with canalicular necrosis of epithelium ( $p < 0,05$ ). Patients with diabetes mellitus relate to arteriolosclerosis ( $p < 0,05$ ), mesangial thickness ( $p < 0,05$ ) and interstitial inflammatory infiltrate ( $p < 0,01$ ).

**Conclusion:** There is a significant correlation of pathological changes in renal tissue with systemic diseases and some clinical data of deceased COVID-19 patients.

## THE ROLE OF GABA-A RECEPTORS IN THE NUCLEUS OF SOLITARY TRACT IN REGULATION OF COUGHING

Valeria Budošová, Michal Šimera, Ivan Poliaček

Department of Medical Biophysics, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutors: doc. RNDr. Michal Šimera, PhD., prof. RNDr. Ivan Poliaček, PhD.

*E-mail contacts: budosova10@uniba.sk, michal.simera@uniba.sk, ivan.poliacek@uniba.sk*

**Introduction:** The nucleus of solitary tract (NTS) comprises the second-order neurons, which are the first synaptic target for the primary cough-related sensory input. They process and integrate the information with other inputs and provide an output to the brainstem network to generate cough. The NTS play significant role in regulation of cough excitability, motor drive and cough phase timing. However, cough modulation from rostral NTS (rNTS) and caudal NTS (cNTS) may differ significantly.

**Material and methods:** The Bicuculline (a competitive GABA-A receptor antagonist; 1 mM) was bilaterally microinjected into the rNTS and cNTS on 8 spontaneously breathing anesthetized cats (♂;  $4.22 \pm 0.23$  kg). The cough reflex was mechanically induced by a soft polyethylene fibre via the cannula placed in the trachea (tracheobronchial cough). Electromyograms (EMGs) of diaphragm (DIA) and abdominal muscles (ABD), oesophageal pressures (EP) and blood pressure (BP) were recorded and analysed.

**Results:** Bilateral microinjections of 1 mM bicuculline in the rNTS significantly reduced cough number ( $p < 0.001$ ), amplitudes of DIA ( $p < 0.01$ ) and ABD ( $p < 0.001$ ) EMG, inspiratory ( $p < 0.01$ ) and expiratory ( $p < 0.001$ ) EP and prolonged the duration of the cough expiratory phase (as well as the total cough cycle duration). Bilateral microinjection of bicuculline in the cNTS significantly reduced cough number ( $p < 0.01$ ) and amplitudes of ABD ( $p < 0.05$ ) EMG and elongated cough expiratory phase and total cough cycle duration.

**Conclusion:** Our results confirm the existence of complex neuronal structures in the NTS necessary for cough production. GABA-A receptors within the region of NTS play an important role in the regulation of coughing. We can pinpoint differences in neuronal configuration related to the cough control in the cNTS vs. rNTS in cats. The finding support the existence of separate inspiratory and expiratory cough control and even possibly distinct 2<sup>nd</sup> order neuronal populations.

## HIGH METHIONINE DIET AND ITS POSSIBLE INFLUENCE ON THE GUT-BRAIN AXIS

Michaela Fábryová, Mária Kovalská

Department of Histology and Embryology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: RNDr. Mária Kovalská, PhD.

*E-mail contacts: fabryova44@uniba.sk, maria.kovalska@uniba.sk*

**Introduction:** Methionine is an essential amino acid regularly consumed within the diet. One of the intermediate products in the Met metabolism is homocysteine (Hcy). Generally, a high level of Hcy (hHcy) in plasma is a risk factor for atherosclerosis, thrombosis and hypertension. Our research project is based on previous research which connects higher Hcy (hHcy) levels with neurodegeneration. Derived from this information, we explored how a moderate Met diet affects the gut.

**Material and Methods:** Moderate Met diet at 2 g/kg of animal weight/day for four weeks induced mild hHcy in adult Wistar rats. After the mild hHcy induction, animals were sacrificed, gut (small and large intestine) was fixed in 4 % paraformaldehyde, followed by a saccharose bath and proceeded for cryosectioning with subsequent histological and immunofluorescence analyses.

**Results:** Histomorphological analyses showed an increase in the number of disintegrated absorptive cells in the small intestine. The immunofluorescence analysis showed significant changes in the reduction of tight junctions, increased inflammatory elements, and increased proteosynthetic activity of multipolar neurons with the rise of nerve fibres of enteric nervous system branches in Met-diet-treated animals.

**Conclusion:** These pilot findings suggest disturbing the physiological barrier with increased inflammation elements in the intestines, possibly influencing the gut-brain axis and leading to neurodegeneration's development or progress, which could represent an interesting and relevant target for future therapeutic interventions.

**Acknowledgement:** Supported by VEGA 1/0192/22.

# PREDICTING THE RESPONSE OF CHRONIC MYELOID LEUKEMIA PATIENTS TO TREATMENT WITH TYROSINE KINASE INHIBITORS: IN VITRO ANALYSIS OF SELECTED SIGNALING MOLECULES OF BCR::ABL<sub>1</sub> POSITIVE LEUKEMIA CELLS

Michal Lacek<sup>1</sup>, Vladimír Divoký<sup>1</sup>, Edgar Faber<sup>2</sup>

<sup>1</sup> Department of Biology, LF UP in Olomouc

<sup>2</sup> Department of Hemato-Oncology FNOL

Tutors: doc. RNDr. Vladimír Divoký PhD., prof. MUDr. Edgar Faber, CSC.

*E-mail contacts: m.lacek@icloud.com, vladimir.divoky@upol.cz, edgar.faber@upol.cz*

**Introduction:** Chronic myeloid leukemia (CML) is a myeloproliferative disease characterized by the *BCR::ABL<sub>1</sub>* fusion gene, which is responsible for the myeloproliferative phenotype. In current targeted therapy, inhibition of *BCR::ABL<sub>1</sub>* tyrosine kinase (TK) by specific inhibitors (TKIs) has been successfully used in the treatment of CML. Phosphorylation (p) monitoring of two *BCR::ABL<sub>1</sub>* TK-activated signaling molecules, Crkl and SFK, is used to assess the sensitivity and/or resistance of patient cells to TKIs.

**Objectives:** 1. To evaluate the sensitivity of leukemia cells to TKIs after their in vitro cultivation with inhibitors, using monitoring of pCrkl and pSFK by flow cytometry (FC);  
2. To compare in in vitro assays the efficacy of clinically used TKIs imatinib (IM), dasatinib (DAS) with an experimental inhibitor LGR-3922, developed at the Faculty of Science, UP.

**Material and Methods:** *BCR::ABL<sub>1</sub>* positive line K562 and 7 patients (6 CML, 1 acute leukemia) were analyzed. Cells were cultured with or without inhibitor. After incubation, cells were lysed and analyzed by western blot (K562) and FC (K562, patient samples). pCrkl, pSFK were detected.

**Results:** pCrkl and pSFK detection in K562 showed concordance by western blot and FC analysis. In patient samples, the degree of *BCR::ABL<sub>1</sub>* sensitivity or resistance to TKIs was expressed as a measure of pCrkl inhibition. The degree of pSFK inhibition was measured independently; SFK activity is partially independent of *BCR::ABL<sub>1</sub>*. LGR-3922 is a dual inhibitor of both *BCR::ABL<sub>1</sub>* and SFK, as is DAS. Against *BCR::ABL<sub>1</sub>*, it showed better inhibition than IM but worse inhibition than DAS. Against SFK, it showed comparable inhibitory activity to DAS.

**Conclusion:** In vitro culture of leukemia cells in the presence of TKIs and subsequent FC analysis can be applied as a predictive tool for therapeutic response to TKIs in CML patients. LGR-3922 succeeded as an inhibitor of *BCR::ABL<sub>1</sub>* and SFK kinases in the K562 cell model.

**Acknowledgement:** Supported by grants IGA\_LF\_2021\_004 and IGA\_LF\_2022\_003. FNOL Ethics Committee 39/18.



## BYSTANDER EFFECT ON THE BRAIN AND LIVER AFTER FRACTIONATED SPINAL CORD IRRADIATION OF AGING RATS

Mihailo Mijatović, Soňa Báľentová

Department of Histology and Embryology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: Assoc. prof. MVDr. Soňa Báľentová, PhD.

*E-mail contacts: mijatovic1@uniba.sk, sona.balentova@uniba.sk*

**Introduction:** Ionizing radiation used in the radiation therapy of brain or head and neck tumors and metastases affects neuronal and glial cell population and lead to morphological and functional deficits. Research into radiation therapy reveals that damage is not limited to cells close to the target cells. The outcome of this so-called bystander effect can lead to unintended consequences in surrounding and distant healthy tissue. The present study investigated the radiation-induced bystander effect on the specific brain regions and liver after fractionated spinal cord irradiation.

**Material and methods:** Middle-aged adult male Wistar rats (12 months old) received fractionated spinal cord irradiation with a total dose of 24 Gy administered in 3 fractions (dose 8 Gy per fraction) once per week on the same day for three consecutive weeks. In rats that survived two months after irradiation (14 months old), we investigated changes using histochemistry, immunohistochemistry, confocal microscopy, and image analysis in the liver and two neurogenic brain regions: the hippocampal dentate gyrus (DG) and the rostral migratory stream (RMS).

**Results:** Although image analysis of the brain and liver is incomplete, preliminary results have shown increased apoptosis and neurodegenerative changes in the DG within the RMS and liver.

**Conclusion:** The study showed that the insignificant metabolic and histopathological changes gradually weaken the total radiation dose affecting these organs. Therefore, the influence of older age as a possible neuroprotective factor in the development of radiation-induced changes cannot be ruled out.

**Acknowledgement:** This study was supported by the grant of the Ministry of Education, Slovak Republic (VEGA) No. 1/0131/22.

# COGNITIVE ASPECTS OF EMOTIONAL REGULATION IN THE CONTEXT OF BILINGUAL LANGUAGE PROCESSING: A NEUROPSYCHO-LINGUISTIC PILOT STUDY

Kevin Ľuboslav Patrás, Anna Barnau

Department of Foreign Languages, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: Mgr. Anna Barnau, PhD.

*E-mail contacts: anna.barnau@uniba.sk, kevin.l.patras.1@gmail.com*

**Introduction:** Several studies on the emotional language processing in bilingual individuals have consistently found a reduced emotional responsiveness to stimuli presented in the non-native language (L2) as compared to the native language (L1). The aim of this neuropsycholinguistic pilot study is to investigate how emotional regulation and memory processes in bilingual individuals are linked, with a special focus on cognitive aspects, short-term memory (STM) and long-term memory (LTM) in vocabulary retention.

**Materials and methods:** Fourteen first-year medical students, 13 females and 1 male, 19 to 21 years old, were recruited for the present study. A galvanic skin response (GSR) device was used to measure their emotional responses to aural stimuli. All the participants were given instructions to memorize 10 Slovak and 10 English words, which they had to reproduce after a short break lasting 15 seconds. The participants' emotional states were monitored and recorded on the GSR device before, during and after the word recall tasks. A standardized Positive and Negative Affect Schedule (PANAS) questionnaire was administered before and one week after the experiment to assess the participants' emotional states. One week after the measurement, the questionnaire aimed at students' self-evaluation was also administered. Two sample t-test as well as Spearman correlation test were used to analyze the study results.

**Results:** A GSR device was used to measure emotional states of students with the typical reading at the relaxed stage ranging from 50 - 70. We found out that best cognitive recall of words (14-16 in total) was in the range of relative deviation from the relaxed state 8.33% - 10.94%. There was a statistically significant difference between the beginning and the end of the measurement on the GSR device ( $p=0.00158$ ). Thus, the students were more stressed when reproducing the words in L1 ( $p<0.05$ ) than in L2 ( $p>0.05$ ), while they remembered statistically significantly ( $p=0.00189$ ) more words in L1 (108 words) than in L2 (81 words). Overall percentage of word recall success in both languages was 67.5% in the case of STM and 34.64% in LTM, while there was a statistically significant difference between them ( $p<0.05$ ). The non-standardized questionnaire distributed to the students confirmed the findings from the PANAS questionnaire.

**Conclusion:** This pilot study partially correlates with findings from the scientific literature, but further studies with a larger sample are needed. In order to better understand emotional-cognitive processes, it is necessary to further investigate brain activity using methods such as ERP in multilingual students. Our study correlates with the EU policy on multilingualism and linguistic diversity in EU countries.

## HYPERHOMOCYSTEINEMIA AND ITS EFFECT ON THE VASCULAR SYSTEM OF SELECTED ORGANS

Katarína Poliaková, Mária Kovalská

Department of Histology and Embryology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutor: RNDr. Mária Kovalská, PhD.

*E-mail contacts: poliakova55@uniba.sk, maria.kovalska@uniba.sk*

**Introduction:** Homocysteine (Hcy) is synthesised from the essential amino acid methionine (Met) via a multistep process. There are several reasons why Hcy can be elevated in the blood. Diet especially plays an important role. If there is an increased intake of Met in the diet, lower intake of B vitamins, folate and/or a defect in one of the enzymes involved in Hcy metabolism, there is a significant high risk of increased levels of Hcy (hHcy) in the plasma. It is well known that hHcy is responsible for atherosclerotic vascular disease and thromboembolism. In our research, we focused on the clarification and histomorphological proof of the influence of hHcy on the microvasculature of selected organs, specifically the liver, heart, and kidneys.

**Material and Methods:** Moderate Met diet at 2 g/kg of animal weight/day for four weeks induced mild hHcy in adult Wistar rats. After the mild hHcy induction, the animals were sacrificed. The liver, heart and kidney were excised, fixed in the 4% paraformaldehyde, frozen, cut, and processed for histological and immunohistochemical analyses.

**Results:** The histomorphological analysis showed alterations at the level of the medium-sized blood vessels' lumen radius and their thickness. We observed significant changes in the level of damage to the endothelial lining of the capillaries in all three mentioned organs.

**Conclusion:** Since a different type of capillary is found in each of the studied organs, we can confirm the hypothesis of damage to the microvasculature on all three levels, continuous, fenestrated, and sinusoidal capillaries, based on our results, which might subsequently lead to other pathologies' development and deserve future investigation.

**Acknowledgement:** Supported by VEGA 1/0192/22.

## MEASUREMENT OF THE ELECTROMAGNETIC FIELD DISTRIBUTION IN THE ENVIRONMENT OF THE CELL CULTURE INCUBATOR

Petra Sakslová, Jakub Míšek, Ján Jakuš

Department of Medical Biophysics, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutors: Ing. Jakub Míšek, PhD., prof. MUDr. Ján Jakuš, DrSc.

*E-mail contacts: sakslova1@uniba.sk, jakub.misek@uniba.sk, jan.jakus@uniba.sk*

The electromagnetic field (EMF) can be viewed as the combination of both an electric field (produced by stationary charges) and a magnetic field (produced by moving electric currents). EMF has a potency of being an influential factor for exposed living organisms, ranging from microcultures, laboratory animals up to the humans. Our main objective has been to measure low frequency (LF) EMF produced by the incubation box (VWR ILCO180) and to determine whether EMF poses a compromising factor for growing microculture samples.

Our research was conducted in the laboratory at the Department of Medical Biophysics. The broadband meter Narda NBM550 equipped with LF sensor Narda EHP-50D was used to measure both electric and magnetic part of EMF. We have determined two frequency bands at which the values of both electric and magnetic fields were measured, first at 5-200 Hz and the other at 120 Hz-10 kHz. A paper was used to create means of mapping the surface of each the three shelves in the incubator. The map consisted of 16 equal regions. The incubation box can produce heat, maintain a room temperature and cool the interior. We needed to measure each state of the box separately, therefore we measured EMF totally in three modes: standby, heating and cooling. The sensor was placed in the particular region, and the average value at a certain frequency was measured.

The highest intensity of magnetic field was measured in LF<sub>1</sub> (7.63 μT). When the incubator was set in heat mode (2.69±1.61 μT), the values have been significantly higher ( $p < 0.001$ ), than the values measured at the standby mode (0.04±0.01 μT) and the cooling mode (0.15±0.17 μT).

The measurements found that LF EMF emitted by the incubator box should not be neglected and must be incorporated during the research concerning effects of EMF exposure.

**Acknowledgement:** This study was supported by projects APVV-19-0214 and VEGA 1/0173/20.

# BUDESONIDE DELIVERED BY HIGH-FREQUENCY OSCILLATORY VENTILATION AS A POTENTIAL TREATMENT OF ACUTE RESPIRATORY DISTRESS SYNDROME

Jakub Topolan, Nikolett Nemcová, Pavol Mikolka

Department of Physiology, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutors: Mgr. Nikolett Nemcová, RNDr. Pavol Mikolka, PhD.

*E-mail contacts: topolan1@uniba.sk, nemcovag1@uniba.sk, pavol.mikolka@uniba.sk*

**Introduction:** Acute respiratory distress syndrome (ARDS) is a severe and life-threatening condition with insufficient lung function and severe hypoxemia. Neutrophil mediated pneumonia worsens damage to alveolar epithelium and surfactant and thereby potentiates a respiratory failure. A glucocorticoid together with an effective pulmonary route appears to be a reasonable treatment option. The study aimed to investigate the effect of glucocorticoid budesonide delivered intrapulmonary using high-frequency oscillatory ventilation (HFOV) on lung function and inflammation in a clinically relevant model of severe ARDS.

**Material and methods:** ARDS was triggered in anaesthetised, ventilated adult New Zealand white rabbits (18 ♂;  $2.5 \pm 0.3$  kg) by intratracheal instillation of HCl (3 ml/kg, pH 1.5), in combination with high tidal ventilation ( $V_T$  20 ml/kg) to mimic ventilator-induced lung injury. Once the severe ARDS model was induced (a ratio of arterial oxygen partial pressure to inspired oxygen fraction, P/F  $\leq 13.3$  kPa), budesonide therapy (9 ♂; Pulmicort, 0.25 mg/kg) was administered by HFOV (frequency 8 Hz, MAP 1 kPa,  $\Delta P$  0.9 kPa), or air in the controls. During the next 4 hours of lung protective ventilation, blood gases and respiratory parameters were recorded regularly. *Postmortem*, lung injury, pulmonary oedema, leukocyte count, and the levels of cytokines TNF $\alpha$ , IL-1 $\beta$ , IL-6, IL-8, IL-10 in bronchoalveolar lavage fluid were evaluated.

**Results:** Budesonide therapy significantly improved lung function within 30 min of administration, with a sustained trend until the end of the experiment. Budesonide reduced the level of inflammatory cytokines, the wet-to-dry lung weight ratio, a marker of oedema formation, and alleviated total lung injury compared to untreated animals.

**Conclusion:** Treatment of experimental ARDS with HFOV-delivered budesonide improves lung function and attenuates inflammation. Further research focusing on drug deposition in the lung is required.

**Acknowledgements:** The study was supported by VEGA 1/0004/21, UK/101/2023.

## EVALUATION OF ANTINEOPLASTIC EFFECTS OF PLANT NATURAL SUBSTANCES IN BREAST CANCER MODEL

Ester Vlčková, Lenka Koklesová, Peter Kubatka

Department of Medical Biology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutors: prof. RNDr. Peter Kubatka, PhD., RNDr. Lenka Koklesová

E-mail contacts: vlckova88@uniba.sk, peter.kubatka@uniba.sk

**Introduction:** Comprehensive scientific data provide evidence that isolated phytochemicals or whole plant foods may beneficially modify all stages of cancer. Data from our laboratory showed that the mixtures of low-dose phytochemicals present in specific herbs, spices, or fruits may be efficient against experimental breast carcinogenesis.

**Methods:** The purpose of this study was to assess the oncostatic efficacy of dietary administered *Salvia officinalis* L. in the model of chemically-induced rat mammary adenocarcinoma. *S. officinalis* (as haulm powder) was administered in the diet at two concentrations of 0.1% (w/w) and 1% (w/w) during the whole experiment. At autopsy, mammary carcinomas were removed and prepared for immunohistochemical and molecular evaluations.

**Results:** *S. officinalis* in both doses significantly improved high/low grade carcinoma ratio and lengthened tumor latency by 8.5 days in the group with higher dose when compared to control animals. We have found significant pro-apoptotic, anti-oxidant, anti-inflammatory, and anti-cancer stem cells effects in treated specimens. Evaluation of epigenetic alterations in rat cancer specimens *in vivo* demonstrated significant downregulation in lysine methylation status of *H3K4m3* and upregulation in lysine acetylation in *H4K16ac* levels in groups with administered salvia. Moreover, methylation status of five promoters of tumor-suppressive genes (ATM, PITX2, RASSF1, PTEN, and TIMP3) and expression of selected oncogenic and tumor-suppressive miRNAs were analyzed. We have revealed significant decreases in the expression of oncogenic miR21 and also suppressive miR145 after salvia treatment.

**Conclusion:** Our results showed significant chemopreventive effects of salvia haulm in the breast carcinoma model. This effect of salvia was associated with the significant epigenetic modulations in breast carcinoma cells *in vivo*.

**Acknowledgement:** This study was supported by the grant VEGA 1/0045/23.

## MAGNETIC RESONANCE SCANNING VS. COMPUTED TOMOGRAPHY AND THEIR USE IN CLINICAL MEDICINE

Michal Vyparina, Nadežda Višňovcová<sup>1</sup>, Oliver Štrbák<sup>2</sup>

<sup>1</sup> Department of Medical Biophysics, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

<sup>2</sup> Laboratory of Metabolomics, Biomedical Centre Martin, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

Tutors: Mgr. Nadežda Višňovcová, PhD., RNDr. Oliver Štrbák, PhD.

*E-mail contacts: vyparina4@uniba.sk, nadezda.visnovcova@uniba.sk, oliver.strbak@uniba.sk*

The aim of this thesis is to compare CT and MRI modalities and the possibilities of their application in clinical practice. Computed tomography (CT) utilizes X-ray absorption. The patient is put into an annular holder (gantry) containing an X-ray tube and an opposite detecting system, which measures the amount of passed radiation, thus showing the amount of absorbed radiation, which is interpreted by a computer as tissue density, creating an image using different shades of gray. This shade gradient indicates hypodense and hyperdense tissues. Tissue density is expressed using Hounsfield units (HU) relative to water, which has a density of 0. Fat and air show negative values (hypodense tissues), and their CT image will appear dark, even black. Soft tissues, blood and bones show positive values (hyperdense tissues), and their CT image will appear bright, even white. Magnetic resonance imaging (MRI) utilizes atoms with an odd proton number, particularly hydrogen. All tissues contain hydrogen, mainly in the form of water. MRI scanner creates a longitudinal magnetization across the patient, which cannot be measured because it is parallel with the scanner's external magnetic field. To obtain a contrast, transverse magnetization must be attained by transmitting a radiofrequency pulse to the tissue with a frequency identical to the precession frequency of the monitored atoms (Larmor frequency). The electric current created on the basis of Faraday's law can be recorded and used to create an image, the contrast of which is determined by different concentrations of hydrogen protons or by the presence of various macromolecular and paramagnetic substances. Fourier transform is used to process the signal and to create the final image. The image is obtained by two basic sequences: spin echo and gradient echo. The main MRI parameters are:  $T_1$  relaxation time (time until longitudinal magnetization is recovered),  $T_2$  relaxation time (time until transverse magnetization dissipates), repetition time TR (time between two radiofrequency pulses), and echo time TE (time between two echoes).

## CLINICAL ANATOMY OF THE THYROID GLAND, ADJACENT STRUCTURES AND ITS CLINICAL CORRELATIONS

Iryna Zavhorodnia, Gabriela Hešková, Desanka Výbohová

Department of Anatomy, Jessenius Faculty of Medicine in Martin,  
Comenius University in Bratislava

Tutors: MUDr. Gabriela Hešková, PhD., doc. MUDr. Desanka Výbohová, PhD.

*E-mail contacts: zavhorodnia1@uniba.sk, gabriela.heskova@uniba.sk,  
desanka.vybohova@uniba.sk*

**Introduction:** Thyroid gland is an endocrine organ, located in the visceral compartment of the omotracheal triangle of the neck. This study is focused on the observation of the anatomical variations of the thyroid gland and its adjacent structures (blood vessels, nerves and parathyroid glands) from the clinical point of view.

**Materials and methods:** Relations of the important anatomical structures in the omotracheal triangle were studied on formalin-fixed cadavers (5 males, 2 females) donated to the Department of Anatomy.

A classic Kocher's incision was made halfway between the cricothyroid cartilage and the suprasternal notch. Sternocleidomastoid and infrahyoid muscles were reflected laterally to expose the thyroid gland.

**Results:** Dissection of the cadavers was performed to study the adjacent structures of the thyroid gland. The medial and lateral approaches were used to compare the accessibility of the recurrent laryngeal nerve, thyroid vessels and parathyroid glands. The medial approach represents the access through the isthmus that is cut to reach the medial surface of the thyroid gland in syntopy with a trachea. The lateral approach designates the access from the lateral surface of the thyroid lobe, dorsally and to the depth behind the lobe and to the trachea. Relations of the recurrent laryngeal nerve, thyroid arteries and veins, common carotid artery, internal jugular vein, vagus nerve, cardiac branches, parathyroid glands and lymphatic nodes were evaluated.

In total, three out of seven cadavers (42,86%) contained pyramidal lobe and thyroid gland levator. The other thyroid glands consisted only of 2 lobes and isthmus. Pyramidal lobe and levator appeared to be occasional structures of the thyroid gland, especially on the right side. Postoperatively they may cause complications, if left unrecognized in situ.

**Conclusion:** Knowledge of detailed anatomy of the anterior neck is essential for the surgeons to avoid iatrogenic injuries during surgical interventions such as thyroidectomy, tracheostomy and cricothyrotomy.



Authors are responsible for content of abstracts.

**Abstracts from 44th Students' Scientific Conference**

Editors: Assoc. Prof. Michal Šimera, RNDr., PhD. Marcel Veterník, M.Eng., PhD.,

Comenius University in Bratislava

Jessenius Faculty of Medicine in Martin

Number of pages: 60

Graphic design & print: IdeaPrint s.r.o., Martin

ISBN 978-80-8187-135-1

2023



ISBN 978-80-8187-135-1

