Abstract Book / 9th Student Congress of Neuroscience NeuRi 2019

Abstract Book

NeuRi
STUDENT CONGRESS
OF NEUROSCIENCE

9th Student Congress of Neuroscience
26 – 28 April 2019
Rijeka and Rab

IMPRESSUM

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CONTENTS

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WELCOME NOTE

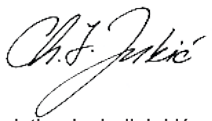
Dear Colleagues,
I am honoured to welcome you to the 9th Student Congress of Neuroscience – NeuRi 2019!

It is an exciting time for neuroscience as we continue to grow and adjust, remaining always adaptable, motivated and curious. We're transforming the way we operate to continuously improve our ability to understand and cure illnesses that are beginning to affect more and more of the world's population. We are witnessing new discoveries and small breakthroughs that help shape modern ways of diagnosing, treating and living with neurological or psychiatric diseases. Every day we have new information, new evidence, which can ultimately lead to great discoveries and that is why I believe we can always expect the unexpected.

Through the past eight years, NeuRi has established itself as a Student Congress that attracts more and more young scientists and neuroscience enthusiasts. We have prepared three days of scientific and social program at the Faculty of Medicine, University of Rijeka, as well as in the city of Rijeka – often called "the City that flows", and the Kvarner paradise – the island of Rab, with wonderful hosts at the Rab Psychiatric Hospital.

The world of neuroscience is an exciting area of research, and we will continue to meet and bring inspired people together in conferences like this. Every work published in our Abstract book is a proof of hard work, potential and knowledge. We should all be very proud of where we are today and excited about where we are headed. Throughout this conference, I ask you to stay engaged, keep learning from your colleagues and help us shape the future of neuroscience. My personal respect and thanks goes out to all of you.

On behalf of Organizing, Scientific and Honorary Board -
Welcome to Rijeka and Rab at NeuRi 2019!



Christina Isabell Jukić
President of NeuRi 2019
Rijeka, 26 April 2019

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Programme

Friday, 26 April 2019
FACULTY OF MEDICINE, RIJEKA

14:00 – 15:45 REGISTRATION (GREAT HALL)

16:00 – 16:30 OPENING CEREMONY NEURI 2019 (AUDITORIUM 2)
CHAIRPERSONS: Gordana Župan, Christina Isabell Jukić, Luka Fotak

16:30 – 16:45 GROUP PHOTO OF ALL PARTICIPANTS (IN FRONT OF THE FACULTY)

16:45 – 17:45 PLENARY LECTURE (AUDITORIUM 2)
Dinko Mitrečić: Application of stem cells in neurovascular and neurodegenerative brain diseases
CHAIRPERSONS: Srećko Gajović, Emina Horvat Velić, Josipa Kajić

17:45 – 18:00 COFFEE BREAK / REGISTRATION (GREAT HALL)

18:00 – 19:00 PLENARY LECTURE (AUDITORIUM 2)
Aleksandar Savić: Forensic psychiatry and psychiatric aspects of aggressive behaviour
CHAIRPERSONS: Kristina Pilipović, Emilija Borčić, Tena Piljušić

19:00 – 21:00 DINNER (GREAT HALL)

Saturday, 27 April 2019
PSYCHIATRIC HOSPITAL RAB

06:45 DEPARTURE BY BUS TO RAB (BAN JOSIP JELAČIĆ SQUARE)

10:00 – 11:00 PLENARY LECTURE (CONGRESS HALL)
Vesna Šendula-Jengić: Complex posttraumatic stress disorder – from diagnosis to recovery
CHAIRPERSONS: Sanja Katalinić, Christina Isabell Jukić, Maša Lovrović

11:00 – 11:15 COFFEE BREAK

11:15 – 12:30 STUDENT SESSION I (CONGRESS HALL)
CHAIRPERSONS: Ingrid Škarpa-Prpić, Ljerka Delač, Ivan Škara
1. **Ajla Tihić, Abdullah Veladžić, Larisa Kovačević**: The correlation between the frequency of seizures and degree of depression in patients with simple focal epileptic seizures
2. **Kamelija Horvatović, Jelena Osmanović Barilar:** Influence of enriched environment and physical activity on insulin signaling in the hippocampus of a rat model of sporadic Alzheimer's disease
3. **Bobana Samardžija, Giovanna Dashi, Maja Odorčić, Nicholas J. Bradshaw:** Review of protein-specific aggregation connected to schizophrenia
4. **Monika Tomin, Zlatka Radičević, Dunja Degmečić:** Early appearance of symptoms of schizophrenia
5. **Dorian Laslo, Terezija Berlančić, Dunja Degmečić:** Comorbidity of alcoholism in schizophrenia patients

12:30 – 13:30 LUNCH AND SIGHTSEEING

13:30 – 14:45 STUDENT SESSION II (CONGRESS HALL)
CHAIRPERSONS: Vesna Šendula-Jengić, Paula Georgev, Eva Levatić

1. **Emilija Borčić:** Awake bruxism as a coping mechanism
2. **Ana Došen, Tanja Grahovac-Juretić:** Psychotic disturbances in addicts to multiple psychoactive substance
3. **Gordana Čizmar, Nataša Lončar:** Self-esteem and sense of failure in students with intellectual disability
4. **Ena Kantor, Veronika Kirin, Dino Krupić:** Individual differences in Affective Neuroscience Personality Scales (ANPS) in relation to expressed depressive and anxious symptoms
5. **Ljubica Brigitte Nikić:** Face-ism effect in an online environment
6. **Lana Mrdović, Vedad Dedić, Amina Kraljušić, Ivana Malešić, Mersad Baručija:** Surgical treatment of chronic subdural hematoma: clinical presentations, risk factors and outcomes

15:00 – 17:30 RAB SIGHTSEEING

17:30 – 19:30 RETURN TO RIJEKA

22:30 NEURI PARTY (STOP CAFFE & CLUB)

Sunday, 28 April 2019
FACULTY OF MEDICINE, RIJEKA

09:00 – 09:30 BREAKFAST / REGISTRATION (GREAT HALL)

09:30 – 10:30 POSTER SESSION (GREAT HALL)
CHAIRPERSONS: Jasenka Mršić-Pelčić, Megi Pavletić, Vinko Beg

1. **Matea Hodonj, Josip Batinić:** Central nervous system involvement with multiple myeloma presenting as oculomotor dysfunction
2. **Tomislav Perković, Marina Perković:** Secondary solitary brain tumour lesion in a patient with active lung tuberculosis
3. **Petar Brlek, Kamelija Žarković:** An unusual transformation of a pineal region teratoma into a glioblastoma with an embryonalneuroectodermal differentiation
4. **Ella Sever, Irena Glažar:** Myasthenia gravis associated with lichen planus
5. **Ana Mršić, Ena Mršić, Manca Nikić, Ena Šukunda, Melita Kukuljan:** Pulmonary arteriovenous malformation and recurrent brain abscess in the Osler-Weber-Rendu syndrome
6. **Manca Bregar, Ivana Paljk Likar:** Headache during pregnancy
7. **Antonela Petrović, Ivana Tomljanović, Sanja Mikašinović, Matea Ivaničić, Jelena Ban, Miranda Mladinić Pejatović:** Identification of key molecules involved in neuroprotection and neuroregeneration using new in vitro preparations of opossum *Monodelphis domestica* central nervous system
8. **Adna Saračević, Amina Pidro, Miloš Kosorić, Belma Gazibera, Refet Gojak:** Correlation of cerebrospinal fluid / serum glucose ratio to proteinorrhachia in bacterial and viral meningitis in adults
9. **Terezija Berlančić, Dorian Laslo, Dunja Degmečić:** Suicidality in depression – case report

10. **Felipe Correa da Silva, Christiane de Favoro Aguiar, Lauar de Brito Monteiro, Pedro Manoel Mendes de Moraes Vieira:** FAHFAs induce metabolic changes in microglia – perspectives at neuroimmune interface
11. **Petar Gabrić, Marko Banda:** Did early *Homo* have language? Neurocognition behind stone toolmaking
12. **Mihaela Ivošević, Sonja Alimović:** Neuro-ophthalmological view on cerebral palsy
13. **Dejan Gvoić, Dinko Štimac, Ariana Fužinac-Smojver, Tanja Grubić Kezele:** Epidemiological analysis of operated intracranial aneurysms at the Department of Neurosurgery of Clinical Hospital Centre Rijeka
14. **Valentina Ahel, Natali Ružić, Zrinka Trope, Ariana Fužinac-Smojver, Tamara Kauzlarić-Živković, Tanja Grubić Kezele:** The impact of exercise on pain, headache, quality of sleep and life in individuals with multiple sclerosis
15. **Nejra Mlačo, Bakir Kudić, Sabina Komić, Zarina Babić, Mersad Baručija:** The role of surgical treatment in high grade glioma therapy
16. **Avdo Kurtović, Miloš Kosorić, Nina Kovačević, Ismar Ećo, Mersad Baručija:** Neurosurgical management of low-grade gliomas
17. **Kristina Kampić, Vladimira Vuletić, David Bonifačić:** INR regulation problems as a possible cause of stroke – case report
18. **Amina Pidro, Adna Saračević, Miloš Kosorić, Belma Gazibera, Refet Gojak:** Prognostic value of the initial finding electroencephalography and magnetic resonance inadult patients with meningitis

10:30 – 10:45 COFFEE BREAK / REGISTRATION (GREAT HALL)

10:45 – 12:15 STUDENT SESSION III (AUDITORIUM 1)
CHAIRPERSONS: Sanja Kovačić, Gaia Bellesi, Martina Ivanišević

1. **Dora Gašparini, Jasenka Mršić-Pelčić:** Capsaicin – potential solution for chronic pain treatment
2. **Miloš Kosorić, Amina Pidro, Adna Saračević, Belma Gazibera, Refet Gojak:** Evaluation and prognostic value of serum LDH and CK in patients with different types of meningitis
3. **Kornelija Berečić, Lara Pilepić, Marina Roje Bedeković:** The impact of intensive speech therapy on a patient with transcortical motor aphasia
4. **Rebeka Đarmati, Jadranka Vraneković:** HFE gene mutations in Down syndrome
5. **Ljerka Delač, Philip Persson:** The application of neuroimaging in marketing and the understanding of the brain's reward systems in consumer decisions: an overview
6. **Emina Horvat Velić, Bruno Srezović Bijelić:** Tau – from gene to disease: a neuroinformatics approach
7. **Maša Lovrović, Silvestar Mežnarić, Gabrijela Begić, Ivana Gobin:** *Elizabethkingia meningoseptica* as an emerging cause of pediatric meningitis

12:15 – 13:15 LUNCH (GREAT HALL)

13:15 – 14:45 WORKSHOPS (AUDITORIUM 4, AUDITORIUM 5)
I. Alzheimer's disease
(Sanja Kovačić)
II. EEG
(Ingrid Škarpa-Prpić)

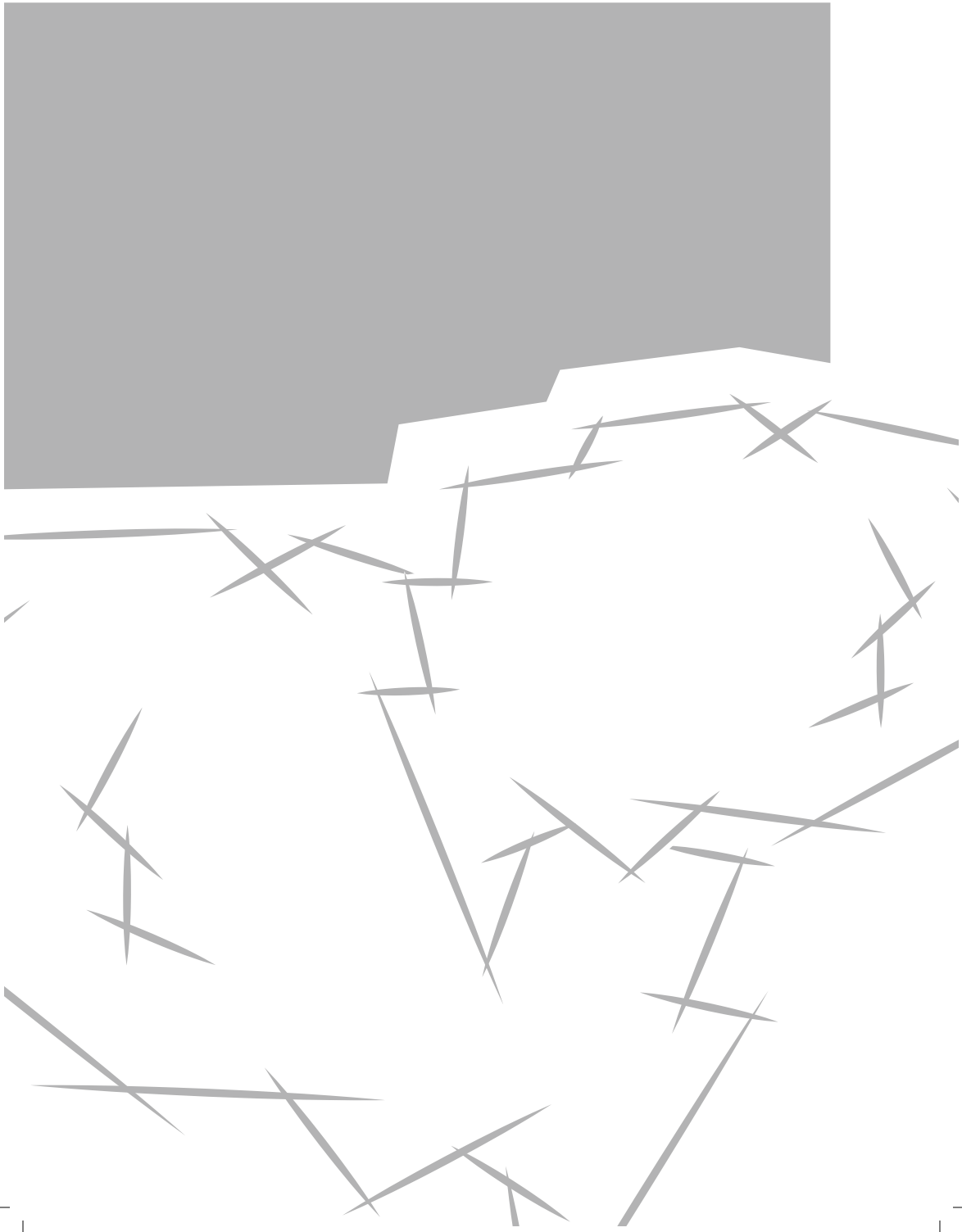
14:45 – 15:00 COFFEE BREAK (GREAT HALL)

15:00 – 16:30 STUDENT SESSION IV (AUDITORIUM 1)
CHAIRPERSONS: Ingrid Škarpa-Prpić, Antonio Perčinić, Silvestar Mežnarić

1. **Petra Josipović, Marko Kolšek, Dea Salamon:** Application and availability of assistive technology in post stroke elderly patients
2. **Džana Jamaković, Armin Šljivo, Timur Šečić, Ahmed Mulać, Ibrahim Omerhodžić:** Current approach in management of ependymoma in children population
3. **Klara Krmpotić, Iva Šutevski:** Neuronal differentiation in developing and adult brain
4. **Emina Letić, Ajla Hamidović, Sabina Kurbegović, Amila Hlivnjak, Ibrahim Omerhodžić:** The role of decompressive surgery in the treatment of malignant middle cerebral artery stroke
5. **Manuel Martinović, Rajna Koren, David Visentin:** Alzheimer's disease: neurodegenerative disorder at the molecular level
6. **Iva Stjepanović, Marijana Vrankić, Marina Kulfa:** Rehabilitation and education of children with cerebral visual impairment
7. **Marina Rumora, Ivana Munitić:** The role of microglia in amyotrophic lateral sclerosis

16:30 – 16:45 CLOSING CEREMONY NEURI 2019 (AUDITORIUM 1)
CHAIRPERSONS: Christina Isabell Jukić, Maša Lovrović, Luka Fotak

Plenary Lectures



Application of stem cells in neurovascular and neurodegenerative brain diseases

Dinko Mitrečić
Laboratory for Stem Cells, Croatian Institute for Brain Research, University of Zagreb, School of Medicine, Zagreb, Croatia

Faced with a burden of brain diseases, modern medicine searches for new therapeutic strategies. Regeneration of nervous tissue based on benefits linked to stem cells has attracted a significant attention. Among numerous brain diseases, in this presentation we focus on two of them: while stroke stands as the most significant and most common cause of a life-long disability, amyotrophic lateral sclerosis (ALS) is a paradigm of a fatal progressive neurodegenerative disease defined by very fast deterioration of motoric neurons and inevitable death of the patient within few years after the first appearance of symptoms. Here we present an overview of current state of the art in experimental application of stem cells in stroke and amyotrophic lateral sclerosis. While for stroke our group uses a mouse middle carotid artery occlusion model, ALS is successfully modelled by animal mutants of superoxide dismutase 1 (SOD1). Here we describe our experience with both direct intraparenchymal and intravascular transplantation of mouse neural stem cells and our observation about rates of survival, migration and differentiation of the transplanted cells. While stereotaxic intraparenchymal injection allows to obtain a large concentration of cells in the targeted region, they survival is linked to formation of a local niche. Intravascular transplantation is possible because of opened blood brain barrier and cells which accumulate in the region affected by disease can survive for very long periods. Based on our and similar experiences from preclinical studies, many clinical trials with stem cells have been launched. Although characterized by rather heterogeneous conclusions in patients, possibly linked to cell source, many measurable benefits have been observed. It is obvious that parallel and coordinated work on both preclinical models and patient trials will help to gradually increase therapeutic effects of stem cells transplanted to the brain tissue affected by these fatal diseases.

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Forensic psychiatry and psychiatric aspects of aggressive behaviour

Aleksandar Savić
University of Zagreb, School of Medicine, Department of Psychiatry and Psychological Medicine, Zagreb, Croatia
University Psychiatric Hospital Vrapče, Department for Diagnostics and Intensive Care, Emergency Psychiatry Unit and First Psychosis Unit, Department for Forensic Psychiatry, Zagreb, Croatia

Forensic psychiatry is commonly understood in a reductionist fashion, and often inappropriately "promoted" in the media, exclusively in the context of evaluation and treatment of individuals who committed crimes, and are assumed to have committed them under the influence of mental disorders. In a wider context, however, forensic psychiatry is a subspecialty of psychiatry that stands at the crossroads between law and psychiatry, and consequently plays a role in formulating and applying wider legal framework that regulates mental health issues in the society. It has been stated that modern forensic psychiatry rests on advances in four key areas: a) development of medical and legal understanding of the connection between mental disorders and criminal behavior, b) development of the definitions of legal insanity and methods of evaluating it, c) new methods of treatment that change character and the outcome of (forensic) psychiatric treatment, and d) changes in attitudes in general population towards mental disorders. Forensic psychiatrists are in their every-day work exposed to a number of ethical controversies, due to specific issues they have to deal with. In addition to ethical issues they share with other psychiatrists, forensic psychiatrists find themselves pressed between on one side implied expectation of protecting the society (as a "tool of the state"), and the imperative of caring and advocating for and treating forensic psychiatric patients. Risk assessment and its management, key areas of evaluation and treatment in forensic psychiatry, cannot be understood adequately without conceptualizing links between mental disorders and serious criminal behavior. Those links necessarily include mediator role of aggression and aggressive behavior. While today we tend to see aggressive behavior automatically as part of the mental disorders spectrum, it is important to remind ourselves that aggressive behavior is part of our evolutionary (and not just evolutionary) heritage and does not imply existence of mental disorder per se. Most authors report that non-adaptive aggressive behavior could potentially stem from dysfunction of interconnected brain regions, primarily including prefrontal cortex, anterior cingulate cortex, and subcortical limbic structures (e.g. amygdala). Changes in those regions and their connectivity were confirmed in a number of psychiatric disorders, although not necessarily accompanied by aggressive behavior, which makes it clear that we deal with complex interactions and connections that include a number of mediators and moderators. Clarifying complex neurobiology of aggressive behavior and its connection to changes seen in mental disorders, forensic importance of specific psychopathological phenomena, and independent risk factors for aggression and violent behavior, are vital for forensic evaluation, risk assessment and management, but also for destigmatization of those with mental disorders who are too often unjustifiably labeled as inherently unpredictable and aggressive.

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Complex posttraumatic stress disorder – from diagnosis to recovery

Vesna Šendula Jengić
Rab Psychiatric Hospital, Rab, Croatia

Posttraumatic stress disorder is relatively well described in psychiatric literature in the context of conditions that arise as a result of extreme and unusual external stressors. International classifications of diseases and conditions are mostly congruent in the description and diagnostic criteria of this disorder. Complex post-traumatic stress disorder is described in ICD-11 as a separate entity, while DSM-V experts failed to reach a consensus on the C-PTSD diagnosis itself. There are many overlapping symptoms between these two disorders. Long-term exposure to stress with repetitive victimization experiences can have a powerful impact on cognition and emotional state of the victim, as in cases of interpersonal violence (family, sexual violence, etc.). Ethiopathogenesis, modalities of disorders and specificity of the therapy will be presented. Complex posttraumatic disorder can be associated with a large number of physical illnesses and also their primary cause. Good detection, diagnosis and therapy are therefore very important. As with other disorders, the right choice of therapy should be based on well-defined pretraumatic, peritraumatic and posttraumatic events, the emotional response, as well as on the personality of the affected person. Long-term exposure to symptoms, refractory reaction to therapy and easy retraumatization make the people very vulnerable and, despite their psychological suffering, they often need additional motivation to stay in therapy. The treatment process is relatively long, which can cause therapeutic pessimism. Apart from the reduction of symptoms, the quality of life after the performed therapy includes the so-called posttraumatic growth. That is one of the key goals of therapy. The presentation will show several clinical cases of complex PTSD.

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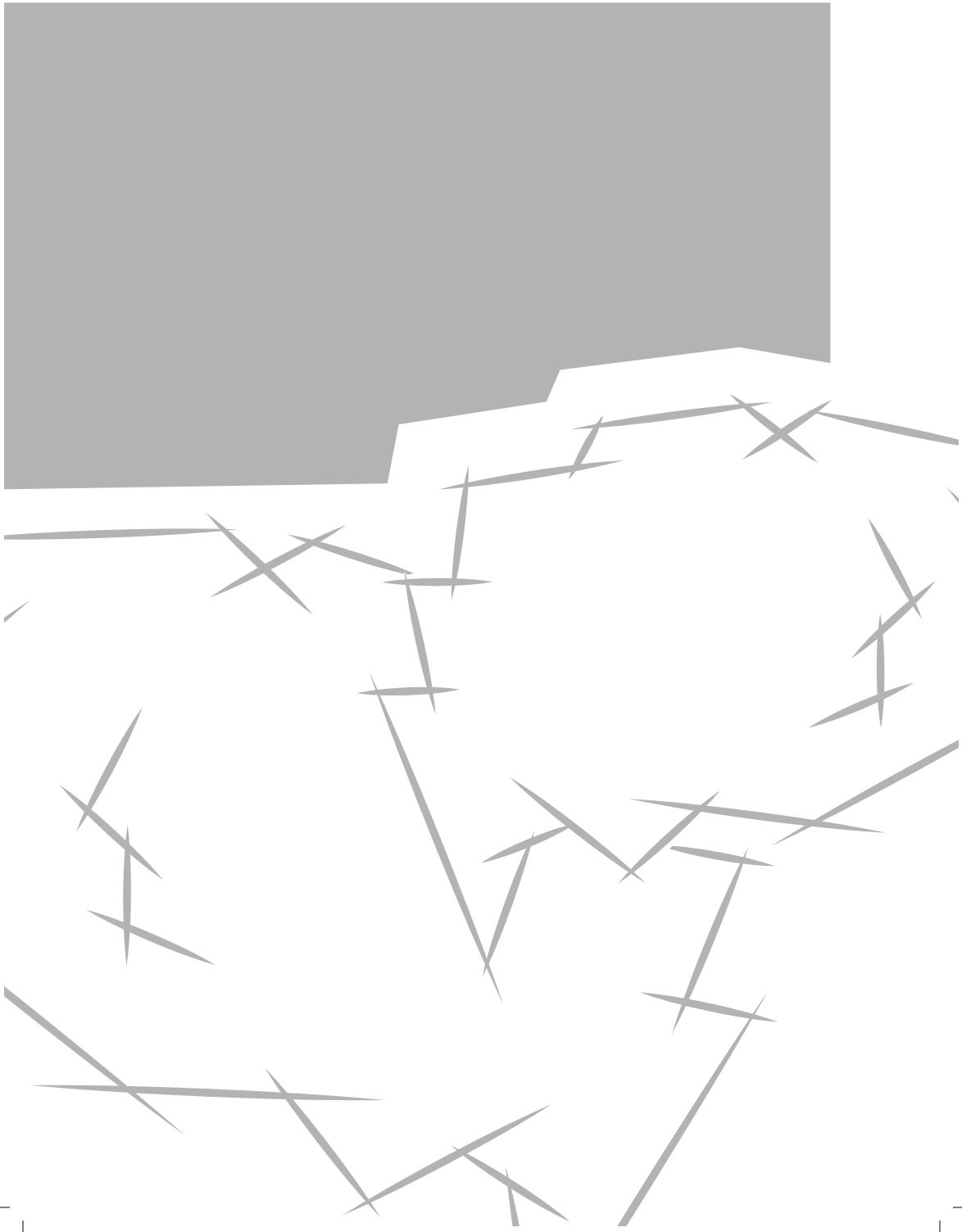
Symposia



The correlation between the frequency of seizures and degree of depression in patients with simple focal epileptic seizures

Ajla Tihić[1], Abdullah Veladžić[1], Larisa Kovačević[2]
[1]University of Tuzla, Faculty of Medicine, Tuzla, Bosnia and Herzegovina
[2]University Clinical Centre Tuzla, Clinic of Neurology, Tuzla, Bosnia and Herzegovina

The aim of the study was to determine the incidence of seizures and the degree of depression in patients with simple focal epileptic seizures in relation to sex distribution. The study included 100 patients, 50 women and 50 men, with simple focal epileptic seizures. The variables which were tested are: sex, frequency of seizures and degree of depression. Depression was measured with Hamilton's depression scale and the correlation was measured with the Pearson test. In men, seizures occurred most often once a year (12 or 24%), and in women, less than once a year (19 or 38%). There is a significant difference in the distribution of the frequency of seizures in men and women (p=0.0017), which means that men were more likely to have attacks. The average Hamilton scale was 8.3 ± 5.9 (from 2 to 27). The largest number of patients (63) didn't have any symptoms of depression, some symptoms were seen in 28 patients, and 9 patients experienced symptoms of major depression. The mean Hamilton scale score in men was 8.3 ± 5.9 (from 2 to 27), and in women 8.3 ± 6.0 (from 2 to 24), and there was no significant gender difference (p=0.97). The coefficient of correlation of the frequency of seizures and the degree of symptoms of depression was 0.79. The analysis showed that there is a positive correlation between the frequency of seizures and the degree of depression in patients with simple focal epileptic seizures and that there is no significant difference in sex distribution.

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Influence of enriched environment and physical activity on insulin signalling in the hippocampus of a rat model of sporadic Alzheimer's disease

Kamelija Horvatović[1], Jelena Osmanović Barilar[2]
[1]University of Zagreb, School of Medicine, Zagreb, Croatia
[2]University of Zagreb, School of Medicine, Department of Pharmacology, Zagreb, Croatia

Physical activity (PA) and enriched environment (EE) improve cognition and alleviate the pathophysiological process in patients with Alzheimer's disease (AD). Possible connection of insulin signalling and PA was studied in STZ intracerebroventricularly (icv) treated rats but without investigation of EE effect. The goal of the study was to investigate whether prevention of cognitive deficits in a STZ-icv rats, induced by a combination of EE+PA, is related to changes of insulin receptor (IR), insulin degrading enzyme (IDE), tau (t-tau), phosphorylated tau (p tau), total glycogen synthase kinase 3beta (t-GSK3β) and phosphorylated glycogen synthase kinase-3beta (p-GSK3β) in the hippocampus (HPC). Adult, male Wistar rats have been divided into 2 groups and undergone streptozotocin intracerebroventricular (STZ-icv) injection (3 mg/kg) or vehicle, respectively. Immediately after the STZ treatment one half of each group was subjected to EE and intensive mental and physical training in the Morris Water Maze (MWM) and Rota rod test (RRT) for 3 months. IR, IDE, t-tau, p-tau/t-tau expression in HPC was measured by Western blot. Data were analysed by Kruskal-Wallis followed by Mann-Whitney U-test ($p>0.05$). EH+PA prevented cognitive deficits in STZ-icv rat model by reducing entries into the incorrect compartments (number of mistakes) in the MWM, in comparison to controls. EE+PA also prevented the decrease in IR (-38%) and IDE (-37%) levels and increment in p/t tau ratio (200%) found in HPC of STZ-icv rats compared to controls without EE+PA. Our research implies that the mechanism responsible for the prevention of cognitive deficit in animals representing sporadic AD model and subjected to EH and PA might be related to the changes in insulin signalling in the HPC. More research is needed to fully understand the possible underlining mechanisms.

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Review of protein-specific aggregation connected to schizophrenia

Bobana Samardžija, Giovanna Dashi, Maja Odorčić, Nicholas J. Bradshaw
University of Rijeka, Department of Biotechnology, Rijeka, Croatia

Schizophrenia, as a complex condition, includes various genetic and non-genetic aspects. Recent research suggests the existence of insoluble protein aggregates in the brains of patients. The onset of protein aggregation could be due to disruptions in protein homeostasis or incorrect protein folding, similar to other chronic brain conditions, such as Alzheimer's and Parkinson's diseases. The inspiration for our research is Trio Binding Protein-1 (TRIOBP-1 or Tara), whose aggregation is known to be dependent on a specific cluster of amino acids. In this review, we focus on three proteins, Disrupted-in-Schizophrenia-1 (DISC1), dysbindin-1 and Collapsing-Response Mediator Protein 1 (CRMP1), which show evidence of protein aggregation from post mortem cases, in vivo animal work and in vitro analysis in schizophrenia research. We are continuing our investigations into protein aggregation in mental illness through two lines of research. Firstly, DISC1 and dysbindin-1 are being investigated for aggregation-critical groups of amino acids, in a similar manner to TRIOBP-1. The second approach is identifying novel proteins with the potential to form aggregates in these conditions. Further research into protein aggregation in schizophrenia should prove to be a useful tool in diagnostic and treatment.

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Early appearance of symptoms of schizophrenia

Monika Tomin[1], Zlatka Radičević[1], Dunja Degmečić[1,2]
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[2]University Hospital Centre, Psychiatric Clinic, Osijek, Croatia

Schizophrenia is a chronic psychiatric disorder characterized by episodes in which the patient is unable to distinguish between real and unreal experiences. It's caused by interaction between genetic and environmental factors which leads to damage of brain structure or function; life stressors can be triggers for disorder onset. It usually appears between the age of 16 and 30. Symptoms fall into several categories – positive (hallucinations, paranoid delusions and distorted perceptions), negative (apathy, anhedonia, avolition), affective (depression, anxiety, sense of guilt), aggression and impaired cognition. The treatment includes antipsychotics and psychological support. A 30-year-old female patient was hospitalized on Psychiatric Clinic in University Hospital Centre Osijek due to observation because of appearance of disorganization, incoherent thinking, auditive hallucinations, impaired affect modulation combined with constant fear and ideas of guilt. At the age of three she was diagnosed with schizophrenia and she started with temporary antipsychotic therapy. During the adolescence she was treated in Child and Adolescent Psychiatric Clinic Osijek due to psychotic decompensation and endogenous psychotic process. As an adult, she continued having occasional exacerbation of symptoms, such as apathy, anergy, affective oscillations, suicidal ideas and auditive hallucinations. She was hospitalized several times, during every one of those crises, including the present one, for about one month; while hospitalized, she was treated with number of antipsychotics and sociotherapy, which led to a decrease of symptoms and enabled further ambulatory treatment with antipsychotics and to receive Xeplion (Paliperidone palmitate) 150 mg intramuscularly each month. Besides those episodes, her stage is unchanged and controlled by medications. Although schizophrenia usually appears among people medium or older age, there is a small number of extremely early appearance of the disorder, which leads to severe clinical symptoms, lack of independence, stigmatization and reduction in quality of life.

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Comorbidity of alcoholism in schizophrenia patients

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Schizophrenia is one of the most severe and most challenging mental disorders for medication treatment. There are four groups of symptoms that can occur in patients suffering from schizophrenia: positive, negative, cognitive and aggressive. Addictions are appearing more often in patients with mental disorders compared to the general population. In this retrospective study we researched medical histories of patients diagnosed with schizophrenia who were hospitalized at Psychiatric Clinic during 2018. Our aim was to determine how often patients who had diagnosis of schizophrenia had alcohol addiction. We researched sociodemographic data, alcohol addiction and psychotrauma. For normal distribution in nominal variables we used 2-test and for numeric variables we used t-test. In all statistical tests, $p<0.05$ was considered significant. There was a total of 101 patients, 54 (53,5%) were male, age median was 51 years (maximum 83, minimum 21). Most of them, 58 (57,4%), lived in a city. Alcohol was consumed by 27 (26,7%) of patients. In patients that consumed alcohol there were 21 (77,8%) males, age median was 53 years (minimum 24, maximum 67). Most of the patients who consumed alcohol were unemployed, 12 (44,4%), 3 (11,1%) were employed, and 10 (37,0%) were in retirement. Regarding education 15 (55,6%) finished high school, 2 (7,4%) finished college and 1 (3,7%) finished just elementary school. In patients who consumed alcohol just 1 (3,7%) suffered from psychotrauma. There were 16 (59,3%) unmarried patients, 8 (29,6) were married and 3 (11,1%) were divorced. Male schizophrenic patients were more likely to consume alcohol ($p=0,003$) than female patients. From the results of statistical analysis, we can conclude that male patients consume alcohol more often, but it is still unclear if it is a cultural habit or do male patients use alcohol more often to allay symptoms of disease.

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Awake bruxism as a coping mechanism

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Bruxism is a repetitive contraction of masticatory muscles followed by jaw movement causing the grinding or clenching of the teeth during sleep or in the awake state. Bruxism is considered to have multifactorial etiology which can be observed on three levels: peripheral factors such as dental occlusion, psychosocial influence and central or pathophysiological causes involving brain neurotransmitters or basal ganglia. Psychosocial factors such as stress and anxiety are the most common cause of oral parafunctions which, alongside awake bruxism, include biting of oral mucosa (self-mutilation). Why is it that our body produces unconscious purposeless movements which are not part of oral functions like mastication, speech or swallowing? Recent studies show possible positive effects of mastication on cognitive performance and reduction of stress. Two studies concerned with this issue both agree that chewing a piece of gum positively affects working memory and subjective alertness. Another study noted the correlation between chewing force applied for chewing a gum and the reduction of salivary cortisol after performing a stressful task, although this result has to be taken with caution for salivary cortisol response is influenced by many factors. In another experiment researchers examined connection between mastication and pain relief. After a painful stimulation of individual's leg while chewing a gum the nociceptive flexion reflex (NFR) protocol is applied alongside brain perfusion measurement and blood tests. The results showed decreased NFR and increased blood perfusion in the ventral part of prefrontal cortex, which implies that chewing may have analgesic effect. These findings suggest that awake bruxism may be our body's way of providing relaxation by relieving stress, anxiety, and even pain. They also indicate that mastication has a potentially significant effect on negative psychosocial states, although its physiological pathways are yet to be discovered and its definitive effects confirmed with further research.

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Psychotic disturbances in addicts to multiple psychoactive substance

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Nowadays, there is evidence of rising use of illegal psychoactive substances, especially in younger population. Psychosis includes reduced capability of reality assessment, which causes changes in perception, thinking, experience and behaviour. This report shows a 31-year-old male patient in regular outpatient care for the past year and a half because of paranoid processing of reality, psychoactive substance abuse and gambling addiction. The patient is currently unemployed, unmarried, without children and lives in Rijeka with his mother. After a party he attended, where he consumed large amounts of alcohol, he developed a feeling of being watched and laughed at. He has been feeling strange since then, and that was the reason for his first examination by a psychiatrist. The aim of this report is to show importance of distinguishing between different causes of psychotic disturbances. A matter of concern in this case is whether his psychotic disturbances are of a primary cause or triggered by long-term abuse of psychoactive substances. The patient is regularly examined by a psychiatrist, but is selective when it comes to taking prescribed medication. Psychological testing shows irritability, depression, anxiety, paranoia, and issues with emotion regulation. He was treated with antipsychotics, anxiolytics and antidepressants. It is assumed that this patient's psychotic disturbances are caused by illegal psychoactive substance abuse, considering the fact that those disturbances appeared after long-term abuse. Further treatment is needed as well as further assessments of the patient to surely establish a positive correlation between psychotic decompensations and psychoactive substance abuse.

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Self-esteem and sense of failure in students with intellectual disability

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Self-esteem plays a key role in the individual's development process. Healthy self-esteem, which implies a positive evaluation of oneself is very important for the personal development, because it influences personal aspiration to find a place in society, to be considered equally valuable and competent, and to contribute to the improvement of one's social environment. The aim of this review is to provide insight into the importance of self-esteem that students with intellectual disability (ID) have, i.e. the way they evaluate themselves in relation to other people from the environment and how this evaluation can affect their health, sense of failure and, consequently, quality of life. This paper contains findings collected from electronic database, by reviewing relevant literature, regarding students with ID and their self-esteem, as one of the psychosocial factors that influence the realization of educational potentials, academic and life success of the individual. People with ID often value themselves as less valuable than general population, which decreases their chances for growth and progress on the social scale and can additionally negatively affect their mental health. Thus, it is necessary to strengthen and support self-esteem from early childhood. People who consider themselves worthy and competent, accept themselves, are more tolerant of frustration and don't underestimate themselves, have positive approach, and they are successful in the diverse activities and challenges of everyday life. Therefore, it is necessary for each individual to put forth the effort and eliminate the possibility of underestimating people with ID.

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Individual differences in Affective Neuroscience Personality Scales (ANPS) in relation to expressed depressive and anxious symptoms

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Neuroscientific experiments show that primary mammalian affective systems of animals are very similar to humans and are located deeply in subcortical regions of the brain. There are six independent affective systems called; PLAY, SEEK, CARE, FEAR, ANGER and SADNESS that can be measured by the Affective Neuroscience Personality Scales (ANPS), and which is found successful in detecting individuals with depressive and anxiety symptoms. Therefore, the main aim of our research was to translate the ANPS on Croatian language and to examine its validity in the prediction of depressive and anxiety symptoms. Total of 148 participants (Mage=26.2, SD=9.80) recruited by the snowball method, completed an online survey that consisted of The ANPS, Severity Measure for Depression and Generalized Anxiety Disorder. The results of correlational analysis revealed statistical significant correlations between depressive symptoms and FEAR ($r = .51$, $p < .01$), SADNESS ($r = .51$, $p < .01$), and ANGER ($r = .24$, $p < .01$) and PLAY ($r = -.28$, $p < .01$) and SEEK ($r = -.34$, $p < .01$). Similarly, anxiety symptoms correlated also with FEAR ($r = .60$, $p < .01$), SADNESS ($r = .54$, $p < .01$) and ANGER ($r = .35$, $p < .01$) and PLAY ($r = -.33$, $p < .01$) and SEEK ($r = -.29$, $p < 0.1$). These findings support the usefulness of the ANPS in the prediction of depressive and neurotic symptoms. Overall, we can conclude that the ANPS is useful in explaining two of the most prevalent mental disorders in population – anxiety and depression. The findings of this study can contribute to neuroscientists and professionals interested in the treatment of depression and anxiety since the theory underlying the ANPS provide precise interpretation of neurochemical systems underlying six basic emotional systems.

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Face-ism effect in an online environment

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Previous studies have analysed photographs and found that men are more often portrayed with focus on the face than women. This phenomenon was called face-ism. They say that people that are presented with greater focus on the face are evaluated as more intelligent and more ambitious, or characteristics related to masculinity. Higher facial projection in men and greater body projection in women's photographs can therefore support existing sexual stereotypes. The aim of this study is to examine the phenomenon of face-ism effect in an online environment when people have control over their self-representation. A sample of 400 participants was used in the content analysis. The participants were sampled by the method so that four Facebook groups from the Croatian area were selected and whose description varied to include a different spectrum of participants. After sampling the participants, only the current profile photo was considered, watching the sex, which part of the body is visible in the photo, physical activity of the person in the photo, if the person is smiling in the photo, the number of people in the photo, background of the person and the way of photographing. The results of this study showed that there was no statistically significant effect of face-ism between men and women, men and women do not differ in the way they are presenting themselves through a profile photo. There was a statistically significant difference between the sexes regarding the clothes of the person in the photograph, women were more dressed in formal clothes, and men in the everyday. The results obtained by this analysis did not confirm the presumed face-ism effect and are not consistent with the research carried out before. No statistically significant difference between men and women was displayed in photos with greater focus on the face or entire body.

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Surgical treatment of chronic subdural hematoma: clinical presentations, risk factors and outcomes

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Chronic subdural hematoma (CSDH) is a type of subdural hematoma whose etiology factors are classified as „4A". This highly recognized acronym stands for: Age, Alcohol, Atrophy and Anticoagulant therapy. CSDH is presented with a collage of symptoms: headache, cognitive decline and focal neurologic deficiencies. This state urges a need for prompt surgical management. It may lead to more severe outcomes such as coma or even lethal outcome. The aim of our observational retrospective research was to evaluate the various risk factors and subsequently the outcomes of all patients with CSDH. Research was based on evidence through medical charts of hospitalized patients with CSDH at the Department of Neurosurgery of Clinical Centre University of Sarajevo for a period of two years (2017-2018). Our results show that a total amount of 57 patients were diagnosed with CSDH. All of them underwent a surgical procedure of trepanation. Variables taken in analysis contained the etiological causes classified as 4A including head trauma, postoperative results and if present the postoperative complications. Majority of patients were men (82,15%), with the mean age of 72,8 years. Most common clinical presentation was the weakness of one side of the body (76.7%). In the clinical histories of 21 patient, head trauma was found prior to the manifestation of symptoms. Use of anticoagulant therapy was shown in 16% of patients, while 21,42% used aspirin. Postoperative results included regained neurological status, drop of some degree in neurological status on the follow-up, and death. In conclusion, an CSDH is a severe medical condition that is frequent in the male elderly population. Head trauma is the most common cause of subdural hematoma. Other risk factors can increase the need for on-time surgical procedures. Surgical management of CSDH in our research has shown to be effective in patients' recovery (more than 80%).

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Capsaicin – potential solution for chronic pain treatment

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Capsaicin is a compound of chili peppers responsible for their burning and irritant effect. It acts as a double-edged sword, displaying both pronociceptive and anti-nociceptive characteristics. The aim of this paper is to present current knowledge about possibilities of capsaicin administration in chronic pain treatment. Topical capsaicin acts directly on transient receptor potential vanilloid 1 (TRPV1) of C and A-delta nociceptors. TRPV1 controls movement of sodium and calcium ions across the cell membrane. Initially, binding opens the ion channel causing depolarization and the production of action potentials, which are usually perceived as itching, pricking, or burning sensations. Repeated applications or high concentrations give rise to a long-lasting effect termed defunctionalisation. In addition, the reduction of central sensitization through reduced C-nociceptor input contributes to capsaicin's indirect mechanism of action. Capsaicin provides effective durable pain relief and reduction of intensity and area of pain in patients with chronic pain with a faster onset of analgesia and considerably fewer systemic side effects than the conventional treatment. High-dose capsaicin patch has recently been studied for treatment of pain associated with diabetic peripheral neuropathy, chemotherapy-induced neuropathy, postherpetic neuralgia, HIV neuropathy, neuropathic lumbosacral pain, phantom limb pain, posttraumatic and postoperative pain, peripheral neuropathic pain secondary to chronic inflammatory demyelination neuropathy, and polyneuropathy of unknown etiology. Furthermore, low-dose capsaicin patch has shown a beneficial effect on osteoarthritis, rheumatoid arthritis, and fibromyalgia. However, capsaicin can cause common side effects, such as: stinging, burning, pruritus, papules and erythema (application-site reactions) and headache. Apart from this, several not so common side effects have been documented, such as: diarrhoea, nausea, vomiting, fatigue, infections, musculoskeletal disorders, hypertension, coronary vasospasm, myocardial infarction and dizziness. Topical administration enables combination with other drugs and analgesics with limited drug-drug interactions. Chronic pain still represents a major treatment challenge and capsaicin might be a potential solution.

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Evaluation and prognostic value of serum LDH and CK in patients with different types of meningitis

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Meningitis is an acute infection of the protective membranes that surround the brain and spinal cord – meninges. It is a medical emergency among the most important problems in medicine because early recognition, efficient decision making, and rapid treatment can be lifesaving. In the course of central nervous system infection, lesions of other enzyme-rich tissues also occur that can adversely affect the body during enzyme release by tissue destruction. The aim of this study was to evaluate the levels and prognostic value of lactate dehydrogenase and creatine kinase in serum of patients diagnosed with different types of meningitis. A retrospective cross-sectional study was done. The study included 27 adult patients, 15 of which were diagnosed with bacterial meningitis and 12 were diagnosed with viral meningitis, treated in the Clinical Centre University of Sarajevo in the period between 1st July 2017 and 30th June 2018. The data was analysed after they were collected from patients' medical records. Enzyme levels in serum were compared between day 0 (day of admission) and 7th day of hospitalization. Statistical analysis was performed using standard statistical software (SPSS). Mean serum LDH level of patients with bacterial meningitis on day 0 [321.6 U/L (175.0 – 838.0 U/L)] was higher than that of patients with viral meningitis [286.1 U/L (143.0 – 444.0 U/L)], while mean serum CK level of patients with bacterial meningitis on day 0 [656.4 U/L (20.0 – 5039.0 U/L)] was lower than that of patients with viral meningitis [1393.5 U/L (91.0 – 6893.0 U/L)]. Mean serum LDH and CK levels were significantly reduced from 0 to 7th day in patients with bacterial meningitis ($p=0.001$; $p=0.002$) as well as in patients with viral meningitis ($p=0.006$; $p=0.023$). Estimation of serum LDH and CK profiles is a simple, inexpensive and rapid method that, combined with routine CSF cytochemical analysis and clinical examination, can be diagnostic and prognostic marker of meningitis in adults.

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The impact of intensive speech therapy on a patient with transcortical motor aphasia

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In Croatia, stroke patients, after being diagnosed with aphasia, do not get speech therapy due to lack of therapists. As a result, language disturbances are not treated in the acute phase in which patient recovery is most successful. The aim of this study was to show an impact of intensive speech therapy on a patient with a changing clinical picture of aphasia A female patient, 70 years old, presented a sudden disturbance in speaking skills noted by her neighbour on the telephone. The real onset time of stroke symptoms was unknown. An emergency CT scan showed no signs of ischemia or haemorrhage. We first observed the patient two days post-stroke. Bedside assessment of her language skills showed low scores on all tasks. Interestingly, the only language skill preserved was repetition which is a diagnostic marker for transcortical aphasias. Three days post-stroke, the patient was diagnosed with transcortical motor aphasia using Western Aphasia Battery. The results were used to create a treatment plan focusing on her naming skills, as well as her functional communication. The materials were controlled considering the effects of imageability, word frequency, word length and word class. Duration of therapy was 7 days, 30 – 45 minutes daily. Six days post-stroke, an MRI was performed which showed an acute ischemic lesion of the left uncus, amygdala, hippocampus, posterior internal capsule and corpus geniculatum laterale. Furthermore, chronic vascular lesions can be seen bilaterally diffuse in the periventricular area, frontal and parietal lobe and in the subcortical part of the temporal lobe. A repeated assessment on the last day of therapy showed statistically significant improvement on the naming subtest. The patient improved from transcortical motor aphasia to anomic aphasia. We emphasize the importance of early, intensive speech therapy in the intensive care unit as a cost-effective treatment of aphasia.

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HFE gene mutations in Down syndrome

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Down syndrome (DS) is caused by trisomy of chromosome 21, and is the one of major genetic causes of intellectual disability. By the age of 40 all DS individuals develop plaques and neurofibrillary tangles of Alzheimer's disease (AD). Numerous studies have implicated metals such as iron in the pathogenesis of AD. One of many proteins involved in maintaining iron homeostasis is the HFE protein. Alterations in the expression pattern of HFE protein were found in brains of AD patients. Two mutations of HFE gene, C282Y and H63D, were shown to affect body iron status. Both mutations could be related with earlier onset of AD symptoms and faster progression of the disease. The hypothesis of the study: C282Y and H63D mutations of HFE gene, individually or in combination, contribute to neurodegeneration and are risk factors for early onset AD in DS individuals. Methods: Genotyping was done in 180 DS individuals and 200 healthy controls using PCR-RFLP methods. The frequencies of alleles and genotypes are compared between groups using the χ^2 and Fisher's exact tests. Odds ratios and 95% confidence intervals were calculated to evaluate the allele/genotype risk for iron overload in DS. The results don't show a statistically significant difference in frequency of alleles and genotypes between DS group and control group. H63D mutation was found in only 23.89% cases and in 25,50% controls. While C282Y was found in 4.44% cases and in 3.00% controls. A comparison between frequency of genotypes in men and women has also been made but no significant difference was found there either. All individuals who participated in this study are Caucasian and from Croatia, there's a possibility that with a larger and different group of people the results would change.

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The application of neuroimaging in marketing and the understanding of the brain's reward systems in consumer decisions: an overview

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Consumer neuroscience is an interdisciplinary field that combines psychology, neuroscience, and economics to study how advertising and marketing strategies affect the brain physiology. Practical implications can be made for the use of neuromarketing by analysing neurophysiological and neuroanatomical variants among individuals using different neuroimaging methods. Our aim was to collect existing knowledge scattered throughout multiple studies and approach it in a systematic fashion, thereby summarizing what has been researched on the topic of neuromarketing so far, as well as to highlight any potential suggestions for further research to be performed. A search of the literature was conducted in online libraries PubMed, LUBSearch using the following keywords: consumer, neuroscience, neuromarketing, brain regions, marketing, implications, brain imaging. The studies that we found showed that various neuroimaging methods, such as EEG, fMRI, and NIRS have shown a significant correlation between the activation of reward mechanism circuits and the preference of a certain brand, as well as the customer's willingness to pay for the product. It was observed that cortical volume variations and cerebral asymmetry correspond to impulsive consumer behaviour. The data obtained through neuroimaging was shown to be a more accurate predictor of satisfaction than any explicit rating by study participants. A positive correlation has been found between brain activity and future product sales. This has potentially great implications because of the possibility to test products at an early stage and determine their sales potential. Marketeers should therefore consider neuromarketing as a useful tool for segmentation and market testing, as well as a method to determine the future potential of a product and allocate their investments thereafter. Neuromarketing has a potential that has not yet been fully tapped into and one that could be of great use in the planning of future marketing strategies by private companies, as well as helping to elucidate the way the brain reward system is activated and used during the consumer process.

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Tau – from gene to disease: a neuroinformatics approach

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Tau protein is most famous for its implications in various neurodegenerative diseases such as Alzheimer's disease and other taupathies. Tau proteins are microtubule-associated proteins (MAP) and they act as microtubule stabilizators. They are encoded by a gene located on chromosome 17 and exist in six isoforms. Tau proteins are almost exclusively found in central nervous system, primarily neurons. Abnormal tau phosphorylation leads to its toxic and damaging effects on neural tissue – due to hyperphosphorylation, tau proteins accumulate and form neurofibrillary tangles. Mutated tau is unable to bind to microtubules which in turn start to fall apart. However, the precise role these tangles play in the development of the disease is still unknown. Here, we explore the tau protein synthesis using various bioinformatical tools, starting from the encoding gene. Different isoforms are visualized using molecular visualization software, and the exact tau protein synthesis is thoroughly explained, including splice variants. Considering that tau is an intrinsically disordered protein, there exist no fully solved 3D structures. Therefore, we compare the dynamical properties of a fragment in its phosphorylated and non-phosphorylated states. Specifically, we look at the changes in general protein stability, solvent accessible surface area, and hydrophobicity. Our simulations show, in accordance with current theories, that phosphorylation of tau reduces its binding affinity to microtubules, which destabilizes them.

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Elizabethkingia meningoseptica as an emerging cause of pediatric meningitis

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Elizabethkingia meningoseptica is a ubiquitous gram-negative aerobic bacillus that predominantly causes outbreaks of meningitis in premature newborns and infants in neonatal intensive care units. In this research, *E. meningoseptica* was isolated from biofilm aggregated on faucet aerators, along with *Pseudomonas*, *Aeromonas* and other bacteria. The biggest challenge with *E. meningoseptica* is diagnostics. Considering the fact that pediatric meningitis caused by *E. meningoseptica* has an extremely high mortality rate (more than 50%), diagnosis needs to be fast and accurate so that proper treatment can be started. *E. meningoseptica* presents very similarly to *Pseudomonas* in bacterial culture. *E. meningoseptica* was found to be susceptible to ciprofloxacin and cotrimxazole which can be used in pediatric population. Research shows that proper institutional hygiene and maintenance are currently the only way of prevention. The aim of this research was to test the efficiency of UV light disinfection on this bacterium. *E. meningoseptica* was cultivated on MH agar and a bacterial suspension of 10^6 CFU/mL was made. This suspension was treated under a UV lamp at 366 nm for 15 and 30 minutes, with the control group not exposed to UV light. An antibiogram was performed to determine susceptibility to antimicrobial agents. Results show that *E. meningoseptica* is extremely resistant to UV light, showing only slight growth reduction at the 30-minute mark. Antibiogram showed multiresistance to antibiotics used to treat gram-negative bacterial infections. To conclude, UV radiation is not efficient enough to destroy this bacterium in health care environments and different methods of disinfection should be combined.

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Application and availability of assistive technology in post stroke elderly patients

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Assistive Technology (AT) can become an important tool in increasing the independence and quality of life of people with disabilities. Efficacy of AT is generally not sufficiently studied in randomized controlled trials. There are findings that indicate the need of finding the new mechanisms to ensure the effective implementation of the AT procurement process and development of more coherent and comprehensive healthcare policy in Slovenia within the elderly people who had a stroke. Objectives of study are to determine the opinions and experiences of healthcare professionals and elderly people who have suffered stroke towards; the consequences of stroke and their impact on the quality of life, level of knowledge and how informed healthcare professionals and patients are in the area of availability and application of AT. A qualitative study was conducted at the Centre for elderly people „Lucija“ in Slovenia. Semi-structured interviews were conducted for gathering the opinions of healthcare professionals and elderly patients who had a stroke (N=18). The collected data were analysed according to the rules of qualitative analysis. We have developed the first and second order codes classified under common terms “higher order” which are associated with the relevant term. Second order codes are grouped into categories, the dimensions within each category are defined. Therefore, dimensions are “at the highest degree of interpretation”. Healthcare professionals should create a document that will contain general guidelines on the availability, application, usage and procurement process of AT. The Government of Slovenia should encourage the development of innovative and cost-effective solutions in the field of assistive-rehabilitative technology. The following questions arise; Is the biomedical model and a multidisciplinary approach truly applied in professional practice in the Slovenian health institutions? How the level of communication within the professional team influence on the quality of treatment and recovery of elderly people with disability?

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Current approach in management of ependymoma in children population

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Ependymomas are the third most common type of brain tumours in children population, accounting for approximately 10% of primary central nervous system (CNS) neoplasms. It is a neuroepithelial tumour that arises within, or adjacent to, ependymal lining of ventricular system or the central canal of the spinal cord. The diagnosis and disease staging are performed by craniospinal MRI. According to World Health Organisation (WHO), ependymomas are classified by histological and molecular diagnostics assessment of tissue specimens. Ependymomas have been separated into three distinct regional compartments, the supratentorial, the posterior cranial fossa and the spinal column. Two-thirds of paediatric ependymomas are arising in the posterior cranial fossa. Two main options for treatment of ependymomas in children are surgery and radiotherapy. Surgery is first and crucial treatment for both children and adults. In paediatric patients, for intracranial ependymomas, WHO grades II or III local radiotherapy is performed regardless of residual tumour volume. Radiotherapy is also used for incompletely resected tumours and gross total resection is the best option for treatment of spinal ependymal tumours. Children younger than 12 months are reserved for chemotherapy alone. Even though ependymomas are primarily surgical lesion, current guidelines recommend chemotherapy also for adults with recurrent disease when further surgery and irradiation are no longer feasible. Recently, nine clinically and molecularly distinct subgroups of ependymomas across regional compartments have been identified. These findings now may lead to more precise diagnostic and prognostic assessments and molecular subgroup-adapted therapies. It has been indicated that complete surgical resection is related to 5-year survival rates ranging around 70% to 80%, whereas patients with subtotal resection have significantly poorer outcomes with 5-year survival rates around 20% to 40%. Radiotherapy is performed regardless of residual tumour volume and chemotherapy is recommended for children who are less than 12 months old.

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Neuronal differentiation in developing and adult brain

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The process of neuronal differentiation, also known as neurogenesis, is characteristic for embryonic development. Neuronal proliferation and differentiation start in the neural tube after neurulation and establishment of the nervous system basic organization. When formed, the neural tube consists of one pseudostratified layer of neuroepithelial cells. These are stem cells that, during development, go through a series of proliferative and later neurogenic divisions and give rise to fully differentiated neurons. For differentiation of neuroepithelial cells into radial glial cells, basal progenitor cells and ultimately neurons, three phenomena are important; division orientation, interkinetic nuclear migration and length of the cell cycle. In polarized neuroepithelial cells, the position of the mitotic spindle is of critical importance in determining whether both daughter cells inherit apical membrane in which specific proteins, receptors, adherens and tight junctions are located. Interkinetic nuclear migration is another important factor to consider in differentiation. The migration of cell nuclei, in apical-basal axis, depends on the cell cycle and through this process, specific signals from the apical membrane can reach nuclei at different speed rates. Lastly, signals will cause changes in cells only if there is enough time. In this way, cell cycle length affects the destiny of the stem cells. Despite the broadly accepted theory that neuronal differentiation does not occur in adulthood, the issue is still not fully resolved. Therefore, a large number of studies are directed towards finding the answer, and just last year, two papers with completely contradictory results have been published. In this lecture we will explain the process of embryonic neurogenesis and present evidence, from recently published scientific papers, which confirm and disapprove the theory of neuronal differentiation in the adult brain.

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The role of decompressive surgery in the treatment of malignant middle cerebral artery stroke

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The middle cerebral artery (MCA) stroke is an interruption of blood flow to the areas of the brain that receive blood through the MCA (parietal lobe, temporal lobe, internal capsule and thalamus). The term “malignant MCA stroke” describes massive hemispheric infarctions that occur in 1 - 10% of all MCA stroke cases and which are linked with acute neurological deterioration and poor outcome of patient. Pathophysiological background of the malignant MCA stroke lies in severe and progressive cerebral oedema which causes rise of intracranial pressure and subsequently neurological deficit, midline shift and potential brainstem herniation. The role of decompressive surgery in the treatment of MCA stroke lies in the reduction of raised intracranial pressure and prevention of secondary brain damages. The results of the three European multicentre randomised trials concerning the role of decompressive surgery in the treatment of MCA stroke - HAMLET, DESTINY and DECIMAL and current AHA/ASA guidelines 2018 were discussed and analysed for this article, followed with the case examples from the Department of Neurosurgery University Clinical Centre Sarajevo. It has been indicated that the surgical treatment as option for the acute ischemic stroke associated with malignant oedema is related with lower mortality rates across all age groups but better functional recovery for patients <60 years.

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Alzheimer's disease: neurodegenerative disorder at the molecular level

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Alzheimer's disease (AD) is a slowly progressing fatal neurodegenerative disorder. Massive loss of the brain tissue leads to progressive dementia with insidious onset of agnosia, aphasia and apraxia. AD is currently the most expensive disease in the health system of developed countries that can affect 1 in 14 people at the age of 65 and 1 in 6 at the age of 80. Early diagnostic methods based on brain imaging and histopathology have shown that changes in brain tissue can be observed only in the late stages of the disease when pharmacological interventions cannot be effective. More than 450 mutations in key proteins in amyloid metabolism have shown that pathogenesis starts at the molecular level before there are any visible changes in the brain tissue. We are using the University of Rijeka supercomputer as a "molecular microscope" to visualize how disease-causing mutations can change the structure and functions of toxic amyloid proteins and membrane-embedded protease gamma-secretase. Molecular dynamic calculations with software package GROMACS enabled us to visualize how disease-causing mutations can change the structure and proteolytic activity of gamma-secretase. We found that disease-causing mutations can increase the distance between the aspartic residues in the active site of gamma-secretase. Increase in separation between the catalytic aspartates can decrease the capacity of gamma-secretase to process the toxic amyloid peptides. This results in gradual accumulation of toxic amyloid proteins in cell-membranes what leads to cell death and massive loss of the brain tissue in Alzheimer's disease. We have designed methods for in silico design and evaluation of potential drugs for Alzheimer disease that can specifically target disease-causing changes in the structure of membrane-embedded protease. Disease-causing changes in protein structures showed that cholesterol is crucial for secretion of the toxic amyloid proteins in the healthy cells.

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Rehabilitation and education of children with cerebral visual impairment

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Cerebral visual impairment (CVI) comprises problems in visual functioning due to retrochiasmal visual and visual association pathway pathology. This can be isolated or accompany anterior visual pathway dysfunction. It is a major cause of low vision in children in the developed and developing countries. The most common causes of cerebral visual impairment are hypoxic-ischaemic encephalopathy, traumatic brain injury, infections of the central nervous system, neonatal hypoglycaemia or other metabolic disorders. It can also be caused by seizure disorder, maternal intake of drugs or it can be acquired later in childhood. CVI can be considered in the context of the localization of the brain damage: the visual pathways and occipital lobes, the middle temporal lobes (for perception of movement), the ventral stream and temporal lobes (for recognition and orientation) and the dorsal stream and parietal lobes (for search and visual guidance of movement). Depending on the localization of the brain damage, children with CVI can have severe visual impairment or impaired but functional vision. Localization of the brain damage implicates different problems in visual functioning. Therefore, each child with CVI requires individualized assessment of visual functioning in order to formulate an appropriate educational plan. The aim of this paper is to provide an overview of diversity of possible adaptations for children with CVI within educational context. Education professionals need to be able to interpret medical information about visual impairment and its potential effect on children's functioning and apply it within student's individualized education program, e.g. making changes to the general environment that can promote interactivity and learning of children with CVI and also minimize the need for direct instruction, special materials, or special techniques. The main goal of individualized education program is enabling the child with CVI to be successful in everyday life.

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The role of microglia in amyotrophic lateral sclerosis

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Amyotrophic lateral sclerosis (ALS) is a progressive disease of the upper and lower motor neurons that results in death of the patient in the period of 1 to 5 years after the onset of first symptoms. To this date the exact causes of the disease are unknown, however mutations many genes were found in ALS patients. Also, a number of mechanisms were identified that result in motor neuron degeneration, such as changes in RNA processing and alteration in axonal transport. Onset and progression of ALS does not only depend on the processes taking place in the motor neurons, and the surrounding glial cells and cells of the immune system greatly contribute to ALS pathogenesis. Microglial cells are the innate immune cells that protect CNS against infections and damage. They play an important role in the development and progression of ALS, acting both neuroprotective and neurotoxic. Together with other glial cells, microglia actively participate in neuroinflammation, and thus contribute to degeneration of motor neurons. This paper describes the exact mechanism of these cells in ALS, with a special focus on the role of microglia.

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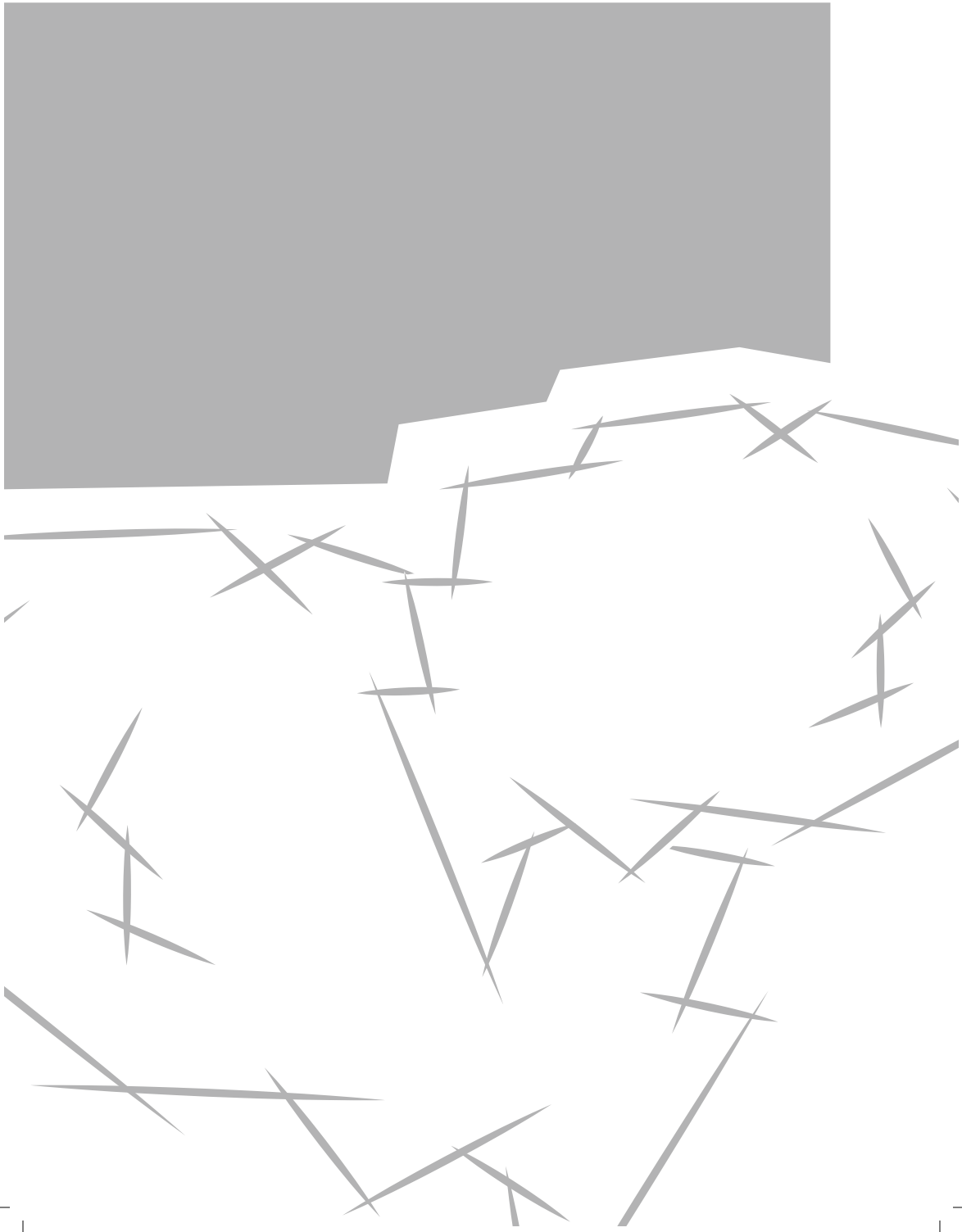
Poster Session



Central nervous system involvement with multiple myeloma presenting as oculomotor dysfunction

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Multiple myeloma is a monoclonal gammopathy characterized by plasma cell proliferation in the bone marrow and monoclonal immunoglobulin production. It usually presents with anaemia, renal damage, hypercalcemia and osteolytic bone lesions. In extreme cases, usually in the relapse disease, myeloma can present with central nervous system (CNS) involvement; a rare condition occurring in 1% of patients. We present a case of patient with CNS involvement. In 2008, a 47-year-old man was diagnosed with multiple myeloma (IgA lambda), Durie-Salmon stage IIIA and ISS stage III. Initially he received 4 cycles of VAD (vincristine, doxorubicin, dexamethasone) protocol but with no response. Treatment was continued with bortezomib and dexamethasone followed by tandem autologous hematopoietic stem cell transplantation and interferon alpha2a maintenance therapy; complete remission was accomplished. In November 2016, disease progression was observed, combination of bortezomib, melphalan and dexamethasone (VMP) was started and very good partial response was achieved. In July 2018, clear signs of progression were found. Treatment with carfilzomib and dexamethasone was started but after one cycle the patient presented with oculomotor damage. Brain MRI showed expansive and infiltrative process in the area of occipital condyles, clivus, sphenoid sinus and posterior ethmoidal. Hypophysis was pushed cranially and left cavernous sinus was infiltrated causing dysfunction of oculomotor nerve. Cerebrospinal fluid (CSF) analysis confirmed infiltration with plasma cells (3% of cells by flow cytometry). Localized radiotherapy was initiated and chemotherapy with bendamustine was started but soon disease progressed further, and the patient died in December 2018. Despite considerable advances in myeloma treatment, majority of patients experience multiple relapses, each being more aggressive and more difficult to treat. CNS involvement occurs usually in the late relapses and remains the worst presentation of the disease with limited treatment options and poor prognosis.

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Secondary solitary brain tumour lesion in a patient with active lung tuberculosis

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Secondary brain lesions make up about 35% of all brain tumours. Most are multiple, while solitary secondary lesions are rare. In the differential diagnostics of solitary brain lesions, following must be considered: primary tumours, secondary metastases, intracerebral hematomas, abscesses, granulomas of various etiologies. We report a case of a 40-year-old patient with acute delirious episodes of variable intensity with a dominant symptom of disorientation. The patient was hospitalized for the treatment of active lung tuberculosis and had no history of prior neurological or psychiatric disorders. Symptoms gradually aggravated over the course of two days. An emergency CT of the brain was performed, showing frontal left-most formation of 40x36x27 mm, with edema and threatening herniation. These findings were confirmed by MRI. A primary neoplastic process, brain tuberculosis and other granulomatous inflammation were considered a differential diagnosis. After one month of conservative treatment, and due to the progression of neurological symptomatology, supratentorial craniotomy and ablation of the formation was performed. Pathohistological diagnostics led to final diagnosis of the metastatic melanoma. After the procedure, gradually came to clinical and radiological (CT, MRI) enhancements. To conclude, solitary brain formations may represent a differential diagnostic problem. Although the patient has been treated for a disease that can be presented with brain lesions, it is necessary to perform additional tests with the aim of setting up final diagnosis.

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An unusual transformation of a pineal region teratoma into a glioblastoma with an embryonalneuroectodermal differentiation

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Glioblastoma is the most common and aggressive (grade IV) diffuse glioma in adults. However, an embryonal neuroectodermal tumour-like component occurs in only 0.5% cases. In addition to the histologic deviation, this tumour can present with different clinical phenotypes and responsiveness to treatment. We report a case of a 21-year-old patient with periodic instability of coordination and occipital pain which spread to both temporal regions. In the previous history, at the age of 5, the patient underwent a neurosurgical operation of an immature teratoma in the pineal region. Biopsy results demonstrated the tumour consisted of several different types of tissue including clusters of primitive and mitotically active neuroepithelial cells that formed primitive neural tube components. These cells were vimentin and neuron-specific enolase (NSE) positive, while S-100, cytokeratin and neurofilament negative. In December 2018, after hospitalization, MRI showed an axial expansive nodule (47x55x38 mm) in the left cerebellar hemisphere and an inhomogeneous signal with a pathological spectroscopy pattern of a metabolite with a high amount of choline and low α-naphthaleneacetic acid. After neurosurgical resection, the biopsy revealed tumour tissue with polymorphic, small glial cells positive to glial fibrillary acidic protein (GFAP), partially positive to synaptophysin and negative to isocitrate dehydrogenase 1 (IDH1). Fluorescence in situ hybridization (FISH) analysis showed the absence of 1p/19q codeletion. Based on immunohistochemical staining and FISH, pathology confirmed a wild type of glioblastoma with embryonal neuroectodermal elements (WHO grade IV). Intracranial immature teratomas are uncommon germ cell tumours, which can have a wide and complex variety of components and thus a various range of relapses. Therefore, we present an extremely rare case of transformation to a high-grade diffuse glioma with an embryonal neuroectodermal differentiation.

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Myasthenia gravis associated with lichen planus

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Myasthenia gravis (MG) is neuromuscular disorder that causes muscle weakness. It's mediated by antibodies against the postsynaptic acetylcholine receptors. Affected patients often present with multiple oral complaints. In some cases, MG can present as lichen planus(LP) which is chronic inflammatory disease of unknown source but can be associated with autoimmune pathogenesis. The aim is to present patient with MG and associated LP and discuss a way of treatment. A 65-year-old female patient presented to the clinic with multiple oral complaints. Patient was diagnosed with myasthenia gravis and was prescribed Mestinon. Examination showed inflamed small white papules on a buccal mucosae and tongue which suggested reticular form of lichen planus. To confirm the diagnosis, biopsy of buccal mucosae was taken and results of PHD revealed focal dysplasia of the epithelium and dense inflammatory infiltration along the basal membrane which suggested the diagnosis of reactio lichenoides and confirmed clinical diagnosis. Patient also reported xerostomia. We measured unstimulated saliva and proved a decreased salivary flow rate while stimulated saliva was within normal limits. We confirmed the diagnosis of lichen planus and prescribed topical glucocorticoid betamethasone. Also, chlorhexidine mouthwash was prescribed to prevent potential fungal infection which can result after a long-term usage of glucocorticoid. After four weeks of treatment, we established erythema on the buccal mucosae. It was also suggested to patient to replace amalgam fillings with other material which couldn't be connected as potential cause of lichenoid reaction. For two years now, the patient has been in regular follow up without recurring symptoms. Although etiology of LP remains unknown there is connection with autoimmune pathogenesis and diseases such as MG. Following treatment with topical glucocorticoid was efficient and well tolerated option, but the therapist must be very careful regarding this kind of therapy in order to avoid possible complications with coexisting MG.

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Pulmonary arteriovenous malformation and recurrent brain abscess in the Osler-Weber-Rendu syndrome

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Hereditary hemorrhagic telangiectasia (HHT) also known as Osler-Weber-Rendu syndrome is a rare autosomal dominant disease characterized by multisystem vascular abnormalities in the form of telangiectasia or arteriovenous malformations (AVM). We present the case of a 41-year-old patient with a recurrent brain abscess associated with HHT. The patient was admitted for symptoms of elevated intracranial pressure, meningism, consciousness disorder, motor paraplegia, psychomotor disorder and high body temperature. The patient's medical history revealed that he had a duodenal ulcer since he was 12 years old, hemangioma of the tongue that was surgically removed and that he has recurrent epistaxis. Two members of the extended family have symptoms of anemia and frequent epistaxis but without a diagnosis of HHT. Ten years ago the patient had brain abscess which was surgically removed. He successfully recovered from hemiparesis and motor aphasia, which were consequences of the surgery. Neuroradiological diagnostic methods reveal left temporo-occipital lesion as the result of the surgical removal of the mentioned abscess. Also, it reveals a right thalamic recurrent abscess and the compressed lateral chamber caused by peripheral edema. Since the patient did not consent to the surgical treatment of the recurrent abscess, the antibiotic therapy was prescribed and the symptoms withdrew. Then stereotactic biopsy and brain abscess drainage were performed, the microbiological diagnosis confirmed a fungal infection (*Aspergillus nidulans*) and antimycotic therapy was initiated. Given the already mentioned symptomatology, HHT was suspected and pulmonary angiography revealed an AVM with a diameter of 30 mm in the middle lobe of the right lung. The patient was released from the hospital without any consequences and returned to daily activities without neurological deficits. Since the diagnosis of HHT is clinically based on Curacao's criteria, no genetic testing is required in this patient.

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Headache during pregnancy

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Headache is the most frequent referral for neurologic consultation in the outpatient setting and is a prevailing cause of life with disability. Many pregnant women experience headaches, especially in the first and third trimesters. The main causes are hormonal changes, sleep deprivation, caffeine withdrawal, low blood sugar, dehydration, stress, poor posture (particularly third trimester), anxiety. We report a case of a 26-year-old patient suffering from tension headaches and benign intracranial hypertension. Symptoms started 5 years before her first hospital admission and worsened during the first pregnancy. The neurologist conservatively treated her with 500 mg acetazolamide every twelve hours. She was admitted to maternity hospital in the 26th week of first pregnancy. She suffered from severe headaches, being unable to do anything but lie in a dark room. Laboratory results were normal, her blood pressure around 140/85, lumbar puncture negative. The ophthalmologist excluded papilla stagnans. The patient underwent psychological treatment during which she revealed a history of sexual abuse from ages 9 to 12. She moved out of her childhood village, yet she still often runs into "the friend of her parents' ". She and her partner have received ample psychological support. At 34 weeks of gestation she experienced a psychological breakdown. A healthy baby girl was delivered via cesarean section in 2014, followed by another one in 2017. We emphasize the significance of a wholesome approach to setting a diagnosis when standard diagnostic methods give unspecific results in atypical clinical presentation. It is very important to discern a primary headache, in case of which the pain is the disease itself, from a secondary headache, when the pain is a symptom of another disease. More strictly, this is the main concern regarding pregnant women suffering from this symptom.

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Identification of key molecules involved in neuroprotection and neuroregeneration using new in vitro preparations of opossum *Monodelphis domestica* central nervous system

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One of the major challenges of modern biology concerns the inability of the adult mammalian central nervous system (CNS) to regenerate and repair itself after injury. A preferred model to study and reveal cellular and molecular basis of regeneration is neonatal opossum *Monodelphis domestica*. Opossums are marsupials that are born very immature, with unique possibility to successfully regenerate spinal cord after injury in the first two weeks of their life. After that, the regenerative capacity of their spinal tissue is abruptly lost. They offer an exceptional opportunity to study the mammalian CNS that can regenerate, without a need of invasive intrauterine surgery of pregnant females that is necessary for other mammalian laboratory animals, such as mouse or rat. In the previous studies we have identified the genes that changes their expression at the time when regeneration in opossum stops being possible. Now, we are analysing the proteomes of the opossums of different age which can and cannot regenerate spinal cord tissue after injury, looking for the new molecules associated with regeneration and axonal growth. The activity of candidate molecules will be inhibited to test their functional role in neuronal regeneration using in vitro intact spinal cord preparation and advanced imaging. In parallel, we are preparing and analysing the opossum CNS primary cultures from animals of different age, to test candidate molecules, and to reveal differences in the cellular content and metabolic characteristics related to regeneration focusing on stem cells. The results of the project could make substantial contribution to our understanding of neuronal regeneration in mammals, but also provide candidate targets for future novel therapeutic interventions for neurodegenerative disorders.

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Correlation of cerebrospinal fluid / serum glucose ratio to proteinorrhachia in bacterial and viral meningitis in adults

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Meningitis is an acute infection of central nervous system (CNS) involving meninges. Evaluation of the cerebrospinal fluid (CSF) is the single most important aspect of the laboratory diagnosis of meningitis. The CSF glucose levels are interpreted in relation to the serum levels, and the results of this analysis is used to distinguish bacterial from viral meningitis. The main objective of our study was to describe the correlation between CSF / serum glucose levels, in both bacterial and viral meningitis, in adult patients. This is a retrospective, observational cross-sectional study that was conducted at the Clinic for Infectious Diseases at the University Clinical Centre of Sarajevo, during the period between June 30th 2017 and June 30th 2018. There were 27 patients older than 18 years of age, both male and female, who were included in this study. Patients underwent lumbar puncture and collection of serum samples for laboratory analysis due to clinical indications and suspicion of CNS infection at admittance. The CSF / serum glucose ratio less than 0.5 is considered being pathological. Laboratory parameters were analysed by specific statistical tests: t student test, Mann-Whitney test, χ^2 test and Fisher's exact test. Values $p<0.05$ are indicated as statistically significant. Out of 27 patients enrolled in the study, 12 were diagnosed with bacterial and 15 with viral meningitis. We found that 92% of patients with bacterial and 40% with viral meningitis have pathological values of the CSF / serum glucose ratio. Pathological CSF protein value being above 0.6 mg/ml was found in 96% of samples and in 100% of patients who were diagnosed with bacterial meningitis. This study suggests that the CSF / serum glucose ratio in relation with proteinorrhachia may be a good indicator for differentiating bacterial from viral meningitis, as these parameters are found to be pathological at a higher level in bacterial meningitis.

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Suicidality in depression – case report

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The major depressive episode (MDE) is defined as the experience of a cluster of symptoms and signs of MDE that lasts at least 2 weeks, and is associated with clinically significant distress or functional impairment. Suicidality is the most difficult symptom. A 52-year-old male, geodetic engineer, unmarried, without children, living with his parents was admitted for the first time at the Clinic for Psychiatry in January 2019 for MDE. His father was treated for aggressive behaviour. Since childhood he was teased and isolated at school which continued during college. He stated that he was the shortest in class, and later at college he felt isolated because he lived with his aunt while others lived at dorms. First urge for suicide happened in college when he stood at the top of the building. Second time he took a bath and went outside during winter to catch a pneumonia intentionally. In the last year he has actively searched the best way to commit suicide. The last suicide attempt was with a rubber rope, but he stopped because of the pain and didn't tell anyone about it. He is unable to function at work in the last 5 years and has blocks of thoughts. He is highly intelligent but has problems with short-term memory. He lost interest for social interactions, never formed a physical or emotional connection with a woman, and has no friends just colleagues and business associates. Six months prior patients' hospitalization his younger sister left for Ireland with her family leaving him alone with his parents. Psychiatric symptoms and suicidality intensified in this period and patient had problems in his private company. With this case report we wanted to point out importance of anamnestic facts during the whole lifespan and suicidality as very obdurate and difficult symptom to treat.

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FAHFAs induce metabolic changes in microglia – perspectives at neuroimmune interface

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Fatty Acid Hydroxy Fatty Acids (FAHFAs) are a recently discovered novel class of mammalian lipids with anti-inflammatory effects. FAHFAs are mainly synthesized in adipose tissue and are dynamically regulated by energetic status. In obese individuals, there is a chronic and low grade inflammatory process in the hypothalamus, orchestrated by microglia. FAHFA exerts anti-inflammatory effects directly in dendritic cells and macrophages. Our aim is to investigate the impact of FAHFA treatment on microglia function and physiology. The microglial cell line BV2 was employed in all experiments. The cells were treated with a FAHFA Isomer (20 μM) for 30 min prior LPS stimulation. The supernatant was collected for ELISA and the cellular content used for gene expression evaluation. Protein expression of inflammatory mediators was evaluated on FAHFA-treated microglia. Metabolic parameters were measured by Seahorse. FAHFA signalling promoted NF-KB stabilization through IKB-α degradation and increased phosphorylation of Erk1/2. FAHFA treatment reversed LPS-induced TNF-α gene expression and secretion and induced IL-10 expression; IL-6 levels remained unaltered. FAHFA-treated microglia expressed high levels of Mrc1 and reduced LPS-induced expression of Nos2. FAHFA treatment reduced glycolysis, but potentiated LPS-induced glycolysis. The inhibition of glycolysis blunted the TNF-α secretion in a higher magnitude in co-treated cells. FAHFA induces an anti-inflammatory phenotype in microglia. These effects appear to be mediated through immunometabolic regulation. The co-treatment of FAHFA and LPS induces glycolysis, and partially blunts the pro-inflammatory program induced by LPS. The inhibition of glycolysis with 2-Deoxyglucose in FAHFA-treated cells completely abrogated LPS-induced TNF-α secretion. Thereby, FAHFAs treatment partially reverses the LPS-induced pro-inflammatory phenotype.

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Did early *Homo* have language? Neurocognition behind stone tool-making

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Recently, considerable interest for language evolution has arisen. Many researchers believe that language evolved via exaptation of domain-general cognitive systems such as long-term memory, visuospatial processing and executive functioning. Therefore, many studies on language evolution have focused on determining when specific cognitive functions, which might have supported language, developed. One approach in this area has been to establish the neurocognitive and neural correlates of specific behaviours during the Palaeolithic period (from ~3.3 mya to ~10 kya). The focus has been on stone-toolmaking-related behaviours because of the higher preservation of stone in the archaeological record compared to other materials. The earliest stone industry is the pre-*Homo* Lomekwian. It has been hypothesized based on experimental replication of the knapping process that the Lomekwian findings are suggestive of lesser functional lateralization of the motoric and prefrontal cortex compared to modern humans. The next stone industry, the Oldowan, typically associated with *Homo habilis*, has been linked to more complex subsistence strategies and social behaviours. Neuroimaging studies have shown that Oldowan toolmaking predominantly involves frontoparietal sensorimotor areas and the cerebellum, which is why this industry has been described as cognitively relatively „ape-like“. The following industry, the Acheulean, taxonomically linked to *Homo erectus* and chronologically coinciding with significant brain enlargements in our genus, is believed to be more demanding in hierarchical and sequential action processing compared to earlier technologies. Additionally, neuroimaging studies have shown higher activation of the right Broca's area and temporal cortici during Acheulean compared to Oldowan toolmaking. Recently, a study by our lab comparing sidescraper manufacture, associated with *Homo heidelbergensis* and Neanderthals, and Oldowan toolmaking has found higher involvement of visuospatial and executive functions in the former task. While it is hard to generalize based on this data, we will suggest some implications for the existence of language in early *Homo*.

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Neuro-ophthalmological view on cerebral palsy

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Cerebral palsy is a disorder of movement and posture due to damage to immature brain which can be cortical, subcortical, or cortical and subcortical. Early brain malformations and congenital, prenatal or postnatal factors affect not only the motor areas of the brain but also different parts of the visual pathway causing various visual disorders and problems in everyday visual functioning. Altered neuro-ophthalmological findings are very frequent in cerebral palsy and rates vary significantly from study to study (50 – 90%). Most children with cerebral palsy have refractive errors, fundus oculi abnormalities, altered fixation, altered smooth pursuit, altered saccadic movements, strabismus, extrinsic ocular motility disorders, intrinsic ocular motility disorders, abnormal ocular movements, reduced visual acuity, reduced contrast sensitivity, altered stereopsis and altered visual field. More than half of children with cerebral palsy may have cerebral visual impairment, a frequent cause of low vision which is often misdiagnosed as blindness. Current scientific literature pays limited attention to visual function in children with physical disabilities. The aim of this presentation is to show that, besides specific motor profiles, each type of cerebral palsy (choreoathetotic, ataxic and spastic) can be defined by specific neuro-ophthalmological profiles. The above mentioned most common neuro-ophthalmological findings in cerebral palsy will be reviewed in overall population of children with cerebral palsy, compared between specific types of cerebral palsy and compared according to motor impairment level to show the connection between motor delay and degree of vision impairment. Visual impairment plays an important role in psychomotor development of children with cerebral palsy which is why an early neuro-ophthalmological assessment is very important. The accurate detection of visual disorders in cerebral palsy does not only lead to a complete clinical diagnosis but also to an appropriate intervention plan to enhance visual functioning.

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Epidemiological analysis of operated intracranial aneurysms at the Department of Neurosurgery of Clinical Hospital Centre Rijeka

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Aneurysms of the cerebral vasculature are relatively common. A systematic review collecting data from many countries reported a prevalence of 0.4% and 3.6% in retrospective and prospective autopsy studies, and 3.7% and 6.0% in retrospective and prospective angiographic studies. 85% of saccular aneurysms of the cerebral vasculature occur in the circle of Willis. Multiple aneurysms are seen in 30% of patients. There are many risk factors for the development of intracranial aneurysms, both inherited and acquired. Females are more prone to aneurysm rupture, with subarachnoid hemorrhage 1.6 times more common. The prevalence of aneurysms is increased in certain genetic diseases but also run in families in the absence of an identified genetic disorder, with a prevalence of 7% to 20% in first or second degree relatives of patients. The acquired risk factors are increasing age, hypertension, smoking, estrogen deficiency, hypercholesterolemia, etc. This retrospective study included 32 patients with intracranial aneurysms with different localization. All patients were subjected to neurosurgery process at the Department of Neurosurgery, Clinical Hospital Centre Rijeka, in the period from 2015. to 2017. The data stayed anonymous according to the Helsinki Declaration. The aim of the study was to determine the difference in the sex incidence, age-related involvement, occurrence of multiple aneurysms, and presence of prior arterial hypertension and to determine which the most common localization of intracranial aneurysms is. According to analysed statistical data, women are more affected than men (81%), and the most common localization of intracranial aneurysms is the anterior communicating artery (38%). It was found a higher risk for intracranial aneurysms in middle-aged and older adults (1930-1969 period of birth; 85%). Comorbidity such as previous arterial hypertension occurs in 50% of cases with female predominance (94%), and very small percentage of patients suffers from multiple aneurysms (25%). Funded by University of Rijeka: uniri-biomed-18-41.

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The impact of exercise on pain, headache, quality of sleep and life in individuals with multiple sclerosis

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Multiple sclerosis (MS) is a chronic and progressive disease with unpredictable episodes of inflammatory demyelination that results in appearance of the symptoms with psychophysical dysfunction and limitations, which reduce the quality of everyday life. Apart from specific symptoms of the disease, people with MS are encountered with accompanying „invisible“ symptoms on daily basis like fatigue, pain, sleep disorders and emotional-cognitive disorders. Physical activity has been shown to have a positive effect on MS pathogenesis. The aim of the study was to determine the influence of group exercise led by physiotherapist on psychophysical progress, pain, headache and the quality of sleep and everyday life in MS patients. The study involved 24 individuals with MS with Expanded Disability Status Scale form 1.0 ¬– 8.0, divided into 2 groups: exercise (N=13) and related control with no exercise (N=11). Exercise group performed upper and lower limbs exercise combined with breathing exercise (2 d / week, 60 min / session) for 8 weeks. Participants underwent measures of physical pain (Visual analogue scale for pain, VAS), quality of life (RAND Medical outcomes study 36-item short-form health survey, SF-36), impact of headache (Migraine Disability Assessment Test, MIDAS) and sleeping quality (Insomnia Severity Index, ISI) before and after an 8-week period. After the completed exercise program, the MIDAS and ISI values showed statistically significant improvement in people with MS (p=0.03; p=0.04) unlike the control group (p=0.82; p=0.34). The VAS values showed also improvement but with no statistical significance (p=0.07). In addition, all aspect of quality of life improved (emotional and physical functionality and limitation, pain, fatigue and general health), but only quality of life associated with the physical limitation showed statistical significance (p=0.008). This exercise program has helped to reduce pain, headaches and improve sleep quality as well as quality of life in people with MS. Funded by University of Rijeka: uniri-biomed-18-41.

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The role of surgical treatment in high grade glioma therapy

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High-grade gliomas represent the most devastating forms of brain cancer. Surgery is commonly the initial therapeutic approach for tumour debulking and obtaining tissue for a definitive diagnosis, followed by radiation and chemotherapy as standard treatment options. This study discusses the role of surgical management of high-grade gliomas and aims to determine whether there is any benefit regarding recovery of neurological deficit and alleviating symptoms. This was a retrospective study, which included 36 patients surgically treated for high-grade glioma at the Clinic of Neurosurgery, Clinical Centre University of Sarajevo. We retrieved the records of patients diagnosed with gliomas at this clinic during the period from January 2017 to January 2018 and collected data on gender, age, pathologic diagnosis, main symptoms, neurological status before and after surgery, size of resection and tumour recurrence. Data analysis was performed using the IBM SPSS program (version 23). Surgical procedure was total resection in 63.9% cases. Subtotal resection was performed in 5.6% patients and tumour reduction was performed in 13.9% patients. Biopsy alone was performed in 16.7% patients. On discharge, patients who underwent tumour resection (biopsy excluded) had a neurologic deficit in regression in 63.3% cases and fully recovered in 10% cases. 20% patients had a normal neurologic status both before and after surgery. One patient treated with tumour reduction also had persistent neurologic deficit. One patient had a lethal outcome due to postoperative complications. In all cases where only biopsy was performed, neurologic deficit persisted after surgery. Tumour resection results in a long term decrease of neurologic deficit and symptoms, mainly by reducing intracranial pressure. Accordingly, the biopsy alone doesn't improve neurologic status. Tumour resection increases the Karnofsky Performance Score of the patient which allows further cancer treatment.

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Neurosurgical management of low-grade gliomas

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Low-grade gliomas (LGG) are diverse group of brain tumours that most common occur in mid-age, and generally have better long-term survival in comparison with high-grade gliomas. Operative strategies for patients with LGG include subtotal resection, gross total resection (GTR), supratotal resection (STR) and glioma biopsy. The most popular surgical techniques are STR and GTR used to make a total tumour resection with radical resection of perilesional brain tissue, non-glioma region. Sometimes, LGG can infiltrate eloquent area of brain, making their resection difficult. We retrospectively reviewed medical records of 18 patients with LGG that underwent surgery or biopsy from 1st January 2016 to 31st December 2018 at Clinical Centre University of Sarajevo. There were 9 male and 9 female patients, all adults. Median age of the patients was 41.5 years. All patients underwent MRI before procedures and lesions were identified that way. Histological subtypes of World Health Organization of LGG tumours were as follows: pilocytic astrocytoma – WHO grade I (22%); ganglioglioma – WHO grade I (6%); diffuse astrocytoma – WHO grade II (61%); oligodendroglioma – WHO grade II (11%). The most dominant symptom were seizures (73%); other symptoms in patients with or without seizures were headaches (28%), weakness in extremities (28%), fatigue (17%), nausea and vomiting (17%), dizziness (17%) and personality changes (6%). Out of all patients, a total of 16 (88%) underwent gross total resection and 2 (12%) patients underwent tumour biopsy. Gross total resection surgery is the most appropriate technique for LGG treatment when tumours are within resectable brain area. Tumours involving the corticospinal pathway, speech areas, and other eloquent regions may not be amenable to aggressive surgery and in those cases biopsy is used as neurosurgical option of treatment.

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INR regulation problems as a possible cause of stroke – case report

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World Health Organisation defines stroke as a „brain attack“ that is caused by the interruption of the blood supply to the brain, usually because a blood vessel bursts or is blocked by a clot. This cuts off the supply of oxygen and nutrients, causing damage to the brain tissue. Within minutes, brain cells begin to die. When brain cells die during a stroke, abilities controlled by that area of the brain such as memory and muscle control are lost. In this case we present a 34-years-old woman who comes to the Clinic with symptoms of difficult speech and weakness of the left side of the body. She was presented as a stroke in development. From the history of the disease we find out that she had an operation of stenosis of aortic valve and ascending aortic aneurysm and also aortic valve replacement with mechanical prosthesis. After surgery, the doctor determined the international normalised ratio (INR) values between 1.5 and 2.0 because this mechanical prosthesis is a new model of On-X Aortic Valve. The On-X Aortic Valve is a newer generation heart valve made of a unique material and design characteristics compared with earlier generations of mechanical heart valves. The On-X Aortic Valve is the only mechanical valve with FDA and CE approval as being clinically proven safe with significantly less blood thinner (warfarin) and lower values of INR. In this case, the INR values were not enough to prevent the occurrence of the thrombus and stroke. During the treatment of the patient, an INR was determined between 2.0 and 3.0. That was optimal INR for preventing stroke or potential brain bleeding. This case was a major challenge in regulating INR due to cardiac problems and possible re-emergence of stroke or potential brain bleeding.

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Prognostic value of the initial finding electroencephalography and magnetic resonance in adult patients with meningitis

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Meningitis is an acute inflammation of the protective membranes covering the brain and spinal cord. It is life threatening system infection, affects all ages and genders. Etiology in most cases is unknown. Time and rapid management of meningitis are required. Diagnosis is based upon clinical, laboratory, electroencephalographic (EEG) and neuroradiological examination. The main aim of this study was to examine whether initial brain magnetic resonance (MRI) and EEG in patients with meningitis might be prognostic and diagnostic predict factors and possibly, in combination with the altogether severity of the clinical picture, could lead to the diagnosis and evaluation of outcomes. It is a retrospective cross-sectional study conducted at the Clinic for Infectious Diseases, Clinical Centre in Sarajevo in period of 30th June 2017 and 30th June 2018. We covered adult patients treated who were clinically diagnosed with meningitis. All data, neurological symptoms and signs, aetiological diagnosis, cytological examinations, MRI and EEG were retrieved from medical records. For the statistical analysis, the SPSS for Windows package was used. For continuous variables, the Kolmogorov-Smyrnov test, mean value and measure of dispersion were used: median, interquartile range, and Mann-Whitney test. We originally enrolled 27 patients (16 males and 11 females), median patient age was 43. The initial neurological signs and symptoms on admission was seizure 89%, headache 74%, meningeal signs 67%. The most frequent type of meningitis was viral 56%. EEG recording was performed in 93% patients and showed abnormalities in 76% patients. MRI was performed in 85% and we found 65% abnormal. EEG and MRI display diagnostic and prognostic significance, and with acuteness and seriousness of clinical picture, could lead to earlier correction of treatment and faster recovery of patients. Also there was significant correlation between the severity of clinical picture, various comorbid conditions and age of patients.

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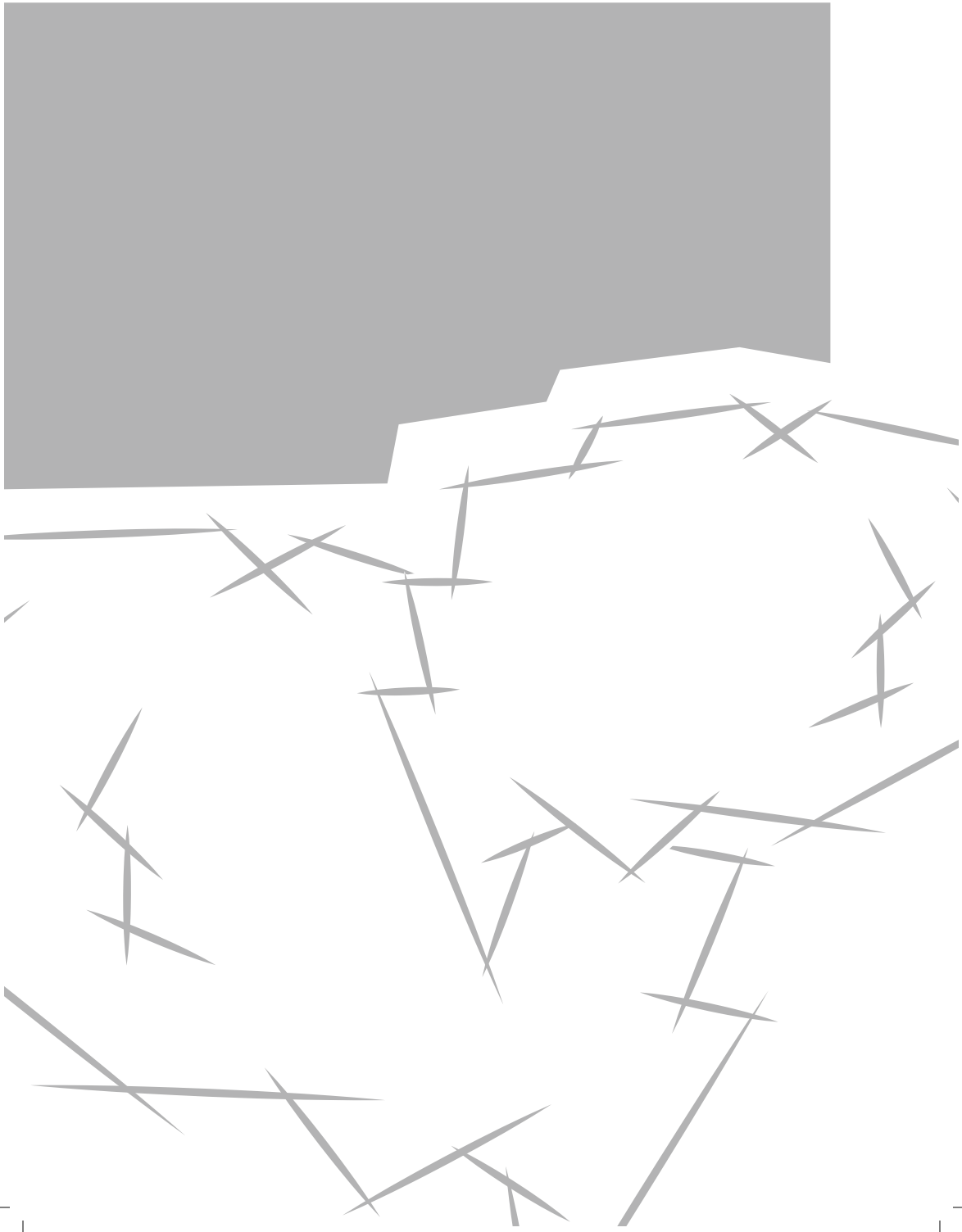
Workshops



Alzheimer's disease

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Alzheimer's disease (AD) is a neurodegenerative disorder characterised by progressive cognitive impairment. It is the most common type of dementia affecting more than 40 million people in the world today. Despite significant scientific effort, the cause of AD remains unknown, but genetic and environmental risk factors have been impathologic changes of AD are diffuse and neuritic plaques, marked by extracellular amyloid beta deposition, and neurofibrillary tangles with intracellular accumulation of tau protein. Whether plaques themselves cause AD or they are a by-product of the AD process is unknown. AD can be *definitely* diagnosed only after death, by linking clinical measures with an examination of brain tissue in an autopsy. Dementia specialists use several methods and tools licated. The hallmark neuropto help determine whether a person who is having memory problem has "possible Alzheimer's dementia" (dementia may be due to another cause) or "probable Alzheimer's dementia" (no other cause for dementia can be found). To diagnose AD, it is necessary to obtain data about overall health, use of medicines, diet, past medical problems, ability to carry out daily activities, and changes in behaviour and personality of the patient, followed by conducting tests of memory, problem solving, attention, counting, and language. In the diagnostic process is also important to carry out standard medical tests, such as blood and urine tests, to identify other possible causes of the problem and to perform brain scans, such as computed tomography (CT), magnetic resonance imaging (MRI), or positron emission tomography (PET) to rule out other possible causes of dementia. Pharmacological treatments in Croatia currently include cholinesterase inhibitors that function by reversibly binding to and thus inactivating acetylcholinesterase (donepezil and rivastigmine). The following approved and available medicine is memantine, functions as a N-methyl-D-aspartate (NMDA) receptor antagonist and regulates the activity of glutamate.

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EEG

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An electroencephalogram (EEG) is a non-invasive diagnostic method used to evaluate the electrical activity in the brain. This test measures brain waves and evaluates brain disorders. Brain cells communicate with each other through electrical impulses. An EEG can be used to help detect potential problems associated with this activity. The main indication for EEG recording is loss of consciences and seizure's suspicion. EEG recording is necessary to establish electro-clinical syndromic diagnose in patients with epilepsy. The type and location of altered brain activity during a seizure can be recorded using EEG - so called ictal EEG. It also is used to evaluate people who are having problems associated with brain function - confusion, coma, tumours, sleep disorders, changes in behaviour, long-term difficulties with thinking or memory, or weakening of specific parts of the body. It is also used to determine brain death, to evaluate brain activity after severe head injury or before a heart or liver transplant. EEG in children is usually used during the sleep, but also in the adults when the diagnosis is not clear. The EEG technician will attach electrodes to different locations on the scalp. The electrical signals from the brain are converted into wavy lines on a computer screen. An EEG isn't uncomfortable, and patients do not feel any shocks on the scalp or elsewhere. But, having electrodes pasted to the scalp can be a little stressful not only for children, but also sometimes for adults. The aim of this workshop is to learn the basics of EEG, recognize normal cerebral waves and main specific cerebral waves which indicate pathological conditions. ("pathological cerebral waves").

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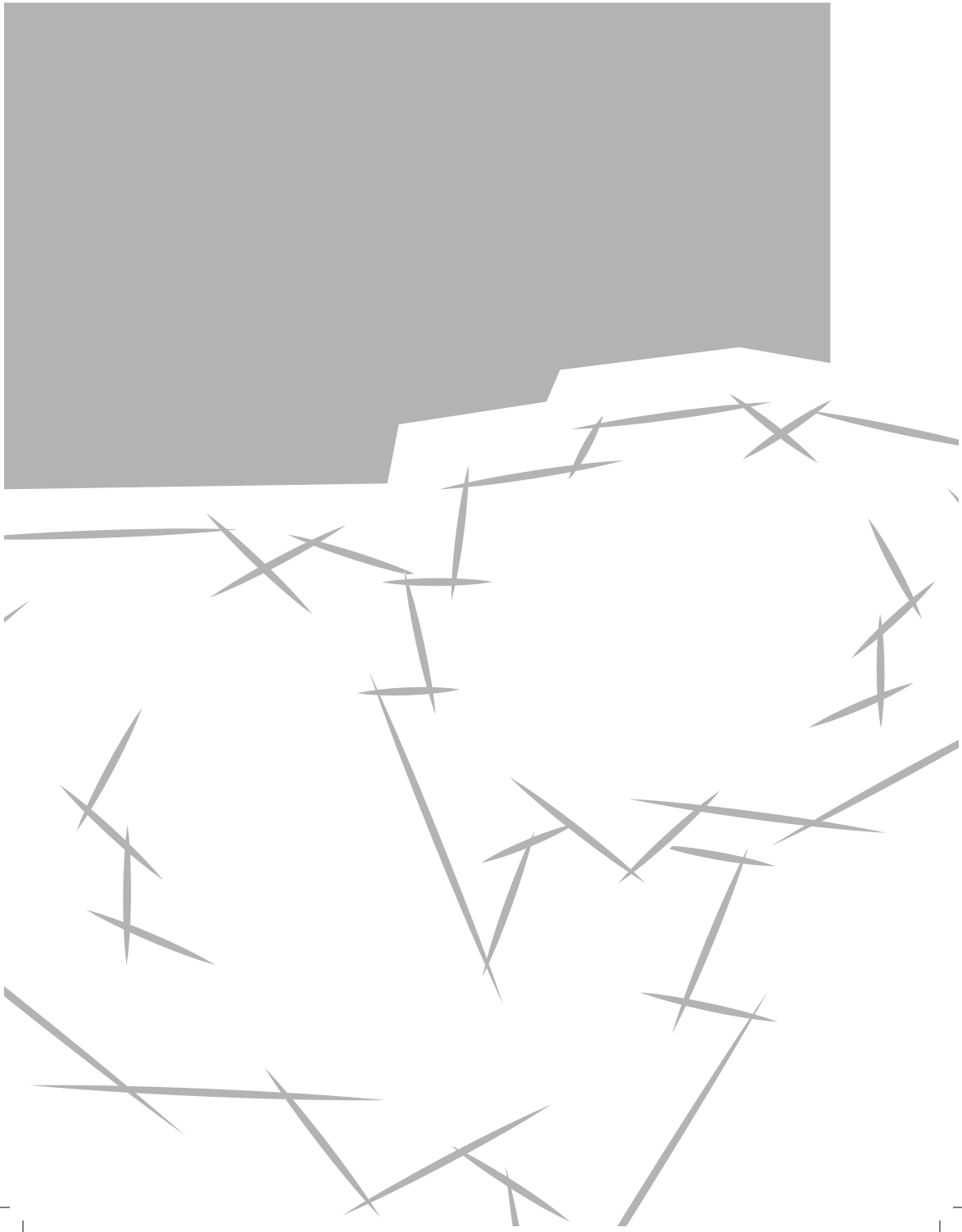
Acknowledgements



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