

COMENIUS UNIVERSITY IN BRATISLAVA  
JESSENIUS FACULTY OF MEDICINE IN MARTIN



# ABSTRACTS

from

43rd Student Scientific Conference  
JFM CU, Martin

April 27, 2022  
Martin, Slovak Republic



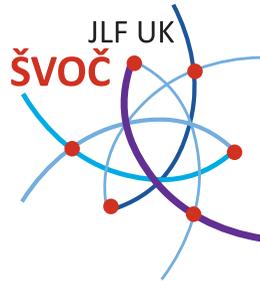
# ABSTRACTS

from  
43rd Student Scientific Conference  
JFM CU, Martin

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*Success is not the key to happiness. Happiness is the key to success.  
If you love what you are doing, you will be successful.*

*Albert Schweitzer*

Dear fans of young student science,

in these uncertain times, thanks to the sustaining engagement of students, tutors and organizers, we stand on the doorstep of the next year Student Scientific Conference. The academic year 2021/2022 at the Jessenius Faculty of Medicine, Comenius University in Martin, will be associated with the 43rd Annual Student Scientific Conference, which makes all of us happy. It's also due to the fact that presentations will be delivered face-to-face, participants will be able to see and hear the presenters. We can also meet and greet our friends, committee members from our partner faculties who will honor the faculty with their visit.



We believed that life will go back to normal, if we learn to cope with a pandemic and pay less attention to it. But it hasn't happened. Do not forget that not all students and academics are lucky to be able to study and work in peace. Some interrupted their studies, stopped working, some are fighting for their life. And it is happening not far from us, only a few hundred kilometers east of our country. That is why we respect our tradition of having this conference. We continue in a tradition of passing the knowledge and information to our students. Later, they will do the same.

This year, twenty-two presentation papers will compete in three categories: theoretical, clinical and non-medical. The organizers, with their continuous invention efforts, have again introduced several novelties, for example the graphic design of the booklet or the prize award for the best papers. Thank you very much for all help and contribution in making the conference a success. Come and take part!

**Andrea Calkovska**  
Dean

## PROGRAM AT GLANCE

**Date:** April 27, 2022

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

**Registration:** April 27, 2022, until 8.30 or before the beginning of your section

**Opening ceremony:** Aula A – Novomeského 9, Martin ..... **08.30 – 08.40**

### **Aula A**

Section of Clinical Disciplines (1st part) ..... 08.45 – 10.15

– coffee break

Section of Clinical Disciplines (2nd part) ..... 10.30 – 11.45

### **Aula B**

Section of Theoretical and Pre-Clinical Disciplines ..... 08.45 – 10.15

– coffee break

Section of Non-Medical Study Programmes ..... 10.30 – 11.45

**Closing ceremony:** Aula A – Novomeského 9, Martin ..... **12.00**

.....  
**Duration of lectures: 10 minutes, discussion – 5 minutes**  
**Language: Slovak, Czech or English**  
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Clinic of Pneumology and Phthysiology, Jessenius Faculty of Medicine in Martin,  
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Department of Haematology and Transfusion medicine,  
Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

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# **ABSTRACTS**

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

## INOPERABLE LIVER TUMORS

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**Introduction:** According to World Health Organization statistics for the year 2020, liver tumors are the 3rd most common oncologic cause of death worldwide. In Europe, the most common malignant liver lesions are colorectal cancer metastases, followed by hepatocellular carcinoma, in both cases 70-80 % of patients are inoperable at the time of diagnosis. In the past, the prognosis of unresectable liver tumors was very poor, treatment was limited just to systemic pharmacotherapy, external radiotherapy and palliative methods. However, the development of interventional oncology methods has led to the expansion of therapeutic options, including locoregional therapies, which are no longer exclusively palliative method, but also allows the surgical down-staging and serves as a bridge to liver transplantation.

**Material and methods:** We present a case of 62-year old male patient recently diagnosed with hepatocellular carcinoma, we documented the progression of liver lesions based on radiological imaging methods and also the entire diagnostic and therapeutic process, according to data obtained from the hospital information system. Patient underwent transarterial chemoembolization as first-line treatment, and also sorafenib was approved, in accordance with current guidelines. Based on knowledge obtained from foreign scientific publications discussing the same issue, we propose other therapeutic methods that could be considered in this particular patient.

**Discussion:** This case illustrates currently available treatment options for patient with inoperable liver tumors in Slovakia, in comparison to the much broader options available abroad. It also make us aware of the importance of the diagnosis determination as early as possible due to relatively rapid progression of lesions.

## INFECTIOUS COMPLICATIONS AFTER KIDNEY TRANSPLANTATION

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**Introduction:** Infections remain the most common non-cardiac cause of mortality after kidney transplantation (KTx). Therefore the main objective of immunosuppressive treatment is to create balance between decreasing incidence of acute kidney rejection and avoiding the incidence of infections, at the same time.

**Material and methods:** We performed retrospective, monocentric analysis of patients who underwent kidney transplantation from 2011 to 2020 with different types of induction immunosuppressive therapy. We monitored the incidence of infections in terms of etiology, localization and the severity in different intervals after KTx.

**Results:** Our study included 78 patients (56 men, 22 women), the average age was 45 years. Subsequently, we divided patients based on the induction therapy to 2 identical groups – basiliximab and ATG group, both consisted of 28 men and 11 women. In ATG group, we noticed higher proportion of recurrent bacterial infections (56.4 % vs. 5.1%), multidrug resistant infections (20.5% vs. 2.6%) and 23,1% urogenital tract infections (23.1 % vs. 2.6%) 1st month after KTx. On the other hand, the incidence of CMV and viral infections from 1st to 6th month after KTx were higher in basiliximab group (both 10.3 % vs. 5.1%). In our study, the severity of infections expressed by need for hospitalization increased from 2.6% 1 month after KTx to 15.4% in period from 1st to 6th month after KTx in patients with ATG. On the contrary, no patient in basiliximab group needed hospitalisation because of infection 1st month and from 6th-12th month after KTx.

**Conclusion:** Based on presented results, induction with ATG has higher risk of developing recurrent and severe infections with need for hospitalisation decreasing the maximal benefit of KTx.

## OLFACTORY DYSFUNCTION IN PARKINSON'S DISEASE

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**Introduction:** Smell derangement is a non-motor symptom of Parkinson's disease (PD). The aim of this study was to determine the incidence of hyposmia and anosmia in patients with PD and compare them with the incidence in the control group (CG).

**Material and methods:** The study included 22 patients with PD (11 women, 11 men; mean age of 63.18 years) and 22 healthy probands (11 women and 11 men; mean age of 61.05 years). The smell of all participants was examined with the University of Pennsylvania Smell Identification Test (UPSIT), which is one of the few standardized tests.

**Results:** With UPSIT, we found that all PD patients had severely impair olfactory functions, with anosmia in the ratio of 10:22 (45.45%) being the most common. Furthermore, we observed severe hyposmia in the ratio of 8:22 (36.36%) and moderate hyposmia in the ratio of 4:22 (18.18%). In CG we also detected disorders of olfactory functions, but in a different number and severity. We most often observed mild hyposmia in 9 subjects (40.91%), followed by 7 subjects with moderate hyposmia (31.81%), 4 subjects with normosmia (18.18%) and 2 subjects with severe hyposmia (9.09%).

**Conclusion:** Smell disorders are more severe in patients and more common compared to CG. The increased presence of mild to moderate hyposmia in CG may be related to a small cohort as well as a relatively high number of smokers (27.27%) and ENT diseases (9.09%). Another cause that may have affected the number of subjects with hyposmia is the COVID-19 pandemic and related vaccination in most subjects in CG. Overcoming COVID-19 as well as vaccination may be a contraindication to performing the olfactory test and therefore UPSIT does not seem to be appropriate for use during respiratory epidemics. The results indicate the presence of a prodromal marker of neurodegeneration (olfactory disorder) in healthy probands, and therefore, from the point of view of PD, further monitoring of CG in the coming years will be of interest.

## PERSONALISED THERAPY IN PEDIATRIC RHEUMATOLOGY

David Klepárník, Kateřina Bouchalová

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**Introduction:** Juvenile Systemic lupus erythematosus (jSLE) is a chronic multisystem autoimmune rheumatic disease. Vitamin D is a hormone that controls calcium metabolism and bone homeostasis. The prevalence of hypovitaminosis in patients with jSLE was determined to be between 36 and 96%, while in the standard population ranged between 8 and 30%. The aim: comparison of 25-OH vitamin D levels in patients with jSLE at the time of diagnosis and the level determined at the last follow-up.

**Material and methods:** 26 patients were included in this study. Patients mean age 15.71, SD  $\pm$  2.964. The mean age at the time of diagnosis was 14.49 years, SD  $\pm$  3.12 years. Normal range for serum 25-hydroxyvitamin D is 75–250 nmol/L. Comparison of vitamin D level at the time of diagnosis and last follow-up with a reference value of 75 nmol/L was performed by a nonparametric Wilcoxon single-sample test. Comparison of concertation at the time of diagnosis level and last follow-up was performed using the Wilcoxon paired test.

**Results:** Vitamin D levels at the time of diagnosis were statistically significantly lower than 75 nmol/L ( $p = 0.020$ ). The level of vitamin D at the last control was statistically significantly higher than 75 nmol/L ( $p = 0.023$ ). All patients were treated with standard jSLE therapy and substituted with vitamin D. Vitamin D levels at the time of jSLE diagnosis were significantly lower ( $p < 0.0001$ ) than at the last follow-up.

**Conclusion:** Vitamin D levels at the time of diagnosis in paediatric patients with SLE were statistically significantly lower than 75 nmol/L. According to the available literature, no study has yet looked at vitamin D levels in patients at the time of diagnosis. We also demonstrated significantly higher vitamin D levels in patients at the last follow-up. We demonstrated a statistically significant difference between vitamin D levels at the time of diagnosis and at the last follow-up. These data suggest a good effect of treating hypovitaminosis D in patients with jSLE.

## THE EFFECT OF VACCINATION ON THE COURSE OF SARS-CoV-2 DISEASE IN HOSPITALIZED PATIENTS

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**Introduction:** SARS-CoV-2 is a new type of coronavirus which cause COVID-19 disease. First patient with the disease was identified in Wuhan, China in the end of 2019 and then the virus has spread quickly to the whole world and has caused global pandemic. The disease can vary from asymptomatic course to severe, life-threatening illness. There is a vaccination against SARS-CoV-2 which should at least decrease the risk of severe course of the disease. The goal of our project has been to prove this claim.

**Material and methods:** Our project is retrospective. We have collected data from medical records of patients who had been hospitalised at Clinic of Pneumology and Phthysiology in University hospital in Martin during „third wave“ of COVID-19 pandemic – from 4th of October 2021 until 31st of December 2021.

**Results:** 182 patients were enrolled to our project. There were 35 (19,23%) vaccinated and 147 (80,77%) non-vaccinated patients; 96 (52,75%) males and 86 (47,25%) females. 45 patients died from whom 10 were vaccinated (28,57% of all vaccinated) and 35 were non-vaccinated (23,81% of all non-vaccinated). Median age of death was 88,5 years old in vaccinated group and 77 years old in non-vaccinated group. Median length of hospital stay was 9 days in vaccinated and 10,5 days in non-vaccinated. In vaccinated group, only 1 patient was ventilated (2,86% of all vaccinated) and there were 23 ventilated patients from non-vaccinated group (15,65% of all non-vaccinated).

**Conclusion:** We need more data to prove that vaccination can significantly decrease the risk of severe presentation of COVID-19. However, our data shows that vaccination could have an impact on the course of COVID-19 in patients involved in our project.

## IMPACT OF DABIGATRAN TREATMENT ON ROTATION THROMBOELASTOMETRY

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**Introduction:** Atrial fibrillation (AF) is the most common cardiac arrhythmia. The risk of AF in patients  $\geq 40$  years old is estimated at 25%. Stroke is a major complication associated with AF. Patients with AF have a four- to five-fold increased risk of stroke. Preventing thromboembolic events, while minimizing bleeding risks, remains challenging when managing patients with atrial fibrillation. A rapid and reliable assessment of the dabigatran effect is desirable in dabigatran treated patients with uncontrolled bleeding or before acute surgery. This study aimed to assess the anticoagulant effects of dabigatran in patients with NVAf as assessed by the whole blood assays ROTEM, and how data from these methods correlate to plasma dabigatran concentrations measured by Hemoclot.

**Material and methods:** Patients (n=27) with non-valvular AF were enrolled. Dabigatran was administered 150 mg BID due to AF (at 7:00 AM and 7:00 PM). Plasma dabigatran concentrations were determined by hemoclot thrombin inhibitor assay (Hyphen BioMed, France) 12 hours after a previous drug dose administration for the assessment of the dabigatran trough level and 2 hours after the next drug dose administration for the assessment of the dabigatran peak level. ROTEM was performed with ROTEM Gamma (Penta-pharm GmbH, Munich, Germany). We performed EXTEM and INTEM tests simultaneously and the measures were clotting time (CT), clot formation time (CFT), and maximum clot firmness (MCF).

**Results:** The ROTEM clotting time (CT) and maximum clot firmness (MCF) correlated strongly with dabigatran concentrations when activated with the reagents Ex-tem ( $p < 0.0001$ ) and In-tem ( $p < 0.0001$ ).

**Conclusion:** In summary we have found that the ROTEM variable CT and MCF, when activated with triggers Ex-tem and In-tem, has a strong and highly significant correlation with the plasma dabigatran concentration and could thereby be an alternative to estimate dabigatran concentration in emergency situations.

## MOLECULAR PATHOLOGY OF EGFR GENE IN NON-SMALL CELL LUNG CARCINOMA

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**Introduction:** The EGFR gene consists of 28 exons, but only 4 exons (18,19,20,21) play a role in the development of NSCLC, in which 41 carcinogenic mutations may occur. According to the effectiveness of TKI treatment, we divide mutations into activating and resistant, in which the tumor does not respond to the given treatment. A tumor biopsy is required for molecular analysis. Biopsies are divided into small and large according to the extent of the tissue taken. The principle of exclusivity assumes that tumor cells can contain only one causal mutation, but now we know that this principle does not always apply.

**Material and methods:** We evaluated samples from 368 patients with EGFR gene mutations. In the first subdivision, patients were classified according to the exon that was mutated. We also selected patients with resistant mutations. We also divided the patients into two parts according to the size of the biopsy, and in these subsets we independently evaluated the effectiveness of detecting 2 mutations.

**Results:** Mutations affect individual exons of the EGFR gene very unevenly. Exon 19 deletions dominate, representing 56%. This is followed by exon 21 mutations, which represent 32%. Mutations in exons 18 and 20 are rare (exon 18 - 1,5%; exon 20 - 6%). A coincidence of 2 mutations was identified in 4,5% of patients, which violates the principle of exclusivity. Up to 8% of mutations were resistant, present either as a single mutation or in coincidence with another mutation. When comparing the effectiveness of small and large biopsies, the differences between them were small number deviations.

**Conclusion:** We found that mutations in the EGFR gene are not equally common. Mutations in exons 19 and 21 predominate, and mutations in exons 18 and 20 are rare. We have proved that the principle of exclusivity is violated. We should consider preferring NGS analysis that can diagnose multiple mutations simultaneously. We have also shown that the effectiveness of small biopsies is sufficient.

# IMMUNOGLOBULIN KAPPA FREE LIGHT CHAINS AS A NEW DIAGNOSTIC MARKER OF MULTIPLE SCLEROSIS

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**Introduction:** Multiple sclerosis (MS) is a chronic autoimmune inflammatory demyelinating disease of brain and spinal cord, that usually manifests as a sudden onset of varying neurological symptoms. In disease etiopathogenesis, genetic predisposition (e.g. HLA-DRB1\*15:01 mutation) and environmental triggers such as infections (EBV, HSV6), smoking or hypovitaminosis D play an important role. Polman's diagnostic criteria are required to confirm the diagnosis of MS - objective neurological findings, MRI scan, evoked potential examination and positive findings of intrathecal immunoglobulins synthesis in the cerebrospinal fluid (CSF). For this reason, we routinely examine oligoclonal bands (OCB) by isoelectric focusing and IgG index, methods with several imperfections. Kappa free light chains ( $\kappa$ -fLC) in CSF were suggested as promising novel markers of intrathecal synthesis of immunoglobulins. However, reported reference values were discrepant. Thus, we aimed to determine our own cut-off values of  $\kappa$ -fLC (CSF concentration, quotient, index) and to analyse their accuracy in MS diagnostics.

**Material and Methods:** Serum/CSF paired samples were analysed from 46 MS patients and 63 controls with non-inflammatory and non-MS inflammatory diseases of CNS. The concentrations of  $\kappa$ -fLC were measured immunoturbidimetrically (SPA PLUS®, Freelite®). The ROC curves, diagnostic sensitivities and specificities were analysed with respect to the cut-offs, which were determined using Youden's index.

**Results:** The optimal cut-off values were determined as. 1.08 mg/L for CSF  $\kappa$ -fLC level; 0.0994 for  $\kappa$ -fLC quotient; 18.15 for  $\kappa$ -fLC index. To distinguish MS patients from controls, the highest combined sensitivities/specificities were observed for  $\kappa$ -fLC index (0.76/0.98), followed by  $\kappa$ -fLC quotient (0.76/0.97), CSF  $\kappa$ -fLC level (0.76/0.95) and IgG index (0.65/0.89). The OCB detection showed the sensitivity 0.83 and the specificity 1.00.

**Conclusion:** In MS diagnostics, all novel  $\kappa$ -fLC markers showed better sensitivities and specificities than IgG index, but did not reach those of OCB detection. In patients with suspected MS, we recommend parallel use of  $\kappa$ -fLC index and OCB, especially if OCB findings are unclear or negative. This study was supported by the grant VEGA 230/20.

## POSTOPERATIVE INFECTIONS AFTER EXTERNAL VENTRICULAR DRAINAGE

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**Introduction:** External ventricular drainage (EVD) remains a treatment modality of choice in patients with acute onset hydrocephalus. It is, however, associated with a risk of postoperative central nervous system infection, a complication especially difficult to treat.

**Material and methods:** We have retrospectively assessed clinical course of 54 patients who underwent EVD during period of 2017-2021. Incidence of postoperative infections, infectious agents and possible risk factors were assessed by means of univariate tests and logistic regression modelling.

**Results:** The observed overall incidence of newly developed central nerve system infection after EVD reached 14.81%. In the logistic regression model the only observed variable significantly associated with increased odds for postoperative central nervous system infection was the duration of EVD (OR 1.26; 95%CI 1.05-1.51;  $p=0.01$ ). Postoperative infections occurred after an average period of 14.63 days. The most common infectious agent identified was Staphylococcus species.

**Conclusion:** Despite various possible risk factors suggested, the only significant risk factor of postoperative infection after EVD is its duration. EVD should therefore be terminated or converted to a permanent drainage system as soon as possible to avoid the increased risk of central nerve system infection.

## CEREBROSPINAL FLUID BIOMARKERS IN CLINICALLY ISOLATED SYNDROME

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**Introduction:** Clinical isolated syndrome (CIS) is defined as the first attack of focal neurological symptoms lasting at least 24 hours with a possible risk of developing multiple sclerosis (MS). Clinically definitive MS (CDMS) is defined as two separate clinical events affecting two different areas of the CNS. Since the probability of progression from CIS to CDMS is individual, it is an attempt to find a cerebrospinal fluid marker that would predict this probability.

**Material and methods:** Cerebrospinal fluid samples were taken in 2016-2020 from a total of 95 patients. The test group was further divided into two subgroups. The first group consisted of patients who endure only one clinical attack (CIS) and the second group of patients who progressed within a few months. Samples were analyzed by turbidimetry and isoelectric focusing. The Mann-Whitney U test was used to compare the two groups. ROC analysis was used to find optimal cut-off values for prediction of progression. Based on the cut-off values of the monitored parameters, the OR values were determined using binary logistic regression. The tests were performed at a significance level of 0.05.

**Results:** The Mann-Whitney U test showed a significant difference between patients with and without progression in all parameters monitored, except IgA. The IEF FLC kappa marker with AUC = 0.827, Se = 80.4% and Sp = 84.1% was evaluated as the best marker in terms of progression prediction by ROC analysis. The OR statistics for the prediction of progression determined the OR values for individual parameters. The highest OR value was shown by the IEF FLC kappa parameter (OR = 21,671).

**Conclusion:** Of all these parameters, marker IEF FLC kappa reached the highest value of AUC. Furthermore, it was found that there is a 21-fold higher chance of progression if the value of the IEF FLC kappa parameter is greater or equal to cut-off value. Given this fact, IEF FLC kappa could serve as a marker of progression from CIS to CDMS.

## SELECTED RESPIRATORY AND ESOPHAGEAL MECHANISMS IN GASTROESOPHAGEAL REFLUX DISEASE

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**Introduction:** Gastroesophageal reflux disease presents with a variety of esophageal and extraesophageal symptoms. Of the extraesophageal ones, cough, throat clearing, globus are most prevalent. Pathogenesis of these symptoms is complex and incompletely understood, however, microaspirations of refluxate have their role established. As a substantial proportion of patients present with recurrent or persistent inflammation of the upper airways, one might assume that impairment of airway defense mechanisms might also be involved. We hypothesized that GERD patients have impaired mucociliary clearance. We therefore determined ciliary beat frequency (CBF), one of the major quantifiable aspects of mucociliary clearance in patients with extraesophageal GERD.

**Material and methods:** Consecutive patients with extraesophageal GERD had a sample of the ciliated epithelium obtained from the nose using a cytology brush. Nasal CBF was analyzed using a digital high-speed video microscope and the software application Ciliary Analysis (NI LabVIEW), which is situated in Department of Pediatrics, University Hospital in Martin. Control group consisted of healthy volunteers without GERD symptoms and any airway inflammation at least 3 months prior to the evaluation. Maximal, minimal and average value of the CBF (Hz) was obtained.

**Results:** 11 patients with GERD (4F/7M) and 8 healthy controls (6F/2M) were analyzed. Mean CBF of GERD patients was significantly lower than in healthy volunteers ( $5.94 \pm 0.98$  Hz vs.  $11.14 \pm 1.53$  Hz, resp.,  $p < 0.00001$ ). Maximal CBF of GERD patients was also significantly lower than in healthy volunteers ( $8.72 \pm 1.2$  Hz vs.  $18.13 \pm 0.73$  Hz, resp.,  $p < 0.00001$ ). No significant difference was found in terms of the minimal CBF ( $4.23 \pm 0.89$  Hz vs.  $3.93 \pm 1.53$ , resp.,  $p = 0.55$ ).

**Conclusion:** Patients with extraesophageal GERD had a significantly lower mean and maximal CBF than healthy volunteers. Mucociliary clearance is most probably impaired in these patients which might contribute to their symptoms. Further research is needed to confirm the role of reflux in this impairment.

## MODIFIED PULMONARY SURFACTANT ENRICHED BY N-ACETYLCYSTEINE IN THE EXPERIMENTAL DOUBLE-HIT MODEL OF LUNG INJURY IN RATS

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**Introduction:** Hyperoxia and accumulation of reactive oxygen species (ROS) during supportive ventilation induce an inflammatory response. This leads to lung damage and make the lung tissue more susceptible to secondary bacterial infection. The effect of native antioxidants can be enhanced by therapeutic antioxidants such as N-acetylcysteine (NAC) and/or surfactant preparations. The aim of the study was to prove the hypothesis that combination of exogenous surfactant and NAC is more efficient than NAC monotherapy in the experimental double-hit model of lung injury induced by hyperoxia and bacterial lipopolysaccharide (LPS).

**Material and methods:** Adult male Wistar rats ( $n=28$ ,  $295\pm 30$ g b.w.) were anaesthetized, tracheotomized and ventilated via endotracheal tube with frequency of 60/min, a fraction of inspired oxygen ( $FiO_2$ ) 1.0, inspiratory time 40%, tidal volume of 6ml/kg. In some animals, LPS (E.coli, O55:B5, 500  $\mu$ g/kg, 1.25 ml/kg b.w) was instilled intratracheally to induce infection (LPS group). Animals with hyperoxia and LPS were treated with NAC 10mg/kg b.w. intravenously (NAC group) or with exogenous surfactant intratracheally (Curosurf, 50 mg of phospholipids/kg b.w.) and NAC 10mg/kg b.w. intravenously (PSUR+NAC group). Controls received sterile saline and were ventilated with  $FiO_2$  0.4. After 4 hrs of ventilation, inflammatory markers (IL-1 $\beta$ , TNF- $\alpha$ , IL-6) and oxidative stress (TBARS, AOPP, TAC) were analysed in homogenized lung using ELISA. Total leukocyte count was evaluated in blood and lung oedema was expressed as wet/dry lung weight ratio.

**Results:** In comparison with controls, hyperoxia and LPS increased IL-1 $\beta$ , TNF- $\alpha$ , IL-6, TBARS, AOPP in lung (all  $p<0.01$ ), lung oedema formation ( $p<0.05$ ) and decrease TAC ( $p<0.01$ ) and total count of leukocytes in blood. In LPS-treated animals, NAC administration increased TAC ( $p<0.05$ ) and decreased IL-6 ( $p<0.05$ ). This effect was potentiated by administration of exogenous surfactant and NAC. In addition, PSUR+NAC significantly reduced inflammation and increased total antioxidant capacity (all  $p<0.05$ ) in comparison with NAC monotherapy.

**Conclusion:** Exogenous surfactant in combination with N-acetylcysteine may be superior to NAC alone in treatment of animal double-hit model of acute lung injury.

## INFLUENCE OF VARIOUS FORMS OF INDUCED HYPERHOMOCYSTEINEMIA ON THE CNS

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**Introduction:** Hyperhomocysteinemia (hHcy) is considered to be a well-known risk factor for both cardio- and cerebrovascular diseases. Homocysteine (Hcy) acts as a potent neurotoxin within the brain. HHcy is associated with alterations of neural tissue metabolism and plasticity which then may proceed to morphological changes. Despite all of the gathered evidence, influence of hHcy is still being further explored as the exact mechanism standing behind metabolic causes of neurodegeneration remains unclear too. HHcy can be experimentally induced by means of methionine (Met) diet or by subcutaneous (s.c.) Hcy applications. Our previous work suggests different pathomorphological changes within the rat brain when different induction styles are used. We studied these outcomes in combination with ischemic insult which aggravates the tissue injury caused by hHcy.

**Material and methods:** HHcy was induced by both s.c. injections of Hcy (1.2  $\mu\text{mol/g/day}$ ) in duration of 21 days and Met rich diet (2g/kg/day) in duration of 28 days. Rat model of global brain ischemic injury was induced by 4-vessels occlusion followed by 15 minutes long ischemia. Animals were sacrificed, brains were fixed in 4 % paraformaldehyde and proceeded for cryosectioning with subsequent histological analysis of hippocampus and primary motor cortex using a confocal microscope.

**Results:** The immuno-histochemical and histopathomorphological analyses detected differences in animal group exposed to s.c. Hcy application in comparison to Met rich diet group. Selective identification of neurons, microglia, astrocytes, NMDA-receptors and newly formed vessels showed that changes were more significant when hHcy was induced by s.c. Hcy application.

**Conclusion:** Our findings suggest that s.c. Hcy application vs Met rich diet inducing hHcy have different effects on the rat brain tissue.

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## **MECHANISMS OF ACQUIRED TEMOZOLOMIDE RESISTANCE IN GLIOBLASTOMA CELL**

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Glioblastoma multiforme is the most common and lethal brain tumour-type. Temozolomide (TMZ) is the first-line chemotherapy drug that has been used to treat glioma for over a decade, but the benefits are limited by half of the treated patients who acquired resistance. The direct repair protein methylguanine DNA methyltransferase (MGMT) removes the cytotoxic O<sup>6</sup>-methylguanine lesion delivered by TMZ and so its expression by tumours confers TMZ-resistance. The aim of our study was to detect sensitivity of glioblastoma cell lines (T98G and U87) to TMZ treatment and subsequently determine expression changes of cancer pathway-associated genes by qRT-PCR method.

Both, T98G and U87 lines were treated with increases concentrations of TMZ during different times. In addition, we treated the cell lines with special inhibitors (ABT-199 and MK-1775) and monitored the synergistic effect. Their viability was measured by colorimetric MTT assay. We used the commercially available RT<sup>2</sup> PCR Array Cancer PathwayFinder™ to identify transcriptomic profile of 84 genes.

During the 48 h incubation, we found that U87 cells are more sensitive to TMZ than T98G cells, in addition, we demonstrated more effective synergy with inhibitors. We were able to detect the MGMT protein by Western blot analysis on U87 cells, thus confirming the acquisition of resistance to TMZ. We identify deregulation of expression in 17 genes associated with cancer pathways between the TMZ treated and untreated T98G cells. These results may be relevant in understanding the phenomenon of TMZ resistance, especially in glioma cells lacking MGMT expression, and may also aid in the design of new therapeutic strategies to improve the efficacy of TMZ in glioblastoma multiforme patients.

This work was supported by the Slovak research and Development Agency under the Contract No. APVV-18-0088.

## EFFECT OF VARIOUS MODE OF TRACHEAL MECHANICAL STIMULATION ON THE COUGH MOTOR PATTERN

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**Introduction:** Cough clears the throat and breathing passage of foreign particles, microbes, irritants, fluids, and mucus by a rapid expulsion of air from the lungs. The cough reflex is elicited by the irritation of mechano- and chemo-receptors located in the airways. The main goal of this study was to determine the effect of a „weak“ (less intensive) and a „strong“ (more intensive) mechanical stimulation of the trachea on the cough motor pattern.

**Material and methods:** This study was conducted on spontaneously breathing cats (8♂; 4.3 ± 0.8 kg) under pentobarbitone anaesthesia. Blood pressure, oesophageal pressure and electromyograms (EMGs) of the diaphragm (DIA) and the abdominal muscles (ABD) were recorded and analysed. The cough was elicited mechanically with a back and forth motion of soft catheter in the determined (about 12 cm long) tracheal area below tracheal cannula. Control „weak“ stimulation represented one move inside and outside, „strong“ stimulation represented four moves inside and outside of the trachea.

**Results:** „Strong“ stimulation produced higher number of coughs with their inspiratory and expiratory efforts increased. Coughs induced by „strong“ stimulation had shorter inspiratory and expiratory phase durations, active phase of expiration, inter-cough intervals, time of cough EMG activity, total cough cycle time, the duration of cough DIA activation, and the time of DIA to ABD peaks difference.

**Conclusion:** Stronger mechanical stimulation results in stronger and shorter coughs, including their phases and other temporal characteristics of cough. Our results clearly demonstrate the dependence not only spatial, but also temporal cough features and cough cycling properties on the intensity of cough stimulation, representing the number of action potentials and the number of active cough-related afferent fibres.

## GENERATION OF SECOND INDUCED PLURIPOTENT STEM CELL LINE FOR AMYOTROPHIC LATERAL SCLEROSIS MODELLING

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**Introduction:** Here, we present our second successfully-derived iPSC cell line for ALS (Amyotrophic Lateral Sclerosis) modelling. The technology of induced pluripotency was established previously in our lab and already led to the development of two independent cell lines. The purpose of our experiment was to provide a novel in vitro model for ALS research community.

**Material and Methods:** ALS patient signed an informed consent letter and donated a small skin biopsy from which primary cells were isolated. As in the case of ALS-1 (our first iPSC cell line), we reprogrammed isolated cells with commercially available synthetic RNA polycistronic vector. Reprogrammed cells were cultured initially on feeder layer cells (mouse embryonic fibroblasts) and then characterized in vitro by flow cytometry (intracellular and surface cytometry), fluorescent microscopy, karyotype analysis and in vivo with teratoma assay.

**Results:** iPSC cells showed normal male karyotype (XY<sub>46</sub>) and based on STR fingerprint analysis, they were genetically identical with source primary cells. iPSC cell expressed pluripotency factors (Oct-4, Nanog, c-Myc, Sox-2 and SSEA-4) and were negative for SSEA-1 (negative marker for human iPSC cells). In vitro, cells showed their potential to differentiate into three germ layer cells (AFP, TUJ,  $\alpha$ -SMA). When injected into immunodeficient mouse (nude mouse), our cells formed teratomas.

**Conclusion:** We generated a new original iPSC cell line from ALS patient. The cell line was fully characterized and was accepted in Human pluripotent stem cell registry (hPSCreg) as the only second iPSC cell line from Slovakia (<https://hpscereg.eu/cell-line/ORIONio02-A>). Currently, the manuscript describing the cell line is under review in a scientific stem cell journal.

**Acknowledgement:** Our thanks go to Assistant Professor Vladimír Nosál, PhD. and Prof. Egon Kurča, from Clinic of Neurology and Dr. Marek Smolár, PhD. from Clinic of Surgery and Transplant Center, Martin for their support. This work was supported by APVV-17-037 project.

## CHANGES IN ORGANELLE BIOLOGY IN A CELLULAR MODEL OF NEURODEGENERATION

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Key pathomechanisms of neurodegeneration at the cellular level include disorders of mitochondrial physiology. A very well-established inducer of neurodegeneration under experimental conditions is rotenone, which purposefully inhibits electron transfer as well as transmembrane potential generation by mitochondrial complex I. In addition to elevation of reactive oxygen species, the effect of the toxin can be characterized by the decrease in respiratory capacity and thus ATP production. Therefore, research interest is also focused on the factors responsive to mitochondrial energy deficiency. One of these, ATP-dependent potassium ion channels (KATP) are thanks to their effect on potassium/calcium homeostasis and mitochondrial dynamics very potent modulators of neurodegenerative processes. However, the results of several papers addressing KATP channels in neurodegeneration research can be viewed as contradictory. While in some clinical trials the use of the KATP blocker glibenclamide led to an improvement in the clinical condition of patients suffering from neurodegenerative diseases, in *in vitro* experiments are beneficial effects on cell survival coupled to KATP agonists instead. In our experiments, we firstly reviewed the toxic effect of diazoxide/glibenclamide in an experimental model of neurodegeneration based on rotenone treatment of SH-SY5Y cells by MTT test. In order to account for the controversy surrounding the effects of these drugs, we worked with undifferentiated and differentiated SH-SY5Y cells. Finally, we assessed changes in mitochondrial potential and calcium homeostasis by fluorescence confocal microscopy using calcium (FURA2-AM) and transmembrane potential (MitoTracker RED FM) sensitive fluorescence probes. Preliminary results indicate a mitigating effect of diazoxide and, in contrast, a worsening effect of glibenclamide on the toxic effect of complex I inhibitor exclusively in the case of differentiated cells after 24h. Other interesting findings include the high association of mitochondrial activity with intracellular calcium concentration observed indiscriminately in both differentiated and undifferentiated cells. Thus, the obtained results point to probability of different sensitivity of analysed cell types to KATP channel modulation under control as well as pathological conditions.

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## MIDWIFERY READINESS TO DEAL WITH AN ACUTE SITUATION (ECLAMPTIC SEIZURE, UTERINE HYPOTONIA)

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**Introduction:** A midwife can often be confronted with acute situations in her practice. Therefore, it is essential to master the correct procedures in dealing with a woman's acute conditions when every minute is needed, especially when it comes to saving two lives. The main goal of our thesis is to find out how midwives are prepared for emergency situations.

**Material and Methods:** We used a non-standardized questionnaire with our own design to collect the necessary data. The target group consisted of midwives (n = 49) working at gynecological and obstetric departments. The distribution of the measuring tool was performed with printed and electronic versions, while data collection took place from September 2021 to March 2022. In processing the obtained data, we used descriptive statistical procedures – arithmetic mean, standard deviation, absolute and relative abundance.

**Results:** Analysis of collected data we have found that most midwives are prepared to provide adequate care for eclamptic seizures and uterine hypotonia. Up to 73.47% of respondents (n = 36) stated that they would be able to proceed adequately with eclampsia. Also, almost all midwives (n = 45, 91.84%) would be able to actively respond to the onset of uterine hypotonia. Although the incidence of eclampsia is currently very low in our country, up to 44.90% (n = 22) of respondents have experienced this condition, however 55.1% (n = 27) of respondents have no experience with this condition. As many as 75.51% (n = 37) of respondents have experienced uterine hypotonia in their practice more than 3 times. More than half of the respondents (n = 28; 57.14%) indicated that their workplaces have standard procedures for eclampsia and hypotonia, but other midwives (n = 21; 42.86%) do not have this knowledge. Almost all midwives (n = 44, 89.80%) confirmed that they were supported by supervisors during an acute situation, and 42 of them stated that this assistance is also available at night shifts. 46.94% of respondents (n = 23) do not participate in training for acute situations in obstetrics and 44.90% (n = 22), on the other hand, do participate. Training for acute situations is not implemented at all for up to 46.94% (n = 23) of midwives. 38.78% (n = 19) of the respondents stated that model simulations of acute situations were not included in the trainings.

**Conclusion:** As a positive finding we can consider that most midwives feel ready to handle acute situations, and most of them also state the support of supervisors in their practice. We are aware of gaps in the implementation of training for midwives and in the lack of model simulations of acute situations in obstetrics.

## ATTITUDES OF ADOLESCENTS TOWARDS PARENTHOOD

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**Introduction:** Almost all developed countries, including the Slovak Republic, suffer from a demographic crisis. Some positive changes in the society (increase of education, open market and borders, etc.) negatively impact attitudes towards parenthood and the family. The perception of the adolescents' preferences to become a parent and the factors that affect these future perspectives may help to understand some aspects of the demographic crisis.

**Methodology:** The goal of descriptive research was to determine the attitudes of adolescents towards parenthood – aspiration to become a parent, and to identify the factors, which may affect these attitudes. We have used a non-standardized questionnaire of own design. The Cronbach's Alpha coefficient of the questionnaire – 0.7. The research tool was divided into four subscales. The sample consisted of N = 360 adolescents (men / women) with an average age – 17.51 ( $\pm$  1.51). The data was processed by using descriptive statistics and non-parametric tests: Mann-Whitney U test and Kruskal-Wallis, ANOVA, statistical significance  $p < 0,05$ .

**Results:** The research has positively verified that up to 80.28% of adolescents want to become parents. Of the social factors, partner life has the greatest impact on the attitude of adolescents towards parenthood – it was stated by 68.81% of the respondents. The majority, 79.31%, of the adolescents knows the term planned parenthood and 55.56% of them use contraception. Statistically significant differences in the attitudes of the adolescents towards parenthood have been determined in terms of sociodemographic characteristics (gender, religion, family, attended school, number of siblings and partner life) in subscales.

**Conclusion:** In terms of midwifery and its work in the community and the family, we see the further examination of given topic as meaningful especially in regards to the continuing demographic crisis. The work of a midwife with an adolescent population as part of parenting education could be beneficial for further research of the attitudes towards parenthood and to raise awareness of the adolescents about reproductive issues.

## PATIENT SAFETY CULTURE FROM THE PERSPECTIVE OF NURSING STUDENTS

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**Introduction:** Nursing students during clinical education are in direct contact with patients and have the opportunity to influence providing nursing care. Therefore the issue of patient safety culture (PSC) needs to be examined from the perspective of nursing students. Students can point out strengths and weaknesses in both academic and clinical settings and can help identify strategies to improve patient safety. The study aimed to explore nursing students' perspectives on the phenomenon of patient safety culture.

**Material and methods:** From April 2021 to October 2021, empirical data were collected using the Hospital Survey on Patient Safety Culture - Nursing Students (HSOPS-NS). The research group consisted of nursing students in the bachelor's and/or master's degree program (n = 190) from five faculties in the Slovak Republic.

**Results:** Nursing students rated the overall level of patient safety well, but the assessment of individual PSC dimensions was lower than the recommended 75%. „Openness in communication“ (60.0%), „teamwork“ (56.8%) and „supervisor / manager support“ (56.1%) were the best rated dimensions. Conversely, service exchange and patient transfers (33.7%), non-repressive measures (33.9%) and staffing (34.5%) were the worst-rated. Differences in perceptions of the individual dimensions of the PSC were confirmed on the basis of age, degree and year of study, work environment, supervision in practice and reporting system. Several dimensions were significantly predictive to the overall degree of patient safety culture ( $p \leq 0.05$ ).

**Conclusion:** Nursing students' perception of the PSC phenomenon should be evaluated regularly and complex. It can complete nurses' perceptions and point to multi-dimensional factors that condition the safe nursing care provision. Providing safe care by nursing students can be more effective by systematic evaluation of the PSC construct, and at the same time, it is possible to compare the results of overall patient safety at the national and international levels.

## SELECTED PSYCHOSOCIAL ASPECTS OF REPRODUCTIVE HEALTH IN ADOLESCENTS IN SLOVAKIA

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**Introduction:** Adolescence represents the most turbulent period of sexuality development. In recent decades, young people's sexual behaviour has changed significantly and moved to a younger age. Social environment during adolescence is an important determinant of sexual behaviour. Adolescents' attitudes towards sexuality are also important predictors of the sexual behaviour.

**Material and methods:** The aim of the research was to describe and find out the connections between sexual behaviour, emotional health and attitudes towards sexuality in adolescents. We used a set of questionnaires to collect data. They consisted of actually compiled questions and 2 standardized questionnaires: GHQ-12 (The General Health Questionnaire) and BSAS (The Brief Sexual Attitudes Scale). 219 adolescents in Slovakia aged 15 to 20 participated in the research (AM = 17.8; SD = 1.1). The majority of respondents were women (73.4%; 160).

**Results:** 59.9% of adolescents (130) have experience with sexual contact. 45.7% of sexually active adolescents have experience with non-binding sexual contacts. 13.0% (17) of girls were victims of involuntary sexual activity. 47% of adolescents have personal experience with sexual harassment on the Internet. 44.4% of respondents follow pornographic content. Over half of adolescents would welcome more information on building and maintaining a long-term relationship (58.5%; 114). Girls who were forced into sexual activity showed significantly worse emotional health than girls whose sexual activity was voluntary. Boys and adolescents with sexual experience have significantly more liberal and instrumental attitudes to sexual contact. Pornography watching was also observed to a greater extent in boys (83.9% vs. 29.9% in girls) and sexually active adolescents (53.1% vs. 31.0% in sexually inactive people).

**Conclusion:** The results of our work have confirmed the presumption that sex and sexual activity are significantly linked to attitudes towards sexual contact and pornography. Deteriorated emotional survival was also confirmed in adolescents who were forced into sexual activity. We recommend carrying out further research in future aimed at clarification of connection of the sexual attitudes and sexual behaviour including emotional health.

## AWARENESS OF PREGNANT WOMEN REGARDING FALL RISK PREVENTION

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**Introduction:** A pregnant woman is exposed to a higher risk of falling due to pregnancy which poses a danger to the mother and fetus. The aim was to find out the awareness of pregnant women about the risks of falling during pregnancy and to find out the personal experience of women with falling.

**Material and methods:** A combined methodological approach was used, including a quantitative method through a questionnaire involving 140 pregnant women ( $28.96 \pm 5.08$ ) and a qualitative method using a semi-structured interview involving 12 women ( $29.25 \pm 4.83$ ) who had experienced with a fall during pregnancy. Descriptive statistics were used to process the questionnaires and qualitative data analysis was used to process the interviews.

**Results:** Most women's pregnancies were uncomplicated. More than half of the women practiced sporadic physical activity during pregnancy and 26.5% of the women did not engage in any physical activity. There was a low level of participation by health professionals about the awareness of falls. Demonstrated answers showed that the knowledge of women is average. Most women perceived the risks of falling during pregnancy. Fear of falling was expressed by 56.4% of women. During pregnancy 15% of women had personal experience with the fall. 57.14% agreed with participation in the interview. We found that most of them fell in the third trimester of pregnancy with minor falls, most often by slipping. Half of the women sought professional help after the fall. 41.7% of women reported adverse consequences of the fall like pain (44.4%), fear, anxiety (33.3%), stomach bump (25%). The connection between physical changes and the risk of falls was perceived by 25% of women and 41.7% of women said that greater awareness of falls during pregnancy would help to prevent them.

**Conclusion:** A midwife can play an important role in preventing falls during pregnancy by informing and educating women, identifying risk factors, using standardized screening tools for risk pregnant women and then implementing specific interventions to eliminate the risks.

Authors are responsible for content of abstracts.

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