

COMENIUS UNIVERSITY IN BRATISLAVA
JESSENIUS FACULTY OF MEDICINE
IN MARTIN

2020



41st STUDENT SCIENTIFIC CONFERENCE

ABSTRACTS

April 30, 2020

Martin, SLOVAK REPUBLIC

**41st Student Scientific Conference
Jessenius Faculty of Medicine in Martin
Comenius University in Bratislava**

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**Dear students and tutors,
dear fans of young science.**

Research is an essential part of modern medical education. Since the founding of our faculty, students have worked as trainees in various medical fields. The first Student's Scientific Conference was held in 1972 and since then, with exception of the period after the velvet revolution, it has been organized at regular basis. Student's Scientific Conference use to be the big holiday. It is a presentation of several months long effort of those who made decision to do some extra work in addition to their study and those who wish to succeed in the tough competition.



I am glad that the continuity of student scientific activities was maintained also in this special year 2019/2020. The coronavirus has slowed down the academic life and did not allow us to meet in person, on the other hand, we have gained time to think about other improvements in this area. The previous 40th year was a great success, and we believe that the next year, which we are all looking forward to, will be the same or even better.

Meanwhile, let's browse the proceedings of 2020 and have a look, how much our students managed to do before epidemiologic situation prevented them from working in the labs and clinics...

Prof. Andrea Čalkovská, MD., DrSc.

Dean

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ABSTRACTS

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

ASSESSMENT OF EARLY DYNAMICS OF POSTTRAUMATIC INTRACREBRAL HAEMATOMAS USING COMPUTED TOMOGRAPHY

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Introduction: Traumatic intracerebral haematomas endanger the patient not only by their extent and mass-effect, but there is also a serious risk of their further expansion, which is a well-known factor associated with poor prognosis.

Material and methods: We assessed the computed tomography (CT) findings of 20 patients with posttraumatic intracerebral haematomas, who were treated at our clinic during the year 2019. A CT-volumetric measurement of the haematomas and perifocal edema was performed in studies obtained during the first 96 hours after the injury.

Results: We observed an average increase of the lesion's volume by 4.46 ± 6.04 cc. The average increase of perifocal edema reached 11.11 ± 13.37 cc. The difference between the edema and haematoma enlargement was, however, not significant ($p=0.06$; Mann-Whitney). Haematomas with initial volume above 10cc expanded significantly more, than the smaller ones ($p=0.01$; Mann-Whitney). This tendency was not observed during the measurements of the perifocal edema ($p=0.29$; Mann-Whitney). Also, we did not prove that decompressive craniectomy was associated with a significantly bigger expansion neither of the haematoma, nor of the perifocal edema ($p=0.15$, $p=0.18$ respectively; Mann-Whitney).

Conclusions: We observed a tendency for significant expansion of the traumatic intracerebral haematomas in lesions exceeding 10cc on the initial CT. This relationship did not apply on the expansion of perifocal edema. Also, we did not observe any effect of the decompressive craniectomy on the lesion's dynamics. Due to a limited number of included patients, we plan to continue this study during the year 2020 in order to obtain more relevant results.

This work was supported by a grant: Dynamics and risk factors of progression in posttraumatic intracerebral haematomas – a comparison of surgical and conservative treatment, UK/136/2019 (Grant of the Comenius University in Bratislava, Slovak Republic

LONG-TERM FOLLOW-UP OF PATIENTS AFTER ISCHEMIC HEMISPHERIC STROKE

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Introduction: Short-term follow-up (within 90 days) of stroke patients is common in the evaluation of results of the most clinical studies. Long-term evaluation of such patients is relatively rare. Aim of our study was to evaluate ischemic stroke patients after minimally two years period after incident (27-39 months).

Material and methods: From 262 records of stroke patients hospitalised during year 2016 we identified 107 patients with well-defined acute ischaemic hemispheric stroke. Patients were contacted via phone, and positive response or death confirmation we received from 86 patients which underwent further analysis. Patients were divided into two groups – reperfusion therapy (RT) group (28%) received rt-PA and/or mechanical thrombectomy, and conservative therapy (CT) group (72%) received other than reperfusion therapy. Functional outcome and mortality were evaluated.

Results: 38 (44%) patients died (27 CT vs. 11 RT, $p=0.84$). From all deaths, 21 (55%) patients died (14 CT, 7 RT) within 3 months. From 48 survivors 3 (3,5%) patients (3 CT) returned to work, 13 (15%) were independent (10 CT, 3 RT), partially dependent at home care were 18 (21%) patients (11 CT, 7 RT), 9 (10.5%) were completely dependent at home care (7 CT, 2 RT), and 5 (6%) patients were at long-term healthcare/retirement house (4 CT, 1 RT).

Conclusion: Despite modern therapy ischemic stroke still has high long-term mortality and negative impact on functional outcome.

CLINICAL EFFICIENCY AND COMPLICATIONS OF CRANIOPLASTIC SURGERIES

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Introduction: Following a cranial decompression or removal of calvarian bone due to inflammation or tumorous infiltration, a need for reconstruction of the cranial vault arises not only due to cosmetic, but also for therapeutic reasons. Despite of being considered a routine procedure, cranioplasty is associated with a substantial risk of failure, or postoperative complications.

Material and methods: Patients undergoing cranioplasty during the years 2015-2019 were included and their postoperative clinical course and rate of complications was assessed.

Results: Overall, this study includes 71 patients with significantly more men than women (54 vs. 17 respectively, $p < 0.001$, t-test). The most frequent condition requiring cranioplasty was a presence of a calvarian defect after a decompressive craniectomy for traumatic brain injury (43 patients). Autologous bone flap was used in 45 cases (63.38%), 3D printed titanium implant in 24 cases (33.8%) and bone cement in 2 cases (2.82%). Failure of the cranioplasty requiring an explantation of the flap occurred in 5 patients (7.04%), surgical revision was needed in 9 patients. The most common complication observed was an unintended intraoperative durotomy, occurring in 9 patients (12.68%). Postoperative improvement of motor functions was observed in 3 patients (4.23%), consciousness quantified using Glasgow Coma Scale improved in 8 patients (11.27%). The average value of modified Rankin scale at two months postoperatively was 0.96 ± 1.72 .

Conclusions: Our results illustrate the potential for improvement of neurological functions that may follow cranioplasty. However, complications with a various degree of severity may occur and even result in need of the implant removal.

MODERN METHODS OF INTRAOPERATIVE NAVIGATION WITHIN OPERATIVE TREATMENT OF BRAIN TUMORS

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Introduction: A clear trend in modern surgical treatment of brain tumors is to achieve the maximum possible resection of the tumor, which is safe for the patient and does not lead to worsening of the existing or the emergence of a new neurological deficit. For this reason, the methods of intraoperative morphological and functional monitoring are applied to a significant extent within surgical procedures.

Material and methods: At the Neurosurgical Clinic of JLF UK and UNM, we retrospectively assessed 139 patients over a period of 2014-2019 who underwent resection using the SonoWand Invite intraoperative navigation system and patients in whom brain tumor mass was detected using 5-ALA (5-aminolevulinic acid).

Results: SonoWand Invite's navigation were resected gliomas (39.57%), meningiomas (20.86%), metastases (15.83%), lymphomas (3.60%), Schwannomas (2.88%), other tumors (7.19%). Tumor histogenesis could not be found in 10.07% of patients. 7 of 55 patients with glial tumors received 5-ALA pre-operatively to more accurately detect tumor tissue and its borders. HGG (high grade glioma) histology was also demonstrated in 5 patients in whom fluorescence was detected. In one patient, fluorescence was not present (histology showed LGG). One patient with histologically verified HGG (high grade glioma) of cerebellum, fluorescence was not present. In meningiomas, the radicality was higher than in HGG, and the detection of tumor by 3D (possibly 2D) ultrasound function of the SonoWand system contributed to the radicality of the resection. In some case it was possible to detect vessels using Doppler function or Power Doppler. Of the total number of patients were 51.08% men and 48.92% women.

Conclusion: Intraoperative morphological navigation using imaging methods in the resection of brain tumors contributes to a higher radicality of tumor resection and the overall safety of surgery. Simultaneous monitoring of brain functions is important, either by intraoperative neuromonitoring or awake resection.

IN-HOSPITAL CARDIAC ARREST IN ADULTS, SURVIVAL ANALYSIS

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Introduction: In-hospital cardiac arrest is underestimated in modern research. It can be considered as a disease itself or an easily detectable consequence of underlying condition. Its prevalence, anticipating symptoms, management and prognosis are not yet well analysed. CPR in hospital is unique due to the concomitance between severe condition of the patient related to the basic illness with better identification of acute states. The survival after in-hospital CPR is expected to be higher than in case of prehospital CPR due to faster recognition of the life-threatening situation in combination with easy access to qualified personnel with medical equipment. Mainly cardiological patients are predisposed to in-hospital CPR.

Material and methods: Retrospective, observational study of all patients to whom the CPR team was called in year 2019 in the UNM in Martin. Analysis was carried out of medical records of patients primarily hospitalised outside of the department of anaesthesiology and intensive care. The study consisted of collecting and analysing data about age, gender and survival rate in intervals 2 hours, 24 hours, 48 hours, 3 days, 7 days and 30 days after CPR. The condition for including the case into the study was CPR started by the staff of the calling department. In total the analysis involved 76 patients.

Results: Males: 51 (67,11%), females: 25 (32,89%). Average age of all: $69.01 \pm 15,40$, males: $66,58 \pm 14,08$, females: $71,70 \pm 17,05$. Most common type of diagnosis during admission was cardiac disease (34,21%). CPR finished by declared death in 61,84%. Survival in 2h (5,26%), 24h (10,53%), 48h (0), 3 days (1,32%), 7 days (5,26%), 30 days (6,58%), survived more than 30 days (9,21%).

Conclusion: The total number of patients released home after in-hospital cardiac arrest is small. Unfortunately, the largest part of in-hospital CPR is unsuccessful. Low rate of survival is one of the determinants of the quality of healthcare. More males are resuscitated than females. There is slight tendency for males being younger than females in CPR.

CHANGES OF HEMOSTASIS IN PATIENTS AFTER *IN VITRO* FERTILIZATION

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Introduction: *In vitro* fertilization (IVF) is one of the most effective forms used for infertility treatment. Infertility in women is often accompanied by a hypercoagulable state that can lead to the impairment of embryo implantation and placental blood circulation. As a result, there is an evolving need to estimate the time of increasing bleeding risk during pregnancy and postpartum period, what is crucial for the right timing of anticoagulant prescription. Low-molecular-weight heparin (LMWH) is the most common anticoagulant used during IVF cycle.

Material and methods: 18 women (median age of 35 years) who previously underwent IVF cycles were analyzed. Blood samples (BS) were collected at five time points: 1st at 10-12 weeks of the pregnancy, 2nd at 16-18 weeks, 3rd at 26-28 weeks, 4th at 35-36 weeks and 5th at 6-8 weeks postdelivery. Coagulation tests were performed and levels of platelets, D-dimers, Factor VIII activity, Protein S, anti-Xa activity and ProC Global were retrospectively analyzed. Additionally, patients' anamnesis and treatment during the IVF cycle were taken into consideration.

Results: The study revealed the progression of hypercoagulation starting at the time of the 2nd and 3rd BS, reaching a maximum at 4th BS: levels of procoagulant factors, such as D-dimers and Factor VIII activity increased; levels of anticoagulants, such as Protein S and ProC Global ratio decreased. Parameters started normalizing at 5th BS. Besides this we found that women who presented with known hemostatic disorders (sticky platelet syndrome, Factor V Leiden thrombophilia, activated protein C resistance) had more significant changes in coagulation parameters and thus were at increased risk of IVF failure.

Conclusion: Higher doses of LMWH are required in infertile women with blood disorders before and during 35-36 weeks of the IVF cycle in order to increase the success rates of pregnancy.

CORRECTION OF SOFT TISSUES OF THE ORAL CAVITY BY LASER SMILE DESIGN IN STOMATOLOGY

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Introduction: Modern technologies are getting to foreground also in dentistry. Use of laser in Smile design technique brings the benefit not only to the dentist, but also to the patient. The aim of my work is the presentation of treatments using Er:YAG laser in correction of the oral cavity soft tissues and bring an idea of possibility to use Smile-design for teeth rehabilitation plan.

Material and methods: The treatment was performed by solid-state laser Er:YAG Fotona Lightwalker ASP. Depending on the treatment the laser was set in energy ranges from 50 mJ to 200 mJ, pulse frequency from 10 Hz to 40 Hz and power from 0,50 to 3 W. Patients attended extraoral and intraoral clinical examination, depending on need OPG x-ray and introductory fotodocumentation and peroperative fotodocumentation was made. Treatment was performed under topical anesthesia (2% Lidocaine) or local anesthesia (4% Ubistesine).

Results: All 9 treatments made by laser were successful without any accompanying and postoperative complications. Using laser were successfully performed: *Gingivectomy and frenulectomy labii superioris, Frenulectomy labii superioris, Surgical crown lengthening, Frenulectomy linguae, Removing of bone sequester, Subgingivally localised caries with complicating treatment access, Treatment of periodontal pocket, Incision with purpose to facilitate tooth eruption of the dentitio difficilis of tooth 38, Miniinvasive veneer preparation.*

Conclusion: Patients described painless treatment process and also an absence of unpleasant feelings from the second day after treatment. Advantage of using a laser in cases listed above were clean overview of operative field and short treatment time. During clinical examination was found adequate operative wound healing without signs of inflammation.

AUTONOMIC DYSREGULATION IN PATIENTS WITH SPONTANEOUS SUBARACHNOID HEMORRHAGE

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Introduction: Subarachnoid hemorrhage (SAH) is acute bleeding into subarachnoidal space. Spontaneous SAH is associated with a very high mortality and morbidity. The patients surviving initial bleeding are still susceptible to secondary complications, including cardio-pulmonary compromise, neurogenic pulmonary edema and others. Sympathetic overactivity can contribute to the initiation and progression of these serious complications. In our study we focused on examination of autonomic nervous system in acute phase of SAH.

Material and methods: Twelve patients with SAH in a time period 09/2019 – 03/2020 were enrolled in our study. We focused on the acute phase of SAH – within 24 hours from the diagnosis. Non-invasive measurement of heart rate (HR) and blood pressure (BP) variability was performed. The correlation between acquired measurements and clinical outcomes as assessed by Glasgow Outcome Scale (GOS) will be analyzed statistically.

Results: Currently, only few clinical trials have been done to assess cardiovascular autonomic dysregulation in patients with spontaneous SAH. Our preliminary data shows that female subjects are more susceptible for spontaneous SAH. Further analysis – after an increase in sample size and more detailed cardiovascular oscillations analysis – will include the correlation of in the HR and BP variability measures, including baroreflex sensitivity, with GOS in patients in acute phase of spontaneous SAH.

Conclusion: Based on the literature, we expect that impaired cardiovascular control expressed by changes in HR and BP variability could be associated with adverse outcomes in acute phase of spontaneous SAH. We expect that our results can help in early detection and consequent appropriate treatment of sympathetic overactivity. We suggest that this approach could improve patients' outcome.

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VULNERABILITY OF SUBCELLULAR STRUCTURES TO PATHOGENESIS RELEVANT FOR PARKINSON'S DISEASE

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Introduction: Parkinson's disease (PD) is the second most prevalent neurodegenerative disorder worldwide. On subcellular level is PD associated with abnormal function of mitochondria, endoplasmic reticulum (ER), Golgi apparatus, lysosomes and microtubular system. Pathogenesis of mentioned structures is thoroughly investigated. A major hallmark typical for PD is accumulation of α -synuclein (α S). Its aggregated form is a crucial component of Lewy bodies, formed in advanced stages of PD, clearly detectable by microscopic analysis. Beside α S aggregation, further morphological changes on subcellular level could be associated with PD-like neurodegeneration. Their relevance as well as time progression of all morphological changes is not answered properly till nowadays. Therefore, the aim of this study is to identify possible new hallmarks, as well as their occurrence in time after PD-like pathogenesis.

Material and methods: Human SH-SY5Y neuroblastoma cells were treated with rotenone (5,10,50 μ M) in different time periods (1,2,4,24h) for the purpose of microscopic observation of PD-like pathogenesis. Cell staining by fluorescent probes/antibodies was performed to visualize changes in mitochondria, Golgi apparatus, ER, lysosomes and microtubular morphology during the exposition to rotenone.

Results: Observed changes of investigated organelles were detected immediately after 1 hour of rotenone treatment or with maximal delay of 4 hours. Accumulation of α S was in alike conditions in previous experiments identified after almost 24h. Microtubules, ER and mitochondria are according to our results supposed to be the most vulnerable organelles, as we observed immediate (1h) structural change caused by rotenone in all used concentrations. Golgi apparatus showed fragmented pattern in first two hours of treatment depending on rotenone concentration. Volume enlargement of lysosomes was revealed after 4 hours of the highest used rotenone concentration.

Conclusion: Results indicate novel morphological changes of lysosomes observed in toxic model of PD. Although the sensitivity of examined structures to rotenone slightly differed, it could be summarized, that all observed changes significantly precede accumulation of α S in used model. From this point of view, all studied organelles have potential in early diagnosis of PD-like changes inside the cell.

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ONE PCI CENTRE RETROSPECTIVE ANALYSIS - RISK FACTORS AND MORTALITY IN PATIENTS PRESENTED WITH STEMI IN UNIVERSITY HOSPITAL IN MARTIN

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Introduction: Acute coronary syndrome (ACS) refers to any constellation of clinical symptoms that are associated with acute myocardial ischaemia. ACS is divided into ST – elevated myocardial infarction (STEMI), non-ST elevated myocardial infarction (NSTEMI) and unstable angina (UA). STEMI results from complete and prolonged occlusion of epicardial blood vessel and is defined as a myocardial injury with necrosis, a significant elevation of cardiac troponin values in a clinical setting consistent with myocardial ischaemia. Major risk factors for coronary heart disease (CHD) that cannot be changed are age, gender, family history and factors that can be changed are dyslipidaemia, high blood pressure, diabetes, smoking, overweight/obesity, excessive alcohol/stress, being active. This study concerns well-known risk factors mentioned above, but also the impact of demographic factors, weather, day of the week of STEMI and other interesting features in patients presented with STEMI.

Material and methods: 383 patients with STEMI were analysed who underwent primary percutaneous coronary intervention (pPCI) referred to University Hospital Martin in 2015. Modifiable and non-modifiable clinical risk factors, impact of weather, demographic parameters, selected biomarkers and mortality were retrospectively analysed.

Results: The majority of 383 patients with STEMI were male (n=260, 67.9%) and the rest were female (n=123, 32.1%); the mean age of patients was 66.56 years (+/- 11.71). Patients with positive family history of cardiovascular disease (CVD) were n=90, 23.5%; with diabetes (n=89, 23.2%), hypertension (n=249, 65%), dyslipidaemia (n=231, 60.8%) most of them were smokers (n=119, 31.1%), with no previous history of myocardial infarction (MI), neither anticoagulation (n=364, 94.3%) or antiplatelet therapy (n=283, 73.9%). Up to date 9/12/2019 was n=82, 21.9% of these STEMI patients non-living.

Conclusion: According to data-driven analysis not only typical clinical risk factors and lifestyle, but also specific weather conditions could trigger the manifestation of IHD. The next step is to aim on both groups of risk factors and try to create scoring system for early evaluation of patient with IHD.

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COMPLICATIONS OF SPONTANEOUS SUBARACHNOID HEMORRHAGE

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Introduction: Spontaneous subarachnoid hemorrhage (sSAH) is acute bleeding into subarachnoidal space. Complications following sSAH varies in severity and impact on the clinical outcome. The most common systemic complications include cardio-pulmonary compromise, homeostasis disturbances and others. The aim of this study is to determine the admission parameters which potentially may play role in development of systemic complication in sSAH patients.

Material and methods: Twenty-three patients with sSAH in a time period 09/2019 – 03/2020 were enrolled in our study. We focused on the acute phase of sSAH – within 24 h of onset. Those who suffered from clinical manifest cardio-pulmonary compromise, disturbances in homeostasis, hydrocephalus development or early mortality within 1 week of ictus were categorized into complication group.

Results: A total of 23 patients fulfilled the inclusion criteria and were enrolled in this study. There were 8 men and 15 women with a median age of 57 years. The clinical severity of sSAH was high in third of the subjects. The following complications were observed: cardio-pulmonary compromise (four patients), hydrocephalus (three patients), homeostasis disturbances and early death (two patients). Hyperglycemia was the most frequent disturbance in almost all patients with sSAH.

Conclusion: The most common complications of sSAH are: hyperglycemia, hypernatremia, cardio-pulmonary compromise and hydrocephalus. Patients with these complications in acute phase are more prone to worse outcome. Our study has a several limitations and further analysis must be provided.

NEUROENDOCRINE TUMORS OF THE LUNG

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Introduction: Neuroendocrine neoplasias of the lung (abbreviated as NEN) present a spectrum of malignant neoplasms classified by 2015 WHO classification into: carcinoid (NET G1 as used for gastrointestinal NENs), atypical carcinoid (NET G2) and neuroendocrine carcinoma (NECa G3) with types small-cell lung carcinoma (SCLC) and large cell neuroendocrine carcinoma (LCNEC). Criteria for classification include: number of mitoses per 10 HPF, proliferation index (Ki67), and the presence of necrosis. In 2017-2018, WHO classification introduced new category for gastrointestinal NENs between NET G2 and NECa, namely NET G3. Morphologically and functionally it belongs into well-differentiated NENs and its Ki67 ranges from 20% (the upper limit for atypical carcinoid and NET G2) to 55%. The objective of this study was analysis of lung NENs by objectified evaluation of their Ki67 to determine a possibility of identification of category NET G3 among these tumors.

Material and methods: We identified 26 cases with Ki67 index at time of diagnosis lower than typical numbers of SCLC and LCNEC, between 20% and 60%. By method of manual counting of Ki67-positive nuclei, we specified proliferation index in so-called hot-spots with the highest proliferation rate. Next, we searched clinical data of patients to find a correlation between detected proliferation index and length of survival.

Results: First, we verified seemingly inconclusive results – certain patients with low Ki67 showed poor survival typical for NECa, others survived longer. In morphology-based re-evaluation of cases into four sub-groups – „SCLC“, „SCLC with lower Ki67“, „non-classic SCLC“ and „gray zone“ – patients with findings categorized as „non-classic SCLC“ and „gray zone“ displayed a trend of longer survival.

Conclusion: This study was realized on small file of patients, therefore we cannot define an unambiguous conclusion. We proved an existence of subtypes of lung NECa, including tumors with lower malignant potential. Our conclusions need to be confirmed on greater number of cases to take a standpoint towards the existence of category NET G3 among lung NENs.

EFFECT OF EDOXABAN ON PLATELET AGGREGATION

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Introduction: Edoxaban is an oral anticoagulant drug and a direct factor Xa inhibitor. The inhibition of factor Xa leads to decreased thrombin generation. The reduction in thrombin could also result in an indirect inhibition of platelet aggregation. Oral anticoagulants and antiplatelet therapy are often combined, therefore it is essential to know, whether edoxaban has additional effects on platelet function. It is not fully understood if and how edoxaban impacts platelet function. The aim of the present study was to assess the effects of edoxaban on in vitro platelet aggregation.

Material and methods: The study was realized in 20 patients with non-valvular AF on edoxaban therapy. Edoxaban was administrated once daily. Blood samples were taken 24 hours after a previous drug dose administration, followed by next blood sample after 2 hours. Light transmission aggregometry was performed for the laboratory investigation of platelet function.

Results: The mean age was 71.0 ± 11.88 years (range 36-88 years). Edoxaban doses were 30 mg (20%) or 60 mg (80%) once daily. The TRAP-induced platelet aggregation was significantly lower two hours after edoxaban was taken compared to baseline measurement ($44.7\% \pm 32.03\%$ vs. $73.3\% \pm 25.55\%$; $p < 0.0001$). The mean edoxaban concentration at baseline was 27.32 ± 15.8 ng/mL and 215.0 ± 72.17 ng/mL two hours after edoxaban was taken. The dose-response curve for the plasma-diluted factor Xa time assay with edoxaban had a correlation coefficient of $r^2 = 0.09$ for baseline and 0.002 for followed measurement (after two hours).

Conclusion: Thrombin is a potent inducer of platelet aggregation. Low thrombin levels will result in reduced aggregation. Platelet aggregation and coagulation cascade are affected at the same time.

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CYTOKINES AS BIOLOGICAL MARKERS OF LOW GRADE RENAL CELL CARCINOMA AND IT'S RECURRENCE

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Introduction: Renal cell carcinoma (RCC) is a tumour with late manifestation, poor prognosis and increasing rate. In its pathogenesis various cytokines are involved. According to our last study, there has been significant difference between concentrations of several cytokines in RCC patients and healthy subjects (1). The aim of this study was to confirm the high prognostic value of relevant cytokines and analyze their dynamics in patients after nephrectomy.

Material and methods: In this study we analysed six urine samples from patients with histologically verified RCC and 14 controls. Six patients (4 males in age 49 grade 4 (NG4), 58 (NG2), 71 (NG4) and 75 years (NG2); 2 females in age 75 (NG4) and 80 years (NG2)) provided urine samples before nephrectomy and also on Day 3 after surgery. The Bio-Plex assay and commercial Bio-Plex™ Human Cytokine Standard 27-Plex were used to detect cytokine levels. The haemoglobin amount was quantified in urine to eliminate false positive results. The acquired data were subjected to multiple statistical analysis.

Results: In our previous study, the several cytokines in presurgical urine samples were significantly elevated. PDGF, VEGF, IL-15, eotaxin, MCP-1 and MIP-1 β were those that reached significantly higher levels compared to controls. The current results revealed corresponding data – the concentrations of all these cytokines were elevated in patient's urine before surgery and have dropped on the third day after tumour resection. Only in patient 5 (NG4) there was observed a subtle increase in PDGF.

Conclusion: Our study confirms that the cytokines with the highest prognostic value in RCC have tendency to decrease after surgical therapy. This indicates they could possibly serve as biological markers of RCC allowing not only the detection of its early stages but also the detection of disease relapse. However, these results are only preliminary and more research has to be done, particularly increasing the number of enrolled subjects.

PROFESSIONAL VALUES SCALE: PSYCHOMETRIC EVALUATION OF SLOVAK VERSION

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Introduction: Professional values strongly influence healthcare professionals' decisions on patient health care. *The Nurses Professional Values Scale - Three (NPVS-3)* has 28 items. The questionnaire was conceptualized based on a critical review of the literature on the Code of Ethics (ANA, 1985, 2001), values and professional values of nurses by Weis & Schank in 2017. The aim of study was to evaluate psychometric characteristics (internal consistency and factor analysis) of the Slovak version *NPVS-3*.

Material and methods: Study was realized in a University Hospital in Martin. The sample consisted of 160 nurses, who were recruited from November 2019 to February 2020. Cronbach Alfa and Factor analysis with varimax rotation were used to determinate psychometric characteristic of the scale.

Results: 4 factors explaining 74,775 % of the common variance were identified. Factor 1 - *Professional care* (20 items) was mostly related to different aspects of professionalism. Factor 2 - *Quality* (4 items) reflected improving the quality of care through peer review activities, better research, implementing standards and improving the learning environment. The third factor, *Respect and safety of the patient*, contained two items focused on respect to dignity and human rights and the provision of safe nursing care. The last factor *Self-reflection* contained also two items was focused on self-esteem and responsibility for oneself. Cronbach's alpha of total scale was 0.964, which means that the questionnaire is reliable at 96%. Cronbach's alpha of factors varied from 0.467 to 0.978.

Conclusion: The study findings showed that the Slovak version of the *NPVS-3* is reliable instrument that can be used for measuring professional values in nursing.

RATIONED NURSING CARE FROM THE PERSPECTIVE OF NURSING STUDENTS

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Introduction: Nursing students are considered to be a part of the nursing team. Increasing demands on practical training potentiate more frequent confrontations of students with the phenomenon of rationed nursing care in clinical practice. During the clinical training, students are exposed to rationed care, or they contribute to its prevalence. The phenomenon has a significant impact on the professional socialisation of students; thus, this study aimed to explore how these students interpret the concept of rationed care.

Material and methods: The qualitative study was conducted using semistructured interviews with 18 third-year nursing students from three universities within the Slovak Republic. Data were collected until its saturation. Interviews were recorded and transcribed to the text editor. Obtained data were further analysed using thematic analysis which resulted in the development of themes and subthemes.

Results: We identified four meaningful themes focused on the phenomenon of rationed care from the perspective of nursing students namely *Rationed nursing care through the eyes of nursing students*; *Be or not to be a nurse in clinical practice?*; *Is mentor an important part of the professional socialisation of students?*; *“Everyone has to start from oneself” – students’ experience of preventing strategies*. In the first theme, students describe their perception of the phenomenon in clinical practice. In the second theme, students introduce reasons for staying or leaving the nursing profession. This theme includes the issue of mentoring in the context of the professional socialisation of nursing students. The last theme reveals the preventive strategies of the occurrence of rationed care described by students, including their suggestions for preventive strategies and descriptions of its importance for clinical practice.

Conclusion: Students perceive rationed care as a significant threat for patients, nurses, organisations of healthcare facilities as well as for themselves. They are aware of the importance of the preventive strategies whose implementation may lead to the reduction or elimination of rationed care.

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POST-FALL ANALYSIS OF FALL RISK FACTORS IN HOSPITALIZED PATIENTS WITH NEUROLOGICAL DISEASES

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Introduction: Hospitalization in neurological patients increases the fall risk. A fall is a risk factor that complicates the patient's health condition. Since 2014, a fall during hospitalization is notified as an adverse event in Slovakia.

Aim of our study was to identify falls risk factors and falls risk score in adult inpatients with neurological disease.

Material and methods: Retrospective analysis of medical records of 40 hospitalized patients who fell at the Neurological Clinic of University Hospital in Martin (2014-January 2020). Empirical data collection was performed according to a list of selected falls risk factors and fall risk screening using the Morse Fall Scale (MFS score 0-125) in combination with self-care ability assessment - Barthel Index of Activities Daily Living (Barthel ADL Index level 0-100).

Results: In sample N = 40 patients (24 men, 16 women) the most common diagnosis was cerebrovascular disease (N = 27). The mean age of the sample was 70.5 ± 15.2 (min. 29, max. 93) years. There were most common fall risk factors: gait and balance disturbance (N = 40), chronic disease ≥ 5 diagnoses (N = 38), pharmacotherapy ≥ 5 drug groups (N = 34), the average pcs. of drug taken per 24 hours was 13.0 ± 5.7 (min. 2, max. 31). Falls history in the past year had 11 patients. Five patients had a recurrent fall during hospitalization. In the sample N = 40 patients had a moderate dependence in Barthel ADL Index (60.6 ± 23.6). The mean score of fall risk by MFS was high 75.8 ± 26.6 (min. 30, max. 125) on admission to hospitalization, it increased after patient's fall to MFS 97.8 ± 22.5 (min. 55, max. 125). Patients most often fell in their hospital room (N = 33) and during the night shift (N = 24).

Conclusion: Effective falls prevention and management during hospitalization is based on objective assessment of fall risk factors and fall risk screening on admission. Risk for falling can be minimized realizing targeted interventions in hospitalized patients.

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CAESAREAN SECTION – THE MOST FREQUENT PROBLEMS OF WOMEN AFTER THE POSTPARTUM PERIOD

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Introduction: In relation to the increasing ratio of the Ceasarean section it is needful to discuss its effects on the health of woman and child. The aim of this research was to determine the most common problems after Caesarean section, after the pospartum period within one year from the labour.

Material and methods: The study was attended by 56 women (average age $30,36 \pm 5,56$) after the caesarean section within one year after the labour, who visited selected gynecological departments. As a measuring tool was used non- standarized questionnaire made by the authors. For data analysis we used the basic descriptive statistics.

Results: The biggest problem the women suffer from is the pain of the wound (51,79%). However, the results demonstrate the fact that the wound after Caesarean section heals without any complication in majority of respondents (82,14%). Women also suffer from pain of different nature (30,36%). It is mostly related with the uterus involution and headache. Respondents also refered to annoying feelings related with the Caesarean section wound as the itching, pulling, numbness. Duration of sleeping is usually less than 6 hours (41,07%), which is caused mainly by taking care of the child (85,71%). In relation to the motility, respondents have problem with motion (58,93%), mainly with getting up of the bed. 44,6 % of women reported the problems caused by the onset of lactation, however 89,3 % of these women breastfed their child. 85,71 % of women have support person, who helps women with the child care. In the case of sexual life only 10,72 % of women cited some problems. Despite all of the problems the labour satisfaction is high (67,9%).

Conclusion: The research estimated the fact that women after Caesarean section suffer from the problems related with also after the postpartum period. The biggest problems are pain, lack of sleep and motility problems. However, most of the women reported satisfaction with the labour.

FERTILITY AWARENESS AND FERTILITY CARE

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Introduction: Fertility awareness and fertility care have significant consequences for the public health.

Material and methods: In this research the cross-sectional quantitative study design was elected. The research sample consisted of 216 women in the age of 18 – 30 (average age: $22,88 \pm 4,27$). For data collection we used questionnaire of our own construction focused on detection of opinions, attitudes of women in the issues of fertility, also foreknowledge, knowledge and practice in relation with their own fertility care. For analysis of obtained information we used descriptive statistics.

Results: Women's opinions and attitudes in fertility issues were mostly positive, however only 48,15 % expressed sufficient information about fertility and fertility care. The internet was the most frequently used source of information (26,75 %). Although only 13,80 % of respondents cited the medical staff as the source of information, it was proved as the most required source of information. Majority of women (52,32 %) did not have any information about fertility-awareness based methods and we detected also insufficient awareness about these methods (23,61 %) from the medical staff. The lack of information has also been proven in knowledge, especially with regard to age, as one of the risk factors of fertility.

Conclusion: In regard to identified deficiencies it is important to improve the women's fertility awareness including the fertility care, increase the fertility information offer with emphasis on the prevention mainly by the medical staff. Midwives should except of participating on fertility awareness also identify the risk factors related to fertility and they should recommend and suggest all available solutions and preventive precautions of fertility problems with the aim to improve women's reproductive health.

INFLUENCE OF SYMPATHETIC ACTIVITY ON ARTERIAL STIFFNESS MEASURED BY CAVI (CARDIO-ANKLE VASCULAR INDEX)

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Introduction: Cardio-ankle vascular index (CAVI) is a measure of arterial stiffness from heart to the ankle. CAVI reflects not only the structural changes in the vessel wall, related to the atherosclerotic process, but also the functional stiffness – i.e. arterial tone modulated by sympathetic activity. Index kCAVI, measured from heart to knee, covers smaller part of the peripheral circulation. The aim of our study was to evaluate the effect of changes in sympathetic activity (elicited by head-up tilt test of two different inclinations) on parameters CAVI and kCAVI in the context of changes in total peripheral resistance (TPR).

Methods: In our preliminary study we examined 6 male volunteers (age 20.6 ± 0.5). CAVI and kCAVI were measured using VaSera VS1500 device. TPR was assessed using the formula: $TPR=80 \cdot (\text{mean MBP}/\text{mean CO})$, where MBP is mean blood pressure measured on beat-to-beat basis (Finometer) and CO is cardiac output measured using impedance cardiography (Itamar Medical). Median values of 300 heart beats of MBP and CO were used for the calculation of TPR. All parameters were measured in supine position and in two head-up tilt test angles (HUT_{20°}, HUT_{40°}).

Results: In comparison with supine position, CAVI, as well as TPR, were significantly higher in both HUT angles (CAVI_s = 5.58 ± 0.51 , CAVI_{HUT20} = 6.69 ± 0.78 ($p = 0.043$), CAVI_{HUT40} = 8.130 ± 0.79 ($p = 0.043$); TPR_s = 1047.7 ± 165.8 , TPR_{HUT20} = 1171.3 ± 222.2 ($p = 0.043$), TPR_{HUT40} = 1252.2 ± 177.8 ($p = 0.043$)). kCAVI was significantly higher than kCAVI in supine position only in HUT_{40°} (kCAVI_s = 5.34 ± 0.41 , kCAVI_{HUT20} = 5.94 ± 0.36 , kCAVI_{HUT40} = 6.98 ± 0.75 ($p = 0.043$)).

Conclusion: The results of our study suggest that CAVI is sensitive to changes in sympathetic activity provoked by head-up tilt test due to changes in peripheral circulation (vasoconstriction). kCAVI seems to be less sensitive to sympathetic activity changes, because stronger stimulus (HUT₄₀) was needed to elicit significant changes in kCAVI.

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LATINARIUM – AN EFFECTIVE ELECTRONIC SUPPORT TO IMPROVE KNOWLEDGE OF MEDICAL TERMINOLOGY

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Introduction: The modern period requires an effective exploitation of the digitalization potential of the teaching process and educational resources as there is a general trend of integrating the modern technologies into classical education. Based on students' needs and faculty requirements, we have contributed to this strive by processing the vocabulary corpus from two medical terminology textbooks into a digital form and making it available on the website.

Material and Methods: The source material for our project were two textbooks: Bujalková, M. – Šimon, F.: *Terminologia medica Latina*. 3. vyd. Martin: Vydavateľstvo Osveta 2019 and Bujalková, M. – Jurečková, A.: *Greco-Latin Medical Terminology*. 1st edition. Martin: Vydavateľstvo Osveta 2017. The procedure included obtaining the consent form the authors of the textbooks to publish the lexical corpus contained in these works. The method of the website creation was based on three basic pillars: i) *domain name*, i.e. an identification string to identify the website easily; ii) *web hosting* i.e. a space where the website is located; and iii) *the CMS (Content Management System) platform*, i.e. the content management and website design system. The key activity was the website content creation, which in practice meant the transformation of the both textbooks' vocabulary into digital form with subsequent interconnection process to create a separate SVK and EN versions.

Results: The only condition for using the website is to have a mobile phone / tablet / computer with an internet connection and the URL www.latinarium.sk – welcome to the website of the first electronic support for teaching Latin medical terminology in Slovakia. The dictionary is trilingual, consisting of Slovak, Latin and English medical terminology. As a result, the dictionary has the potential to help not only the Slovak students of General Medicine, Dentistry, Nursing, Public Health and Midwifery, but also students of the English General Medicine teaching program.

Conclusion: *Latinarium* has been created as a unique online dictionary, being freely available to its users – students all over Slovakia, since the source textbooks are used by all Slovak medical faculties as well as some health care faculties. Hence, it may serve as a help for students in case they do not have the recommended literature, or prefer the digital to the printed form of the textbook and would like to verify their knowledge of Latin-Greek medical terminology.

INDUCED PLURIPOTENCY - AN UNLIMITED SOURCE OF CELLS FOR PERSONALIZED THERAPY

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Introduction: Induced Pluripotent Stem cells (or iPSc) show a great potential for regenerative medicine. *In vitro* and *de novo* induced pluripotency allows any differentiated cell to be later shaped into other cell types, allowing countless possibilities: from cardiomyocytes to neuron precursors, from pancreatic β -cells to retinal cells. Those cells could further be used as new line therapies for diseases like diabetes mellitus type 1, help treat myocardial infarctions or even blindness.

Material and methods: Since last year, we successfully reprogrammed isolated human skin fibroblasts into iPSc and then neural precursor cells. To test the pluripotency of iPSc cells, we established xenograft model using iPSc-injected Crl:NU(NCr)-Foxn1nu athymic mice. Derived neural precursor cells were later transplanted into immunosuppressed pigs intraspinally to test their ability to survive and differentiate *in vivo*. Finally, the same iPSc cell line was also used for *in vitro* differentiation into beating cardiomyocytes, using commercially available media and protocol partially designed by our team.

Results: Both our *in vivo* transplantations and *in vitro* experiments showed promising results as the neural precursor cells survived in pigs and differentiated into neurons *in vitro*. *In vivo* differentiation potential is currently being evaluated by IHC. The cells injected in nude mice formed a teratoma, revealing their pluripotency. We also successfully differentiated our *in vitro* model cell line into beating cardiomyocytes.

Conclusion: The ability of our cells to differentiate into different tissue types shows their pluripotency, thereby confirming the successful reprogramming of regular fibroblasts isolated from skin into induced pluripotent stem cells. We continue expanding our protocols for possible future clinical use of iPSc-derived cells.

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EPIGENETIC IMPACT OF PLANT FOODS ON EXPERIMENTAL MAMMARY CARCINOGENESIS

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Introduction: Comprehensive oncology research suggests an important role of phytochemicals or whole plant foods in the modulation of signaling pathways associated with anticancer action. Based on our previous data, it seems that the mixtures of low-dose phytochemicals present in whole foods may be very effective against mammary carcinogenesis.

Material and methods: The goal of this study is to assess the anticancer activities of *Cinnamomum zeylanicum* L. using rat breast carcinoma model. *C. zeylanicum* (as bark powder) was administered in the diet at two concentrations of 0.1% (w/w) and 1% (w/w) during the whole experiment in chemically induced rat mammary carcinomas. At autopsy, mammary carcinomas were removed and prepared for immunohistochemical and molecular analyses.

Results: *C. zeylanicum* in both doses significantly reduced the tumor incidence by 15.5% and non-significantly suppressed tumor frequency by more than 30% when compared to controls. An evaluation of the mechanism of anticancer action using valid oncological markers showed several positive changes after treatment with *C. zeylanicum*. Histopathological analysis of treated rat tumor specimens showed a significant decrease in the ratio of high-/low-grade carcinomas compared to controls. In treated rat carcinomas, we found pro-apoptotic, anti-proliferative, anti-angiogenic, and anti-cancer stem cells effects of cinnamon. Regarding the evaluations of epigenetic changes in rat tumors, we found significant changes in post-translational chemical modifications of histones, miRNA expressions, and methylation status some TSG gene promoters.

Conclusion: Our results showed tumour-preventive effect of cinnamon bark in the breast carcinoma model. This effect of cinnamon was associated with apparent positive epigenetic modulations in breast carcinoma cells *in vivo*.

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EFFECTS OF STIMULUS STRENGTH ON THE COUGH MOTOR PATTERN

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Introduction: Cough is the most important defense reflex of the respiratory system. It appears after the receptors located in the airways, which are innervated by the vagus nerve, are stimulated. The main purpose of the cough response in a living system is to expel the source of stimulation in order to maintain clear airways capable of securing sufficient airflow. The main goal of this study was to determine, whether the stimulation of exclusively upper or lower areas in the trachea (“weak” stimulus) had any influence on the pattern of cough response, in comparison to stimulation of upper and lower parts of trachea simultaneously (“strong” stimulus).

Materials and methods: This study was conducted on spontaneously breathing cats (7♂; 4.22 ± 0.21 kg) under pentobarbitone anesthesia. The cough was elicited mechanically with a motion of catheter in the tracheal areas. Blood pressure, esophageal pressure and electromyograms (EMGs) of the diaphragm (DIA) and the abdominal muscles (ABD) were recorded and analyzed.

Results: Stimulation of upper/lower tracheal regions exclusively produced coughs with significantly ($p < 0.05$) prolonged inspiratory and expiratory phase durations, inter-cough intervals, time of cough EMG activity, total cough cycle time and the duration of cough DIA activation. Stimulation of both upper and lower tracheal regions concurrently resulted in higher number of coughs in 10 s stimulation ($p < 0.01$), the endotracheal inspiratory and expiratory pressure peaks and the amplitudes of DIA and ABD EMGs ($p < 0.05$).

Conclusion: Our results indicate that stimulation of larger parts of trachea increases the number of coughs and significantly alters spatio-temporal characteristics of cough motor pattern. Intensity of cough stimulus, represented by the number of active cough-related afferent fibers, determines the number and strength of the cough response, but also the cycling and timing features of coughing.

NEURODIFFERENTIATION OF HUMAN DENTAL STEM CELLS

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Introduction: Stem cells play a key role in the regeneration processes of each organ and tissue. The best source for regeneration of mature neurons are neural stem cells. However, the access to neural stem cells is very difficult. Dental stem cells appear as a perspective new source in regenerative processes. It is due to their easy access, differentiation potential and very good proliferation ability, which does not transform to cancer phenotype.

Material and methods: We used human dental pulp stem cells (DPSCs) to study their biological properties and differentiation into neural cells during specific cultivation condition *in vitro*. We compared the cell morphology, expression of specific surface markers as well as unique protein production during three weeks cultivation in media with various concentration of serum (0%; 0.2%; 0.5%; 1%; 2%; 10%).

Results: We proved that reduced serum concentration (up to 1%) has a supportive effect to transform DPSCs into neural precursor cells. This spontaneous differentiation was analyzed using fluorescently labelled antibodies. The most dominant shift (up to 45% increase in positivity) was observed using CD56, a glycoprotein known as neural cell adhesion molecule. Similar effect (32%, resp. 18%) was confirmed using CD133, resp. CD109 markers which are widely expressed in brain cells. Moreover, the presence of TUJ protein (beta III tubulin, a neuronal marker) was detected only in samples with reduced serum concentration (up to 1%) compared to control cells (10% serum).

Conclusion: Using specific cultivation condition and low-cost supplements we successfully prepared neural precursor cells from human DPSCs. These stem cells could be used as excellent option for studies of neurological diseases and for autologous transplantation due to their great differentiation potential. Further experiments focused on electrophysiological properties of differentiated cells in reduced serum condition must be performed.

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HYPERHOMOCYSTEINEMIA AND IT'S INFLUENCE ON THE PROGRESSION OF ALZHEIMER'S DISEASE-LIKE NEUROPATHOLOGICAL FEATURES IN THE MODEL OF GLOBAL BRAIN ISCHEMIA

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Introduction: Alzheimer's disease (AD) is by far the most common of neurodegenerative diseases, which are not only characterized by cognitive decline, but also by typical histomorphological changes. AD results in massive hippocampal and neocortical neuronal loss with the tendency to chronicity and irreversibility. As the exact pathomechanism of AD remains unknown, there are still being discovered and further explored new risk factors, such as hyperhomocysteinemia (hHcy). As previously reported, there is association of hHcy, modifiable independent risk factor, with AD-like pathological features, whose progression can be accelerated by ischemic stroke or global brain ischemia. In this year's work we carried on searching for and analysing histological and cellular changes in tissues exposed to such conditions, hHcy and ischemic insult with following reperfusion, with main focus on metabolism and apoptosis of neural cells. **Material and methods:** Rat model of global forebrain ischemia-reperfusion injury (IRI) was induced by 4-vessels occlusion lasting 15 min of ischemia followed by reperfusion period of 24 hours. hHcy was induced by subcutaneous injection of Hcy (1.2 $\mu\text{mol/g}$) once a day in duration of 21 days. Animals were sacrificed, brain were fixed in 4 % paraformaldehyde and proceed for cryosectioning followed by histological analyses using a confocal microscope.

Results: The immunohistochemical analysis detected differences in animals exposed to hHcy in comparison to control groups after selective identification of Peroxiredoxin 5, ApoE and Annexin V immunocomplexes. The results showed changes in antioxidant capacity also in onset of apoptosis and dysregulation of ApoE in cortical and hippocampal neural cells in animal groups previously exposed to hHcy and hHcy with 24 hours of ischemic-reperfusion. **Conclusion:** These findings suggest that hHcy alone and combined with IRI alternates neural metabolism, antioxidant and apoptotic response to such conditions in cerebral cortex and hippocampus and together with dysregulation in ApoE could these changes lead in the progression of AD-like pathological features.

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THE IMPLEMENTATION OF OMICS TECHNOLOGIES IN BRAIN CANCER RESEARCH

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Gliomas are the most frequently occurring malignant central nervous system tumours. The development omics-technologies over the past decade has revolutionised translation cancer. We have decided to focus on four different areas (transcriptomics, proteomics, metabolomics and epigenetics) that accurately reflects the cellular, genetic, and molecular basis of gliomagenesis.

Transcriptomics is a technology aimed to study of RNA transcripts that are produced by the genome. This method is capable of performing the quantification of protein-coding and non-coding gene expression, and determination of alternative splicing. Using the method it is possible to gather and classify abnormal events in the malignant progression of gliomas to the range of different grades, which can be used as biomarkers. Over the past years brain cancer proteomics (BCP) has been attempted at different levels, including proteome analysis of patient biopsies and bodily fluids of glioma cells. BCP encompasses the identification and quantitative analysis of differentially expressed proteins relative to healthy tissue counterparts at different stages of disease, from preneoplasia to neoplasia. Metabolomics is the global quantitative assessment of endogenous metabolites within a biological system, taking into an account genetic regulation, altered kinetic activity of enzymes, and changes in metabolic reactions. Thus, compared to genomics and proteomics, metabolomics reflects changes in phenotype and therefore function. As an example of metabolomics discoveries is an oncometabolite 2-hydroxyglutarat one of the top-ranked biochemical markers for tumour grade classification. Over the last decade mutations in epigenetic regulator genes have been identified as key drivers of subtypes of gliomas with distinct clinical features. Importance of epigenetics shows exploring connections between epigenetic silencing of the DNA repair gene MGMT, causing the resistance of cancer cells to alkylating agents and patient's benefits from alkylating agent therapy.

We believe that a detailed description of the gliomagenesis at multiple levels in parallel can ultimately contribute to individual therapy and thus improve the overall survival of patients.

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GABA_A RECEPTOR ANTAGONIST INHIBITS COUGH DIFFERENTLY IN NUCLEUS OF SOLITARY TRACT IN CATS

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Introduction: Regulation and mediation of the cough reflex is controlled by GABA receptors located in the solitary nucleus (NTS). Specifically, GABA_A receptors were studied further for their control of neural excitability.

Material and Methods: Bicuculline (GABA_A receptor antagonist) was injected bilaterally into the rostral (rNTS) and caudal (cNTS) solitary tract nucleus in 8 anesthetized cats (4.22 ± 0.23 kg). Analysis of electromyograms (EMGs) of abdominal (ABD) and diaphragm (DIA) muscles, expiration and inspiration esophageal pressures (EP) and blood pressure (BP) were performed. The cough reflex was induced mechanically by soft polyethylene catheter within 10 s long stimulation of lower airways.

Results: Bilateral microinjection of 1mM bicuculline in the cNTS (31.6 ± 0.51 nl to the left side; 60 ± 15.73 nl to the right side) significantly reduced cough number ($p < 0.05$), amplitude of ABD EMG and expiratory EP (all $p < 0.01$). The temporal analysis presented with considerably elongated of whole cough expiratory part (CTE) as well as the total cycle of cough length (CT_{tot}) (all $p < 0.05$). Furthermore, this also showed shortened overlying ABD and DIA discharge (all $p < 0.05$). Bilaterally microinjections of bicuculline in the rNTS (36.5 ± 3.26 nl to the left side; 27.5 ± 1.60 nl to the right side) yields very high reduction of cough numbers ($p < 0.001$), amplitudes of DIA EMG ($p < 0.01$) and ABD EMG ($p < 0.001$) together with inspiratory EP ($p < 0.01$) and expiratory EP ($p < 0.001$). The cough temporal analysis after rNTS microinjection showed elongated CTE, CT_{tot} cough phases (all $p < 0.01$) and significantly shortened overlapping of DIA and ABD discharge (all $p < 0.01$).

Conclusion: The results confirmed high significance of GABA mediated mechanism in the NTS in cough control and showed a different GABA-ergic inhibitory system in the cNTS and rNTS on mechanically induced cough in cats.

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MEASUREMENT OF LOW FREQUENCY ELECTROMAGNETIC FIELDS DURING DIFFERENT MODES OF THE MOBILE PHONES

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Introduction: Mobile phones (MPs) and other microwave-based electronic devices (EDs) have quickly become a part of our everyday routine. MPs and EDs emit radiofrequency (RF) electromagnetic fields (EMFs). However, a lack of research has been conducted to study interactions of combined RF and low frequency (LF) EMFs that are also produced by the MPs and EDs.

Material and methods: This research was expanded by using more MPs, other EDs (wireless chargers), with employment of the internet and devices not older than 5 years. The aim was to measure values of LF magnetic fields in several modes: 1st – devices switched into stand-by mode, charger plugged in, 2nd – charger unplugged, screen turned off/on, 3rd – phone calls in 2G/3G networks, 4th – internet calls using Wi-Fi, 5th–wireless chargers measured during inactive (without MP) and active charging mode (with MP). Measurements were performed 5-times in two frequency ranges: 5-200Hz (LF1) and 120Hz-10kHz (LF2), using the broadband RF meter NARDA550 and NARDA50D (Germany). Thus, total number of measurements was 180 for MPs and 40 for wireless chargers. Statistical analysis was performed by Microsoft Excel using T-test.

Results: Results showed that the highest values were measured during speaking mode on front (LCD) side within LF1 ($23.21686\mu\text{T}\pm 8.34\mu\text{T}$, $p<0.01$, comparing front and back side), peak at $f=7.22\text{Hz}$. The lowest values were measured within LF2 on front side with the LCD off, charger unplugged ($0.02884\mu\text{T}\pm 0.00249\mu\text{T}$, $p>0.05$, comparing front and back side), peak at $f=171\text{Hz}$. High performance MPs had higher values compared to budget phones. The highest values for wireless chargers were found within LF1 in stand-by mode ($131.58\mu\text{T}\pm 4.12\mu\text{T}$, $p<0.001$, comparing active/inactive charging modes) and the lowest were measured within LF2 while charging MPs ($0.1206\mu\text{T}\pm 0.025\mu\text{T}$, $p<0.001$, comparing active/inactive charging modes). Values during charging mode were significantly higher.

Conclusion: The study showed that LF EMF emitted by the electronic devices should not be neglected and must be incorporated in the research, to study possible detrimental effects of EMF exposure.

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Note:

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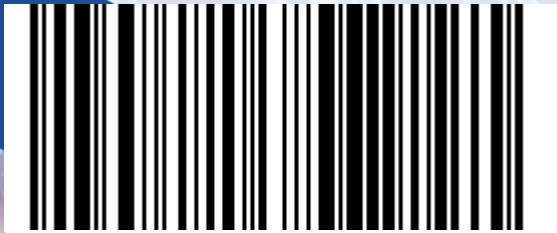
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