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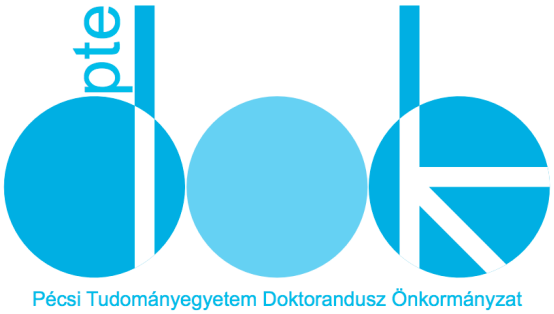

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Presidential Welcome Speech

Dear Doctoral Students, Doctoral Candidates and Young Researchers,

I warmly welcome you on the pages of the MedPECS 2021 Conference's Book of Abstracts.

We have been facing a huge challenge over the past year or more because of the coronavirus epidemic. In these difficult times, it is even more important that science seeks answers to the questions that arise, and thanks to scientific efforts we will get through this period and hopefully soon, thanks to science, our lives can get back to normal.

But for this to happen, it is essential that certain aspects of scientific life - such as conferences, of which professional discourse is an essential part - continue to take place, maintaining a healthy system of the academic sector. This is what we wish to contribute to this event, which we hope will serve as a starting point for future collaborations, in addition to presenting professional results. One of the cornerstones of these collaborations could be innovation, which is a key element of scientific life. To this end, this year we will seek to bring innovation closer to doctoral students and young researchers, with the help of eminent experts, to facilitate the realisation of new innovative ideas.

I am confident that, despite the online format, the conference will be marked by useful and forward-looking work and will lead to professional development for all participants.

Finally, I would like to thank all the kind participants of the conference for choosing our event to present their latest research results.

I wish you professional success and good health!

Best regards,

Bence Závodi
president
University of Pécs
Doctoral Student Association

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Health Sciences I.

Quality of life, anxiety, depression, and well-being in long-term survivors of testicular cancer. A six-year longitudinal study.

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Introduction: The highest incidence of testicular cancer (TC) lies around the „busy" life period (25–40 years of age) when man are making important decisions about personal and professional life and sexuality is of great importance too. The treatment option is in many cases unilateral or bilateral orchiectomy when lifelong testosterone replacement is mandatory. So despite the high survival rate it can have a long lasting impact on the important parts of the life. [1]

Aim: We aimed to investigate the differences between unilateral testicular cancer survivors (UTCSs) and bilateral testicular cancer survivors (BTCSs), who undergone unilateral or bilateral orchiectomy, in quality of life, anxiety, depression, illness intrusiveness and well-being levels.

Methods: Intent-to-treat population (ITT) at the baseline in 2014 consists of 24 BTCSs and 49 UTCSs. Per protocol population (PPP) at the follow-up in 2020 included 17 BTCSs and 29 UTCSs. All survivors in the study were free of disease with median follow up of 2.92 (0.25-28.5) years since orchiectomy. Outcomes were assessed using validated questionnaires (EORTC-QLQ-c30; STAI; HADS; CES-D; WHO-5; IIRS) and sociodemographic data were collected. Mann-Whitney, Wilcoxon and GZLM tests were used for statistical analysis.

Results: Emotional functions, illness intrusiveness and anxiety scores in the dropped out patients were worse than in the PPP (all $p<0.05$). At the follow up we found a significant decrease in depression level both of UTCSs ($p=0.042$) and BTCSs ($p=0.047$). UTCSs exhibited significant decline in anxiety scores ($p=0.033$) from baseline to 6 years. Intimacy score in BTCSs were higher than in UTCSs both at the baseline ($p=0.013$) and the follow up ($p=0.002$). Cognitive functions were worse in the BTCSs than the UTCSs at the follow up ($p=0.021$).

Conclusions: Survivors of bilateral or unilateral testicular cancer present with various psychological difficulties requiring careful management to permit a good quality of life.

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[1] Alexis O, Adeleye A O, Worsley A J: Men's experiences of surviving testicular cancer: an integrated literature review in Journal of Cancer Survivorship 2020; 14: 284-293.

Keywords: longitudinal assessment, testicular cancer, quality of life, distress

Social Stigma Facing People Living with HIV/AIDS in Khartoum Care and Treatment Centers, Khartoum State, Sudan-2019.

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Introduction: Social stigma is a condition of dissatisfaction of an individual or a group of people according to specific characteristics which distinguish them from the community [1], and has been delineated by WHO as a "hidden" burden of disease. Sudan faces the HIV/AIDS epidemic, there is a level of social stigma, and other factors associated with people living with HIV/AIDS (PLWHA) in Khartoum State in different domains including family activities, community and the workplace [2].

Aim: To assess the prevalence of social stigma among PLWHA, and to identify the factors associated with social stigma in order to evaluate the effectiveness of the applied counselling as a tool to reduce social stigma among PLHWA.

Methods: A cross-sectional study was conducted in Care and Treatment Centers (CTCs), Khartoum State, Sudan. A sample of 400 PLWHA participated and distributed proportionally according to the weight of over five CTCs and in each centre has done according to the daily admission rate. A pre-tested questionnaire and interviews with CTCs managers were used to collect the data. The associations between different variables were checked using the Chi-square test at a 95% confidence level.

Results: 62% of PLWHA suffered from social stigma, where 54.4% were suffered from the social stigma in their families, 38% in the community and 7.6% in the workplace. 4.2% has been rejected by their families, 28% were living under stress by their partners. A small group 3% have been terminated from work. As a consequence of fear from the social stigma, 53.3% of people living with HIV/AIDS avoided using condoms with a partner and 41% was afraid to mention having HIV/AIDS. 91.3% have been depressed and only (1%) have attempted suicide. From the interviews, counselling was applied in CTCs to reduce internal stigma. There was a significant relationship between social stigma and depression ($P = 0.001$) and between social stigma and fear of social discrimination ($P < 0.05$).

Conclusions: The majority of PLWHA suffered from the social stigma associated with many factors such as fear of social discrimination. Counselling has applied in the CTCs but health education should be revised in all domains to help PLWHA cope with their situation.

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[2] Elhassan S: social stigma facing people living with HIV/AIDS in Khartoum State, Sudan, Advanced Search (MPEH) degree in Public and Environmental Health, Graduate College, University of Algazera, Gazera, Sudan 2016: 8-10.

Acknowledgements: This work were supported by DAAD-in-country scholarship and the Stipendium Hungaricum Scholarship program (SH ID: 44760)

Keywords: Social stigma, HIV/AIDS, Discrimination, Counselling

Linguistic Analysis of Schizophrenic Patients' Mentalizing Skills

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Introduction: The study of schizophrenia, and particularly that of schizophrenic speech requires an interdisciplinary approach. Individuals with schizophrenia reportedly exhibit severe difficulties in speaking and mentalizing. In order to understand the nature of their linguistic dysfunction, the primary task is to identify the occurence of linguistic disturbances at the specific levels of language including phonology, morphology, syntax and discourse. [1] As speech can be considered as the reflection of thoughts, the analysis of schizophrenic speech can also provide useful insight into patients' mentalizing skills.

Aim: The study presents the preliminary results of an interdisciplinary research based on guided interviews related to Hemingway's short story entitled *The End of Something* [2]. The primary purpose of the research is to describe and categorize schizophrenic patients' language use with a special focus on their mentalising capacities as reflected in their speech.

Methods: The case study consists of 20 guided conversations between a PhD student and schizophrenic patients. The interviews were digitally recorded and subsequently transcribed. The qualitative analysis targeting the description and categorization of recurring lingustic patterns related to mentalizing skills present in the speech of individuals with schizophenia was performed with the help of WordSmith Tools 5.0. concordance software. As a result, collocations related to linguistically expressed mentalizing capacities could be identified.

Results: Based on the analysed interviews, it can be suggested that schizophrenic patients' language use reflects mild microlingustic disturbances. More severe forms of impairments are more likely to occur at the pragmatic and discourse level. [3].

Conclusions: Hopefully, the findings can provide an accurate description about the interplay between language use and mentalizing skills, and offer some possible indications for psychotherapeutists how to detect characteristic linguistic impairments and improve mentalizing capacities in individuals with schizophrenia.

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Keywords: doctor-patient communication, schizophrenic speech, discourse analysis, mentalization

Nationwide investigation on the association between lower limb amputation and the structural factors of general medical practices and patient's socio-economic indicators in Hungary.

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Introduction: Hungary is among the countries where the lower limb reduction (LLA) is an important source of health loss [1-2]. Although, it is known that the patients' socio-economic status is a predictor of LLA, the primary care structure as a determinant of LLA risk is hardly investigated in this respect.

Aim: Our study aimed to investigate associations of LLA risk with structural features of general medical practices by controlling for the patients' socio-economic status.

Methods: Using data from 2018 covering the whole country, GMP specific LLA risk standardized by patients' age, sex, and eligibility for exemption certificate were computed in adult. Multivariate linear regression model was applied to evaluate the relationship between GMP specific LLA risk and GMPs' structural parameters (list size, settlement type, geographical location, GP vacancy, age of GPs, adult-and children or adult-only type of the GMP) and patients' socio-economic status (education, employment, Roma ethnicity, household crowding).

Results: In Hungary, 1386 lower-limb amputations were identified in 2018. The crude prevalence of LLA was 18.9/100,000. Increased risk of LLA was observed in the GMPs with smaller list size (β= 0.071; 95%CI= 0.042;0.099), higher level of employment (β= 0.047; 95%CI= 0.001;0.094), and higher households crowding (β= 0.055; 95%CI= 0.018;0.092). Decreased risk of LLA was detected in GMPs with lower level of employment (β= -0.054; 95CI%= -0.099;-0.010) providing care for adults only (β= -0.128; 95CI%= -0.174;-0.081).

Conclusions: In Hungary, LLA risk is significantly determined not only by the patient's socio-economic status, but also by structural factors of GMPs, suggesting that the LLA risk could be reduced by better organization of the primary health care for the diseases can lead to LLA.

References:

[1] A. J. Ploeg, J.-W. Lardenoye, M.-P. F. M. Vrancken Peeters, and P. J. Breslau, 'Contemporary Series of Morbidity and Mortality after Lower Limb Amputation', Eur. J. Vasc. Endovasc. Surg., vol. 29, no. 6, pp. 633–637, Jun. 2005, doi: 10.1016/j.ejvs.2005.02.014.
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Acknowledgements: This project was supported by the Stipendium Hungaricum Scholarship Program (grant SHE-00714-004/2020 to UJ).

Keywords: lower limb amputation, socioeconomic status, general medical practice, primary health care

Comparison of baseline characteristics, clinical management and outcomes for patients with acute coronary syndrome

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Objektive: The aim of this study was to describe current characteristics of patients admitted for acute coronary syndrome (ACS) in Hungary compared to Iraq and to analyse whether in-hospital and 30 days post discharge outcomes variations are explained by differences in patients' baseline characteristics and clinical management.

Methods: A prospective cohort study was conducted at two cardiac centers between May 2018 to May 2019. The study included 164 consecutive ACS patients; 64 patients from the Pécs Heart Institute in Hungary and 100 patients from Al-Nasiriyah Heart Center in Iraq. Baseline characteristics, clinical management and in-hospital and 30 days post discharge outcomes were recorded.

Results: Overall, Iraqi patients were more often diagnosed with STEMI (64.0% vs. 26.6%). In contrast, Hungarian patients were more often diagnosed with NSTEMI (73.4% vs. 36.0%). The patients were younger in Iraq and often had a family history of CAD than those in Hungary. Conversely, Hungarian patients more often had hypertension, dyslipidemia, prior MI, prior Percutaneous coronary intervention (PCI) and prior coronary artery bypass graft (CABG) than Iraqi patients. PCI and CABG were performed more in Hungary (92.2% vs. 70.0%; 10.9% vs. 0.0%, respectively) than in Iraq. In-hospital mortality and 30 days post discharge were low in both countries without any major differences. However, Hungarian patients recorded a higher events rate during hospitalization and after 30 days post discharge from Iraqi patients.

Conclusions: Our results showed that variations in ACS outcomes are due to differences in baseline characteristics, disease severity, and clinical management in both countries.Moreover, there is a obvious impact of financial and administrative factors on medical decision-making and quality of services provided.

Keywords: Baseline characteristics, clinical management, outcomes, acute coronary syndrome

Evaluation of the effect of age and body mass index on static gait parameters

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Introduction: Ambulation is a vital ability in ageing which provide independence and satisfying quality of life [1, 2]. Many different parameters influence the balance, gait pattern and mobility including age, cognitive functions and body composition [3].

Aim: In this research we aimed to evaluate whether age and body mass index (BMI) have an impact on spine parameters and static gait characteristics in such a way, if these variables influence the mobility and balance of the elderly [2] [1] [3].

Methods: Sixteen healthy individuals (age: 59+/-12 years, 15 females, 1 male) were tested with non-invasive height adjustable Diers Formetric 4D spine movement analysis system connected to Diers pedoscan. During the evaluation, the volunteer stood on a treadmill and the system recorded the maximal kyphotic and lordotic angle, trunk inclination, trunk imbalance, pelvic inclination, tilt and torsion along with centre of mass and weight distribution.

Results: According to the results, ageing was correlated with higher BMI (R^2 = 0,4453). According to the static spine parameters, higher kyphotic angle (mean:61.97°+/-13) was correlated with ageing (R=0.59) and trunk inclination (mean: 4.06°+/-3.08) (R=0.6) but stronger correlation was found between BMI and kyphotic angle (R^2 = 0.5729). To evaluate the variation of centre of mass, weight distribution and foot pressure data were collected and compared to the spinal results. BMI increased the total centre of mass movement (R=-0.28) in addition to ageing (R=-0.38). Weight distribution was related to pelvic tilt (left: R=0.51, right: R=0.51). Total centre of mass movement was correlated to higher kyphotic angle (R^2 = 0,3084).

Conclusions: According tour result, BMI has stronger impact on spinal kyphotic angle than ageing. Furthermore, stabilometry is strongly correlated to higher BMI and also overweight cased pelvic tilt alteration affected weight distribution and centre of mass movement, therefore healthy lifestyle and body composition is extremely important for elderly to maintain ambulatory functions and safe balance and avoid falling and further complications.

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Acknowledgements: The research project is conducted at the University of Pécs, Hungary, within the framework of the Biomedical Engineering Project of the Thematic Excellence Programme 2020 (2020-4.1.1-TKP2020)

Keywords: ageing, movement analysis, gait, spine, mobility

Health Sciences II.

Assessment of knowledge levels and attitudes of junior doctors regarding infectious diseases and antimicrobial resistance

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Introduction: Appropriate professional competencies and attitudes are of critical importance for healthcare-personnel to effectively prevent, diagnose and treat infectious diseases and to curb the spread of antimicrobial resistance (AMR) [1].

Methods: A self-administered, paper-based, 47-item questionnaire was developed by an expert panel to assess the knowledge-level (30-items) and attitudes (10-items) of junior doctors on infectious diseases and AMR. Pilot testing was performed among residents at the University of Szeged. Statistical analyses were performed by IBM SPSS Statistics 22.0.

Results: Among the n=146 respondents, 57.5% (n=84) has polled female, with an average age of 29.06±3.22 years. Results of internal consistency measures (Cronbach's α, KR-20) and test-retest analysis showed acceptable consistency and reliability. The number of correct answers among the respondents were 15.53±3.78 overall (medical microbiology: 6.00±1.80, epidemiology/infection control: 5.36±1.69, infectology: 4.27±1.60); 36.3% did not reach a 50% score. 95.1% of residents presented with an appropriate attitude (score≥5), while no correlation was shown between attitude scores and correct responses.

Conclusions: Our instrument may be an effective tool for the identification of knowledge gaps related to infectious diseases among young prescribers in the early years of their career.

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Acknowledgements: The research was supported by the János Bolyai Research Scholarship of the Hungarian Academy of Sciences (BO/00144/20/5) and the New National Excellence Programme (ÚNKP-20-5-SZTE-330).

Keywords: questionnaire development; healthcare professionals; microbiology; infectiology

Nurses' satisfaction and patient adverse events: A descriptive multi-site study

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Introduction: The causes of the adverse events are numerous and interrelated with job satisfaction and support the nurses receive. For instance, work-related stress was associated with more adverse events [1,2]. On the other hand, recognition of nurses, which is considered a type of support, was also associated with higher job satisfaction [3].

Aim: To assess the relationships between pediatric nurses' satisfaction, perceived social support, and their perceived patient adverse events.

Methods: A cross-sectional descriptive design was used in this study. A convenient sample of 225 pediatric nurses were selected from Eight governmental and one university-affiliated hospital. The governmental hospitals were selected proportionally to represent the north, middle, and south areas of Jordan. The university hospital was selected from the only two university-affiliated hospitals. Participants were asked about (1) some demographic variables, (2) four types of nurse-perceived patient adverse events (medication errors, pressure ulcers, patient falls, and nosocomial infections), (3) social support from their families, co-workers, and managers, and (4) their perceived job satisfaction. Pearson correlation and multiple regression tests were used to assess therelationships between the studied variables.

Results: Nurses' job satisfaction was negatively correlated with the perceived frequency of pressure ulcers ($r = -.14$, $p < .05$). The family support was negatively correlated with perceived frequencies of medication errors ($r = -.14$, $p < .05$), pressure ulcers ($r = -.14$, $p < .05$), patient falls ($r = -.13$, $p < .05$), and nosocomial infections ($r = -.14$, $p < .05$). Manager support was also negatively correlated with perceived frequencies of medication errors ($r = -.18$, $p < .01$), pressure ulcers ($r = -.23$, $p < .01$), patient falls ($r = -.21$, $p < .01$), and nosocomial infections ($r = -.15$, $p < .05$).

Conclusions: It is essential that nursing managers encourge co-workers and manager support to improve pediatric nurses' satisfaction, improving patient safety. Families should participate in supporting their relative pediatric nurses to improve nurses' satisfaction and the safety of pediatric patients.

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Acknowledgements: The researchers thank the participating pediatric nurses and everyone who contributed to the current study.

Keywords: Nurse, satisfaction, adverse events, support

Measuring health literacy among Hungarian and foreign health care university students

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Introduction: Health literacy (HL) has a deep impact on people's decisions about their health and health care system. Measurement and improvement of HL level is essential to develop an appropriate health care system. Starting to develope HL level in young ages is important, schools and universities have a big role in development of it. Several study show that the level of HL among university students studying in fields of health care is inadequate [1,2].

Aim: The aim of our study was to measure health literacy level among Hungarian and foreign university students (HS vs. FS), who are studying in the fields of health care in University of Pécs.

Methods: A self-made questionnaire was used to measure the socio-demographic data and information about the university studies and health condition. HLS-EU-Q16 questionnaire, Newest Vital Signe and Crew-questions were used to examine the health literacy level. The participants could fill the questionnaire online via the Microsoft Office 365 Forms.

Results: Two-hundred thirty-two HS and 35 FS filled the questionnaire. Two-third of the students were female and they are in their early 20s. One-hundred eighty-two of HS and 22 of FS did not have a GP in the town they are studying. Most of the students (72% vs. 74%) heard about HL before (most of the HS during their studies, most of the FS via the media). Seventy-eight percent of HS and 74% of FS think that their HL level is sufficient. During the filling of the questionnaire some of them did not understand why they had to solve mathematical problems and interpret the text during the measuring. This respondents had limited HL level.

Conclusions: Most of the students thought that they have a sufficient HL level. If we compared the different HL questionnaires we found that limited HL level is more frequent than we expected. Students have a problem with basic text interpretation tasks and calculations as well. To improve HL level we also need to improve these skills during the university studies.

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Keywords: health literacy, university studies, foreign students

Barriers of mental health help-seeking and approaches to reduce them in medical school: the student's perspective

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Introduction: Multiple evidence suggests that medical students are a high risk group for psychological morbidity. However the majority of students with mental health problems remain untreated due to failure to seek treatment. In the literature the students' in-depth perspectives on the barriers of seeking treatment from university mental health services and approaches to increase service utilization have been of less interest, especially in Hungary.

Aim: We aimed to understand medical students' perspectives and provide a comprehensive picture of barriers of help-seeking from university mental health services and approaches to reduce these barriers in the University of Debrecen.

Methods: Semi-structured interviews were conducted with 13 Hungarian and 13 foreign medical students at years I-VI in four focus groups (mean age=21.8, SD=1.88, 73% males). Interviews were audio-recorded, transcribed and content-analyzed by two independent coders using NVivo and manual checking.

Results: The most prominent reason not to seek treatment was the fear of stigmatization. Another set of barriers consisted of the lack of awareness or unfavorable reputation of the available services, lack of knowledge on signs to seek help, lack of familiarity with psychological treatment processes, excessive self-reliance and fear of exposure. The participants suggested that university mental health service providers need to consider psychoeducational and marketing approaches to engage students, improve information-flow, run campaigns to reduce stigmatized attitudes, increase understanding of mental illness and treatments and offer not only short-term counseling but long-term forms of psychological treatments. Students expressed openness and mostly positive attitudes toward online counseling that might help to reduce several mental health help-seeking barriers.

Conclusions: Multiple interventions would be needed to reduce barriers of help-seeking in university mental health services among medical students, primarily psychoeducational and marketing approaches. Providers might consider continuing online counseling as a potential type of care even after the state of emergency over Covid-19 pandemic is withdrawn.

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Keywords: mental health, medical students, help-seeking behavior, mental health service utilization

When the Parent Responds – Characteristics of Triadic Interaction

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Introduction: Obesity is an increasing problem in children worldwide. In Hungary almost 25% of the children are overweight.The therapy and diagnosis of obesity and its complications should be assessed and supervised by a medical doctor. Communication between the doctor and his/her patient is of paramount importance. Proper communication between the doctor child and parents is essential in order to achieve sufficient cooperation. Pedaiatric communication is special because the child is accompanied by a carer to the doctor's office. The carer interacts with the doctor in behalf of the pediatric patient, Clear communication is very important for all the participants in the triadic interaction.

Aim: The aim of the analysis the description of a the triadic commincation between the participants, and the comminication of the parent.

Methods: A target of my research is the 500 children and their carers participating in the Obesity Clinic at the Department of Pediatrics, Medical School, University of Pécs. The analysis of the comminucations between doctors, parents and children is carried out with Folker 2.1 transciption software. The 10-hour recorded material consists of 35 dialogues. In the presentation I will analize the transcribed content of 1 dialogue. I selected this particular dialogue because it is an extremely typical example of a triadic interaction that takes place in the doctor's office. The length of the conversation (18:41) roughly corresponds with the time typically spent with examining and history taking in the obesity clinic. The participants of the consultation are the doctor caring for obese children, and their parents.

Results: During the consultation the doctor contributes to the conversation with the most amount of talking, he speaks at least 25% more than the rest of the participants. In the course of the conversation the doctor makes 52 contributions, the parent comes second 43 times, who, considering the child's age, completely takes over the child in certain parts of the conversation.

Conclusions: Both the parent and the child talked about the patient's lifestyle, however the doctor took over during diagnostics and anouncing the results of the results of physical examination. Future examinations include the analysis of all conversations.

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Keywords: triadic, communication, child, doctor, parent

Attitudes of psychiatrists towards their patients across Europe

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Introduction: Many people think that people with mental disorders might be dangerous or unpredictable. These patients face various sources of disadvantages and experience discrimination in job interviews, in education, and housing. Mental health-related stigma occurs not only within the public community, but it is a growing issue among professionals as well [1]. Our study is the first that investigates the stigmatising attitudes of psychiatrists across Europe.

Aim: We designed a cross-sectional, observational, multi-centre, international study of 36 European countries to investigate the attitudes towards patients among medical specialists and trainees in the field of general adult, child and adolescent psychiatry.

Methods: An internet-based, anonymous survey will measure the stigmatising attitude by using the local version of the Opening Minds Stigma Scale for Health Care Providers. Data gathering started in July 2020 and will continue until June 2021. A total of 3247 psychiatric practitioners have completed our survey up until now.

Results: 62% (n=2016) of the participants have a friend or family member who suffers from mental illness and 39% of them (n=1251) have sought help for their own mental health problems. Those who sought help for their own problems had less stigmatising attitudes towards patients (median total sores 29 vs 32 $p<0.0001$). Participants who are open to case discussion groups and those who provide psychotherapy presented more favourable attitudes than those who do not (median total scores 30 vs 34 and 30 vs 32 $p<0.0001$ for both).

Conclusions: Our study highlights the importance of the lived experience of mental health professionals who sought help for their psychiatric disorders, as well as the importance of psychotherapy, case discussion, supervision or Balint-groups in the attitude of psychiatrists. We hope that this study will draw attention to the need for developing and tailoring anti-stigma interventions for healthcare professionals including psychiatrists.

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Keywords: Mental health related stigma, stigmatising attitude, psychiatrists, Europe, stigmatisation

Teachers awereness in the treatment of dental injuries

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Introduction: The treatment of dental trauma is an important part of pediatric dentistry. Accidents show virability in location and time and happen on a daily basis. It is a must, to have the proper knowledge, how theese situations should be handled.

Aim: The aim of this study was to evaluate the level of knowledgr about treatment of dental trauma amongst educators in Hungary working with children between the age of 3 and 18.

Methods: In 2018 March a pilot 13 question questionaire was formed, later in 2019 january a final 15 question questionaire was sent to 2720 hungarian educational institution. Total amount of 1426 answers were recieved.

Results: 86.8% of the educators were female, and 52.3% have witnessed some kind of dental trauma. Hungarian educators are not sure wich age is the most dangered. 57,7% think that the playground element causees the most injuries. 86% of the hungarian educators say, they dont have a proper knowledge about the topic.

Conclusions: The older teachers would take the kids to a dentist after an accident, while less of the younger colleges would act the same way. The older techers answer significantly better the youger. Female teachers have better knowledge than men, and older have better than younger. The study shows that the curriculum of teaching degree must be updated. The teachers awereness of dental trauma is weak. The lack of knowledge should be fullfilled.

Keywords: teachers, awareness, dental trauma, treatment, prevention

Public Health and Epidemiology

Health care reimbursement in segregated colonies: nationwide cross-sectional study in Hungary

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Introduction: Segregation is a recognized risk factor for health [1]. A problem persisting in Hungary where 332,658 inhabitants live in segregated colonies compared to the 7,370,949 inhabitants of the non-segregated (complementary) parts of the county's 937 settlements.

Aim: The study investigated the impact of segregation in Hungarian settlements on healthcare reimbursement (spending) in Hungary taking into account socio-economic status of all settlements.

Methods: A cross-sectional study all Hungarian settlements with segregated colonies. Data on 2019 health care services (outpatient service, CT/MRI use, hospital service, medication) reimbursement was provided by the National Health Insurance Fund. A dissimilarity index of payment (DI) between segregated and complementary areas was computed for each settlement. Settlement-level social environment (education, employment, income, crowdedness, location by county, and ethnicity (Roma, German, Croatian, Slovakian, Romanian) by last census of 2011 and their effect on healthcare usage was evaluated by linear regression.

Results: DI for spending aggregated for the whole country was 0.92, with 0.85 for outpatient, 0.79 for MRI/CT services, 1.03 for hospital admissions, and 0.84 for medications. According to the standardized coefficients, settlement level employment had the biggest negative effect on settlement-level DI for outpatient service reimbursement (b= -0.207, p=0.005) followed by education (b= -0.068, p=0.048), while proportion of Roma in the settlement was positively associated (b=0.115, p=0.005). Employment was also negatively associated with DI for MRI/CT spending (b= -0.174, p=0.028), while education was negatively associated with DI for hospital admissions reimbursement (b= -0.080, p=0.023).

Conclusions: Living in segregated colonies is a strong factor impacting healthcare service's reimbursement, determined also by local socio-economic environment. This study shows that any decision making on interventions should take the local (settlement level) environment into consideration.

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Keywords: Hungary, Segregation, Roma, Healthcare, Reimbursement

The Burden of Communicable Diseases in Lebanon: Trends in the Last Decade

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Introduction: The epidemiological trends in communicable diseases in Lebanon have been generally moving in the direction of greater control since the late 1990s. However, this trend was severely affected by the influx of Syrian refugees as from 2011 [1].

Aim: To review the main communicable diseases that experienced an upsurge in the last decade in Lebanon and to highlight the reasons behind this increase.

Methods: Data of reported communicable diseases from 2010 till 2019 were obtained from the Lebanese Ministry of Public Health (LMOPH) epidemiological surveillance database and the World Health Organization reports. Microsoft excel version 13 was used for data entry as well as tables and figures production.

Results: Tuberculosis, measles, mumps, leishmaniasis, and hepatitis A were the main communicable diseases that showed a sharp increase in the last 10 years. Measles outbreaks occurred in 2013 and 2018, leishmaniasis outbreak in 2013, and mumps and hepatitis A outbreaks in 2014. The highest percentages of reported diseases were from Beqaa and North governorates.

Conclusions: The massive influx of Syrian refugees to Lebanon, together with the poor water management system, poor sanitation, deprived living conditions, and limited healthcare access in rural areas might have contributed to the upsurge of communicable diseases. Although the LMOPH succeeded in containing the outbreaks, further efforts are needed to improve the identified gaps in order to avoid future outbreaks.

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Keywords: communicable diseases, infectious diseases, Lebanon, refugees, upsurge

Effectiveness of public health interventions on prescription redemptions among Type 2 Diabetes mellitus patients: Systematic Review and meta-analysis of Randomized Controlled Trials

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Introduction: Redemption of prescriptions among chronic care patients has been a major public health imprtance. But little is known about the interventions effect on it [1,2].

Aim: The aim of this study was to investigate the effectiveness of the various interventions on primary medication adherences among T2DM patients.

Methods: Cochrane Library, Medline/PubMed, EBSCOhost, and SCOPUS databases were quested. The methodological quality was assessed. Meta-analysis was made using fixed effects model and qualitative synthesis for primary medication adhrences.

Results: 3,992 studies were screened, 5 studies met the selection criteria. Pooled medication redemption difference was RD=8% (95% CI: 6-11%), I^2=93.9%, p<0.001. Being older RD 10% (95% CI: 7-13%) I^2=97.8%, p<0.001, community based study 17% (95% CI: 13-21) I^2=91.1%, p<0.001 and IDF Europe region 21% (95% CI: 16-26) I^2=0% were determinant factors of primary medication adherence.

Conclusions: Although, our study demonstrated that primary medication adherence can be improved following the various interventions, there is scarcity of studies on primary medication adherences and further studies are needed.

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Keywords: T2DM, medication adherence, intervention, meta-analysis, RCT

Reproductive health in the Hungarian segregated colonies: nationwide cross-sectional investigation

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Introduction: The health care for the segregated areas' citizens in Hungary is poor, compared to those living in non-segregated areas at the same settlement. Due to this, the risk of inadequate reproductive health in this social stratum has also increased significantly.

Aim: The aim of our study was to investigate the reproductive health of the population living in the segregated area and to identify the socio-economic status elements that influence the settlement of the segregated population.

Methods: A cross-sectional nationwide study conducted in 2019. The age, gender, and eligibility for exemption-certificate standardized health care use indicators of segregated colonies were compared to the complementary part of the settlement (N=955) the colony belongs to. Settlement level data have been aggregated for the whole country to describe the segregation associated disparities. Our data were provided by the National Health Insurance Fund, the 2011 Census and the governmental Land Information System. Reproductive health was assessed by the proportion of low-birth-weight preterm infants and abortions among adults, and the frequency of pregnancies and abortions in adolescents (under 18 years of age). From this set of indicators, a composite indicator was computed as a general indicator of reproductive health. The relationship of the settlement level outcome indicators with the socio-economic status, ethnic composition (Roma, German, Roman, Slovak, Croatian) and the structural characteristics of the settlement was examined using multivariate linear regression models in order to describe the impact of the settlements' social conditions on the within-settlement segregation associated disparities.

Results: Settlement level indicators showed huge variability. Country level aggregated measures showed elevated reproductive risks in the segregated colonies: the adult abortion (RR: 4.08, 95%CI: 3.95-4.22), adult's preterm delivery (RR: 1.57, 95%CI: 1.46-1.69), and for the under 18 age group's abortion (RR: 4.56, 95%CI: 3.99-5.20), teenager pregnancy (RR: 8.82, 95%CI: 7.80-9.97). Overall, the relative risk of adverse reproductive events indicated a 3.53-fold (95% CI: 3.63-3.43) increase in risk. Based on the results of the regression analysis, abortion risk in adults (b= 1.75; 95% CI: 0.49; 3.02) and adolescents (b= 9.57; 95% CI: 1.92; 17.21) was positively related to the employment observed in settlements. The share of Roma living in settlements showed a negative relationship with adults (b = -0.07; 95% CI: -0.11; -0.03) and teenage abortion (b = -0.26; 95% CI: -0.49; -0.02) risks.

Conclusions: Our results demonstrated that the impact of the marginalization on the reproductive health is huge in Hungary. According to our results, the segregated colonies' excess risks do depend on the ethnic composition, and socio-economic status of the settlement.

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Keywords: reproductive health, segregated settlements, Hungarian, Roma ethnic

Primary medication adherence among Hungarian living in segregated colonies in 2019

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Introduction: Those people who live in segregated colonies belong to the most critical social stratum. The Roma are overrepresented among them. To support the intervention targeted on them, the segregated colonies have been defined by a government decree. It provides opportunity for monitoring, thereby planning and evaluating of interventions.

Aim: The aim of our study was to investigate the primary medication adherence (PMA, dispensed ratio of the prescribed drugs) of people living in segregated in order to determine whether poor PMA contributes to the poor health of people living in segregated areas.

Methods: In our study, we analysed the settlement-level data and selected those settlements (N = 955) to which a segregated area belongs. Drug consumption data were provided by National Health Insurance Found for the year 2019. We calculated standardized dispensed ratio (standardized for age, sex, and eligibility for exemption certificate) for the segregated colonies and for the complementary areas (part of a settlement having at least one segregated colony, which part does not belong to the segregated colony). The ratio of these measures from the same settlements (relative redemption ratio) was used to indicate the PMA in the segregated colonies. The association between proportion of Roma living in a settlement and settlement level relative redemption ratio were evaluated by multivariable linear regression models controlled for settlement level socio-economic factors (level of education, employment rate, proportion of married, housing density, net income per capita, location by county, urbanization). Data for confounding factors came from the census for the year 2011.

Results: We observed difference between the segregated and complementary area. The national aggregated standardized dispensed ratio was 9% higher in the segregated area than the complementary area. The proportion of Roma in a settlement influences the drug dispensing significantly ($b = 0.021$, $p<0.001$).

Conclusions: The dispense of drugs does not contribute the poor health status of people living in a segregated area. From this perspective, primary health care reduces health inequalities.

Acknowledgements: This investigation has been supported by the 'Routine health monitoring of Roma adults living in segregated colonies' project (BM/16145-3/2019, FEIF/1616/2019-ITM_SZERZ).

Keywords: Roma ethnicity, primary medication adherence, segregated area

Access to health care in Hungary from the perspective of migration and asylum

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Introduction: The health care systems of the world are often show significant differences, pertaining - among other things - to access to the health care system, which is perhaps the most crucial issue from the point of view of the individual. This is not only relevant for citizens, but for third country nationals as well, thus it needs to be examined what possibilities such persons have to gain access to national health care [1]. Such analysis is necessitated *inter alia* by the increased migration pressure perceivable in current times, as well as the Covid-19 pandemic. The dual layer regulation (i. e. by European and member state law) of these issues further adds to the complexity of the situation, as do the different statuses of third country nationals [2].

Aim: The aim is to map out the health care-related rights of third country nationals in different statuses (migrant, asylum seeker, refugee) in Hungary, in order to be able to formulate recommendations which comply with the requirements of migration control, fundamental rights and the maintenance of public health at the same time. [3]

Methods: Utilizing the historical, analytical and comparative methods, the study analyses the relevant Hungarian and EU laws. It also provides a literature review.

Results and conclusions: This study highlights the discrepancies between access to health care vis-à-vis the different legal categories of third country nationals in Hungary. It provides insight into the correlation of EU and Hungarian laws and regulations in this field and introduces a comprehensive review of the pieces of legislation underlines the most notable gaps in the legal framework. It also makes some policy recommendations based on the findings of the study.

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Keywords: access to health care, migration, asylum, European Union, Hungary

Analysis of the return-to-work program's framework for workers with disabilities due to occupational injury in Indonesia

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Qualitative research investigated the extent of Return to Work (RTW) program in Indonesia organized by Indonesia National Agency of Social Security on Employment (BPJS Ketenagakerjaan). The RTW program purposes to assist disabled workers could regain their dignity because of the occupational accident or occupational disease to be able to return to work safely with their former employers or become an entrepreneur. The RTW program also insure the workers do not be neglected their source of income due to their disability. In addition, this research primarily used secondary data and reached the primary data obtained from an in-depth interview with case managers engaged in the RTW program. The most from this analysis that though the RTW program of BPJS Ketenagakerjaan have already implemented the basic recommendation of ILO, however, there were many factors that could be improved by BPJS Ketenagakerjaan which could potentially help the participants in the future. In particular, an additional benefit for companies and the implementation of a career development service or a partnership with Nongovernmental organizations to guarantee that disabled employees who are unable to return to work with their former employers are still on the global economy.

Keywords: Return to Work Program, occupational accidents benefits, BPJS Ketenagakerjaan

Biomedical Sciences

Cellular internalization of Thymosin beta-4

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Introduction: Hypoxic heart disease is a predominant cause of disability and death worldwide. While restoration of the functional loss is crucial, adult mammals are incapable of efficient repair. Beside stem cell therapy, reprogramming of regenerative regulatory pathways via utilizing secreted small molecules may serve as an alternative. Earlier we discovered Thymosin β4 (TB4), a 43 amino-acid G-actin sequestering peptide promotes myocardial cell survival and angiogenesis following cardiac infarction in adult mammals [1].

Aim: The precise cellular and molecular alterations initiated by TB4 are not fully understood. Reviewing the key signalling pathways and investigation of the internalization process of the molecule is essential and subject of our present investigations.

Methods: In our experiments TB4 was chemically labelled by a bright, photostable dye, ATTO488, and the location of the fluorescent labelling tag was analyzed by Western blot. Earlier data claimed a significance for intact C-terminus, thus it was a requirement for TB4 to become labelled at the proximity of the N-terminal end [2]. We also hypothesized that TB4 enters cells via receptor-mediated endocytosis, therefore ATTO-TB4 was investigated by time-lapse cytochemistry in C2C12 cells. Alternatively, cardiac cells were equally studied to observe the internalization of TB4 expressing T7 phages in vitro.

Results: Western blot analyses demonstrated that the centrally located amino groups of TB4 are prone to conjugation chemistry and suggested the cellular uptake of the peptide most likely occurs via receptor-mediated endocytosis.

Conclusions: In summary, our research revealed key instances in TB4's interactome to gain consequential intelligence regarding the internalization processes of the molecule.

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Keywords: thymosin beta-4, western blot, endocytosis, fluorescent microscopy, receptor

Examination of transport processes via membrane nanotubes with superresolution microscopy techniques

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Introduction: Membrane nanotubes (NT) are long, actin based, membrane covered communication channels, which connect cells even over long distances. These structures are extremely diverse based on their morphology, composition and biological functions. NT-s have crucial role in intensive material transport processes (e.g. mitochondrial transport), in the progression of tumour cells, and in the intercellular spreading of pathogens, but they are also involved in the deterioration of some neurological disorders e.g.: Alzheimer's and Parkinson's diseases.

Aim: Our aim was to examine the possible role of the main cytoskeletal components and their motorproteins in the transport processes mediated by NTs of B-limphocytes[1].

Methods: B-limphocytes of murine origin (A20) were fluorescently labelled to visualize vesicular and mitochondrial transport processes within their NTs. Specific inhibitors were used to block the activity of actin and microtubule associated motorproteins. Superresolution SR-SIM and laser scanning confocal microscopes were used for visualization.

Results: Intensive micro/macrovesicular and mitochondrial transport processes were observed within the examined NT-s. It was shown that an actin-based motorprotein, the myosin-II is responsible for the movement of vesicles within the NT-s, while the delivery of mitochondria was proved to be actin independent.

Conclusions: As NT-s are considered to be potential therapeutic targets our findings contribute to the growing knowledge about these membrane projections, and help to clarify the role of NT-s in the immune response.

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Keywords: intercellular communication, nanotube, vesicle, mitochondria, motorprotein

Heme-mediated activation of the Nrf2/HO-1 axis attenuates calcification of valve interstitial cells

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Introduction: Calcific aortic valve stenosis (CAVS) is a heart disease characterized by a progressive fibro-calcific remodeling of the aortic valves, an actively regulated process with the involvement of reactive oxygen species-mediated differentiation of valvular interstitial cells (VICs) into osteoblast-like cells[1]. Nuclear factor erythroid 2-related factor 2 (Nrf2) regulates the expression of a variety of antioxidant genes, and plays a protective role in valve calcification[2]. Heme oxygenase-1 (HO-1), an Nrf2-target gene, is upregulated in human calcified aortic valves[3].

Aim: We investigated the effect of Nrf2/HO-1 axis in VICs calcification in the presence of heme.

Methods: HuVICs culture, Alizarin red staining, Ca assay, Real-time PCR, Osteocalcin ELISA and western blots are major techniques used in this finding.

Results: Heme inhibited Ca deposition, and OM-induced increase in alkaline phosphatase and osteocalcin (OCN) expression. Heme induced Nrf2 and HO-1 expression in VICs. Heme lost its anti-calcification potential when we blocked the transcriptional activity Nrf2 or the enzyme activity of HO-1. Bilirubin, CO and iron, the products of heme catabolism, as well as ferritin inhibited OM-induced Ca deposition and OCN expression in VICs.

Conclusions: This study suggests that heme-mediated activation of the Nrf2/HO-1 pathway inhibits calcification of VICs. The anti-calcification effect of heme is attributed to the end-products of HO-1-catalyzed heme degradation, and ferritin.

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Keywords: Valve calcification, Valve Interstitial Cell (VIC), Osteogenic Differentiation, Heme, Nrf2-HO1

Membrane nanotubes in zebrafish embryos

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Introduction: Membrane nanotubes (NT) are transient long-distance connections between cells and can facilitate intercellular communications [1]. NTs are actin-based cell protrusions which were first reported in 2004 between rat pheochromocytoma (PC12) cells [2]. Membrane nanotubes were described both *in vitro* (in cell cultures) and *in vivo* (eg. between dendritic cells in mouse cornea [1] or within zebrafish embryos [3]). The mechanism of NT formation is not completely understood yet, nevertheless based on *in vitro* studies conducted on cell cultures, these structures can be developed as actin-driven membrane protrusions from directed, filopodium-like structures or they can be formed when migratory cells separate after close contact. Although convincing results are available about the presence of NTs *in vivo*, the important aspects of their growth and function need to be elucidated.

Aim: In our study we want to visualize and characterize membrane NTs between the epiblast cells of zebrafish embryos.

Methods: For visualization unstained and DiI labelled pre-gastrulation phase embryos were used. Laser-scanning confocal microscope and transmission electron microscope (TEM) were applied to examine the NTs between the epiblast cells of $4-8$ hours-old embryos.

Results: The characterization of membrane nanotubes shows that their length is approximately identical with the individual cell diameters, and their occurrence is pronounced in the animal pole of the embryo.

Conclusions: Our electronmicroscopic experiments confirmed the *in vivo* existence of NTs, but further experiments are needed to reveal their possible function in zebrafish embryo.

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Acknowledgements: University of Pécs, Medical School, Department of Biophysics

Keywords: membrane nanotubes, actin, zebrafish, embryo, intercellular

Internalization of transferrin complexes into HeLa cells

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Introduction: Tumour cells have an elevated iron requirement because iron is essential for the cell's extensive divisions[1]. Based on this various transferrin complexes have been prepared and used promisingly in cancer therapy[1]. Transferrin requires synergistic anion binding for the stable binding of ferric ions[2]. The carbonate ion which binds in vivo to transferrin can be substituted by small anionic molecules which have a carbonate like moiety[2]. Internalization of these complexes by tumour cells can lead to significant physiological effects in the cells[2]. HeLa cells can be used for this approach because it has elevated number of transferrin receptors on the cell's surface[1].

Aim: The present study aimed at describing the preparation of transferrin-anion complexes and developing a method, which is suitable for the visualization of the intracellular location of the transferrin complexes

Methods: The preparation of the transferrin oxalate complex was accomplished by using Schlenk system. Transferrin was labelled with fluorescein isothiocyanate (FITC) and localization of the complexes was visualized by confocal fluorescent microscope. HeLa cells were treated with FITC labelled diferric-transferrin-carbonate complex or diferric-transferrinoxalate complex for 10 minutes or for 1 hour.

Results: The transferrin complexes have been prepared successfully and their iron and transferrin content has been verified. Both complexes the diferric-transferrin-carbonate complex and the diferric-transferrin-oxalate complex were endocytosed by the HeLa cells. After 10 minutes the complexes were diffused in the cytosol and after 1 hour the complexes were located next to the cell nucleus.

Conclusions: The findings implicate the successful internalization of the transferrin-anion complex into HeLa cells.

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Keywords: transferrin, oxalate, FITC, HeLa cells

The effect of interfacial water on protein-small molecule docking

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Introduction: The water molecules at binding interface play an important role in the ligand binding process. Interfacial water (IF) molecules can affect stability and specificity of ligand-protein complexes by either bridging interaction between solute and solvent or by replacements during ligand binding. Therefore, mimicking or replacing bound water molecules by a chemical group on a ligand have become widespread strategies in drug design to improve the ligand binding affinity and its specificity. However, the effective incorporation of crystal waters during the molecular docking simulation has shown to be challenging.

Aim: The goal of this study was to compare the impact of IF water molecules in the first hydration shells or conserved waters on docking results in terms of docking and ranking accuracy.

Methods: In this study, a focused docking experiment on seventeen high resolution structures of protein-small molecule complexes was performed with the AutoDock4 program package. The ligand and the target input structures were prepared in a universal manner and the crystal water molecules were considered as a part of the target. In the docking experiment, each ligand was docked to the target structure without and with the hydration shells or the conserved water molecules. Each docking was repeated with apo and holo target structures.

Results: Based on the average RMSD values of best docked poses, dry docking performed the best and followed by the closest shell and conserved waters, whereas using extended hydration shell the performance was notably lower. In terms of ranking accuracy, docking with shell and conserved waters showed relatively similar performance while dry docking had the least success rate.

Conclusions: For docking with IF waters, ranking accuracy was improved compared to dry docking, however, in terms of docking accuracy, inclusion of interfacial waters had an overall negative effect on docking results indicating that the effective inclusion of IF waters for the simulation is still challenging and need further investigation.

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Keywords: interfactial water molecules, molecular docking, protein-small molecule complexes

Neurosciences

Social role of the GABAergic neurons in the median raphe region

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Introduction: Median raphe region (MRR), mostly due to its serotonin content, is well known for its role in social behaviour. However, vast majority of the MRR neurons are GABAergic, characterized by vesicular GABA transporter (VGAT).

Aim: We aimed to characterized the role of GABAergic MRR neurones in social behaviour.

Methods: Pharmacogenetic technology was used in VGAT-Cre mice allowing specific modulation of these cells. With the help of an adenoassociated virus vector, artificial receptors (DREADD, stimulatory, inhibitory as well as control mCherry) were injected into the MRR. Few weeks later they were stimulated by the artificial ligand (clozapine-N-oxide, 1mg/10ml/kg) and given 30 min before the experiments. c-Fos immunohistochemistry was used to confirm that this technique, as well as selected social behavior is able to stimulate the GABAergic cells in the MRR. Different aspects of social behavior were studied such as sociability; social interaction and resident-intruder tests. Locomotion (open field/OF), anxiety (elevated plus maze/EPM) and short-term memory (y-maze) alterations might also influence the outcome of the social tests, we investigated these behaviours as well.

Results: GABAergic MRR cells were activated by artificial ligand and sociability (increased c-Fos immunopositivity of GABAergic cells in VGAT-Cre x zsGreen crossbread animals) but not during the resident-intruder test. Social stimulus activated the VGAT positive cells. The increase was significantly pronounced after the Sociability test. Accordingly, sstimulation of these cells increased social interested in both sociability and social interaction test without affecting the behaviour during the resident-intruder test. Moreover, there was no effect on locomotion and memory parameters as well. However, during EPM test, inhibitory group displayed higher latency when entering the open arm, suggesting an anxiolytic-like tendency.

Conclusions: All in all, our experiments confirm the role of MRR GABAergic cells in promoting social interest. We can assume that these cells are not homogenous and different subpopulations (e.g. long vs short projecting, neuropeptide containing) might have different role in the observed behaviours, which may remain hidden in our experiments. Further studies with more specific subgroups are required in this field.

Keywords: median raphe region, social behaviour, GABA, DREADD

Fractalkine receptor on microglial cells mediates chronic stress-induced pain behaviors in mice

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Introduction: Neuroinflammation mediated by microglia activation plays a role in the development and progression of chronic pain. The G-protein-coupled fractalkine receptor (CX3CR1) on the microglia surface is known to be involved in mood disorders, stress and inflammatory pain. However, there are no data about its role in stress-induced pain conditions. Therefore, we studied the involvement of the CX3CR1 receptor in a mouse model of chronic restraint stress-induced pain.

Methods: Male fractalkine receptor-deficient (KO) and C57Bl/6J wildtype (WT) mice were restrained in a plastic tube for 6 hours daily for two weeks. The mechanonociceptive thresholds of the paw were determined weekly by dynamic plantar esthesiometry, cold tolerance by withdrawal latency from icy water. Thymus and adrenal-gland weights were measured at the end of the experiments. IBA1 immunohistochemistry was performed to visualize the numerical and morphological changes of the microglial cells in stress- and pain-related brain regions.

Results: Restraint stress induced significant, approximately 15-20% mechanonociceptive threshold decrease (hyperalgesia) after 2 weeks in WT, but not in fractalkine receptor deficient mice. Cold tolerance decreased by 60-70% from the end of the first week in the stressed WT group, but significantly less in the KO group. Chronic stress induced similarly decreased thymus and increased adrenal gland weights in both groups by the end of the experiment. Significantly increased number of Iba1-positive microglial cells was detected in the central amygdala in stressed WT, but not in KO mice. Stress-induced microgliosis was shown in the CA3 hippocampal area in both groups. Additionally, stress significantly increased activated microglia density in the CA3 and the somatosensory cortex in WT, but not in KO mice.

Conclusions: We provide evidence that microglia activation by the CX3CR1 receptor and consequent neuroinflammation mediate chronic stress-induced pain. These results suggest analgesic potentials of fractalkine receptor blocking drugs in these conditions.

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Keywords: fractalkine receptor, stress-induced pain, restraining stress, CX3CR1

Can locomotor impairments and anxiety-like behaviour alter the measurable memory-decline in the triple transgenic mouse model of Alzheimer's disease

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Introduction: Preclinical studies with animal models play crucial role in revealing the pathomechanism and identifying new treatment options for Alzheimer's disease (AD). We used the triple transgenic mouse model of AD (3xTg-AD). During our previous observations decreased locomotor activity had been discovered, which might influence the outcome of other behavioural tests.

Aim: In the attempt to better understand the 3xTg-AD mouse model different aspects of its motor skills and its anxiety-like behaviour was tested.

Methods: Several behavioural tests were performed to measure the locomotor activity (open field (OF) test, rotarod test, grip test) and anxiety (fox odor (FO) test, elevated plus maze (EPM) test). We also performed cognitive tests that are strongly based on motivation (social discrimination (SD), active avoidance, Morris Water Maze (MWM) test). The experiments were carried out on six-month-old male 3xTg-AD animals in comparison with C57Bl/6 controls.

Results: In the OF test 3xTg-AD proved to move significantly less, while during the rotarod test, there was no difference between the genotypes, with worse 3xTg-AD mice performance in the grip test. The 3xTg-AD animals spent more time in immobile, 'freezing', posture during FO. In the EPM, the transgenic mice stepped fewer times into the closed arm, without any genotype difference in the locomotion-independent anxiety measures. During SD and MWM the memory decline of the 3xTg-AD mice was confirmed. In contrast, during the active avoidance the strong stimulus of the electric foot-shock forced even the 3xTg-AD mice to learn the task as fast as their controls.

Conclusions: 3xTg-AD mice show decreased locomotor activity, decreased strength, and enhanced anxiety (see FO) which might contribute to the differences observable during cognitive tests. In tests based on strong motivation, the locomotor difference may disappear, having less influence on the results of memory tests or even motivating the 3xTg-AD mice to learn quickly. Thus, it is also important to take into account different motivational factors.

Keywords: Alzheimer's Disease, 3xTg-AD, locomotion, anxiety, motivation

Metabolic differences might influence the outcome of food-motivated behavioral tests in the 3xTg-AD mice model of Alzheimer's disorder

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Introduction: Alzheimer's disease (AD) is an age-related neurodegenerative disease with progressive memory decline, which places a heavy burden on society. Its transgenic mice models are promising tools in understanding the underlying mechanisms. We used the tripple transgenic 3xTg-AD model and found increased food intake in them.

Aim: To confirm that the memory decline is still visible in food-driven learning paradigms with comparison of 3xTg-AD mice and their age-matched controls. As a possible underlying mechanism, metabolic changes were also investigated.

Methods: Food-motivation-based operant conditioning and pellet retrieval tests were conducted. The body composition was investigated by magnetic resonance imaging, while food and water consumption, physical activity and respiratory parameters (VO_2, VCO_2, RER - respiratory exchange ratio) were recorded in metabolic cages for 24 hours.

Results: There were no differences in the fat content and physical activity, but 3xTg-AD mice consumed more food and water and showed higher RER levels than controls suggesting faster metabolism. Paradoxically, in learning tests 3xTg-AD mice performed better possibly due to a stronger motivational driving force.

Conclusions: The results of food-driven learning tests may be influenced by alterations in the metabolism of the test animals. The 3xTg-AD mice may have higher driving force for food intake, which may explain their better performance during food-driven learning. Further studies are needed to confirm faster metabolism of 3xTg-AD mice.

Keywords: Alzheimer's disease, 3xTg-AD mice, metabolic differents, motivation, learning tests

Associations between Internet use disorder, social cognition and social anxiety: an fMRI study

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Introduction: Recent evidences suggest negative effects of Internet use disorder (IUD) and social anxiety (SA) on social cognitive functions [1], [2]. Growing literature indicates that Internet-related addictions are also associated with breakdown of functional brain networks [3], but the effect of IUD, SA and the interaction of these on social cognitive brain functions is not well understood.

Aim: Our study aims to investigate social cognition-related functional connectivity (FC) alterations induced by SA & IUD, using whole brain psychophysiological interaction (PPI) and region of interests (ROI) analysis with amygdala seeds.

Methods: To observe functional connectivities, BOLD responses during emotion recognition task (e.g. happiness, angry, etc.) were measured in 69 healthy university students (36 females, mean age= 22.4, SD= 2.68). Self-reported questionnaires were used to assess IUD and SA.

Results: Positive correlations between IUD and the FCs between amygdala seeds and brain regions related to social cognition (bilateral anterior and posterior cingulate gyrus, bilateral anterior and posterior middle temporal gyrus, bilateral supramarginal gyrus) were found. SA scores correlated positively with the FCs between amygdala seeds and social cognition-related brain areas (right posterior cingulate gyrus, bilateral supramarginal gyrus). Positive associations were found between IUD/ SA scores and the FCs between amygdala seeds and brain regions (bilateral precuneus, frontal pole and superior frontal gyrus) connected to executive and attentional functions. Triple interactions were found between IUD, SA and social cognition-related FCs.

Conclusions: The triple interactions between IUD, SA and social cognition-related FCs might be suggesting that SA plays a mediating role in the association between IUD and the FCs behind social cognitive functions. IUD in association with SA alters FCs with areas related to social cognition, while the altered FCs with executive and attentional brain regions may be the reason for having difficulties in controlling the overuse. Taken together, these findings suggest that IUD and SA together might have a negative effect on social cognition.

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Keywords: Internet use disorder, social cognition, social anxiety, functional brain networks

Clinical Sciences

Clinical use of cannabinoids in adult Inflammatory Bowel Disease A systematic review and meta-analysis

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Introduction: Pain perception in Inflammatory Bowel Disease (IBD) is a complex somatic and psychological phenomenon. Driven by trial-and-error use and promising experimental research, the (medical) use of cannabis in IBD have recently gained increasing interest both in the medical community and the lay public. Presently the supportive evidence is inconclusive at best, therefore, it is imperative to better understand the prevalence, user patterns and/or the potential clinical benefits/harms to safely consult/educate patients in regards to the safe use of cannabinoids in IBD.

Aim: A systematic review was constructed and registered at PROSPERO to review the contemporaneous literature and to assess evidence proving/disproving the clinical use of cannabinoids in adult IBD.

Methods:Five primary and numerous secondary databases were researched for full text clinical/epidemiological articles published in English language between 2013 and 2020.

Results: Our review failed to identify compelling evidence that cannabis use may positively alter disease course/prognosis in IBD; however, quality of life might be improved (very weak evidence).

Conclusions: Epidemiological studies reported increased prevalence with wide variance suggesting a need for more detailed/stratified adjustment of results to inform clinical practice. Despite significant heterogeneity, numerous psychological factors like anxiety mood disorders together with an array of maladaptive coping strategies, and age/gender proved to be independent predictors of cannabis use in IBD.

The assessed literature was low-level with methodological flaws. More precisely designed, focused research is needed to determine the subgroup(s) of adult IBD patients, which would benefit from cannabis use either clinically and/or in terms of their mental health.

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Keywords: cannabinoids, medical marijuana, cannabis, inflammatory bowel disease, IBD

Meta-analysis: Prognostic role of cell-free DNA in pancreatic adenocarcinoma

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Introduction: Only 20% of pancreatic ductal adenocarcinoma (PDAC) cases are detected in a resectable stage and up to 80% of these recur after radical surgery [1,2]. Better biomarkers are needed to guide the management of this highly lethal disease.

Aim: The aim of our research was to assess the role of cell-free DNA (cfDNA) in evaluating the prognosis of PDAC.

Methods: A systematic literature search was performed in 5 databases based on the PRISMA guideline. The random effect model with the pooled hazard ratios (HRs) and 95% confidence intervals (95%CI) were used for statistical analysis.

Results: The meta-analysis included 43 studies, summarizing data of 3377 patients. Both the appearance of cfDNA (HR=2.17;95%CI:1.63-2.9;I^2=63.4%,p=0.000; HR=2.16;95%CI:1.57-2.97;I^2=62.9%,p=0.004) and the presence of KRAS mutations in it (HR=1.49;95%CI:1.17-1.89;I^2=86%,p=0.000; HR=1.88;95%CI:1.22-2.92;I^2=83.5%,p=0.000) were associated with decreased overall survival (OS) and progression-free survival (PFS) respectively in all stages of PDAC. In unresectable cases only cfDNA detection corresponded to decreased PFS (HR=2.46, 95%CI=1.98-3.07,I^2=0%,p=0.518) and OS (HR=2.42,95%CI=1.98-2.95,I^2=0%, p=0,531), while KRAS mutation in cfDNA had no significant impact. We analyzed the biomarkers together in resectable cases whereas positivity indicated accelerated progression and shortened survival (PFS: HR=3.572;95%CI:2.42-5.28;I^2=0.0%,p=0.380).

Conclusions: The cfDNA is reliable for predicting progression and survival in all stages of PDAC, regardless of resectability, whereas a cut-off value for KRAS mutations in cfDNA seems more appropriate in resectable cases.

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Keywords: pancreatic adenocarcinoma, cell-free DNA, prognosis

GOULASH-PLUS study in the early phase of chronic pancreatitis - results of a 2-year follow-up of the first 133 patients

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Introduction: Acute pancreatitis (AP) can lead to late complications, such as recurrent acute pancreatitis (RAP) and chronic pancreatitis (CP). CP is often recognized in incurable stage, however, parameters that indicate reversible, early-stage CP are still unknown [1].

Aim: Our aim is to find measurable biomarkers and clinical signs of this early phase of CP.

Methods: GOULASH-PLUS is a 6-year observational study of AP, of which data of 133 patients from a 2-year follow-up were analyzed. Abdominal ultrasound (US) was performed in the first year, while endoscopic ultrasonography (EUS) or magnetic resonance cholangio pancreaticography (MRCP) was performed in the second year. Oral glucose tolerance test (OGTT) was performed to detect carbohydrate metabolism abnormality (CMA) and a stool elastase test to measure exocrine insufficiency (PEI). Chi-square and Fisher-exact test were used for statistical analysis.

Results: Exocrine insufficiency was seen in 21% of patients in the first year and in 12% in the second year. CMA was found 33% of patients in the first year and in 28% in the second year. During US, pancreas inhomogeneity or calcification was detected in 20% of non-CP patients. Early CP signs were seen in 26% during EUS or MRCP, 66% of patients in this group had CMA and 17% had PEI. CMA occurred in 74% of patients with moderate to severe AP. RAP occurred in 19.5% of patients over 2 years, with CMA in 30% and PEI in 50%.

Conclusions: In patients with moderate to severe AP or with abnormalities on EUS or MRCP, CMA was detected more frequently.

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Keywords: pancreatitis, observational study, insufficiency

Oral anticoagulation in patients with acute myocardial infarction - Insights from the Hungarian Myocardial Infarction Registry

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Introduction: Anticoagulation reduces the risk of stroke and embolization and is recommended in most patients with atrial fibrillation. Patients after coronary intervention and acute coronary syndromes require antiplatelet treatment. Although oral anticoagulation (OAC) therapy may interfere with the outcome of patients after coronary intervention, its exact impact remains unclear. Importantly, risk-benefit relations may be considerably different after myocardial infarction.

Aim: This study aimed to compare the outcomes of patients who underwent coronary intervention and were treated with/without OAC in a large unrestricted AMI registry.

Methods: Data of patients registered from the Hungarian Myocardial Infarction Registry, a mandatory nationwide program for hospitals treating patients with myocardial infarction were processed. Patients registered between 01.2014. and 12.2017 were included. All-cause mortality, the composite of cardiac events (MACE), and transfusion were compared between patients receiving OAC treatment and a propensity score (PS) matched control group. Subgroup analyses of different anticoagulation and antiplatelet strategies were performed with propensity weighted Cox proportional hazards' models to estimate risk during the first year after the index event.

Results: From 30 681 patients 1 875 cases received OAC treatment and had apparently worse prognosis. After PS-matching, however, we found no difference regarding mortality (hazard ratio [HR]: 0.91 95% CI 0.77-1.09, p=0.303), MACE (HR: 0.92 95% CI 0.78-1.09, p=0.335) or transfusion (HR: 1.21, 95% CI 0.97-1.49, p=0.086). In the PS-adjusted analyses of the OAC group lower mortality (HR: 0.77, 95% CI: 0.60-0.997, p=0.048) and MACE risk (HR:0.73, 95% CI 0.58-0.92, p=0.008) was associated with aspirin treatment.

Conclusions: In patients with acute myocardial infarction, the prognosis of OAC-treated patients was comparable to the PS matched control, however, the omission of aspirin therapy was associated with unfavorable outcomes.

Acknowledgements: This work was supported by the GINOP-2.3.3-15-2016-00031 grant of the Hungarian Government and the Cooperative Doctoral Program Doctoral Student Scholarships, Ministry for Innovation and Technology (ITM), and National Research, Development and Innovation (NRDI): KDP-13-1/PALY-2021

Keywords: acute myocardial infarction, registry, antiplatelet therapy, oral anticoagulation, propensity score matching

General anesthesia related drop of diastolic blood pressure may impact the long-term outcome in stroke patients undergoing thrombectomy – a retrospective single-center analysis

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Introduction: Several factors affect the efficacy of endovascular thrombectomy (EVT) including age, stroke severity (NIHSS), preinterventional ASPECT score and localisation of large vessel occlusion. However, the impact of type of anesthesia and related factors have not been fully explored.

Aim: The purpose of this study was to identify independent predictors of outcome by analyzing procedural factors based on a multicentric stroke registry.

Methods: Data of consecutive patients with acute ischemic stroke (AIS) was extracted from the prospective STAY ALIVE stroke registry. Demographic, clinical, and periprocedural factors including hemodynamic values were analyzed in patients undergoing thrombectomy in either general anesthesia (GA) or conscious sedation (CS). Independent predictors of outcome both at 30 and 90 days based on modified Rankin Scale (mRS:0-2 as favourable outcome) were also explored.

Results: A total of 199 patients (GA: n=76 (38%), male: 34 (45%) vs CS: 117 (59%), male: 56 (48%); while 6 patients were converted from CS to GA) were included in the analysis. The minimum value of systolic, diastolic and mean arterial pressure was significantly lower in GA compared to CS group and GA was associated with longer onset to EVT time and higher drop in all hemodynamic variables (all, $p<0.001$). Importantly, higher drop in diastolic blood pressure (DBP) was independently associated with a poor 90-day outcome ($p=0.024$).

Conclusions: Based on this prospective registry data, GA related drop of DBP independently predicted a poor long-term outcome in patients undergoing thrombectomy. This suggests the necessity of a careful anesthesia protocol in those patients who require GA during EVT.

Acknowledgements: The study was supported by EFOP-3.6.3-VEKOP-16-2017-00009 at the University of Pécs.

Keywords: ischemic stroke, endovascular treatment, anesthesia, blood pressure, outcome

The role of intravenous thrombolysis before mechanical thrombectomy in the treatment of large vessel occlusion strokes

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Introduction: The efficacy of intravenous thrombolysis (IVT) is moderate in the proximal vascular segments of intracranial arteries, as opposed to mechanical thrombectomy (MT). In the management of acute ischemic stroke (AIS) caused by large vessel occlusions (LVO), IVT prior to MT is highly recommended based on the latest guidelines, but the necessity of IVT has been questioned by the latest studies of the past years.

Aim: The aim of our study was to investigate and compare the efficacy and safety of direct mechanical thrombectomy (dMT) and combined therapy (CT) for patients who suffered an AIS with LVO and treated in our department.

Methods: We investigated patients with AIS caused by LVO who were admitted up to 4.5 hours after symptom onset and underwent MT in our department between November 2017 and August 2019. Patients' data were collected in our stroke register. Patients enrolled in our study were divided into two groups depending on whether dMT or CT was used. Our primary outcome was the 30- and 90- day functional outcome measured by modified Rankin Scale (mRS). Mortality at 30- and 90- day, successful recanalization rates, and symptomatic intracranial hemorrhage were considered as secondary outcomes.

Results: A total of 142 patients (age: 68.3 $\pm$ 12.6 years, 53.5% female) were enrolled in our study, including 81 (57.0%) dMT cases, and 61 (43.0%) patients who received CT. The vascular risk factors and comorbidities were significantly higher in the dMT-treated group. At day 30, the rate of favorable functional outcomes was 34.7% in dMT- vs. 43.6% among those who received CT (p = 0.307), by day 90 this ratio changed to 40.8% vs. 46.3% (p = 0.542). Mortality rates at day 30 were 22.2% and 23.6% (p = 0.851), and at day 90 33.8% and 25.9% (p = 0.343). The rate of effective recanalization was 94.2% for dMT-treated patients and 98.0% for CT-treated patients (p = 0.318). Symptomatic intracranial hemorrhage was detected in 2.5% of dMT-treated patients and 3.4% of CT-treated group (p=0.757).

Conclusions: Our results suggest the CT is associated with a moderately better outcome compared to dMT. IVT prior to MT did not increase the risk of symptomatic intracranial hemorrhages.

Special Session: Social and psychological impact of COVID-19 pandemic

Occupational stress and COVID-19 by perspective of radiographers working at emergency departments

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Introduction: Over emergency patient care's usual pressure, current pandemic situation may effect on professionals stress level.

Aim: At our research we would like to present radiographers's occupational stress level working at the emergency patient care units in Hungary.

Methods: From January to March 2021 cross-sectional, descriptive study was carried out by purposeful, non-random sampling. We used the e-mail addresses of nearly 3500 radiology department workers registered in the Society of Hungarian Radiographers' system to send self made and validated Effort-Reward Imbalance (ERI) online questionnaires. Data processing was performed using SPSS version 24.0 statistical software. Descriptive statistics, one-sample t-test, ANOVA, Mann–Whitney and Kruskal–Wallis test with 95% probability were used for statistical items (p=0.05).

Results: We examined 260 radiographers responses. Respondents working at university hospitals had significantly higher stress values (p=0.05). Radiographers who were over 50 years old considered to be the most at risk regarding stress. Working as a CT/MRI operator and confirmed COVID-19 disease among close family resulted higher stress values as well (p=0.05).

Conclusions: This is the first study of radiographers working at the emergency patient care in Hungary measuring the COVID-19 pandemic effects on their occupational stress level. Workplace, age and modalities played significant role regarding occupational stress level among radiographers.

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Acknowledgements: The authors declare no conflict of interest

Keywords: COVID-19, stress, radiographer, emergency, Effort-Reward Imbalance, ERI

Radiographers working at emergency department are frontliners too: The COVID-19 pandemic effect on professionals burnout level

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Introduction: While acquiring medical images (X-ray, CT respectively) radiographers get to close contact with patients therefore they are exposed to possible infection by COVID-19 as well which may have significant impact on their burnout level.

Aim: The aim of our research was to assess the burnout rate of above mentioned group of professionals to analyze the level of burnout related to COVID-19 infection.

Methods: Cross-sectional, descriptive study was carried out by purposeful, non-random sampling. We used the email addresses of nearly 3,500 radiographers registered at the Society of Hungarian Radiographers (MRAE). Our questionnaire was available from January 2021 to March 2021. Descriptive statistics, two-sample t-test, ANOVA test, Mann-Whitney and Kruskal-Wallis test was performed at 95% probability level.

Results: After data cleaning, total of 260 responses were included in the statistical analysis with the mean age of 40,2 (SD=10,51). The respondents has been working in the health care system for an average of 17,72 (SD=11,95) years. Male respondents tend to be more attached by depersonalization and emotional exhaustion (p=0,05, p=0,05,) Respondents between 26-35 years had significantly higher emotional exhaustion values (p=0,05). Being relocated within workplace and confirmed COVID-19 case in close friends of the respondents resulted high depersonalization values (p=0,05, p=0,05).

Conclusions: Regarding our 2018 survey radiographers working had higher depersonalization and emotional exhaustion values, which are partially correlated with years spent in health care system. Regarding current pandemic depersonalization and emotional exhaustion values are slightly higher than at our previous study.

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Acknowledgements: The authors declare no conflict of interest.

Keywords: COVID-19, burnout, radiographer, emergency, MBI

Physical activity and feeling of well-being among Hungarian high school students during the distance education period due to Covid-19 pandemic.

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Introduction: During the second wave of the SARS-CoV-2 pandemic, high school physical education took place in the form of distance learning in Hungary. Decreased physical activity has a negative effect on people's health; its beneficial effect is remarkable not only in people with chronic illness but also in healthy young and adult individuals. [1] Physical activity and short-term changes in inactive behaviours may be permanently amplified during COVID-19 restrictions which may lead to an increased risk of obesity, diabetes, and cardiovascular disease in children. [2]

Aim: The present research aimed to discover changes in adolescents (15–19 years of age) related to physical exercise and healthy well-being before and during distance education.

Methods: We examined high school students in 70 public education institutions in 37 Hungarian cities (N = 2513; 57% girls). Their mean age was (17.27 ± 1.3) years. Physical activity was performed using a self-report questionnaire based on the "Health Behavior of School-aged Children (HBSC) and the Centers for Disease Control Youth Risk Behavior Survey". The data are described in Statistics 13.2. analyzed with a software package. The frequency of physical activity individually and in a group, as well as their comparison by gender, was performed with the Kruskal-Wallis test, at the level of random error ($p < 0.05$).

Results: 57.46% of the total sample indicated less, 27.61% the same amount, and 14.96% indicated that they moved more during the distance education period than in the previous normal education time. Assessment of one's health status deteriorated significantly during distance learning. Boys moved more than girls during the distance learning period, whereas girls 'sense of well-being decreased to a lesser extent than boys'.

Conclusions: In the studied age group physical activity, aerobic or strength-enhancing forms of movement lasting more than 20 minutes decreased significantly. Screen time and sleeping time increased, the feeling of fatigue decreased and the subjective perception of health and well-being deteriorated.

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Keywords: COVID - 19, distance learning, physical exercise, sence of well-being

The impact of Covid-19 onthe violence against womenand initiatives for helpingthe victims

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Introduction: The phenomenon of violence committed against women can be defined as a sexist act which might produce injuries and traumasin physical and psychological ways. According to my previous findings, there are 8 different forms of maltreatment committed specifically against the female genderand those have one feature in common: directly or indirectly they can lead to feminicide,the act of the women's homicide, from which nowadays annually 66.000 women worldwide are suffering. There can be several motives behind the violent acts, such as stereotypes and preconceptions fixated from the youth, a patriarchal social system, evolutionary and biological approaches, or jealousy. For the victimsit often might be difficult to escape from anabusive relationship because, on the one part, the aggressors try to separate them from their supportive environment. On the other hand, due to financial reasons, usuallyit seems to be impossibleto begin a new life, especially when there are children in common. It can therefore be seen that the phenomenon of violence committed against women is a very important and serious problem on a daily basis[1].

Aim: In my recent research I tried to get an insight into the actual situation of women, with two main questions: how did Covid-19 affect the violence committed against them, and what possibilities do we have to help the victims?

Results: Because ofthe outbreak of theglobal pandemic,the cases related to differentforms of violence against women increasedall over the world: the number ofrequests forhelp via phone calls grew with 60%, meanwhile theannouncementsreport more physical than verbal violence due to the victims altered situation of cohabitation. However, apositive consequenceof the quarantine is the possibility of being heard and seen: the responsibility of witnesses and neighbours also has increased with more and more indications and denunciations on their part.

Conclusions: By reviewingthe current situation of womenit can beestablished that there is an urgent need for those initiatives whichcan helpin developingdifferent methodsand measuresfor intervention, such as helplines and sheltersprovidingpsychological and physical help.It wouldbe also important to carry on withsensitizationprograms,targetingthe importance ofequality between women and men.

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Keywords: violence against women, feminicide, impact of Covid-19, initiatives for helping

Covid-19 - tourism - economy

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Introduction: Tourism contributes to the country's gross domestic product (gross national income), thereby contributing to the country's economic growth. In 2019 at the end of the year in China covid-19 epidemic broke out, in 2020 at the beginning of March it had become a world-wide challenge, it caused a huge challenge in both the European Union and domestic economic and social processes. As a result of the outbreak and the precautions taken to control it, air traffic almost completely stopped, tourism fell, many jobs stopped.

Aim: The aim of our analysis was to assess the occupancy of the hotels in Hungary, the number of nights, traffic and revenues of guests, these changes in the covid-19 epidemic situation and thus in the proportion of tourists employed in tourism, their impact on the income situation of the government sector and compare this with the European Union's statistical data.

Methods: The research is a quantitative, descriptive research in which we conducted a complete data analysis of the data collected from the databases. considering the recent years, we took the data of 2015 as the starting data, so we examined the changes from 2015 onwards, whereas for the year 2020, to determine the changes that also occur due to covid-19 we used data from the corresponding period of 2019.

Results: Our results show that the number of overnight stays decreased by 57.73 percent in Hungary and 51.78 percent in the European Union in 2020 compared to 2019. Compared to the previous year. The number of restaurants in Hungary decreased by 27.47 percent, in the European Union by 32.8 percent in 2020. The number of people employed in tourism in 2020 was 8.9% lower in Hungary and 16.7% lower in the European Union than in 2019.

Conclusions: Due to the covid-19 pandemic, the turnover and sales of both the European Union and the Hungarian tourism sector decreased significantly, as well as the number of people employed in tourism, the economic impact of which was reflected in the general government deficit too. The deficit of the general government increased for III. quarter of 2020, it reached 4.1% GDP in Hungary and 5.3% GDP in the European Union, which represents more than seven-fold value as the same period of the previous year, but even compared to the total annual value, it was more than double value.

Keywords: covid-19, tourism, employment, Hungary, European Union

Genetics and Molecular Medicine

Online differential expression analysis tool for normal tumor, metastatic tissue comparison across multiple cancer types

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Introduction: Genes showing higher expression in either tumor or metastatic tissues can help in better understanding tumor formation and can serve as biomarkers of progression or as potential therapy targets.

Aim: Our goal was to establish an integrated database using available transcriptome-level datasets and to create a web-platform which enables the mining of this database by comparing normal, tumor and metastatic data across all genes in real time.

Methods: We utilized data generated by either gene arrays (from NCBI-GEO) or RNA-seq (from the TCGA, TARGET, and GTEx repositories). The altered expression within different platforms is analyzed separately. Statistical significance was computed using Mann-Whitney or Kruskal-Wallis tests.

Results: The entire database contains 56,938 samples including 33,520 samples from 3,180 gene chip-based studies (453 metastatic, 29,376 tumorous and 3,691 normal samples), 11,010 samples from TCGA (394 metastatic, 9,886 tumorous and 730 normal), 1,193 samples from TARGET (1 metastatic, 1,180 tumor, 12 normal) and 11,215 normal samples from GTEx. The most consistently up-regulated genes across multiple tumor types were TOP2A (FC=7.8), SPP1 (FC=7.0) and CENPA (FC=6.03) and the most consistently down-regulated gene was ADH1B (FC=0.15). Validation of differential expression using equally sized training and test sets confirmed reliability of the database in breast, colon, and lung cancer at FDR below 10%.

Conclusions: The online analysis platform enables unrestricted mining of the database and is accessible at www.tnmplot.com

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Keywords: tumor, normal, metastatic, gene expression

Investigation of a common chymotrypsin C (CTRC) polymorphism in chronic pancreatitis

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Introduction: Premature intrapancreatic trypsinogen activation acts as a key element in the pathomechanism of chronic pancreatitis (CP) while chymotrypsin C (CTRC) has an important role in preventing this activation process by degrading trypsinogen. Certain CTRC mutations elevate the risk of CP by diminishing the secretion or the activity of the enzyme.

Aim: To investigate the role of common p.G60= CTRC polymorphism in CP.

Methods: To analyze the presence of the p.G60= CTRC polymorphism by PCR amplification followed by Sanger sequencing, we enrolled 291 patients and 349 controls from the Hungarian National Pancreas Registry. In order to compare our results with international data, we conducted a systematic search in 4 databases (Pubmed, Embase, Scopus and Cochrane Library) and after a multi-step screening process we performed meta-analysis. The functional effect of the polymorphism was investigated with gene expression studies in human samples.

Results: Altogether, we analyzed data from 5379 patients and 9675 controls. The minor T allele was significantly overrepresented in patients compared to controls in both the Hungarian (OR=2.04, 95% CI: 1.47-2.81) and the international cohort summarized by meta-analysis (OR=2.22, 95% CI: 1.69-2.91). Considering genotypes we noticed a significant difference in the presence of heterozygous and homozygous variants between cases and controls. In homozygous form the variant increased the risk of CP five-fold compared to healthy controls (OR=5.14, 95% CI: 2.71-11.48), while in heterozygous form a two-fold increase was present (OR=1.94, 95% CI: 1.57-2.38). Functional studies showed diminished mRNA expression of the mutated T allele.

Conclusions: In our present meta-analysis we showed that the CTRC p.G60= confers an increased risk for developing chronic pancreatitis, especially in its homozygous form. As a result of the mutation CTRC gene expression is decreased, which may lead to lower protein levels thereby affecting an important defensive mechanism against early intrapancreatic trypsinogen activation.

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Keywords: Pancreatitis, Chronic; Genetics; Chymotrypsin C

Examination of Interleukin 1A and 1B single nucleotid polimorphism in development and prognosis of medication-related osteonecrosis of the jaw

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Introduction: The medication-related osteonecrosis of the jaw (MRONJ) is a side effect of bisphosphonates and RANK-ligand inhibitors, that are used in cases of osteoprosis and bone metastasis of tumors [1].

Aim: We examine the single nucleotid polimorphism of interleukin 1A and 1B in development and prognosis of medication-related osteonecrosis of the jaw.

Methods: In our study we apply DentiGen Parodontitis Test for collecting samples. This test is suitable for sampling from oral mucosa cells to ascertain interleukin 1A and 1B single nucleotid polymorphism (IL-1A-889, IL-1B+3953). The genetic samples were evaluated in Istenhegyi Genediagnostic Center with DNA-hybridization technic. In our investigation we made examination in patient group and control group. The role of gene polymorphism in development of the disease is examined by comparing the genetic results of patient group and control group. The investigation of gene polymorphism in prognosis of the disease is based on treatment-induced stage improvement, recovery and the relapses following the treatment.

Results: During our investigation 150 genetic examination were performed. 91 patients are suffering from MRONJ and 59 patients are in control group. In patient group 51 (56,04%) patients carry unfavourable allelic variant, in control group 22 (37,28%) patients have unfavourable allelic variant. We didn't find any association (p=0,498) between the unfavourable polimorphism and the development of the MRONJ. In patient group were used surgical therapy in 79 cases. In this group were detected stage improvement in 78 (98,73%) cases, recovery in 67 (88,15%) cases and relapses in 33 (49,25%) cases. We didn't find stage improvement in 1 (1,26%) case, recovery in 9 (11,8%) cases and relapses in 34 (50,74%) cases. 49 patients have unfavourable allelic variant from 79 patients treated with surgical therapy. We haven't found any connection between the examined polymorphism and the stage improvement (p=0,382) or recovery (p=0,561). Significant association (p=0,022) was detected between the relapses and the carrying of unfavourable allelic variant.

Conclusions: We found significant association between relapses of MRONJ and the carrying of interleukin 1A and 1B polimorphism.

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Keywords: medication-related osteonecrosis of the jaw, MRONJ, Interleukin 1A and 1B, IL-1A, IL-1B

Ubiquitylation-mediated Transcription Regulation upon DSBs

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Introduction: DNA Double Strand Breaks (DSBs) can significantly affect the process of transcription elongation and can further cause chromosomal rearrangements which potentially lead to carcinogenesis. Although DSB-dependent transcription arrest is mediated by mechanisms involving DNA-PK kinase and a puzzling interplay with the ubiquitin system, it has not yet been fully elucidated how RNAPII is being dislodged from the damaged transcribing unit in a finely-tuned manner to provide access for the repair factors[1].

Aim: We investigate the involvement of the ligases WWP2, NEDD4, Cullin3 and ElonginA in the resolution of DSBs during transcription and examine a possible relationship with the DNAPK in the ubiquitylation of RNAPII.

Methods: Directed genomic DSBs were induced in various time-points under DNA-PK kinase inhibition in our VAsiSI stable cell line to examine the protein levels of RNAPII with Western Blot. Furthermore, we investigated RNAPII under random DSBs in U2OS cells in whole cell extracts and in chromatin fractions and we lastly, used TUBEs to examine the ubiquitin profile of S2P RNAPII under DSB induction and DNA-PK inhibition.

Results: We observed that inhibition of DNAPK can lead to a ubiquitous transcription arrest with increased RNAPII protein levels in response to DSBs. Moreover, we detected that DNA-PK differentially affects the E3 ligases' protein level, and that its inhibition abrogates the proper ubiquitylation of S2P RNAPII.

Conclusions: Our results demonstrate the importance of DNA-PK kinase in the proper transcription regulation by severely affecting the ubiquitylation of RNAPII in both directed and random DSB formation. Undoubtedly, unravelling the molecular mechanisms that rule the faithful repair of DSBs and how cancer cells decipher those mechanisms and gain growth advantage could provide beneficial targets for clinical research and drug discovery.

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Keywords: Transcription silencing, ubiquitylation, RNA polymerase II

An alternative way to induce apoptosis in temozolomide resistant glioblastoma cell lines

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Introduction: Glioblastoma multiform (GBM) is a highly invasive and genetically heterogenous primary brain tumor in the central nervous system, with limited treatment options. Its resistance to the lipophilic alkylating agent temozolomide (TMZ) is a major problem in the treatment of GBM [1]. Neddylation is a post-translational modification that conjugates NEDD8 to substrate proteins, and its abnormal activation is observed in GBM. The NEDD8-activating enzyme (NAE) inhibitor MLN4924 is a promising anticancer agent since it has low toxicity and can cross the blood-brain barrier [2].

Aim: The aim of our study is to find an effective combination treatment with TMZ and MLN4924 in the case of our TMZ resistant GBM cell lines.

Methods: GBM cell lines were cultured and treated with different concentrations of TMZ and MLN4924. The cells viability were determined by ATP assay and Hoechst staining.

Results: Most of the cells were TMZ resistant and responded to lower concentrations of MLN4924. The combination treatment with TMZ and MLN4924 successfully decreased the cells viability and sensitized the cells to TMZ.

Conclusions: Our data indicate that MLN4924 in combination with TMZ can be an effective treatment to overcome the TMZ resistance.

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Keywords: glioblastoma multiforme, temozolomide, MLN4924

The potential effect of dihydroretinol on macrophage differentiation, transglutaminase expression and phagocytosis

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Introduction: The proper clearance of apoptotic cells by macrophages plays a key role in the maintenance of the tissue homeostasis. Previous work in our laboratory had shown that upon apoptotic cell engulfment macrophages produce retinoids, that by upregulating numerous phagocytosis related genes, increase their phagocytic capacity. Recent studies indicated that these retinoids might be dihydroretinoids. [1].

Aim: In this study, we aimed to identify genes which are affected during macrophage differentiation by dihydroretinol (DHR) treatment.

Methods: Bone marrow-derived macrophages from C57BL6/ mice were differentiated in the presence or absence of 1 μM DHR in the last two days of the differentiation period and total gene expression profiling was carried out by RNA sequencing. List of differentially expressed genes was generated based on 0.05 multiple-testing-adjusted p-value and 1,5-fold FC cut-off values. Functional profiling of genes was carried out using PANTHER Classification System.

Results: There were 781 differentially expressed transcripts between control and DHR treated samples. 424 transcripts were downregulated (mean of FC values: -2,664714247, median of FC values: -2,079424) and 357 were upregulated (mean of FC values: 6,55024751, median of FC values: 2,3560932) after 48h incubation with DHR compared to the controls. Gene set enrichment analysis showed that the downregulated genes could not be correlated with specific biological processes. However, the upregulated ones could be associated with genes related to inflammation mediated by chemokine and cytokine signaling pathway were significantly altered upon DHR treatment.

Conclusions: Our analysis revealed that DHR regulates the expression of several genes in differentiating macrophages which might contribute to the observed increased apoptotic cell phagocytic capacity upon DHR treatment.

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Keywords: dihydroretinol, macrophage differentiation

Special Session: Prevention, treatment and complications of COVID-19

Role of Complementary and Alternative Medicine in prevention and or treatment of COVID 19

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Introduction: The most recently discovered infectious agent causing Respiratory virus Infections, known as COVID-19 have threatened the life of many across the globe. Since its declaration as pandemic by World Health Organization, the resulting high transmission and mortality rate of the COVID-19 virus did not only set researchers into action but has led to the dependence and discovery active ingredients in self-medication from alternative medicine by serendipity. For centuries, the use of herbs, plants etc., have been used to treat or diagnosed different kinds of diseases and illness.

This paper highlights the role played by Traditional Medicine or Complementary or Alternative Medicine in the prevention and Cure of COVID-19 during the pandemic.

Methods: In this review, relevant literatures related to Complementary and Alternative Medicine with potential to cure and or Prevent COVID-19 from PubMed, Science Direct, Google Scholar were sought for and collected. Direct google searches was made to ensure related articles are not missed with evidence as reported from individuals on social media and other scientific articles.

Results: Complementary medical supplements were found to contains active ingredients and vitamin supplements naturally occurring in them which made them potent in the treatment and cure of the novel COVID-19 virus.

Conclusions: Though, many herbal concoctions have not yet been ascertained to treat nor cure COVID-19, this article have presented the role played by CAM and suggests the recommendation of the use of Alternative Medicine with caution and the harnessing of active ingredients against the COVID-19 virus for development of COVID drugs and clinical trials.

Keywords: COVID-19, Complementary medicine, alternative medicine, Traditional medicine, pandemic, prevention, cure and treatment

Effectiveness of chest compressions when wearing mask during the COVID-19 pandemic – a randomized simulation study among first year health care students

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Introduction: Based on the current resuscitation guidelines during COVID-19 pandemic wearing personal protective equipments is strongly recommended.

Aim: The aims of the current study were to evaluate and compare the effectiveness of chest compressions and the level of fatigue when wearing two different types of mask (surgical vs. cloth) among health care students.

Methods: Two-hundred-sixteen first year health care student were involved into our randomized simulation study. Participants were randomized into two groups: surgical mask (n = 108) and cloth mask (n = 108). Chest compressions' effectiveness (depth and rate) was measured within a 2-minutes continuous chest-compression-only CPR session. Data were collected by an AMBU CPR Software, a questionnaire and recording vital parameters and using Borg-scale related to fatigue (before and after the simulation). For further analysis the 2-minutes session was segmented into 30-second intervals.

Results: No significant difference was measured between the surgical-mask and cloth-mask groups in chest compression depth (44.49$\pm$10.03 mm vs. 45.77$\pm$10.77 mm), rate (113.34$\pm$ 17.76/min vs. 111.23$\pm$17.51/min) and the level of fatigue (5.72$\pm$1.69 vs. 5.56$\pm$1.67) ($p>0.05$ in every cases). Overall, chest compression depth decreased while rate increased over time ($r = -0.171$; $p = 0.01$). Significant decrease was found in chest compression depth between the first 30-sec interval and the second-, third-, and fourth intervals ($p<0.01$).

Conclusions: Wearing two different types of masks during the simulation could deteriorate the effectiveness of chest compressions and can cause fatigue in a shorter time. In contrast, increasing of subjective feeling of fatigue did not deteriorate the real effectiveness. During CPR, changing the rescuer more frequent than 2-minutes would be considered.

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Keywords: chest compressions, COVID-19, wearing mask, fatigue, health care students

Analysis of microvascular and neurodegenerative complications of mild COVID-19

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Introduction: SARS-CoV-2 infection could result in multisystemic inflammatory syndrome and tissues of the eye could be affected by this process. Recent ophthalmological examination methods are able to quantify retinal vessel density and characterize the optic nerve head parameters as well as to measure the peripheral nerves in the cornea (branches from the ophthalmic division of the trigeminal nerve) qualitatively and quantitatively. Thus, a comprehensive ophthalmic examination can provide general informations on the vascular system and the peripheral nerves in any systemic diseases.

Aim: To examine retinal and corneal neurodegenerative and retinal microvascular changes with noninvasive clinical methods in patients after mild or asymptomatic COVID-19 disease.

Methods: 35 patients after PCR-proven COVID-19 infection with mild disease presentation and 28 age-matched controls were enrolled. Optical coherence tomography (OCT) (Topcon DRI OCT Triton, Topcon, Japan), OCT angiography and in vivo confocal microscopy (Heidelberg Retina Tomograph II Rostock Cornea Module; Heidelberg Engineering GmbH, Heidelberg, Germany) were performed in both groups. Corneal subbasal nerve plexus was quantified by using ACCMetrics software (University of Manchester, Manchester, UK). Vessel density (VD) for superficial (SCP) and deep capillary plexus (DCP) and structural OCT parameters were recorded.

Results: Significantly lower nerve branch density (P=0.0004), nerve fiber area (P=0.0001), nerve fiber density (P=0.0009), nerve fiber lenght (P<0.0001) and total nerve branch density (P=0.002) values were observed in patients after COVID-19 compared to healthy controls. VD of the temporal SCP was significantly different between the two groups (P=0.019). No other SCP and DCP vessel density parameter differed significantly between the two groups. None of the retinal nerve fiber layer-ganglion cell layer complex parameters showed significant difference between normal and post-COVID subjects.

Conclusions: Our results suggest that peripheral neurodegenerative changes may occur even after mild or asymptomatic SARS-CoV-2 infection. No microvascular changes were seen with OCT angiography and structural OCT parameters did not show any signs of optic neuropathy in post-COVID patients. In vivo confocal microscopy seems to be an important tool in monitoring peripheral neuropathy in patients after COVID-19.

Keywords: COVID-19, in vivo confocal microscopy, optical coherence tomography angiography, vessel density, peripheral neurodegeneration

Essential oils and liposomes; a promising way for the fight against coronavirus?

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Introduction: Liposomes are modern drug delivery systems with nanosized particles proven to increase the efficacy of certain active ingredients in treating several diseases. Nowadays, due to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) outbreak, liposomes are used as the major component of the new mRNA COVID-19 vaccines (Pfizer/BioNTech and Moderna), preventing the mRNA from getting disrupted [1]. Essential oils (EOs) are a group of lipophilic chemicals with herbal origin. They are used to treat and prevent various diseases due to their anti-inflammatory, antiviral, antimicrobial, and bronchodilatory effects. The EO of Eucalyptus globulus, eucalyptol, with its antiviral effect, means an option against coronavirus [2]. Based on their lipophilic character, EOs are useful for interfering and interrupting the viral membrane. The encapsulation of EOs in drug delivery systems, like liposomes, is recommended to improve their solubility, stability and efficacy [3].

Aim: In this work, we studied the effects of different kinds and ratios of EOs on liposomal formulations. Our goal was to review the EOs encapsulated with liposomes and survey the role of liposomes in the fight against SARS-CoV-2.

Methods: Liposomes were prepared using the thin-film hydration technique. Different ratios of phosphatidylcholine, cholesterol, and EOs were used. The effect of applying various types of EOs was also investigated. Vesicle size was measured via the light scattering method, and zeta potential was analysed using a zetasizer.

Results: The prepared liposome samples had vesicle size below 200 nm and polydispersity index lower than 0.30 showing homogeneous distribution. Zeta potential values tend to be negative. Variations between the formulations prepared with different EOs were detected.

Conclusions: Different ratios of lipids and EOs were used for liposome formulation. EOs showed to have an impact on the vesicles that can be used to optimise the liposomes. Nanoencapsulation of EOs into liposomes is a promising way to facilitate their use.

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Keywords: liposome, essential oil, coronavirus, nanoparticles, drug delivery

Transcriptome signature analysis identifies plasma membrane cholesterol depletion as a potential factor for antiviral drug effect against SARS-CoV-2

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Introduction: COVID-19 caused by SARS-CoV-2 is a global pandemic, which affects the whole world. Repurposing already approved drugs is a promising strategy to find new therapeutic opportunities against rapidly spreading diseases. The general principle of signature-based computational drug repurposing bases on the hypothesis that drugs inducing a gene expression signature opposite to a disease-induced signature can revert disease phenotype. However, drugs provoking similar gene expression changes to virus infection and augmenting the natural immune response can also be effective. Prediction of effective drugs based on gene expression is a widely used procedure, but it lacks mechanistic insight. Interpreting functional changes, such as virus and drug treatment-induced changes in pathway and transcription factor activity can lead to a better understanding of SARS-CoV-2 infection and drug effects.

Aim: In addition to identifying effective drugs against SARS-CoV-2 by analyzing signature similarities between drug and virus infection-induced transcriptomic changes, we wanted to identify key connecting factors between the mechanism of viral infection and antiviral effects of particular drugs.

Methods: We calculated similarities of publicly available signatures of SARS-CoV-2 infected and proven effective drugs treated cell lines. We interpreted functional changes by analyzing pathway and transcriptional factor activity. We validated our computational result via in vitro cell culture, microscopic imaging and image processing.

Results: We found that similarity between infection and drug-induced signatures is predictive for effective drugs against SARS-CoV-2. Inferred pathway and transcription factor activities from virus and drug-induced signatures identified increased activity of NFkB and JAK-STAT pathways as adaptive antiviral responses. Furthermore, the analysis revealed that several effective antiviral drugs activate SREBF transcription factors, key regulators of cholesterol metabolizing enzymes, suggesting altered cholesterol metabolism in drug-treated cells. Imaging experiments with a fluorescent cholesterol sensor validated the cholesterol depletion effect of SREBF activating effective drugs.

Conclusions: The similarity of drug-induced gene expression signature to SARS-CoV-2 infection signature can predict effective antiviral drugs. Several effective drugs identified based on signature similarity depletes cholesterol from the plasma membrane, which is a potential mechanism of antiviral effect due to preventing viral entry.

Keywords: SARS-CoV-2, antiviral, repurposing, cholesterol, transcriptomics

Obstetrics, Gynaecology and Neonatology

Outcome of Pregnancy in Women with Unrepaired Atrial Septal Defect

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Introduction: Atrial septal defect (ASD) is the most common type of congenital heart disease (CHD). Patients with unrepaired (ASD) are prone to develop arrhythmias. In addition, they are also exposed to the risk of paradoxical embolization due to the persisting left-to-right shunt. Thromboembolic events (stroke or TIA) and arrhythmias might be even more frequent during pregnancy.

Aim: Was to analyse the outcome of pregnancy in women with unrepaired ASD while focusing particularly on thromboembolic events.

Methods: The pregnancy and heart disease database of the Gottsegen National Cardiovascular Center includes 477 prospectively followed pregnancies of women with congenital heart disease, of them 31 were index pregnancies in women with unrepaired ASD. Two miscarriages (at 6 and 9 weeks of gestation) were excluded. Previous maternal cardiovascular and thromboembolic events, maternal, foetal, and obstetric complications during pregnancy and postpartum period (6 months) were documented.

Results: 22 women with unrepaired ASD had 29 pregnancies, the mean maternal age was 26 years. Only one previous maternal thromboembolic event (TIA) was documented. No desaturation, NYHA functional class deterioration or pulmonary hypertension was found before pregnancy or during the follow-up period. Three patients (10.3%) had arrhythmias (PSVT/multiple SVES and VES/collapse). No paradoxical embolization was present during pregnancy or in the postpartum period. Two C-Section (6.9%) was needed due to cardiac reasons and other 6 (20.7%) for obstetric complications. Nine patients (31%) needed cardiovascular medications: either Aspirin or Beta-blocker or the combination of these. Mean birthweight was 3347 g, and the mean time of delivery was 39 weeks of gestation. Two premature delivery happened with normal birthweight for gestational age. ASD was inherited by one (3.4%) and in two cases (6.9%) a different type of CHD was diagnosed.

Conclusions: Our results confirms that pregnancy with unrepaired ASD has low maternal and foetal risks. The number of embolic events during pregnancy and in the postpartum period was close to zero.

Keywords: pregnancy, adult congenital heart disease (ACHD), atrial septal defect (ASD), thromboemboli, arrhythmia

Fatty acid supply of women during pregnancy and at delivery: meta-analysis of 186 articles

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Introduction: It is well known, that long-chain polyunsaturated fatty acids play an important role in the maturation of the developing nervous system, thus maternal fatty acid supply is essential for the fetus as well as the newborn baby.

Aim: Our aim was to systematically review fatty acid supply of plasma and erythrocyte lipids in expecting women during pregnancy and at delivery.

Methods: We searched for relevant literature in three databases: Embase, Cochrane Library, and Ovid Medline in July 2017 and in a reduced form in January 2020 with a search strategy which includes the following keyword expressions: (pregnant* OR gestation* OR deliver*) AND (arachidonic OR docosahexaenoic) NOT animal. We extracted data from clinical trials investigating fatty acid composition of plasma or erythrocyte membrane lipids in healthy, expecting women without any fatty acid supplementation during pregnancy. Statistical analysis was performed by Comprehensive Meta-Analysis v3.0 Software.

Results: We found 3809 potentially relevant articles after excluding duplicates. Further 3623 articles were excluded because they did not meet our inclusion criteria, hence 186 relevant articles remained which discussed fatty acid data of plasma or erythrocyte membrane lipids. 53 articles of them published data about plasma phospholipids. We found that during the second trimester studies investigated fatty acid status of a great number of mothers (n = 8753-8983), while in the three other timepoints the studies investigated somewhat smaller (n = 1471-2914) populations. The largest number of studies were found in the third trimester regarding fatty acid data. Values of arachidonic acid were significantly decreased by the 3rd trimester, while at delivery, its values became significantly higher. In contrast, values of docosahexaenoic acid remained quite stable during pregnancy, but decreased by delivery.

Conclusions: Based on our results, on a population level values of arachidonic acid significantly decreased in plasma phospholipids during pregnancy. Contrary to this fatty acid, docosahexaenoic acid status remained remarkably stable throughout pregnancy.

Keywords: fatty acids, plasma phospholipids, pregnancy, arachidonic acid, docosahexaenoic acid

Cardiovascular effects of neonatal hyperglycemia-experimental study

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Introduction: The ability of preterm infants to control their blood glucose level is limited, therefore the fluctuation of blood glucose concentration is frequent. Based on clinical observations preterm infants spend hours in hyperglycemia during the first few months of life. However, only limited data are available about the effect of early hyperglycemia on the cardiovascular system.

Methods: We developed an animal model to investigate the effect of early hyperglycemia in the vascular function and morphology, and the possible changes in the thickness of the heart wall. Newborn Sprague-Dawley rats on the first postnatal day were injected with 100mg/kg streptozotocin intraperitoneally, respectively. Blood glucose level and weight were measured daily. On the 7th postnatal day animals were sacrificed. We dissected the aorta, one part of it was stored in paraformaldehyde. The other part was immediately put into oxygenized distilled water and fixed in DMT 610M (Danish Myo Technology A/S, Aarhus, Denmark). In this way we were able to examine the effect of frequently applied drugs such as dopamine and epinephrine in the neonatal intensive care. After preparation histological slides were made from the aorta and the heart.

Results: Dopamine as a vasoactive agent (in the examined concentrations act as a vasodilator) resulted significantly weaker vasodilator response in different concentrations (10^{-9}; 10^{-8}; 10^{-7}; 10^{-6} Mol). Epinephrine -in contrast with its physiological effect- acted as a vasodilator in 10^{-8}; 10^{-7}; 10^{-6} Mol concentrations. Morphological examinations showed changes in the vascular wall, the hyperglycemic animals had elevated aortic wall thickness. Moreover, the wall of the left ventricle was significantly thicker, while the right ventricle was significantly thinner in the hyperglycemic group.

Discussion: Early hyperglycemia affects the vascular response of the aorta to vasodilator and vasoconstrictor drugs. Hyperglycemia has an effect on the aortic wall and results thicker left ventricle wall and attenuated right ventricular wall.

ConclusionThese results suggest that the early hyperglycemia has impact on the developing cardiovascular system, therefore there is urgent need to the continuous blood glucose monitoring in the neonatal intensive care.

Ethical Committee or Institutional Animal Care and Use Committee Approval: Animal housing, care and application of experimental procedures were in accordance with institutional guidelines under approved protocols (No: BA02/2000- 15024/2011, University of Pecs following the European Community Council directive).

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Keywords: neonatal hyperglycemia, aorta, wire myograph, vasodilation, vasoconstriction

The long-term effect of perinatal overnutrition on the body weight regulation in the offspring

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Introduction: During aging, there are two major trends in body weight regulation: middle-aged obesity and aging anorexia/sarcopenia. Both of them present global health burden and could worsen the morbidity and mortality. Increasing evidence suggests that the perinatal period has a critical role in the programming of the offspring's metabolic health. Maternal perinatal overnutrition could change the central regulation of food intake and energy metabolisms in the fetus leading to offspring's obesity later in life. Our hypothesis is that the perinatal overnutrition could predispose the earlier development of both obesity and aging anorexia/sarcopenia in the offspring.

Aim: In our animal models, we aimed to clarify whether the perinatal maternal high-fat diet could accelerate the aging of the central regulation of energy metabolisms in the offspring resulting in earlier onset of obesity and aging anorexia/sarcopenia. We also aimed to analyze the potential contribution of the important peripheral satiating hormone, cholecystokinin (CCK) to these changes of body composition.

Methods: We investigated the long-term changes of offspring's body weight, food intake and resting metabolic rate (by OxyletPro indirect calorimetry) in four nutritional models of Wistar rats. We applied normal or high-fat post-weaning diet in offspring of standard chow or high-fat diet-fed dams. The maternal diet was carried out through gestation and lactation. We also tested the anorexigenic effect of intraperitoneal injection of CCK in our four groups at the age of 7 months. We measured the food intake by the automated, Feed-Scale system.

Results: We observed faster and increased body weight gain in offspring of high-fat diet-fed dams especially in case of postnatal high-fat diet. We also found that these offspring of obese dams had lower metabolic rate and increased food intake that could account for their weight gain. In the background of the programmed hyperphagia we demonstrated the lack of CCK-induced food intake suppression in offspring of obese dams. The aging anorexia and sarcopenia also developed earlier in these offspring.

Conclusions: Maternal high-fat diet predispose to hyperphagia, decreased energy metabolisms and obesity in the offspring, especially in case of postnatal high-fat diet. The decreased effect of CCK could promote their hyperphagia.

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Keywords: perinatal programming, obesity, sarcopenia, aging

Retrospective study to assess the suitability of endometrial samples for experimental research

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Introduction: When studying clinical endometrial samples, it is necessary to understand the signalling pathways of the normal endometrium. However, extraction of endometrium samples from the uterine cavity is only possible by appropriate surgical indication. Since a surgical intervention usually presupposes an underlying pathological process, signalling pathways in those endometrium samples may also be altered.

Aim: The aim of our present retrospective analysis is to determine what proportion of the surgically removed eutopic samples are suitable as an appropriate control to reveal differences in signalling pathways observed in ectopic tissues.

Methods: We collected relevant data from the clinical e-MedSol system about surgical samples (curettage and endometrial biopsy) performed between January 2017 and March 2020, submitted by the Obstetrics and Gynaecology Clinic, University of Debrecen with a ICD code N9260 (irregular menstrual bleeding). *Research ethics committee approval number: H.0180-2020.*

Results: We analysed 1298 cases. Samples removed from patients older than 44 years, who had a histological diagnosis of a pathological condition, and who underwent surgery due to a suspected condition were excluded. Of the endometrium samples in the proliferative (*n*: 199, mean age: 44.95 ± 7.82) or the secretory phase (*n*: 125, mean age: 43.45 ± 7.37), after exclusion, only 12 and 20 samples, respectively (32 in total), proved to be suitable for further analysis.

Conclusions: Only a fraction of the surgically removed eutopic samples are suitable for experimental research studies. Careful consideration of selection and exclusion criteria must be applied to ensure that only physiological endometrium samples are delivered to research facilities. Knowledge of the histopathological diagnosis is essential to confirm this.

Acknowledgements: Supported by the ÚNKP-20-3-II New National Excellence Program of the Ministry for Innovation and Technology from the source of the National Research, Development and Innovation Fund.

Keywords: endometriosis, endometrium, curettage, histopathology, signalling

Anatomy

Effect of the endogenous PACAP on the hippocampal transcriptome profile of aging mice

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Introduction: The increase in the number of aging and age-related diseases is one of the biggest social problems of our time, which will become an even more important issue in the future. PACAP is a neuropeptide with significant neurotrophic and neuroprotective effects. PACAP KO mice show pathological stress response, early mortality, and other signs of early aging, such as systemic senile amyloidosis, even in young individuals. Its role in the early stages of individual development and premature aging phenotypic signs raises the role of the peptide in aging processes.

Methods: As the hippocampus is one of the most affected areas by nervous system damage and aging processes, given the low median lifespan of the KO population, we used hippocampal samples from 3 and 12-month-old PACAP KO and wild-type mice (n = 2 samples per group). New generation sequencing (Illumina NextSeq550) was performed on the samples, followed by bioinformatics analysis with the help of the SZKK Bioinformatics Research Group based on the "RNA-Seq Data Analysis Pipeline". Network analysis was performed using STRING-DB.

Results: There was a significant difference between the KO and wild groups in chronic stress response and aging, presumably at the level of genes and functional networks that promote hormesis. Gene expression of several basement membranes and extracellular proteins also varied significantly between groups. Several HLA-E equivalent gene marker showed elevated expression in KO mice.

Conclusions: Transthyretin alone plays an important role in the protection against hippocampal damage and cognitive deficits. The levels of folate receptor, aquaporin 1, and claudin 2 showed similar changes in hormesis. Changes in extracellular and basement membrane proteins may be a sign of impaired extracellular space and vascular organization. The presence of HLA-E equivalent genes may indicate microglia activation, chronic inflammation, and the presence of senescent cells that avoid apoptosis. These changes individually indicate defective aging adaptation in KO mice and together support and explain the hippocampal changes seen in early aging KO mice.

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Keywords: Aging, PACAP, Transcriptomics, Network analysis

Investigation of blood samples in PACAP wild-type and heterozygous mice for the aim to reveal the background of senile systemic amyloid deposition

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Introduction: PACAP (pituitary adenylate cyclase activating polypeptide) is a neuropeptide expressed in many organs that has been shown to have general cytoprotective, anti-inflammatory, and antiapoptotic effects. However, the role of PACAP in the aging process is still not clear. On the other hand, we have limited data about blood sample examinations in PACAP wild-type (WT) and PACAP deficient mice. Our aim: In our previous experiments, we have observed accelerated systemic senile amyloid deposition in PACAP KO and PACAP HZ mice. The aim of the present experiment was to reveal whether qualitative and quantitave changes in the blood could be the background of the appearence of the amyloid depositions in several organs.

Methods:In our experiment, blood was collected from 3.5–month-old WT and PACAP heterozygous (HZ) mice (n = 11 per each group) under isoflurane overdose into BD Vacutainer tubes with sodium heparin for serum analysis or EDTA for routine complete blood count. Na+ and K+ ions, alkaline phosphatase (ALP), creatinine, cholesterol, triglyceride, and high- and low-density lipoprotein (HDL, LDL) were measured with a COBAS 8000 analyzer, while blood count was measured with a Sysmex XN-1000-V Multispecies Hematology Analyzer. Statistical analysis was performed using two-way ANOVA followed by Fisher's or Bonferroni's post hoc test.

Results: In our serum analysis we found significant differences between the two animal groups in the level of cholesterol, LDL and HDL. These were increased in the HZ mice group. Investigation of the blood count revealed signifact differences regarding the derived parameters between the two mice groups: MCHC, RDW-SD, RDW-CV, P-LCR, PCT, NRBC, RET, MFR, RET-HE. All in all, the number of reticulocytes decreased, but the heamoglobin content increased.

Conclusions: In our previous research we found that systemic amyloidosis develops not only due to the complete but also partial absence of PACAP. In these deposits we found several proteins, most of them had a role in lipid metabolism. Based on our latest blood sample results, we can say that the decreased level of PACAP in HZ mice induced abnormal lipid metabolism which could be a factor leading to amyloid depositions. The changed bone marrow activity could be a compensatory mechanism against the decreased level of reticulocytes and megakaryocytes.

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Keywords: PACAP, amyloid, systemic amyloidosis, blood

Glaucoma model in rat

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Introduction: The glaucoma is a heterogeneous group of optic disorders, which first causes the peripheral visual field loss, then finally leads to irreversible blindness. This progressive condition will develop slowly by degeneration of retinal ganglion cells (RGC) and later the axons that comprise the optic nerve reduction. It is difficult to investigate the exact pathomechanism of these glaucomatous optic neuropathies in human patients. For better understanding and further investigations, effective animal models are needed to mimic human glaucoma establishment. Several risk factors serve as the cause of the glaucoma, such as age, corneal thickness, and ethnical origin. However, ocular hypertension remains the only modifiable risk factor that is a predominant feature of most glaucomatous animal models.

Aim: In our present study we wanted to develop an optimalized, standardized glaucoma model.

Methods: IOP (intraocular pressure) elevation was occurred after optimization of volume and diameter of the microbeads injection. We injected the anterior chamber of the right eyes with (10µl, 10µm) polystyrene microbeads while the left eyes were injected with the same volume of PBS. We expected the microbeads occlude the aqueous outflow, that lead to IOP elevation. The changes were monitored during the development of disease with tonometer and OCT (optical coherence tomography). After 14 and 28 weeks we processed the retinas for histological and immunohistochemical analysis.

Results: A single injection of microbeads resulted significant IOP elevation, caused significant RGC degeneration and functional loss.

Conclusions: These results support a flexible and reliable model of ocular hypertension with RGC loss. In our further plans we will treat glaucomatous animals with different possible retinoprotective agents to reduce the degree of retinal degeneration.

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Age-Dependent Changes Of Astrocytic Activity During Learning – A Progress Report

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Introduction: Astrocytes are a group of glial cells with several diverse functions. They contribute to clearance of ions and neurotransmitters, as well as to the neurovascoular coupling and metabolism [1-3]. Astrocytes are also known to contribute to memory and synaptic plasticity [1, 2]. We previously found that the NMDA receptor dependent astrocyte-neuron communication is a subject of a strong, age-dependent decline which might affect synaptic plasticity.

Aim: Our recent aims were the setting of Barnes maze test and thein vivo fluorescent microscopy (Miniscope). Our final aim is to observe decline of astrocytic signaling with age during a learning task.

Methods: Mice expressing cre recombinase or GCaMP6f genetically encoded calcium indicator in a GFAP dependent way with different ages (2-month-old, 6-month-old, 1-year-old) were used for the experiments. Barnes maze test was set and analysis of the results was achieved by using ImageJ software. The in vivo fluorescent microscope was purchased from Labmaker (Germany) and placed in a two-step stereotaxic surgery.

Results: We were working on Barnes maze protocol to measure spatial learning and memory of mice (GFAP-cre or GFAP- GCaMP6f) with different ages (2-month-old,6-month-old, 1-year-old) then analysis of these data by ImageJ program to see the relation different mice learning dependent on age. We also present the potential difficulties with setting in vivo microscopy.

Conclusions: After setting the behavioral and in vivo microscopic experiments, we plan to use it to detect the possible decline in astrocytic activity of the neocortex. Furthermore, we also plan to observe astrocytic activity related to formation of NMDA-currents on neurons. These experiments allow us to identify the age-dependent decline of astrocyte-neuron communication.

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Keywords: Astrocytes, NMDA receptor, Barnes maze

Development of the retinopathy in a diet-induced type 2 diabetic rat model

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Introduction: Type 2 diabetes (T2D) accounts for 90% of the population with diabetes, and these patients are also related with diabetic retinopathy (DR). DR is one of the most common cause of new onset blindness in people between 20-74 years in developed countries. A high-fat–fed/streptozotocin (HF-STZ) induced hyperglycemic rat model is usually used for neural complications screening, but the development of DR in this animal model is not clear yet.

Aim: Our aim was to investigate the development and the progression of DR in T2D in rats.

Methods: 3-month-old male Wistar rats were divided in a control and a HF-STZ groups. To induce T2D, HF-STZ animals were injected STZ (i.p.30mg/kg). Control group was kept on a regular rat chow while the HF-STZ group was kept on a high-fat diet. Each rat was followed with different methods (optical coherence tomography (OCT); electroretinography (ERG)) in vivo to screen the morphological and functional changes of the retina at specified intervals (0 day, 15^{th} weeks and after 1 year). After 1 year rats were sacrificed and optic nerves were collected for further morphological analysis.

Results: OCT results demonstrated that the retinas exposed to diabetes showed significant changes in the retina structure, edema, hard exudate and microaneurysm were observed. The total retinal thickness in diabetic group were significantly thinner from the 15^{th} weeks compared to control once. ERG responses of diabetic rats were disturbed (amplitudes of waves and implicit time) compared to control animals. Routine histology of the optic nerve showed less oligodendrocytes cell number in the central retinal area and larger nerve diameter in the diabetes group compared to the controls.

Conclusions: These results clearly demonstrate that diabetic retinopathy is successfully developing in these animals, therefore it will be suitable for further ophthalmic research in the future.

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Keywords: type 2 diabetes, diabetic retinopathy, OCT

Innovation and Medical Technology

Evidence based hand hygiene utilizing an innovative digital system

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Introduction: The incidence of hospital acquired infection has profoundly increased in the past few years. Due to the rise of resistant bacterial strains and the COVID-19 pandemic patient safety and infection transmission prevention has become matter of life and death. Hand hygiene has always been regarded as paramount regarding prevention of infection transmission however, in an era of evidence based medicine, current protocols not only seem outdated but they are also neglecting crucial aspects of hand hygiene. By utilising an innovative digital health system, we can expose these issues and updated protocols according to evidence based science.

Aim: The aim of this study was to examine different parameters regarding the use of alcohol based handrubs (ABHR) by an innovative digital health system.

Methods: The Semmelweis Scanner employs digital imaging and AI-based image processing to objectively determine which areas of the hand were properly covered by ABHR. Participants were given randomly predetermined volumes between 1 and 3 ml. Disinfectant coverage, application times, volume awareness as well as spillage was also examined.

Results: Participants did not cover 5.63% of their hand surface on average when 1 ml ABHR was provided. In contrast, applying 3 ml handrub, the average missed hand surface was decreased to 0.72%. As the volume was increased, more and more participant noticed that ABHR was dripping off from their hand (15.9% vs. 65.6% in the case of 1 ml and 3 ml, respectively). The documented application times were not in accordance with the WHO protocol.

Conclusions: Applying a suboptimal ABHR amount had huge effect on hand hygiene performance. More handrub resulted in better coverage. Further increasing ABHR amount may not result in an additional increase, as dripping became more significant at larger volumes. Equal volumes were perceived quite differently by participants, leading to the conclusion that variance in hand size should be taken into consideration.

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Keywords: Hand Hygiene, Infection Prevention, COVID-19, ABHR

Search redirection attack is a new and effective marketing method of illegal online pharmacies

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Introduction: In addition to unsolicited e-mail and links to advertisements or unwanted interfaces on the Internet, a little-known unethical commercial practice, the so-called search redirection attack, has appeared. Search Engine Results (SERs) of medications include a significant number of irrelevant websites that seemingly "advertise" medications, and link to illegal drug distribution sites.

Aim: Our goal was to assess the extent of the new marketing method that endangers health and drug safety and to present its domestic and international network.

Methods: We examined the SER links and redirection chains of 4 potency-enhancing drugs with high risk of illegal distribution and counterfeiting in Hungary and 11 EU countries, as well as the content of the target websites in the period 2019-2020. Networks were visualized by the Gephi software.

Results: International evaluation of SER lists show that the phenomenon is very different between the countries. Hungary has the second highest number of redirected pages at 35%. We performed three additional studies in a smaller study range at different time intervals for Hungary. It can be stated that in 2019, the rate of redirection attacks was high (58.7%) and then dropped to 32.5% a year later. It is clear from the graphs that the hacked pages remained largely the same, while the final illegal drug distribution target pages changed from time to time. At the international level, ezshopremedieshere.com has the largest network, which is accessible from Hungary 2020 onwards. We could not find a correlation between the proportion of hacked pages and the economic and demographic data of the studied EU countries, probably it is due to multiple factors.

Conclusions: As the proportion of this unethical commercial practice is high at the international level, authors urge counter measures of relevant authorities.

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Keywords: drug distribution, search redirect attack

Manufacturing and examination of vaginal drug delivery system by FDM 3D printing

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Introduction: The first 3D printed medicine was approved by FDA in 2015 and revolutionize the healthcare. This modern technique enables to manufacture complex, personalized products on-demand [1].

Aim: Our aim is to design and prepare a vaginal drug delivery system containing different antibiotics by FDM 3D printing. [2]

Methods: For our experiment, FDM 3D printing was used to manufacture the samples. The dissolution of the samples was measured by a special dissolution test performed in an Erweka Dissolution Apparatus with 200 ml simulated vaginal fluid and for at least 24 hours. The biocompatibility tests were performed on HeLa cell line to determine the dissolved xenobiotic content from the samples.

Results: Based on our results we successfully developed 3D printed vaginal rings containing antibiotics for the purpose of personalized medication. The API's were dissolved through the pores in the upper and lower surfaces of the samples.

Conclusions: Our developed printing technique can be easily used for the manufacturing of vaginal rings.

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Keywords: FDM printing, vaginal ring, biocompatibility, dissolution test

Development of an automated, artificial intelligence based system to recognise, diagnose and follow up nail symptoms and disorders

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Introduction: The differential diagnosis of nail disorders and the assessment of nail disease severity is tedious work, and requires special expertise. Furthermore, nail severity scores do not always correlate with the true extent and severity of nail symptoms.

Aim: Our aim is to develop an automated, artificial intelligence based system to recognise, diagnose, score and follow up nail symptoms and disorders.

Methods: We have developed a mobile phone based nail examiner device for the standardized photo documentation of nail symptoms. The device is equipped with a custom 3D printed setup, special optics and lighting. It captures 16 images for each nail in a standardized automated way, and stores them along with cloud-based documentation technology. For each nail a task is created for annotation, images are later annotated, and analyzed using artificial intelligence. Patients seen for different dermatologic and nail disorders at the Department of Dermatology, Venereology and Oncodermatology of University Pécs, were enrolled in this investigation. Nail images and detailed medical history were collected from patients. In case of onychomycosis, nails were subjected to mycologic analysis including native KOH preparation and/or culture.

Results: Since january 2019, 2283 patients were enrolled, and 3417 nails were documented. So far we have annotated 2599 tasks containing a variety of nail diseases including infectious, autoimmun as well as malignant nail diseases. In the case of 70 onychomycotic and 60 psoriatic nails we determined the frequency of each nail symptom by gender, age, and comorbidity. In psoriatic patients the most common symptoms were: pitting (43%), longitudinal ridging (42%) and splinter hemorrhages (40%). In patients with filamentous fungal infections the most common symptoms were: yellow nail (48%), hyperkeratosis (46%), and white nail (26%); in patients with sprouting fungi these were onycholysis (100%), red discoloration (100%), and hyperkeratosis (92%). Establishment of the incidence and extent of nail symptoms was made, and correlated with specific scoring systems (NAPSI, Target NAPSI, OSI). We found that these systems do not correlate well enough with the severity of the symptomes.

Conclusions: We have developed an innovative nail examiner device, and established one of the largest annotated nail image database so far. By using deep neural network based artificial intelligence, we are currently developing a system capable of recognizing specific nail symptoms with high specificity and sensitivity.

Assessing Medical Terminology in the Light of Online Education

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Introduction: Assessment can unquestionably be used as a perspective in a vast array of contents. Beside the traditional ways of assessing, the slowly emerging online assessment reached its peak due to today's pandemic situation. The focus here is on *online assessment* as a possible form of testing, examining different online assessing methods, namely gap filling, multiple choice, single choice and other exercises.

Aim: The present study is innovative, and its main target is to uncover the intriguing questions of online testing, especially in the means of Medical Terminology. The aim of the study is to enlighten the readers about the advantages and disadvantages of certain types of online test tasks and certain online assessing platforms (*Quizlet, Quizmaker, Redmenta*) in theory and also by a thorough experimental process.

Methods: Material and methods include surveys and online tests written in the subject of Medical Terminology taken by international students at the Medical School of the University of Pécs. The survey has questions regarding online tests, students' and assessors' attitude towards online tests, task types, validity and other issues, which truly have a huge importance hence today's situation around the globe.

Results: The results of the survey found clear support for the necessity of online assessment. Our results confirm that this a good choice not only for the investigated subject, but to nearly all fubjects, given the chance and need to test students' knowledge online. However, it is yet to discover how to deal with the challenges in the context of online assessment.

Conclusions: The study hypothesized that the students of the 21st century expect *instant information* in their online world but are they ready for online assessment as well? The study seeks answers for how to face the possibilities and difficulties in online assessment of Medical Terminology in the means of content, language and ability; intercultural differences in the attitude towards cheating; problem of guaranteeing safe individual work; the question of time limitations and controlling processes and the methods of test preparation and evaluation.

Keywords: Control, Competence, Evaluation, Medical Terminology, Online Assessment

E-Poster Session I.

Anxiety and depression in persons with Cochlear Implants during Covid-19

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Introduction: Fifteen percent of the world's population have been estimated to be living with some form of disability as of January 2018 [1]. In different countries, the incidence of hearing loss is steadily increasing from 2008 to 2018 for the 12 most populated countries in the world [2]. The four most commonly perceived effects of hearing loss worldwide by persons with a hearing loss are communication, relationships, exclusion and reduced job prospects. When your ability to communicate with others is impacted, it creates a domino effect and the exclusion from communication can then impact your relationships and emotional areas in your life. This can cause feelings of loneliness, isolation and frustration which can lead to depression and other mental health illnesses [3]. For those who make use of Cochlear Implants (CI/s), despite the benefits of the C/Is, they still experience impact of the hearing loss in their life [4].

Aim: To determine whether adults with CIs experience significantly higher depression and anxiety due to Covid-19 than those with normal hearing using the Generalized Anxiety (GAD), Patient Health Questionairre (PHQ) and Global Rating Scale (GRC) tools.

Methods: The target population are persons who make use of CI/s wordwide, with a control group of those who are normal hearing. Google Forms will be used as a survey tool to implement the GAD-2, GAD-7, PHQ-2, PHQ-9 questionairres; GRC scale; and open-ended questions.

Conclusions: There are no known articles or research on depression or anxiety on persons with CI/s, there are also no known research on the impact of Covid-19 on persons with CI/s. The data can therefore provide insights quantitatively and qualitatively into their mental health and lived experience during the covid-19 pandemic.

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Keywords: covid-19, anxiety, depression, PHQ-9, GAD-7

Dilatory Response of Masseter MuscletoStress

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Introduction: Different patterns of sympathetic activation may be elicited by different stressors (stressor-specificity) and the effects may depend on the location of the different tissues and organs examined (differential sympathetic activation). In this respect, different vascular control has been reported for the extracranial tissues of the head as compared to the limbs[1]. This was reported in particular for the cutaneous tissue of the face and limbs whereby a constriction is normally reported for limbs and dilatation is often reported in the facial district[2]. Whether a different hemodynamic response to stress also concerns skeletal muscles is unclear.

Aim: The aim of this study is to ascertain possible differential control of blood flow in masticatory and limb muscles in response to different stressors.

Methods: o investigate this issue, near infrared spectroscopy (NIRS) was used to measure relative changes in tissue haemoglobin index (THI) and tissue oxygenation index (TOI). From these parameters, changes in blood flow can be inferred[1]. One NIRS probe was placed over the masseter muscle and one over the biceps muscle. Cardiac output (CO), heart rate (HR) and arterial blood pressure (ABP) were also measured by continuous finger-pulse photoplethysmography. Twelve participants in supine position were subjected to a randomized series of stressors, including cold pressor test (CPT) and apnea (AP). Stress-induced changes on TOI and THI were evaluated by comparing the time average calculated over the last 10 sec of stressexposure, with the baseline (10-s interval before stress exposure). Statistical significance was assessed by Student'st-test and Hochberg's method with Dunn/Sidak alpha correction for multiple comparisons.

Results: The masseter THI showed significantly increase during CPT. While in the biceps THI exhibited a decreasing trend during CPT. On the other hand, the masseter TOI exhibited a significant increase during CPT;while in the biceps,the TOI significantly decreased. No significant changes were exhibited by the different variables during apnea, although there is a trendof increase in masseter THI which no longer significant after correction for multiple comparison.

Conclusions: To conclude, simultaneous monitoring of hemodynamic changes by NIRS in facial and limb muscles allowed to infer consistent differences in the control of blood flow in the two body regions in response to stressors of different types, the masseter more prone towards dilatation than biceps. The functional reason for this difference remains to be ascertained.

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Keywords: Blood Flow, Stress, Muscles, Masseter, Biceps

New, non-invasive computational fluid dynamic methods in the prediction of coronary artery disease progression

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Introduction: To date, fractional flow reserve (FFR) is the gold standard procedure for assessing the condition of coronary arteries. Although the pathomechanism of coronary stenosis and plaque progression is a well-known and intensively researched area, the significance of patient-specific characteristics and complex blood flow parameters are less well known.

Aim: We aimed to compare the pressure, velocity, and flow values measured by simulation with the invasively measured FFR and coronary flow reserve (CFR) values in patients.

Methods: Models were retrospectively analyzed from angiograms of 16 patients who underwent elective coronarography. Four groups were formed for inflow and outflow profiles with transient flow simulation 1: pressure-pressure profile; 2: velocity-pressure profile with vascular phase shift; 3: modified coronary velocity-pressure profile; 4: corrected flow-pressure profile. A constant pressure, velocity model was used as a pilot study.

Results: In the stationary simulation, a deviation of 5.9 $\pm$ 0.07 FFR and 11.5 $\pm$ 0.101% CFR compared to the measured / real values was observed (this showed the best approximation, then the boundary profiles of our transient measurements were examined. In the first group a significant oscillation >100% deviations was seen, in group 2: 10.91% $\pm$ 0.091% FFR, 73.41 $\pm$ 0.549%, significant CFR deviation, in group 3: 6.93% $\pm$ 4.74% FFR, 98.08% $\pm$ 49.85% CFR, in group 4: 13.25% $\pm$ 5.02% FFR 15.29% $\pm$ 8.13% CFR was observed compared to the measured values (the latter shows significantly close reliability, the vasodilated vessels can be attributed to the pressure increase observed during the simulation, which is characteristic of the model, as exactly the appropriate elasticity cannot be fully set in the simulation).

Conclusions: The adjustment system is suitable for non-invasive CFR measurement in coronary arteries. Additional flow influencing parameters can be investigated using CFD simulation. Parameters specific to stenotic vascular sections can be used in long-term prognostic and risk estimation systems.

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Keywords: computational fluid dynamics, coronary artery disease, FFR, CFR

The pro-autophagic effect of IL-36α and lipopolysacchrides in THP-1 cell

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Introduction: Autophagy is an important cellular catabolic process for the removal of damaged organelles, protein aggregates, and intracellular microbes. The lipopolysaccharide (LPS) of Gram-negative bacteria is known to stimulate autophagy. Some cytokines are powerful autophagy inducers, while others act as inhibitors. Interleukin-36alpha (IL-36alpha) is a member of the IL-1 cytokine family. IL-36alpha is highly induced in response to a number of stimuli, and exerts pro-inflammatory effects. The effect of IL-36alpha on autophagy has not yet been fully elucidated.

Aim: Investigation the pro-autophagic effect of IL-36α alone or in combination with the TLR4 agonist LPS in THP-1 cells.

Methods: The levels of LC3B-I and LC3B-II proteins were measured by using western blot analysis. The autophagic flux was determined by measuring LC3B-II levels under conditions where autophagosome degradation was blocked by bafilomycin A, a pharmacological inhibitor of lysosomal hydrolase activity and autophagosome-lysosome fusion. The intracellular localization of LC3B autophagic marker protein was determined by using indirect immunofluorescence assay. The LC3B-positive autophagosomes were quantified with the Image J software. Cytoplasmic acidification was detected by acridine orange staining.

Results: The results have shown that the levels of LC3B-II protein were increased in response to IL-36alpha or LPS. THP-1 cultures treated with IL-36alpha and LPS in combination showed significantly higher increases in LC3B-II levels than that of measured in cells incubated in the presence of IL-36alpha or LPS alone. Both IL-36alpha and LPS increased the number of LC3B-positive autophagic vacuoles, the combined treatment was again more efficient that the cytokine or TLR4 agonist alone. Finally, IL-36alpha and LPS stimulated the formation of acidic vesicular organelles.

Conclusions: These results demonstrate that IL-36alpha and LPS synergistically activate autophagy in THP-1 cells, and suggest that IL-36alpha may enhance the innate immune response against certain Gram-negative bacteria.

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Keywords: Autophagy, lipopolysaccharides, IL-36alpha

The Effect of preoperative chest physiotherapy on oxygenation and lung functions among open heart surgery patients

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Introduction: Postoperative respiratory complications (PPCs) in patients who underwent open heart surgery are serious life threatening conditions.

Aim: This study aimed at the assessment of the preoperative chest physiotherapy effects of on oxygenation and lung functions among patients undergoing open heart surgeries.

Methods: This is a randomized controlled study that was performed on one hundred patients with planned open heart surgery. They were randomly allocated into two groups, one group included patients who underwent the intervention in the form of home chest physiotherapy program for two weeks preoperative in addition to the traditional postoperative program. The other group included patients who underwent only the traditional postoperative one. O2 saturation, forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV1) were all measured daily from the day before (zero day) surgery till the seventh postoperative day. Any pulmonary complication and the length of hospital stay were recorded.

Results: Respiratory function measures were significantly higher in the intervention group (group 1) compared to group 2.

Conclusions: The addition of preoperative physiotherapy program in patients planned for open heart surgery revealed better postoperative respiratory function measures and less pulmonary complications.

Acknowledgements: This research was supported by Stipendium Hungaricum Scholarship, Doctoral School of Health science, University of Pecs.

Keywords: Open heart surgery, preoperative physiotherapy, lung functions, pulmonary complications.

Design of semiconductor contact-grating terahertz source for high energy terahertz pulse generation

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Introduction: Intense terahertz (THz) pulses in the low (0.1–2 THz) and mid (2–20 THz) frequency parts of the THz spectrum enable the development of new compact particles and X-ray sources for technological and scientific applications such as medical (Hadron therapy), security imaging, nonlinear terahertz spectroscopy, among others. Nonlinear semiconductor materials pumped at long infrared wavelengths can be considered as high-energy terahertz source. Pumping at long wavelengths using femtosecond laser pulses suppresses strong two-and three-photon absorption, together with the associated free carriers, allowing the use of higher pump intensities. Tilting the pulse-front to fulfill the phase-matching conditions for efficient terahertz pulse generation by optical rectification is necessary. This can be achieved by the use of contact-grating (CG) technology. This technique is applicable to semiconductors over other nonlinear materials such as lithium niobate because they have smaller pulse-front tilt angles ($< 30^o$).

Aim: The aim of our work was to design semiconductor contact-grating terahertz source for use in the generation of terahertz pulses.

Results: In our numerical simulations, we will demonstrate that diffraction efficiencies, as high as 75% and 90% can be achieved in gallium arsenide (GaAs) and gallium phosphide (GaP), respectively, using binary contact-grating profiles in the infrared pump wavelengths range 2.06-3.9 μm and at phase-matching frequencies of 1-4 THz. Contact grating technology has been successfully applied in zinc telluride semiconductor, where THz pulses with a pulse energy of 3.9 μJ, electric field strength of 0.57 MV/cm and optical-to-THz energy conversion efficiency has been realized [1]. Furthermore, investigations of multi-cycle THz pulses generation by optical rectification in gallium phosphide [2] has revealed that conversion efficiency as high as 3% can be achieved with optimal pumping conditions of a pulse duration of 150 fs, 5 mm crystal length 15 GW/cm2 and 2THz phase-matching frequency [3, 4]. These results demonstrate that GaP as a suitable candidate for high-energy THz source. This can be extended to other zinc blende semiconductors such as gallium arsenide. We will discuss design parameters for semiconductor contact-grating THz source, optimal pumping conditions and phase-matching frequencies for long infrared wavelength pumping with emphasis on the diffraction efficiency. Therefore, terahertz pulses with mJ -energy level are feasible. Potential applications include medical and nonlinear spectroscopy.

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Keywords: Contact-grating, optical rectification, tilted pulse front pumping, Gallium arsenide and Gallium phosphide.

Do we inhibit or do we attend to threatening stimuli? An eye-tracking study of signal suppression.

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Introduction: It was evolutionarily advantageous for us to quickly notice threatening objects in our environment. Theories of attention explain our orientation with two underlying mechanisms, the stimulus- and the goal-driven attentional mechanisms. These processes can be modulated by salient object features like shape, colour or affective valence [1,2]. The signal suppression hypothesis of controlled attention capture theory [3] claims that we are able to inhibit salient signals before their stimulus-driven procession happens, when it comes to physically (and not semantically) salient stimuli. This would result in the working of the goal-driven processes and better task-performance.

Aim: In the present study, our aim was to test the interaction between the stimuli- and the goal-driven attentional mechanisms, while threatening distractor stimuli were present.

Methods: Our participants had to find an exemplar of a neutral category (e.g. a butterfly or a lock, i.e. target) amongst other objects of other neutral categories. We manipulated the target being absent or present, the distractor stimuli (no distractor, threatening distractor or similar in shape to the threatening distractor). Half of the task either had a threatening distractor (snake or gun) or a non-threatening but similar in shape distractor (earthworm, hairdryer) in different but controlled distances (close, middle, far) to the target images. In the other half of the task, we used no distractors. The task was carried out in a behavioural and an eye-tracking study.

Results: In trials where targets were present, a significant effect of the distractors was found in both the behavioural and eye-tracking studies. Our participants were significantly slower in the trials where threatening distractors were present close or far from the target. Reaction times were also slower when similar in shape distractors were close to the target. We found no such difference for the condition where distractors were in a middle position from the target.

Conclusions: Inhibition of threatening stimuli on the close and far conditions is difficult compared to when these stimuli are placed in the middle. People tend to look at the threatening objects that are close more often than they do on the targets. However, they do not look often on these distractors or the targets when they are placed far from the target. The reason behind this phenomenon needs further investigation.

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Keywords: threatening stimuli, attention, signal suppression, inhibition

Overview of Hospital Design and the Impact of the Covid-19 Outbreak

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Introduction: Hospital building design is complex and it is among the architectural spaces that most requires to transmit a sense of relief and healing for their occupants. In this case, the built environment requires a greater concern regarding the patient safety and space quality. Over time the hospital building suffered substantial typological changes. These changes in design, interfered in solutions related to indoor environmental quality, healthcare spaces design and functional hospital joints.

Aim: Investigate and expose data related to the historical and philosophical processes that were part of the evolution of the hospital design from the late eighteenth century to the present time. Analyse the possible changes in the current hospital design model due to the covid-19 outbreak.

Methods: This paper consists of an analysis of the hospital design through history, using the historical-interpretive research methodology and literature review.

Results: Throughout history the hospital building design suffered changes in its typology and configuration. Those changes are due to the contextualization of society, according the scientific developments, different necessities such as diseases outbreaks and philosophical processes. The covid-19 outbreak already affects the hospital design. The current changes are provisory, however some of them will most likely to be taken into consideration in future design of hospital buildings.

Conclusions: The historical-interpretive research methodology was very accurate in analysing the hospital design throughout history. It is interesting to analyse past situations similar to the current covid-19 outbreak and how it affected the hospital design in general.

Keywords: hospital design, healthcare environments, architecture, covid-19 outbreak

The Effect of Disinfection on the Mechanical Behaviour of 3D Printed Materials

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Introduction: When the COVID-19 pandemic has begun, the shortage of medical protective equipment(PPE) became a worldwide phenomenon. Enthusiastic amateurs aimed to help in this exceptional situation, making safety goggles, shieldsor masks, using their own FFF (Fused Filament Fabrication) 3D printer [1,2]. However, it is an undoubtedly honourable initiative, PPE fabricated with additive manufacturing must be critically evaluated.

Aim: This study aims to examine the most frequently used 3D printing materials in terms of mechanical characteristics, and to explore the effect of disinfection protocols on their functionality, with particular regard to those materials which can be used for PPE production.

Methods: ABS, PLA, HIPS and PETG have been tested using FFF technology and PA with SLS technology. The disinfection was carried out with ethanol 70 V/V% and a SumaTabD4 chlorin tablet, according to the clinical protocols. The mechanical tests carried out were the Shore D (ISO 868), Charpy impact (ISO 179-1), 3 point flexural (ISO 178) and tensile tests(ISO 527-1). The different parameters were compared with two-sample t-test with 95% confidence interval, after 10 and 20 cycles of disinfection, where untreated test specimens served as a control samples.

Results: Surprisingly, the Shore D hardness and Charpy tests did not show significant changes. In case of the 3-point flexural test, the Young modulus of PA has increased significantly after 10 cycles (from 1113MPa $\pm$30,5MPa to 1540MPa $\pm$74MPa)then did not changed significantly. The PLA in case of SumaTabD4, the flexible Young modulus increased after 10 cycles, then significantly decreased after 20 cycles(from 3060MPa $\pm$126MPa to 3196MPa $\pm$73MPa, then to 2154MPa $\pm$93MPa), but this statement was not true to tensile Young modulus. Meanwhile ABS and PETG show the least amount of changes against surface sterilizations.

Conclusions: ABS and PETG found as a resistant 3D printing material using surface disinfection methods. Not only industrial SLS technology, but the cost effective FFF technology is also excellent to produce PPE in case of supply shortage.

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Keywords: 3D printing, Personal Protective Equipment, Sterilization, Material properties, Pandemic

Report on the operation of the COVID-MENTA Screening Program - Interim results of data on stress and cognitive functioning

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Introduction: Studies indicate that a professional strategy should be developed for the mental protection of healthcare workers during COVID-19 pandemic, as a robust number of them reaches the clinically significant threshold of severe anxiety, depression, and post-traumatic stress disorder (PTSD) [1, 2].

Aim: Our aim is to report interim results on the ongoing COVID-MENTA Screening Program. We assume that perceived stress level of health professionals can be predicted by cognitive performance [3], and with this data, people at risk are easier to identify. Our further goal is to restore their mental health through individual and group interventions.

Methods: Screening of the medical staff ($N = 70$) happened during the resting phases of working hours. Besides vital signs and psychological data collected, we measured perceived stress with the Distress Thermometer (DT) [4] and executive cognitive performance with the Digit Symbol Substitution Test (DSST) [5] in 5 minutes. Data was collected between the 2nd and 3rd wave of the pandemic in Hungary.

Results: Scores of medical workers' DSST does not significantly correlate with their perceived stress level (r_s = -0,7, p = 0,59). There was no difference in DSST scores among those who perceived robust level of stress ($N = 12$) in comparison to those who did not experience remarkable stress levels ($N = 12$) ($t(22) = 1{,}73$, $p = 0{,}09$).

Conclusions: Our tools are fast and feasible for healthcare professionals, and might give workers the sense of caregiving, or a pastime opportunity. However, our interim results suggest that we should be aware of the possibility, that the DSST is not sensitive enough in the detection of perceived stress level. Rather we propose the use of any wearable sensors that monitors workers' vital signs continuously. The COVID-MENTA Screening Program is still in process, thus our further investigations will concentrate on comparing data between certain waves of the pandemic soon.

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Keywords: COVID-19, perceives stress, cognitive functioning, DSST, screening program

Evaluation of neurovascular coupling by transcranial doppler ultrasound system

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Introduction: Neurovascular coupling (NVC) is a mechanism, which supplies the metabolic need of the active cerebral areas by increasing the local perfusion. Impairment of NVC have been associated with cognitive deterioration, thus monitoring could have an important clinical relevance.

Aim: In this study a new, non-invasive setup is introduced and tested on young and elderly to evaluate NVC by transcranial doppler ultrasound system.

Methods: To establish the system, a transcranial ultrasound, a continous beat-to beat blood pressure monitor and an ICM+ softwer was installed. To test the NVC in middle cerebral artery (MCA) eight specific task was applied. To determine the age dependent changes in NVC 6 healthy young (G1; mean age:25 years) and 6 elderly (G2; mean age: 67,5) volunteer were examined.

Results: The blood pressure was elevated in G2 in case of most tasks. Cerebral arterial blood volume (CaBV) was also increased, in both groups, except during the hyperventillation test (lCaBVmax G1: 17% G2: 21%, rCaBVmax G1: 16% G2: 12%). In case of the Trail making test, CBFv was significantly higher in MCA, in G1, where blood flow velocity was measured as lFV 17% and rFV 12%, and blood volume as lCaBV 17%, rCaBV 12%, respectively. In the older group, the elevation of the parameters was also observed, but statistically it was not significant.

Conclusions: According to our results, trail making test was the most reliable to identify NVC alterations, and aging probably decreases the flow velocity of MCA. The established setup is reliable to non-invasively analyse NVC alterations, but in neurological conditions further clinical trials are needed.

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Keywords: ageing, neurovascular coupling, transcranial doppler

Report on the operation of the COVID-MENTA Screening Program–Interim results of data on psychological distress and suicide ideation

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Introduction:COVID-19 frontline workers are exposed to great psychological distress which can affect their mental health [1] and increase the risk of suicide [2]. Heart rate variability (HRV) [3] and blood pressure [4] could be potential biomarkers of psychological distress. The COVID-MENTA Screening Program was developed to monitor the frontline medical workers' mental health status through perceived stress, HRV and blood pressure.

Aim: The aim of the study was to investigate the association between psychological distress, the biomarkers of stress (HRV and blood pressure) and suicide ideation among COVID-19 healthcare workers.

Methods: 50 frontline healthcare workers participated in the survey. An application was used to measure the HRV and blood pressure, as well as the level of distress and suicide ideation. Spearman correlation was used for statistical analysis.

Results: Psychological distress significantly correlated with suicide ideation ($r(48) = 0{,}43$, $p < 0{,}01$). There were no significant correlation between distress and HRV ($r(48) = 0{,}05$, $p = 0{,}73$), distress and systolic blood pressure ($r(48) = -0{,}16$, $p = 0{,}26$), distress and diastolic blood pressure ($r(48) = -0{,}02$, $p = 0{,}87$).

Conclusions: Our study demonstrated that distress is associated with suicide ideation among COVID-19 healthcare workers, therefore mental screening programs are necessary to protect the mental health of frontline workers. In addition our results showed that the level of psychological distress was not predicted by HRV and blood pressure on our sample.

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Keywords: psychological distress, COVID-19, suicide, heart rate variability, blood pressure

Motivation of employees in covid-19 time and hypnosis impact

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Introduction: Covid-19 generated a need of change and adaptation of the business model of organizations. The emergence of the virus opened the door for researchers, in every discipline, to study its impact and despite being older than the virus, hypnosis is still under-studied in the business field, even as Neuro Linguistic Programming.

Aim: Inspect motivational level according to the emotional intelligence definition, and effect of covid-19 on employees, and test the effectiveness of motivational hypnosis session on them and its possible effect on their perception of the corona virus.

Methods: Exploratory research was made on 10 employees from same company. First questionnaire was shared to study their motivational level and Covid-19 effect. Motivational hypnosis session took place, and finally, a second questionnaire was administered after 48hours to study the possible effect of the hypnosis (time determined by two hypnotherapists).

Results: Motivation level of employees is high despite the covid-19-time. Managers showed a higher motivation level than less experimented employees. Despite their high motivation level, covid-19 did have a big impact on employees. The second questionnaire, after the hypnosis session, showed that hypnosis had increased employees motivation but did not have a significative impact on their perception of the virus.

Conclusions: The size of the sample make it impossible to generalize the findings but this research open doors for further researches.

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Keywords: Covid-19, employee's motivation, hypnosis

Electrospun nanocomposite meshes for tissue engineering

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Introduction: One of the most focused-on point in biomedical research is the fabrication of complex tissue engineering scaffolds, with the ultimate objective being a functional, biocompatible and biodegradable implant that could facilitate and enhance tissue regeneration. Creating such implants is a highly challenging and difficult task as several parameters have to be adjusted and optimised. Composite materials have been regularly used in numerous areas of science and engineering as they incorporate advantages from two or more component materials. Electrospinning is a simple yet highly versatile method to produce membranes composed of nanosized fibres.

Aim: ur objective was to fabricate a composite, fibrous mesh composed of slow and fast degradable elements, that could be applicable as an implant with competent mechanical properties without hindering in vivo tissue integration.

Methods: Fabricated scaffolds were produced by concurrently electrospinning polycaprolactone and poly(succinimide) solutions resulting in scaffolds of 1:1 mass ratios. Post-electrospinning processing including mechanical and chemical treatments were performed to reinforce the scaffolds and induce cross-linkage. Scaffolds were chemically examined with Attenuated Total Reflection–Fourier Transform Infra-Red spectroscopy to confirm the presence of both polymers while investigation of scaffold microstructure was performed with Scanning Electron Microscopy and Fluorescent Microscopy imaging. Water contact angle assessments were conducted to determine scaffold wettability and uni-axial pulling measurements were carried out to evaluate mechanical properties. Cell studies have started with very promising preliminary results.

Results: We confirmed the presence and random interpenetrating distribution of both PSI and PCL fibres in the fabricated scaffolds. Mechanical studies indicate that meshes are indeed competent for implantation while the preliminary cell viability study revealed no cytotoxic effects.

Conclusions: In vivo investigation of biocompatibility and biodegradability can commence.

Keywords: electrospinning, tissue engineering, nanofibres

Burnout Syndrome among health professional on coronavirus outbreaks

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Introduction: COVID-19 has become a global health emergency resulting from physical health and also psychological outcomes due an exposed to unexpected situations in hospitals experienced by health professionals[1]. These exposures increase the risk of developing of mental health conditions, such Burnout Syndrome (BS). BS is a psychosocial phenomenon that emerges as a response to the various occupational stressors present at work. It is characterized mostly by three dimensions, emotional exhaustion, depersonalization and low professional achievement[2].

Aim: to analyze burnout syndrome among health professional on coronavirus outbreaks.

Methods: this is a systematic research conducted on studies published in PubMed, Web of Science, Scopus and Scielo databases.

Results: Terms initially searched a total of 361 articles. After we removed duplicates, checked the title and abstract, and reviewed full-text, four studies eventually met the predetermined inclusion and exclusion criteria. The four approved studies involved 1.235 health workers. Kim et al. [3] studied nurses from emergency room and ICU and found post-traumatic stress disorder of MERS-CoV significantly associated with burnout. (Maunder et al. [4] found in HWCs that maladaptive coping and perceived adequacy of training of SARS-CoV together with protection and support explained 18% of the variance in burnout. Kim and Choi [5] found in nurses from emergency department that job stress was the biggest influencing factor of MERS-CoV-related burnout, and also poor support from family and friends increased this correlation. Lancee et al. [6] found BS as a psychological distress and indicated greater burnout in health works care related to MERS-CoV.

Conclusions: The lack of training to deal with covid is one of the main reasons for poor coping and the development of stress that in combination with other factors, such as the lack of social support, subsidize the emergence of the burnout syndrome in health workers.

Keywords: Burnout syndrome, work disease, occupational exhaustion, health care workers, covid

Cognitive function of children with oral clefts: A pilot study.

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Introduction: Cleft repair surgeries have significantly improved treatment outcomes for individuals with oral clefts. However, new advances in research strongly suggest a unified primary dysfunction of normal brain and face development that could explain the neurodevelopmental issues observed in these children [1,2].

Aim: To identify cognitive skill deficits of children and adolescents with oral clefts in order to analyze the risk associated to the presence of the congenital defect on brain development.

Methods: A prospective-comparative, single-center pilot study was carried out at the Department of Pediatrics of the University of Pécs between July 2020 and March 2021. The participants included children with oral cleft in the care of the Pécs Cleft Team and their controls. The participants were between 8 and 16 years old. The study consisted of genetic screening, questionnaires, computer-based cognitive tests and an IQ test.

Results: A total of 16 children with oral clefts and 14 controls participated in the study. Neurodevelopmental-related issues were observed in more than half of the children with oral clefts (62,5%). The statistical analysis revealed significant difference at the Corsi Block-Tapping Test; controls performed better than children with oral clefts ($p<0.05$).

Conclusions: Statistically significant differences were not observed in the majority of the cognitive tests. However, children with oral clefts presented more often with neurodevelopmental-related issues than the control group. Increasing the size of both study populations will allow a more detailed investigation of the differences between these children.

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Keywords: cleft lip, cleft palate, child, neurodevelopmental disorders, psychiatric comorbidity

The effect of infodemic on the illegal sale of ivermectin medications during the time of the COVID-19 pandemic

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Introduction: The online pharmacy market is rapidly growing during the past two decades as we are moving to a more digitalized world where we mostly get things we need from the internet. Due to COVID-19, the world experienced lockdowns and travel restrictions. The fear of getting infected by the virus led to the increase reliance on online services and purchase of consumer goods via the internet, including pharmaceuticals.

Aim: The aim of our study is to provide evidence about the illegal online availability and consumer accessibility of ivermectin, an anthelmintic agent without substantiated indications for SARS-CoV-2.

Methods: In our study we have combined infodemiology and infoveillance methodology (Google trends, national media and Facebook searches) with our previously published risk-based method for online medicinal products to evaluate of the severity/consequence of the patient safety risks associated with the internet procurement (drug information and guideline evaluation), and the probability of the online purchase of ivermectin products (search engine result (SER) assessment and website analytics).

Results: Users' Google queries on the active ingredient was trending and peaked during the last week of November. Majority of the SER links were relevant during the study period, most (63,3-83,3%) referring searchers to online pharmacy websites offering human medicines direct to consumers. Consumers more likely found links leading directly or indirectly (via redirection) to illegal medicine sellers representing about half (53.3%) of SER links of the first three result pages in December 2020 and reaching 73.3% by March 2021.

Conclusions: Most likely the increased threat caused by the large number of new confirmed cases and the confusion generated by the media on the potential beneficial effects of ivermectin have contributed to the high interest, and presumably the demand for the active ingredient. As Mis- and Disinformation are on the high-rise, Pharmacists which are the "first line" health-professionals are required to provide concise, reliable, and accurate information with reputable scientific validation to counter misinformation and disinformation.

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Keywords: Ivermectin, COVID-19

E-Poster Session II.

Strain-dependent early renal complement expression in UUO murine model of kidney fibrosis

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Introduction: Renal fibrosis develops in chronic kidney diseases and represents a significant health concern due to the exponentially increasing number of patients. However, progression rates vary among patients, presumably due to genetic variation. We have previously described the strain-dependent progression of renal fibrosis in TGF-beta transgenic mice, being C57B/6J (B6) mice resistant [1]. However, early renal fibrosis development events in various common laboratory mouse strains have not been simultaneously tested. Here we compared the rate of fibrotic development due to unilateral ureteral obstruction (UUO) in C57B/6J (B6), Balb/cJ (BalbC), CBA/J(CBA), and FVB/NJ (FVB) mice.

Aim: Although renal complement-3 (C3) expression has been described in several experimental and human kidney diseases, we hypothesize that altered local complement expression might strongly depend on the mice's genetic variability.

Methods: Six-week-old B6, CBA, BalbC, and FVB male mice underwent UUO surgery of the left kidney (n=3-6/strain). Contralateral (unobstructed) kidneys served as controls. Mice were investigated 24 hours post-surgery for mRNA expressions, protein expression of C3, and histological evaluation. Statistical significance was evaluated using a one-way analysis of variance (ANOVA). The level of significance was set to $p<0.05$.

Results: Although the histological evaluation did not show any apparent signs of fibrotic events at 24 hrs post-UUO surgery, C3 gene expression was induced in all strains to various degrees. As markers of tubulointerstitial fibrosis, TGF-beta1 and CTGF mRNA expressions were increased in CBA and BalbC strains, respectively. Gene expressions for Creb5 and STAT3 also showed different expression patterns being more elevated in the BalbC strain. Protein assessment showed C3 protein dysregulation in all strains in control and 24 hours post-UUO animals. Further investigation of individual pathways in each strain will follow.

Conclusions: We conclude that genetic background determines the expression rate of renal complement system components, growth factor, and transcription factors in the UUO murine model of kidney fibrosis. Altered renal complement expression could, through paracrine/autocrine effects, influence chronic kidney disease progression.

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Keywords: Complement, CKD, UUO, fibrosis, transcription factors (TF)

Involvement of the Catecholamine Pathway in Glioblastoma Development

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Introduction: Glioblastoma (GMB) is the most aggressive and the deadliest tumor of the central nervous system (CNS). The standard of care only improves the overall survival of patients by a few months. Explorations of new therapeutic targets related to molecular properties of the tumor are under way. Neurotransmitters and their receptors generally act as mediators of interneuronal communication. However, our previous epigenetic analyses and evidence in the literature suggest that these molecules may also be involved in modulating the development and growth of GBM by acting on neuronal and glioblastoma stem cells.

Aim: To investigate whether or not measures of DNA CpG methylation are inversely correlated by protein expression levels when control brains, primary and recurrent GBMs are compared.

Methods: We quantitated the expression levels of four selected catecholamine pathway markers (alpha 1D adrenergic receptor—ADRA1D; adrenergic beta receptor kinase 1 or G protein-coupled receptor kinase 2—ADRBK1/GRK2; dopamine receptor D2— DRD2; and synaptic vesicle monoamine transporter—SLC18A2) by immunohistochemistry, and compared the results with the methylation levels within the promoter+genes of these markers in the same sequential GBM samples and controls. The levels of promoter+gene methylation of the same markers were then also determined in an independent database cohort of sequential GBM pairs.

Results: The analyses revealed partial inverse correlations between the catecholamine marker expression and promoter+gene methylation levels in tumor vs. control comparisons. However, we found no significant differences in the promoter+gene methylation levels of these markers in either our own or in the database GBM cohorts, despite the fact that all markers showed higher protein expression in the primary compared to the recurrent GBM samples.

Conclusions: The regulation of catecholamine expression is only partially related to DNA CpG methylation within the promoter+gene regions, and additional mechanisms may also influence the expression of these markers in progressive GBM. This study provides further evidence to support the involvement of certain catecholamine pathway markers in GBM development and suggests that the roles of these molecules in modulating tumor growth merit further explorations.

Keywords: DNA CpG methylation, gene expression, catecholamine pathway, sequential GBM

Shikonin inhibits proliferation of human kidney cancer cells through induction of apoptosis

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Introduction: Renal cell carcinoma (RCC) is the 6th most frequently diagnosed cancer in men and the 10th in women, accounting for 5% and 3% of all oncological diseases. Tyrosine kinase inhibitors including sunitinib have been introduced in RCC treatment because of their anti-oncogenic properties. However, in recent years, sunitinib therapy has been less effective, especially in patients with metastatic renal cancers. Therefore, searching for new therapeutic options and investigating this malignancy's underlying molecular mechanisms are of great importance.

Aim: The objective of the present study was to analyze the cytotoxic effect of Chinese plant extract shikonin, on CAKI-2 and A-498 human renal carcinoma cell lines. Moreover, we aimed to compare the efficacy of shikonin with sunitinib. Also, we studied whether shikonin exerts an effect on the expression of some specific oncogenic miRNAs, and their specific targets (e.g. Bax, Bcl-2), after 24 and 72h treatment.

Methods: For *in vitro* assay, shikonin was used at concentrations 1-40 μM. The Cell Titer-Blue Proliferation test (Promega) was used to detect the compound's cytotoxic activity. The effect of shikonin on miRNA was tested with specific stem-loop primers by qRT-PCR.

Results: Shikonin showed a dose dependent effect on both human renal cancer cell lines examined. In contrast to sunitinib, shikonin treatment resulted in significantly more potent inhibition of cell proliferation *in vitro* at 2.5 μM concentration. Among the miRNAs we tested, there was a slight increase in miRNA-21 and miRNA-223 expression in the CAKI-2 cell line, whereas miRNA-155 showed no expression change, compared to untreated control samples after 2.5 μM shikonin treatment. In the A-498 cell line, a slight increase in the expression of the miRNA-21, miRNA-155, and miRNA-223 was found compared to untreated control cells.

Conclusions: Based on our results, we suppose that shikonin-induced miRNAs may inhibit cell proliferation by affecting signaling pathways through their specific targets. miRNAs may also influence the therapeutical sensitivity of renal cancer cells.

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Keywords: renal cell carcinoma, shikonin, Bax, Bcl-2

Expression of indoleamine 2,3-dioxygenase (IDO) and PTEN in human renal carcinoma

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Introduction: Renal cell carcinoma (RCC) is the 10th most common cancer worldwide. Approximately in one-third of patients with RCC develop metastatic disease. The field of immuno-oncology is dramatically changing the landscape of malignant diseases and immunotherapy has become a mainstay of cancer therapy. The inhibition of immune checkpoint molecules, including indoleamine 2,3-dioxygenase (IDO) is a promising approach for activating immuntherapy so far. PTEN is well known to function as a tumor suppressor that antagonizes oncogenic signaling and has a key role in the prognosis and the immunotherapy of the disease.

Aim: This study aimed to explore the role of IDO in RCC and to understand the multifaceted functions of PTEN as both a tumor suppressor and an immune regulator.

Methods: A total of 20 tumorous and healthy tissue samples were obtained from patients, who were diagnosed with RCC and underwent surgery at the Department of Urology, University of Debrecen. Macherey-Nagel Kit was used for isolation of total RNA from tissue samples and from human kidney cancer cell lines A-498 and CAKI-2. The expression of IDO and PTEN was analyzed by real-time qRT-PCR (CFX-96, BIORAD) with specific oligonucleotide primers.

Results: According to our results a highly significant ($p<0.001$) difference was found in the mRNA level of IDO and PTEN among the RCC tissues and the tumor-free kidney tissues in examined. Relationship among age, gender and the expression of the genes (PTEN and IDO) was not observed. Both of the human kidney cancer cell lines showed the expression of PTEN. However, the expression of IDO in any of the cell lines examined was not detected.

Conclusions: In summary, our findings suggest that high IDO expression may play a role in the development of renal cancer, and IDO might be a prognostic biomarker for patients with RCC. Our result could help to understand the complex immune process of this malignant disease and may offer a new therapeutic approach for renal carcioma with less adverse effect.

Acknowledgements: The work was supported by GINOP-2.3.2.-15-2016-00043 (GH) and NKFIH-1150-6/2019 (GH). The work was also supported by the EFOP-3.6.1-16-2016-00022 project. The project is co-financed by the European Union and the Europian Social Fund.

Keywords: IDO, PTEN, qRT-PCR, Renal carcinoma

Development of analgesic silicone-based transdermal patches

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Introduction: Transdermal therapeutic systems (TTS) provide an excellent mode of accurate, safe and painless dosing in drug therapy. Modified silicone-polymer-based systems provide a well-controlled and cost-effective matrix diffusion system.

Aim: We investigated substance release properties, skin penetration and analgesic effect of a modified silicone-polymer-based system loaded with capsaicin.

Methods: Release properties of silicone-based model TTS loaded with capsaicin were measured *in vitro* in Franz-cell and continues flow cells. Capsaicin was detected with HPLC-UV and UV spectrophotometry. Raman spectroscopy was conducted on human skin samples exposed to the TTS. Male Wistar rats were anesthetized with sodium pentobarbital. A surgical incision was performed and sutured on one hindpaw. Capsaicin-releasing TTSs were applied to the epilated dorsal skin either right after the incision or 18 hours later. Patches were kept on the animal for 6 hours. Thereafter, mechanical pain threshold of the hindpaws was detected with dynamic plantar aesthesiometry.

Results: Patches exhibited regulated capsaicin release. According to Raman experiments, capsaicin penetrated into the dermis and epidermis of human skin. Thermal pain threshold of the operated rat paws was elevated by capsaicin treatment compared to that of animals treated with control patch.

Conclusions: Our silicone-based TTS displayed controlled release of capsaicin. Further experiments involving TTS loaded with various detergents and other excipient possessing unexplored potential offer further optimization of substance release and increased therapeutic value.

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Keywords: capsaicin, silicone, transdermal therapeutic system, analgesia, release kinetics

The role of limbic forebrain glucose monitoring neurons in the body weight regulation

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Worldwide the occurrence of various nutritional and metabolic diseases is increasing at a higher rate. In their background, peripheral regulatory disturbances were identified, but nowadays it is well known that the central nervous system regulatory mechanisms are affected as well [1].

The target subject of our present experiments is the group of the so-called glucose monitoring (GM) neurons, which these chemo-sensory cells have fundamental role in the central regulation of both the nutrition and the metabolism [2, 3] as well. These neurons can be found in several brain areas regulating homeostasis, also they can be found in various limbic forebrain structures, which have role in the regulation of learning, motivation, and behavioural aspects of food intake [4–6].

The GM neurons are known to respond actively and variably to the changes of glucose concentration of the surrounding interstitial fluid [7], and consequently they also respond to the blood glucose level changes as well. The intracerebral bilateral microinjection of streptozotocin (STZ) selectively destroys the GM neurons in the affected area. This selective lesion causes various metabolic changes, among others it causes weight gain by disrupting the regulation of carbohydrate metabolism [8].

The goal of the present experiments is to investigate the relationship among the regulatory mechanisms, related to the GM neurons, and the control processes of the blood glucose levels and the body weight.

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In vivo examination of membrane nanotubes in developing zebrafish embryos

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Introduction: Membrane nanotubes (NT) were first reported in 2004 between rat pheochromocytoma (PC12) cells. These actin-based cell protrusions seem to be channels for intercellular communication [1]. Membrane nanotubes were described both *in vitro* (in cell cultures) and *in vivo* between zebrafish embryos [2].

Aim: We focused on the *in vivo* characterization of membrane nanotubes in developing zebrafish embryos.

Methods: Laser-scanning confocal microscope and transmission electron microscopy (TEM) were applied to examine the NTs between the epiblast cells of the embryos.

Results: The characterization of membrane nanotubes shows that their length in 4-5 hours old embryos is approximately identical with the individual cell diameters. In the case of 6-7 hours old embryos, the tubes are considerably longer and their occurrence is pronounced in the animal pole of the embryo.

Conclusions: Our data clearly support the *in vivo* existence of NTs, but further experiments are needed to reveal their possible function in zebrafish embryo.

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Acknowledgements: University of Pécs, Medical School, Department of Biophysics

Keywords: membrane nanotube, zebrafish, embryo, epiblast cells, actin

Detection of Vancomycin Resistant Enterococci (VRE) from Hospital Effluents

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Introduction: Antibiotics are used across society, but hospitals are potentially an important source of antibiotic resistance dissemination into the environment [1]. Enterococci, which are part of the natural intestinal flora of animals and humans, can be released to the environment via sewage. They exhibit multiple intrinsic mechanisms that confer resistance to various antimicrobials [2]. However, with the increased use of glycopeptide antibiotics, mainly vancomycin, in medical institutions, vancomycin-resistant enterococci (VRE) have arisen.

Aim: This study aimed to evaluate the prevalence of vancomycin resistant Enterococci (VRE) from hospital effluents and to characterize the glycopeptide resistant genotypes in the species.

Methods: Total Enterococci and VRE load from the hospital effluents was enumerated in bile esculin azide agar amended with vancomycin at minimal inhibitory concentration and antibiotic free media. The isolates were identified by MALDI-TOF/MS and assayed for antimicrobial resistance profiles. Genes encoding glycopeptide resistance and harbored in plasmid DNA were detected by polymerase chain reaction.

Results: Total Enterococci was significantly higher than VRE (P = 0.0001). However, No significant variation in VRE was observed among the various hospital effluent samples (P = 0.219). The VRE isolates (n=44) recovered from the effluents belonged to the species E. *faecium* (25), *E. casseliflavus* (2) and *E. gallinarum* (17). All the isolates showed multiple antibiotic resistance (MAR) phenotype. 100% (n= 44) were resistant to ciprofloxacin and sulfamethoxazole/trimethoprim, 97.7%, vancomycin, 88.6%, imipenem and 38.6%, teicoplanin. 84% (21/25) of the clinically important E. *faecium* isolates were resistant to glycopeptides, vancomycin and teicoplanin. This resistance was traced to gene *vanA* in the plasmid DNA while 60% (15) harbored gene *vanB* and were also susceptible to teicoplanin. Co-production of both genotypes, *vanA* and *vanB* occurred in 48% (12/25) of this species.

Conclusions: Multidrug resistant VRE is prevalent in untreated clinical effluents discharged into the wastewater network. The presence of clinically important E. *faecium* harboring glycopeptide resistance genotypes in these effluents poses an epidemiological risk due to environmental contamination.

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Keywords: Hospital effluents, VRE, glycopeptide resistance genes

Median raphe region serotoninergic neurones affect depressive-like behaviour and vegetative functions, but not social behaviour

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Introduction: Midbrain median raphe region (MRR) has been indicated in numerous behaviours, however, its role in vegetative functions is debated. Moreover, links between the two are largely unexplored. The effects of MRR is mostly tied to its serotoninergic (SERT+) neurones, even though they are a minor population within the region.

Aim: Our aim was to study the role of MRR and its SERT+ neurones in different aspects of social and depressive-like behaviour in parallel with changes in core body temperature (BT) as a vegetative function.

Methods: Pharmacogenetics was used in mice: control, excitatory and inhibitory designer receptors (DREADDs) were expressed in the MRR. Biotelemetry system was implanted into the abdominal cavity to constantly monitor BT changes. Following the injection of clozapine-N-oxide (CNO), behavioural tests were conducted to measure social behaviour (sociability, social interaction [SIT], resident intruder [RIT] tests) and depressive-like behaviour (forced swim test [FST]). The same protocol was repeated in SERT-Cre mice, but only with control and excitatory groups in order to manipulate the MRR SERT+ neurone population.

Results: Manipulation of the MRR did not affect sociability, but excitation increased friendly social behaviour in RIT. In FST excitation increased floating, while marginally decreased struggling. We observed change in BT only in the case of FST (cold exposure): the drop in BT was lower in the excitatory group both during and after the test. Social behaviour was not affected in the SERT-Cre mice. However, in FST excitation of MRR SERT+ neurones marginally increased floating and significantly decreased struggling. Additionally, diminished BT drop during and after FST was replicated in the SERT-Cre excitatory group.

Conclusions: While MRR indeed regulates social and depressive-like behaviour and BT, SERT+ neurones are responsible only a part of these. Our results show that other neurone populations are increasing friendly social behaviour, while SERT+ cells induce depressive-like behaviour in parallel with diminished drop in BT in cold exposure. This latter finding can have clinical relevance in case of human depressive disorders.

Keywords: median raphe region, social behaviour, depressive-like behaviour, body temperature, pharmacogenetics

Phenotypic and molecular characterization of an imipenem resistant *Phocaeicola vulgatus* isolate

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Introduction: The best known carbapenem resistance among *Bacteroides* spp. is the one that is encoded by the *cfiA* gene of *B. fragilis* and another gene (*crxA*) has been discovered for *B. xylanisolvens* just recently. We had also a *P. vulgatus* strain (*P. vulgatus* 2070) that had also shown imipenem resistance.

Aim: We aimed to characterize *P. vulgatus* 2070 and its imipenem resistance mechanism more thoroughly.

Methods: MIC values to 15 antibiotics for *P. vulgatus* 2070 were determined by Etests and specific β-lactamase and imipenemase activities were measured using its crude cell extracts. *CfiA* gene was tried to detect by conventional PCR. To reveal the presence of other β-lactamase genes whole genome sequencing was carried out and the genome sequence has been analyzed by bioinformatical methods (antibiotic resistance genes by ResFinder and genomic islands by IslandViewer).

Results: *P. vulgatus* was negative for the *cfiA* gene and had the following antibiotic resistance values >256, 1, 32, >256, 16, 4, 0.125, 8, >32, 0.064, 16, 0.5, 4, 0.064 and 8 for ampicillin, amoxicillin/clavulanic acid, piperacillin/tazobactam, cefoxitin, imipenem, meropenem, clindamycin, erythromycin, moxifloxacin, metronidazole, tetracycline, tigecycline, chloramphenicol, rifampicine and linezolide, respectively. As it was resistant to ampicillin, piperacillin/tazobactam, cefoxitin, imipenem, erythromycin, moxifloxacin and tetracycline it can be regarded as multidrug-resistant. Whole genome sequencing resulted in a 5.2 Mb assembled genome in 164 contigs and the following antibiotic resistance genes were found: *cfxA*, another Class A2 β-lactamase gene (bla_{HGD-1}, only identified in genome sequences) and two *tetQ* genes. *CfxA* and the *tetQ* genes resisded on mobilizable and conjugative transposons, respectively. Detection of specific β-lactamase activities gave the following results: >1000 u/mg activity using nitrocefin and 3.2 u/mg imipenemase activity which were not inhibitable by EDTA, whereas tazobactam gave partial inhibition.

Conclusions: Class A2 β-lacatamase genes (as *cepA, cblA* and *cfxA*) are common among Bacteroidetes and are usually potent β-lactamase producers. However, it needs to be clarified if bla_{HGD-1} can confer the low-level imipenem resistance and the low imipenemase activity in *P. vulgatus* 2070.

Keywords: antibiotic resistance, genome, imipenem, Phocaeicola (Bacteroides) vulgatus

Investigation of novel C_5-cyclic curcuminoid analogs in spectral aspects

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Introduction: Curcumin in *Curcuma sp.* proved to be a potential target in pharmaceutical anti-cancer drug development [1], but its poor pharmacokinetic properties are challenging. In the previous years numerous curcumin analogues, so-called C_5-cyclic curcuminoids, with more promising bioavailability, have been synthesized in the Institute of Pharmaceutical Chemistry, University of Pécs. The antiproliferative activity of the new compounds were partly evaluated against different human adherent cancer cell lines and showed promising biological activity. [2]

Aim: The project aim was to investigate the albumin binding properties of three novel synthesized curcuminoid analogues with different biological activity. The aim was to start assessing structure-activity properties to map pharmacokinetic virtue. Based on preliminary results, the biological activity of the compounds might be partially a consequence of non-covalent interaction between the compounds and cellular macromolecules.

Methods: The UV-vis absorption spectra of bovine serum albumin titrated by selected curcuminoid analogues solution were monitored in order to explore the structural changes of BSA caused by addition of the compounds. The stability of the formed albumin-compound complexes were also investigated by monitoring absorbance over time.

Results: Blue shifted absorption maximum of the albumin-compound complex have been determined. The binding constants could be calculated according the Benesi-Hidebrand equation. The results suggest a non-covalent interaction between the compounds and serum albumin, which occured via the π-π stacking between aromatic rings of chalcone analogues and Trp residues possessed conjugated π-electrons and located in the binding cavity of serum albumin.

Conclusions: These data provide new information about albumin binding and therefore additional knowledge on pharmacological effect of cyclic curcuminoid analogues. According to the spectroscopic data, we would like to continue the project with fluorescence spectral measurements supported by a mass spectrometric method.

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Keywords: curcuminoid, UV-vis spectrofotometry, bovine serum albumin, albumin binding

2D gelelectrophoresis of RNAlater™ treated saliva samples

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Introduction: Biomarkers are clinically informative biological substances detectable in various body fluids [1]. In comparision to blood, utiliziation of saliva in biomarker screening may serve benefitial as it requires less utilities, personell and supports patient compliance. However, when sample snap-freezing is inaccessible, addition of RNA stabilizing solution such as RNALater™ is essential for achieving synchronized mRNA and proteomic investigations.

Aim: In contradistinction to the manufacturer's guide, we observed RNALater™ interferes with further proteomic investigations. Therefore, our primary goal was to develop an employable and comparable protocol of sample collection for simultaneous protein and RNA expression analyses of the human saliva.

Methods: We acquired saliva samples from healthy adult volunteers and treated them with RNAlater™ (Thermo Fischer Scientific) or water. Because focusing of the RNAlater™ treated saliva samples was impractical, we utilized Clean Up and Reduction Alkylation kits (Bio-Rad) in various combinations to eliminate excess of salts. Next, we performed two-dimensional (2D) gel electrophoresis to visualize and detect incidental loss of saliva proteins through the procedures. Protein content of the gels was detected by silver staining.

Results: Our experiments revealed that RNAlater™ treatment on saliva samples inhibits the focusing step of 2D gel electrophoresis. Moreover, additional treatment with Clean Up and Rehidration Alkylation kits results in obvious decrease in protein quantity.

Conclusions: Addition of RNAlater™ to various body fluid samples inhibits 2D gel electrophoresis separation of the protein content. This phenomenon is most likely do to its extreme salt concentration. Utilization of a Clean Up kit does not restore protein yield.

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Keywords: saliva, protein, gelelectrophoresis, RNAlater™

Thymosin β4 increases mmu-mir-1196 expression in hypoxic adult mammalian hearts

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Introduction: Cardiovascular diseases are still a leading cause of death worldwide. Despite tremendous efforts, current therapeutic opportunities are extremely limited towards maintaining the injured myocardium's functional and structural integrity. Thymosin β4 (TB4), a 43 aminoacid peptide has been proven to be beneficial towards myocardial cell survival, and coronary re-growth following myocardial infarction (MI). [1]

Aim: Our aim is to identify novel molecular pathways responsible for TB4's beneficial impact on mammalian heart repair.

Methods: miRNA profiling was carried out via microarray utilizing RNA samples of infarcted mouse hearts. The infarcted core, and the healthy remote areas of the hearts were harvested 24 or 72 hours after ligation in TB4 treated and PBS treated groups (n=3/each). We performed in silico target prediction, western blot, and real-time PCR to confirm microarray results.

Results: Our miRNA microarray screen revealed mmu-mir-1196 as a potential target candidate. Based on in silico target prediction ROCK1 protein was identified as best matching protein to our criteria. Western blot analyses revealed significant decrease in ROCK1 protein expression in the infarcted mouse heart lysates 24 hours following MI.

Conclusions: Our results indicate, that TB4 significantly decreases the expression of ROCK1 via initiating mmu-mir-1196 expression in the mammalian infarcted myocardium. Our findings suggest a novel therapeutic role for TB4 as a potential ROCK1 inhibitor for the future.

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Keywords: heart, fibrosis, miRNA, TB4

Effects of multiple hit on the cognitive function of Long Evans rats

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Introduction: The acute effects of social isolation (hit 1) and NMDA receptor antagonists (hit 2) on the cognitive function are well-known phenomenon. The Long Evans (LE) strain is a smart type of rats (compared to e.g. Wistar animals), but the effects of these procedures on their cognitive function are barely investigated.

Aim: The goal of this study was to reveal the effects of double hit and selective breeding (hit 3) on several behavioral parameters obtained in a reward-based test (Ambitus).

Methods: Two generations (1st and 4th, born in the same season) of male and female Long Evans animals without any interventions (controls, LE) and with postweaning social isolation (between the age of 4-7 weeks) and ketamine treatment (for 5 days at the age of 5 weeks, named Liskets) were involved in the study. The breeding selection was based on the behavioral phenotype obtained in the Ambitus test. At the age of 11 weeks rats were tested in the Ambitus apparatus, which is a rectangular corridor constructed of clear plexiglass on black floor (www.deakdelta.hu), where the rats could move around between the walls forward and backward. Each of the four corridors has four side-boxes of equal size (5x5x5 cm; 2-2 on the internal and external walls; altogether 16) with food reward (puffed rice: 20 mg). The animals were allowed to explore the corridor and collect food rewards for 5 min (cut-off time). Two different tasks were applied during the study: in task 1 (trial 1 and 2) all the inside and outside boxes were baited, in Task 2 (trial 3 and 4) only the inside boxes were baited. All of the rats performed two sessions (two trials/session, 1 min apart), one in the morning and another 3 hours later (4 trials/day).

Results: The double hit produced higher level of impairments in the 4th generation compared the 1st one in both the locomotor and exploratory activities. The preference of the baited side during session 2 decreased in both generations of the females, while only in the 4th generation of the males. Regarding the number of eaten rewards, no significant effects were detected, while the eating time was influenced by both the strain and sex. Thus, the learning capacity was significantly lower in 4th generation of the Lisket male animals, while in both generations of the females compared to their control counterparts. No other parameters, including anxiety level, attention index or effective sniffing, were influenced by these procedures.

Conclusions: These preliminary data suggest that further process of selective breeding based on behavioral parameters in a cognitive test is required to get a reliable animal model with impaired cognitive function.

Keywords: behavior, cognition, Long Evans, reward, stress

Transcriptomic changes in trigeminal ganglion cells induced by pituitary adenylate cyclase-activating polypeptide (PACAP)-38 or PACAP6-38 treatment

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Introduction: Pituitary adenylate cyclase-activating polypeptide (PACAP) is a broadly- distributed multifunctional neuropeptide acting on PAC1, VPAC1 and 2 receptors. While PACAP was shown to have neuroprotective effects, it is also suggested to be involved in the generation of migraine headaches. Our previous results on trigeminal ganglion (TG) cells showed that both PACAP-38 and the PAC1/VPAC2 receptor antagonist PACAP6-38 increased intracellular Ca^{2+} levels. [1].

Aim: To unveil the receptorial and intracellular signalling mechanisms behind this phenomenon, we aimed to investigate transcriptomic changes of rat TG cells after PACAP-38 or PACAP6-38 treatment.

Methods: TG cultures were prepared from 1–4-day-old Wistar rat pups. Cells were harvested 6 hours after 1 μM PACAP-38 or PACAP6-38 treatment and total RNA was isolated. RNA-sequencing and statistical analysis were performed with RStudio in order to identify differentially expressed (DE) genes.

Results: We found that both PACAP-38 and PACAP6-38 activate cAMP pathway at the transcriptomic level. Expression of transient receptor potential cation channel subfamily M (melastatin) member 8 (TRPM8) was upregulated, however Complex I in mitochondria was downregulated after PACAP-38 and PACAP6-38 6 h after administration.

Conclusions: Our data suggest that there might be mitochondrial functional alterations induced by PACAP-38/PACAP6-38 due to calcium overload. The potential role of the calcium-permeable TRPM8 channel needs further study.

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Keywords: PACAP, migraine, mitochondrial dysfunction, cAMP, TRPM8

The role of the macrophage migration inhibitory factor in lipopolysaccharide-induced hypothermia in mice

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Introduction: Macrophage migration inhibitory factor (MIF) is a potent proinflammatory cytokine that contributes to various processes associated with systemic inflammation [1]. However, it is not clarified whether MIF participates in mediation of the severe thermoregulatory manifestations of inflammation.

Aim: We aimed to reveal the invivo effect of MIF in lipopolysaccharide (LPS)-induced hypothermia.

Methods: In adult mice, we measured the changes of deep body temperature (T_b) with telemetric thermometry and we recorded the general locomotor activity as well. MIF inhibitor (compound **24**) or its vehicle was administered intraperitoneally in bolus. Thirty minutes later, hypothermia was induced with intraperitoneal LPS (5000 μg/kg) at a subneutral (26°C) ambient temperature.

Results: The administration of compound **24** or its vehicle on its own did not cause any change in the T_b and locomotor activity. In contrast, the applied high dose of LPS caused marked hypothermia and hypokinesis in vehicle-pretreated mice, and the pretreatment of the mice with compound **24** exaggerated and prolonged the LPS-induced decrease in T_b.

Conclusions: We found that MIF plays a limiting role in LPS induced hypothermia.

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Keywords: systemic inflammation, hypothermia, Macrophage migration inhibitory factor

Studying cardioprotective effects of hydrogen-sulfide (H_2S) releasing ibuprofen derivative in isolated rat hearts

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Introduction: Hydrogen-sulfide (H_2S) as a gasotransmitter in a small quantity involved in the regulation of physiological regulatory processes. It's beneficial effect against tissue damage has been demonstrated, moreover H_2S reduces side effects of cardioprotective non-steroid anti-inflammatory drugs (NSAID) [1].

Aim: Ischemia/reperfusion were generated in isolated rat hearts where we investigated the H_2S delivery capacity and cardioprotective effects of a new H_2S donor molecule (BM-88).

Methods: BM-88 was administered for 10 min before or after 30 min ischemia in herats perfused in Langendorff mode. Reperfusion was performed for 120 min. The dose effect of BM-88 was determined by gradually increasing concentration of the molecule. The released H_2S was measured from coronary effluent using electrochemical sensor. Autophagic and apoptotic markers (LC3-I/II, p62, Beclin1) were detected by immunohistochemistry method.

Results: BM-88 supports a long lasting H_2S delivery in the heart tissues. It is likely that a treatment-induced decrease in infarct area was observed in BM-88 exposed hearts.

Conclusions: Confirming the protective effect of our new molecule may open a possibility for the development of cardioprotective agents with less side effects.

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Keywords: autophagy, hydrogen-sulfide, ibuprofen, ischemia, reperfusion

Preclinical evaluation of APN/CD13 and/or Gal-3 selective ^{68}Ga-labelled PET radioligands

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Introduction: Several malignant tumors(such as melanomas) are positive for Aminopeptidase N(APN/CD13) and Galectin-3(Gal-3) receptors. These proteins play an important role in neoangiogenic process and tumor cell invasion. Therefore, its expression is correlated with cancer aggressiveness and metastasis. Our previous studies have already shown that ^{68}Ga-labelled NGR peptides bind specifically to APN/CD13 expressing tumor cells[1].

Aim: The aim of this study was to investigate the pharmacokinetics of APN/CD13 and/or Gal-3 selective radioligands.

Methods: ^{68}Ga-DOTAGA-Bn-c(NGR) – target: APN/CD13, ^{68}Ga-DOTAGA-Bn-LacNH –target: Gal-3 and double targeted ^{68}Ga-DOTAGA-Bn-LacNH-c(NGR) were synthesized by our radiochemistry research group. C57BL/6 mice (n=6) were inoculated subcutaneously with $3x10^6/150\mu$l B16F10 (mouse melanoma) cells, and the control group was (n=9). All three radiotracers were injected intravenously (6MBq$\pm$1) into control and tumor-bearing animals. After an incubation period of 70 minutes, the mice were anesthetized and examined with miniPET camera, and ex vivo distribution studies were performed.

Results: According to the PET images and ex vivo examinations of the control animals, all radiopharmaceuticals showed renal excretion, which indicates its hydrophilic character. Subcutaneously growing primary tumors showed similar tumor/muscle SUVmean values for ^{68}Ga-DOTAGA-Bn-LacNH-c(NGR) and ^{68}Ga-DOTAGA-Bn-c(NGR) based on in vivo measurements, while the SUVmean of ^{68}Ga-DOTAGA-Bn-LacNH was significantly lower.

Conclusions: Due to its adequate pharmacokinetics, ^{68}Ga-DOTAGA-Bn-LacNH-c(NGR) is a potential radiopharmaceutical for PET imaging of APN/CD13 and Gal-3 expressing tumors.

References:

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Keywords: Positron Emission Tomography, APN/CD13, Galectin-3, ^{68}Ga, Pharmacokinetics

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