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Abstract Book

NeuRi
STUDENT CONGRESS
OF NEUROSCIENCE

8th Student Congress of Neuroscience
20 – 22 April 2018
Rijeka and Rab

IMPRESSUM

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CONTENTS

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WELCOME NOTE

Dear Colleagues,

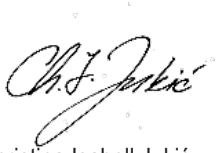
I am honored to welcome you to the 8th Student Congress of Neuroscience – NeuRi 2018!

It is an exciting time for neuroscience as we continue to grow and adjust, remaining always adaptable, motivated and curious. We are 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 seven 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 2018!



Christina Isabell Jukić
President of NeuRi 2018
Rijeka, 20 April 2018

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Programme

Friday, 20 April 2018
FACULTY OF MEDICINE, RIJEKA

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

16:00 – 16:30 OPENING CEREMONY NEURI 2018 (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)
Nataša Jokić-Begić: Dr. Google, do I have cyberchondria?
CHAIRPERSONS: Srećko Gajović, Ingrid Škarpa-Prpić, Goran Arbanas

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

18:00 – 19:00 PLENARY LECTURE (AUDITORIUM 2)
Goran Arbanas: The secret of the female orgasm
CHAIRPERSONS: Daniela Petrić, David Bonifačić, Tena Piljušić

19:00 – 21:00 DINNER (GREAT HALL)

Saturday, 21 April 2018
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: Mastermanipulators: trolling, gaslighting,bcyberbullying – who is behind the mask?
CHAIRPERSONS: Ingrid Škarpa-Prpić, Christina Isabell Jukić, Maša Lovrović

11:00 - 11:15 COFFEE BREAK

11:15 - 12:30 STUDENT SESSION I (CONGRESS HALL)
CHAIRPERSONS: Petra Dolenec, Josipa Kajić, Emilija Borčić
1. Emina Horvat Velić: Possible role of beta-Methylamino-L-alanine (BMAA) in neurodegenerative diseases – a review
2. Petra Linić: Alzheimer's disease: molecular basis and therapeutic approach
3. Maša Lovrović: The gut-brain axis and neuropsychiatric disorders
4. Sanja Mikašinović: Molecular basis of schizophrenia
5. Beti Zaharija, Ines Gvoić, Maja Odorčić: The domain structure of DISC1 (Disrupted in Schizophrenia 1)
6. Marija Janjić: Cognitive deficit after traumatic brain injury and comorbid PTSD

12:30 - 13:30 LUNCH AND SIGHTSEEING

13:30 - 14:45 STUDENT SESSION II (CONGRESS HALL)
CHAIRPERSONS: Vesna Šendula-Jengić, Emina Horvat Velić, Iva Dumančić

1. Nejra Bećarević, Irma Huseinagić, Ana Gmajnić, Munevera Bećarević: Comorbidity of depression and anxiety disorders among miners

2. Ajla Muratović, Tarik Altumbabić, Larisa Kovačević: Correlation of work ability and degree of depression in patients with epilepsy

3. Kristina Kampić, David Bonifačić: Breaking the loneliness stigma: the feeling of loneliness and its reasons among the students of medicine at the University of Rijeka, Faculty of Medicine

4. Josipa Kajić, Matea Šoštarić, Lucija Šutić, Antonija Vrdoljak: Attitudes towards people with mental disorders, physical disability and sexually transmitted diseases

5. Gordana Calić, Tatjana Mentus: Irrational beliefs as a moderator of the connection between self-esteem and affectivity

6. Luka Janeš: The advancement of psychiatry through interdisciplinary methodology of the integrative bioethics

15:00 - 16:00 RAB SIGHTSEEING

16:00 - 19:00 RETURN TO RIJEKA

22:00 NEURI PARTY (RAKHIA)

Sunday, 22 April 2018
FACULTY OF MEDICINE, RIJEKA

07:30 - 08:30 BREAKFAST / REGISTRATION (GREAT HALL)

08:30 - 09:30 POSTER SESSION (GREAT HALL)
CHAIRPERSONS: Iva Rinčić, Martina Šendula-Pavelić, Dominik Lenčić

1. Lea Bušac: Spine injuries in elite synchronized skaters

2. Ella Sever, Magda Tomljanović, Sonja Pezelj-Ribarić, Elizabeta Dadić-Hero: Paroksetin treatment of burning mouth syndrome – case report

3. Katharina Marić: Potential biomarkers of glioblastoma

4. Ivan Franin, Sergej Nadalin, Jelena Rebić, Vesna Šendula Jengić, Alena Buretić-Tomljanović: Polymorphisms in PLA2G4A and PLA2G6 genes and plasma lipid and glucose concentrations in schizophrenia patients

5. Marija Štracak, Ana Matejčić, Svjetlana Šitum, Igor Filipčić: Transcranial magnetic stimulation as a part of comprehensive treatment of alcohol and benzodiazepines addiction

6. Barbara Nikolić, Dora Peršić, Sofia Ana Blažević, Dubravka Hranilović: Development of HPLC method for serotonin, dopamine and noradrenaline determination in rat brain tissue samples

7. Ivan Kraljević, Katarina Madirazza, Maja Valić, Zoran Đogaš, Renata Pecotić: The effect of α-2 adrenergic receptors on renal sympathetic activity (RSNA) during exposure to acute intermittent hypoxia (AIH) in rats

8. Karlo Jeličić, Kristina Bradarić, Mario Malički: Student satisfaction and burnout: a repeated measure study among medical students at School of Medicine, University of Split, Croatia

9. Dorian Laslo, Dunja Degmečić: Sex differences in schizophrenia

09:30 - 09:45 COFFEE BREAK / REGISTRATION (GREAT HALL)

09:45 - 11:15 STUDENT SESSION III (AUDITORIUM 1)
CHAIRPERSONS: Ksenija Baždarić, Martina Ivanišević, Ivan Franin

1. Irma Huseinagić, Nejra Bećarević, Dina Hašimbegović Spahić, Ajla Todorovac, Haris Huseinagić, Mirza Moranjkić: Pharmacokinetics of clopidogrel in neuroradiological interventional procedures

2. Alija Džeko, Deniz Bulja: Evaluation of the role of vertebral elements through stimulation of relative or absolute stenosis of the spinal canal during axial loaded MR imaging of lumbosacral spine on levels L3 – S1

3. Monika Tomin, Marija Olujić, Svetlana Tomić: Purpose of anti-GAD antibodies in autoimmune cerebellar ataxia

4. Jasmina Dalač, Adna Čelik, Mirza Gačanin, Eldin Burazorović: Dandy Walker malformation: complications and their management

5. Marina Popović, Kaja Grgić, Silva Butković Soldo: Sexual dysfunction in multiple sclerosis

6. Adna Čelik, Mirza Gačanin, Jasmina Dalač, Eldin Burazorović: Pediatric brain tumors: diagnosis, treatment and outcome

7. Anamaria Šušnjar, Mara Tešanović, Jelena Marušić: Postpartum seizures with posterior reversible encephalopathy syndrome (PRES)

11:15 - 11:30 COFFEE BREAK (GREAT HALL)

11:30 - 12:30 PLENARY LECTURE (AUDITORIUM 2)
Goran Mrak, Jakob Nemir: Modern neurosurgery
CHAIRPERSONS: Ingrid Škarpa-Prpić, Kristina Kampić, Josipa Kajić

12:30 - 13:30 LUNCH (GREAT HALL)

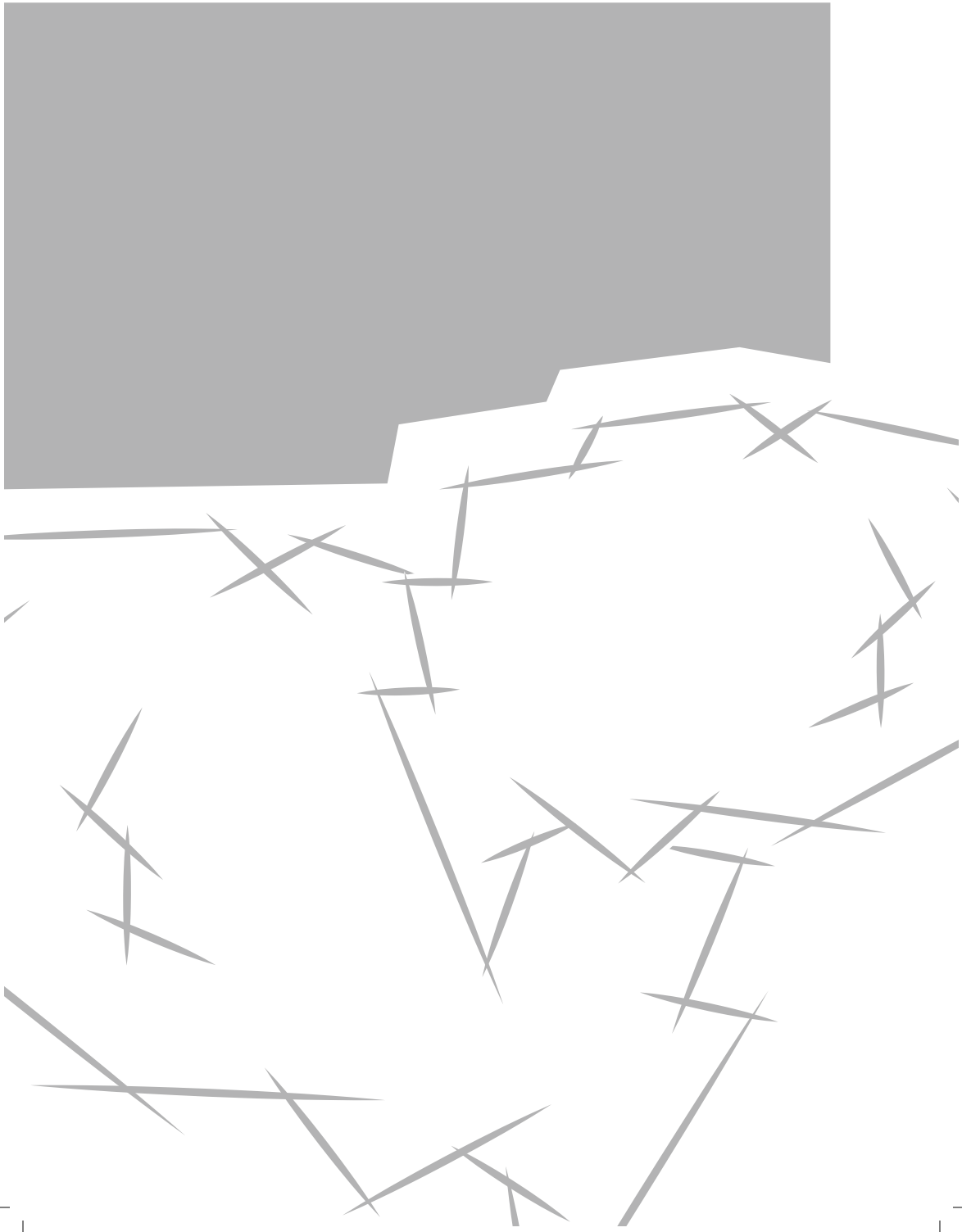
13:30 - 14:30 WORKSHOPS (AUDITORIUM 4, AUDITORIUM 5)
I. EEG in children
(Igor Prpić, Kristina Kampić)
II. Fear of public speaking
(Ines Jakovčić)

14:30 - 14:45 COFFEE BREAK (GREAT HALL)

14:45 - 16:15 STUDENT SESSION IV (AUDITORIUM 1)
CHAIRPERSONS: Kristina Pilipović, Ljerka Delač, Silvestar Mežnarić
1. Maja Ploh, Eliša Papić, Petra Remenarić, Toni Vidović, Valentino Rački, Natalia Kučić: Prototype of integrated model for evidence-based sound therapy
2. Kornelija Berečić, Lara Pilepić, Marina Roje Bedeković: The impact of stroke on language performance
3. Desiree-Željka Brkić: Modulating the endocannabinoid system in human health and disease
4. Dalia Vađunec, Jelena Osmanović-Barilar: Olfactory bulb – potential drug target for Alzheimer's disease
5. Mia Krapić, Mladenka Malenica Staver, Janja Kuharić, Natalia Kučić, Vlatka Sotošek Tokmadžić, Pero Lučin, Kristina Grabušić: Chromatography-based isolation of intracranial extracellular vesicles from patients with severe traumatic brain injury
6. Jana Živanović: Whose mouth works faster than their brain? – the matter of language innateness
7. Mara Tešanović, Anamaria Šušnjar, Mira Ivanković, Vida Demarin: From recurrent peripheral facial palsy to multiple sclerosis

16:15 - 16:45 CLOSING CEREMONY NEURI 2018 (AUDITORIUM 1)
CHAIRPERSONS: Christina Isabell Jukić, Maša Lovrović, Tena Piljušić

Plenary Lectures



Dr. Google, do I have cyberhondria?

Nataša Jokić-Begić
University of Zagreb, Faculty of Humanities and Social Sciences, Department of Psychology,
Zagreb, Croatia

Seeking health information on-line has become an increasingly common behaviour. Understanding the psychological consequences of using the Internet for health information is important because it shapes health behaviour and this influence will undoubtedly grow even stronger with new generations. Access to the internet costs little; online information is easy to access and quick to obtain; there are no bureaucratic hurdles, referral letters or waiting lists; and the anonymity of the internet allows us to make any kind of inquiry without feeling embarrassed. This shift from relying on physicians, medical textbooks, encyclopedias or popular health journals for health information to the use of a medium as simple and ubiquitous as the internet is likely to have a variety of consequences, both positive and negative. While the Internet improves health literacy and can provide valuable health information and emotional support for patients coping with complex health conditions, using the Internet for health and medical information also holds a variety of challenges and dangers. Firstly, exposing people with no medical training to complex terminology and descriptions of medical conditions might place them at risk for the harmful consequences of self-diagnosis and self-treatment. For many, seeking health information on the Internet can also be an anxiety-provoking environment. In some cases, those experiencing growing concern over information found on-line will seek reassurance by engaging in further information searches. If ongoing search fails to reassure them, these individuals are at risk of experiencing a further increase in anxiety. The term used to describe this vicious cycle is cyberchondria, a phenomenon argued to be a form of health anxiety. It is defined by repeated and extreme online searching for medical information that leads to an increase in anxiety or worry and persists as one continues and fails to look for reassuring information. Using a combination of theoretical models, empirical data and clinical experience, this address will attempt to demonstrate the positive and negative influences that new information technology have on health-related behaviour, with particular emphasis on the type and quality of mental health information available on the internet. The influence of the internet on behaviour will be discussed using cognitive models of health behaviour.

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The secret of the female orgasm

Goran Arbanas
University Psychiatric Hospital Vrapče, Zagreb, Croatia

Although one cannot distinguish between the descriptions of orgasm among men and women (readers of descriptions of orgasm cannot differentiate between whether these descriptions were written by men or women), there are many differences among orgasm in men and women. Women can achieve orgasm after many different stimuli (stimuli leading to orgasm in women are more diverse). Women are multiorgasmic, while men have a refractory period. Furthermore, women have orgasm problems more often than men (anorgasmia is one of the most prevalent sexual problems in younger age), women do not achieve orgasm in so many sexual activities as men. There is also a gender difference in the age of orgasmic problems: men have more orgasmic problems in older age, while women have more of these problems in younger age. Therefore, some authors concluded that a female orgasm is a so called side effect of sexual activity, while orgasm has a profound evolutional significance among men. This presentation is an attempt at answering the question why male and female orgasm are so different, at exploring the biological background of these differences, and at discovering the psychological and cultural factors, which influence it. Moreover, different attitudes toward sexuality (and orgasm) in men and women will be discussed. In the end, the lecturer will give some sexological advice how to help women enjoy sexuality more and how to achieve an orgasm easier.

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Mastermanipulators: trolling, gaslighting, cyberbullying – who is behind the mask?

Vesna Šendula-Jengić
Rab Psychiatric Hospital, Rab, Croatia

This might as well be a story about Lombroso, Dr. House and internet trolls...
One of the greatest riddles of the human mind lies in the disorders that float between mental health and illness, such as we see, for example, in psychosis. Although one need not be a mental health professional to notice when someone's behaviour deviates from the normal average, it is difficult to choose from the palette of human behaviour and determine the category, gravity and nature of the disorder. There are personality features that are not part of the so-called normal spectrum of personality and behaviour. Can they become dominant and determine the whole behaviour of an individual? Are Lombroso's prototypes, energy vampires, cold-blooded killers, disturbed, amoral predators among us, or are they very successful, but callous rulers of the world's territory and money? Are some of them hiding for fear of being subject to possible sanctions for their behaviour and show their face in the virtual world as trolls? Do they really lack shame and feelings for morals and ethics? Do we live in a time that favors such tendencies? Is it the person or the society that is sick? Whom and how to treat? We will talk about the challenges of modern technologies, the well-being and risks they bring, and the specific personality disorders, diagnostic and differential diagnostic characteristics of the disorder and current approach to diagnosis and treatment.

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Modern neurosurgery

Goran Mrak, Jakob Nemir
Neurosurgery clinics, Clinical Hospital Center Zagreb, Medical faculty, University of Zagreb

Individual enthusiasm as well as modern technology, especially the introduction of neurosurgical microscope, endoscope, neuronavigation systems, radioneurosurgery and the advent of advanced radiological techniques, have opened up a new chapter in the development of neurosurgery. Today, modern neurosurgery is aimed at the preservation of specific neurological functions inherent to eloquent anatomical regions as well as developing the minimally invasive approaches to various pathological processes involving the brain and skull base. Minimally invasive endoscopic approaches enable the bone sparing techniques, which, often, use natural anatomic corridors such as paranasal sinuses, thus making the resections of different lesions involving the skull base and craniocervical junction possible. Advancements in glial tumor surgery today, enable awake craniotomy resections of eloquent region tumors, preserving the higher cortical functions such as language and emotional response in carefully selected patients. Most of modern intracranial surgical procedures use some form of neuronavigation, facilitating the anatomical orientation as well as evoked potentials recording which enables the modern intraoperative corticography and deep white matter mapping in relation to the tumor, preservation of which is the main goal in such surgical procedures. Human Connectoma Project definitely contributed priceless information considering the deep white matter interconnectivity. The development of radiosurgical procedures, especially the Gamma Knife radiosurgery made possible the treatment of previously untreatable brain tumors regarding whether the difficult to access lesions surgically or lesions deemed too numerous to treat eg. metastatic brain tumors. Modern radiosurgical Gamma Knife procedures are also used to treat various vascular malformations such as AVMs or otherwise untreatable cavernous hemangiomas. The advancement in modern microsurgical techniques and instruments and development of the modern neurosurgical microscope also contributed to revitalizing and enhancing the vascular bypass techniques regarding the revascularization procedures. Neuroradiological advances, especially regarding the MRI devices, PET-CAT devices and PET-MRI devices and the development of the modern EEG techniques, both invasive and non-invasive, together with the formation of multi- and interdisciplinary teams, made possible further development of subspecialties in functional neurosurgery (epilepsy surgery, movement disorders, psychiatric disorders and dementias).

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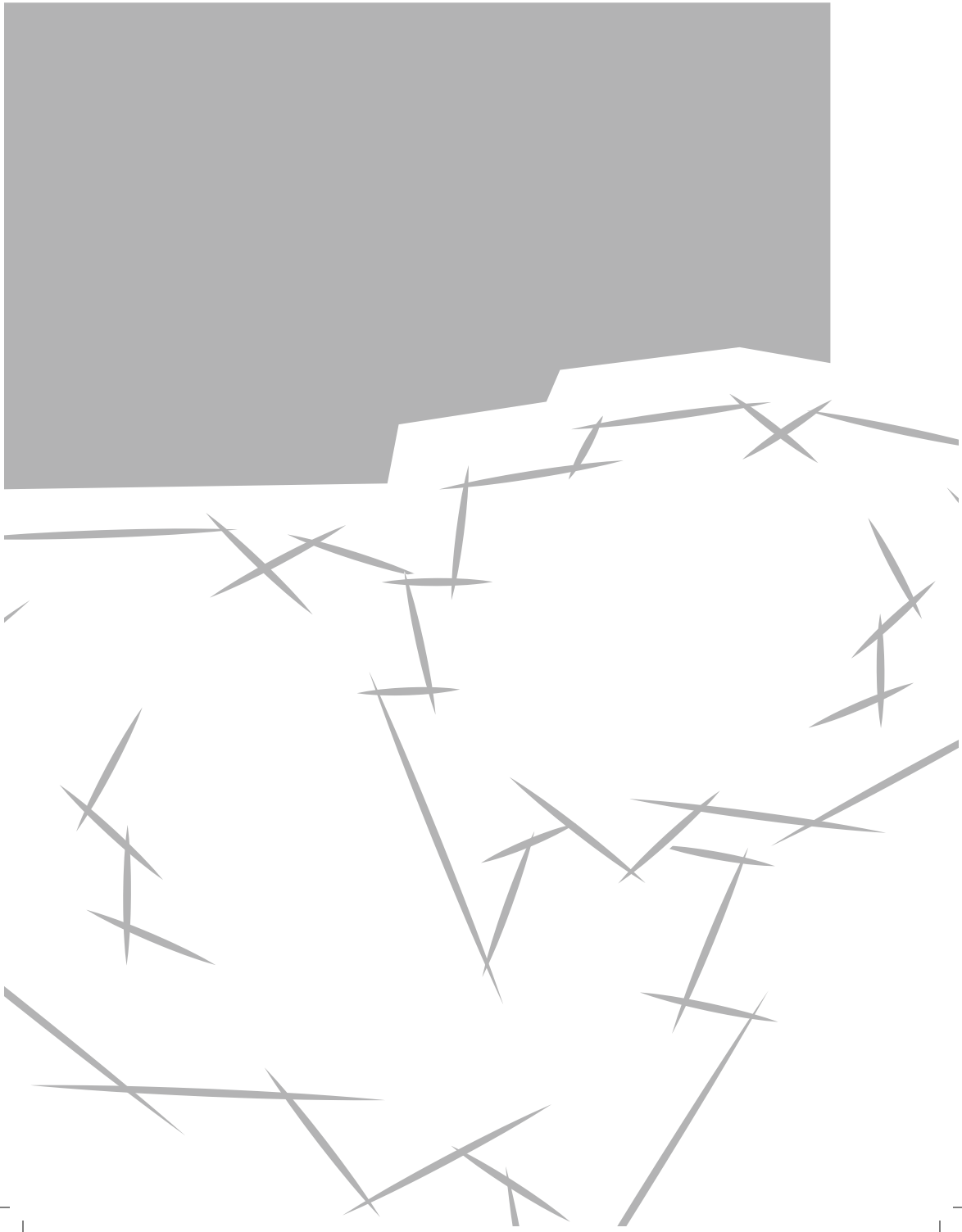
Symposia



Possible role of beta-Methylamino-L-alanine (BMAA) in neurodegenerative diseases – a review

Emina Horvat Velić
University of Zagreb, Faculty of Science, Zagreb, Croatia

Beta-Methylamino-L-alanine (BMAA) is an amino acid (derivative of alanine) that shows neurotoxic properties. BMAA is produced by cyanobacteria and can be found in marine species such as sharks, plants that co-exist in symbiosis with said cyanobacteria, as well as animals that eat, for example, seeds of those plants. The detection of BMAA is possible via laboratory procedures like mass spectrometry or liquid chromatography, to name a few. Neurotoxic mechanisms of BMAA are still unclear, but its negative effect has been noted in rats, rhesus monkeys and humans. BMAA crosses the blood-brain barrier, and once there, it accumulates and it is believed that it causes misfolding and aggregation of proteins. BMAA has been connected to Parkinson's disease, Alzheimer's disease, amyotrophic lateral sclerosis, Huntington's disease, and progressive supranuclear palsy. The exact causation between effects of BMAA and these diseases has not yet been established and this review serves as a study of all available literature. However, a stronger connection has been established between BMAA and complex neurodegenerative disease, amyotrophic lateral sclerosis/parkinsonism–dementia complex (ALS-PDC), also known as Lytico-bodig disease. The disease is characteristic to people of Guam, and it is hypothesized that it develops due to their dietary habits that include consumption of food rich in BMAA. More studies and trials are needed in order to show how, and if BMAA causes this array of neurodegenerative diseases, and whether it is the only factor that contributes to their development (in non-genetic cases), or is it perhaps just one of the contributing environmental factors.

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Alzheimer's disease: molecular basis and therapeutic approach

Petra Linić
University of Rijeka, Department of Biotechnology, Rijeka, Croatia

Alzheimer's is a chronic neurodegenerative disease and the most common form of senile dementia. The greatest known risk factor of the disease is aging, so most patients with the disease are 65 years of age or older. However, it is not considered a normal part of aging, but the result of complex interactions among many factors including age, genetics, environment, lifestyle and coexisting medical conditions. Alzheimer's disease is characterized by a progressive decline in cognitive function, which usually begins with problems with short-term memory. The disease occurs in two forms, hereditary and sporadic. Two characteristic pathological changes in the brain that occur in both forms of disease are the accumulation of amyloid β peptide in extracellular senile plaques and the accumulation of abnormal hyperphosphorylated tau protein in the intracellular neurofibrillary tangles. The neurodegenerative process of the disease is characterized by a synaptic damage, which is accompanied by the loss of neurons in the cerebral cortex and certain subcortical regions of the brain. There is no treatment that stops or reverses the progression of the disease, although some may temporarily improve the symptoms. Approved therapy includes three inhibitors of acetylcholinesterase (donepezil, galantamine and rivastigmine) and one NMDA receptor antagonist (memantin). These medications temporarily reduce memory and thinking problems, but their clinical effect is modest. Over the past decade, the focus of discovery of new therapies is on medicines that change the course of the disease. The aim of such drugs is to slow down the progression of the neurodegenerative process by inhibiting critical events in the pathophysiology of the disease, including the deposition of extracellular senile plaques and intracellular neurofibrillary tangles. However, after decades of research, Alzheimer's disease is still incurable and is considered to be one of the major human health challenges.

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The gut–brain axis and neuropsyphatric disorders

Maša Lovrović
University of Rijeka, Faculty of Medicine, Rijeka, Croatia

The gut-brain axis (GBA) consists of communication between the central and the enteric nervous system, linking the brain with intestinal functions. The discovery of the complexity of the human microbiome has resulted in an ongoing reassessment of many concepts of health and disease, including diseases affecting the CNS. Evidence accumulated from animal studies suggests that psychological stress can affect the composition of gut microbiota. A growing number of studies suggest that the microbiota may be involved in modulating stress-related behaviour. Preclinical studies on germ-free animals show exaggerated neuroendocrine responses and an increase in anxiety-like behaviour which can be reduced by short-term colonization of germ-free animals in adulthood. Even though the biomolecular pathways are not completely understood, these studies show a relationship between gut microbiota and stress and anxiety-related behaviours. Alterations in the GBA have been implicated in the pathophysiology of autism spectrum disorder (ASD). In a study hypothesizing that the regressive onset autism is caused by destruction of indigenous gut flora and its replacement with neurotoxin-producing bacteria, 11 children were treated with Vancomycin and short-term improvement of symptoms was noted in 80% of participants. Colonization with Candida albicans was shown to increase autistic behaviours in children with ASD due to excessive build-up of toxins. Patients suffering from chronic stress were given probiotic treatment containing Bifidobacteria species, and have reported an overall psychological improvement. In another study, subjects were given either probiotics or antidepressants. Those given probiotics showed reduced psychological effects to a similar degree as participants administered Diazepam. Analogous studies found that probiotic therapy reduced depressive symptoms as well as Citalopram and Diazepam. Although our ability to study GBA is more limited in humans than it is in preclinical models, studies suggest that developmentally our resident microbiota, or its absence, can have long-lasting influence on brain functioning and behaviour. Further research might include antimicrobials or probiotics in the treatment of neuropsychiatric disorders.

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Molecular basis of schizophrenia

Sanja Mikašinović
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Schizophrenia is a complex neuropsychiatric disorder that affects about 1% of the world population. It is characterized by the presence of various symptoms that mostly appear in early adulthood and lead to deterioration of the life quality of patients. Despite many efforts to understand the neurobiological basis of schizophrenia, the unique pathophysiology of the disorder is still not defined. Clinical studies and the collected data indicate that schizophrenia is a largely hereditary disease, which depends on multiple candidate genes, for example NRG1, DISC1, COMT, RELN, each of which contributes with a small individual effect to the susceptibility of the disease. There is a general agreement that different biological, environmental and psychosocial impacts, which accumulate throughout life, may adversely affect genetically susceptible individuals and lead to the development of a mental disorder. The most prominent impact has prenatal stress and cannabis use. In recent years, special importance has been given to the epigenetic research that has the linking role and mediates the complex interaction between the environmental factors and genes leading to schizophrenia. Also, the development of high-throughput methods such as genomics and proteomics represent a revolution in the research of the molecular neuropathology of schizophrenia. These methods provide an opportunity to understand not only the individual candidate genes but also the role of molecular pathways and the interaction of genes. In this work, the present data related to molecular genetics of schizophrenia have been collected, as well as future guidance in this field of research. Genetic studies have provided many findings that have been presented as potential biomarkers for schizophrenia, while epidemiological have suggested that a diversity of factors are associated with increased risk for development of this disorder. The integrated approach, which combine the best of numerous different studies such as – omics technologies, is considered to be very promising, as well as stem cell technology.

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The Domain Structure of DISC1 (Disrupted in Schizophrenia 1)

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Disrupted in Schizophrenia 1 (DISC1) encodes a multifunctional scaffold protein, which is a vital protein in early neurodevelopment. It has been strongly linked to major mental illnesses due to its disruption in a family with a high loading of various psychiatric illnesses. Genetic evidence, including a number of association studies in diverse populations, implicate the DISC locus in susceptibility to schizophrenia, schizoaffective disorder, bipolar disorder and major depression. DISC1 modulates several neuronal signalling pathways, but its precise mechanism of action, role in development of mental illnesses, as well as its structure, are still largely unknown. This absence of structural information regarding DISC1 significantly affects further research into the link between disruption of DISC1 function and susceptibility to disease. However, recent work using recombinant protein in vitro has suggested it to consist of at least four distinct folded domains, named D, I, S and C. It was revealed that the disordered N-terminal region of DISC1 is followed by a dimeric D region. Next, in a central stretch that seems to be unstable when expressed in Escherichia coli, lie the overlapping I and S regions, that are crucial for the oligomeric state of DISC1. The extreme C-terminus contains the monomeric, helical C domain that seems to be responsible for protein-protein interactions. Although other structural domains may be added with time, this composition has already provided great insight into the mechanics by which DISC1 is disrupted in schizophrenia and the other disorders mentioned above and will be a helpful resource for future studies.

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Cognitive deficit after traumatic brain injury and comorbid PTSD

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Traumatic brain injury (TBI), especially intracerebral haemorrhage, has previously been reported as a risk factor for cognitive impairment. According to previous findings, approximately 5 – 10% of individuals exposed to trauma develop chronic PTSD. However, in recent years, the focus of interest turns to posttraumatic stress disorder (PTSD) as a possible additional factor that may be associated with impaired cognition. To our knowledge, there are few researches that include the head trauma and comorbid PTSD and they are mainly related to war injuries. A 28-year-old male, who was physically assaulted four years ago, had consequent brain haemorrhage. After the TBI, symptoms of all three PTSD clusters were registered, altogether with cognitive impairment and behavioural symptoms. In view of the persistence of mental difficulty, despite the use of pharmacotherapy (antidepressant, antipsychotic drugs and affective stabilizer) have been done neuropsychological testing, brain MRI and Clinician Administered PTSD Scale. Neuropsychological testing has shown disturbances of attention, memory and abstract thinking, which is consistent with the brain MRI findings. For the purpose of definitive assessment of cognitive functioning, after TBI and comorbid PTSD a longer period of time is required. Special attention is needed when it comes to young people, due to greater potential for recovery but also because of the stigmatization, that accompanies changes in cognitive functioning.

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Comorbidity of depression and anxiety disorders among miners

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Depression is the leading cause of disability worldwide, and is a major contributor to the overall global burden of disease. The prevalence of depression is rising and it often co-occurs with other physical diseases. The aim of the research is to determine the comorbidity of depression and anxiety disorders with chronic physical diseases among employees of the „Brown coal mine Banovici“. We conducted a retrospective study, which included 117 employees from the disease registry who are being under treatment of depression and anxiety disorder. We collected data from medical records of patients about sex, age, marital status, smoking status, physical diseases, types of antidepressants and other drugs they use. The study showed that there are 117 employees of the “Brown coal mine Banovici” who are under treatment of depression and anxiety-depressive disorder. 22 (18.8%) of them are females and 95 (81.2%) males in average life span of 48.3 years. The most commonly used antidepressant is Escitalopram. 62 (53%) out of 117 patients with depression have a comorbidity with diseases of the circulatory system, 24 (20.51%) have a comorbidity with diseases of the musculoskeletal system and connective tissue, 16 (13.68%) have a comorbidity with endocrine, nutritional and metabolic diseases. 25 (21.37%) patients are not suffering from any other chronic physical disease. The most commonly used drugs besides antidepressants are antihypertensive. The comorbidity rate of depression and anxiety disorders with cardiovascular diseases among employees of the “Brown coal mine Banovici” is higher than with all other chronic physical diseases.

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Correlation of work ability and degree of depression in patients with epilepsy

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Epilepsy has a great influence on health, because of its associated physical and psychosocial difficulties, the side effects of anticonvulsant therapy, lifestyle restriction and stigmatization. This study included 100 patients (50 male and 50 female) with generalized tonic-clonic (GTC) epileptic seizures, in order to determine the correlation between work ability and degree of depression of the patients. The age, qualifications, working status and degree of depression were analysed. The degree of depression in patients was measured by the Hamilton depression scale. Average age of patients included in this study was 32.3 ± 12.1 years. There were 57 secondary school graduates, elementary school 31, and equal number (6) were without elementary or higher education. The major number of patients were unemployed (36), there were only 25 employees, housewives 21, students 11, faculty students 5 and one regular and early retirees. The average degree of depression of patients with GTC attacks was 10.5 ± 7.6 (from 0 to 31). The major number of patients had no signs of depression (46), while moderate depression had 33 patients, and the number of reasonably depressed ones was 21. Employees had a middle value 11.1 ± 7.0 (from 2 to 27), 32% had no symptoms of depression, 52% had symptoms of less depression, while 16% had great depression. The degree of depression in patients who were unemployed did not changed significantly (p=0.4) comparing to level of depression in employed patients 9.6 ± 7.6 (from 0 to 31). There were no symptoms of depression in 41.7% unemployed patients, less depression symptoms in 38.9%, and high grade depression in 13.9%. The analysis showed that epilepsy significantly disturbs the work ability, predominantly in patients with GTC. Increased incidence of attacks is causing a higher degree of depression in both sexes, regardless of the type of attack.

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Breaking the loneliness stigma: the feeling of loneliness and its reasons among the students of medicine at the University of Rijeka, Faculty of Medicine

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The notion of loneliness includes a longer period of emotional disturbances which, evolves when a person feels as an outsider, underestimated, unaccepted and excluded by the others and/or they lack an intimate partner to share some activities which cause pleasure and the feeling of true integration into the society and open the possibility for full emotional closeness. The main aim of our research was to discover whether our fellow colleagues, feel lonely despite the fact they are almost constantly surrounded by other colleagues. Furthermore, we tackled the reasons behind these feelings. In our research, an anonymous questionnaire has been used among the students of medicine from all of the six years of the Faculty of Medicine, University of Rijeka. Altogether, 347 students participated in the research. The research design involves 3 parts. The first part is based on the general information about the students (date of birth, sex, year of study). The second part is based on the Likert's scale (graded 1 – never to 5 – always). The third part of the questionnaire is based on the counselling options and the awareness of the students about them. The results go along with the hypothesis that exactly those who should be providing help – actually need help. 4.6% of students responded that they always feel lonely. One fact appeared to be true: even among us there are people who would harm themselves or do another bad deed just for the sake of the feeling of loneliness – 2.6% responded with "always" in this section. Students are not informed about where and from whom exactly to seek help. The reasons behind the feeling of loneliness in the majority of cases are lack of free time due to the overwhelming intensity of the academic life, bad faculty organization, false solidarity among the collegium, as well as unhealthy competitiveness. Who should be blamed for this?

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Attitudes towards people with mental disorders, physical disability and sexually transmitted diseases

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Attitude is a relatively stable way of valuing an object. It includes cognitive, emotional and behavioural components. Croatian research conducted in 2003 showed that half of participants had misbeliefs about mental disorders. Misbelief, a cognitive component of attitude, can easily result in discrimination. During the last decade, experts have invested a lot of effort in destigmatisation of mental disorders, so our main aim was to investigate current condition and compare these attitudes to those toward other often-stigmatised groups, people with physical disability and people with sexually transmitted diseases. Research was conducted on 543 participants whose age ranged from 18 to 72. 71.1% of participants were women. An online questionnaire consisting of demographic questions and misbeliefs scale about mental disorders, physical disability and sexually transmitted diseases (STDs) was used. Participants were also asked to assess the internality, stability and controllability of these conditions. Principal axis method of factor analysis was used to determine homogeneity of misbeliefs scales. Results showed that participants have least misbeliefs about people with physical disability (average result of 10.97% on misbeliefs scale), followed by mental disorders (18.95%) and STDs (21.53%). Highest results on internality scale was for mental disorders, then STDs, and physical disability was perceived as least internally caused. All of the differences were statistically significant ($t=2.48$; $df=533$; $p<0.001$ and $t=10.17$; $df=536$; $p<0.001$ respectively). Physical disability was considered most stable ($t=14.04$; $df=542$; $p<0.001$ compared to STDs), while difference between mental disorders and STDs was not significant. Physical disability was also perceived as least controllable of the three, followed by mental disorders ($t=4.08$; $df=542$; $p<0.001$), and STDs were viewed as most controllable ($t=27.92$; $df=542$; $p<0.001$). These findings imply that prevalence of misbeliefs about mental disorders is decreasing compared to results from research conducted in 2003. It is possible that this is a consequence of programs aimed at stigma reduction. Hence, we should continue with destigmatisation of mental disorders, but also consider implementing programs for reducing other forms of stigma, for example, that associated with STDs.

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Irrational beliefs as a moderator of the connection between self-esteem and affectivity

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In this paper, the correlation between irrational beliefs, self-esteem and the dominant affection (positive and negative) was examined from the viewpoint of rational-emotional behavioural theory (REBT). This theory assumes that negative emotional reactions are generated when negative activating events are observed through irrational beliefs. The tendency of people to evaluate their actions, thoughts and emotions often leads to varying self-esteem. The sample consisted of 89 respondents, age 15 to 19 years. The Check List of Emotions was used to examine the dominant affectivity, General Attitude and Belief Scale (shortened version) for assessing the irrational beliefs and Rosenberg Self-esteem Scale was used to measure self-esteem. Results of the correlation analysis show statistical significance on all variables: irrational beliefs and self-esteem ($r = -.317$, $p < .01$), positive affective state and self-esteem ($r = .344$, $p < .01$), negative affective state and self-esteem ($r = -.307$, $p < .01$), negative affective state and irrational beliefs ($r = .272$, $p < .01$). Positive affective state and irrational beliefs are not statistically significant. Using the analysis of partial correlation, it was shown that when the influence of variables irrational beliefs is controlled, the correlation between the positive affective state and self-esteem is increased ($r = .398$, $p < .01$), while the correlation between the negative affective state and self-esteem decreased ($r = .242$, $p < .05$). The obtained results indicate that irrational beliefs are a moderator between negative affectivity and self-esteem. This paper has emerged from the research conducted as part of the project “Social Participation of Persons with Intellectual Disability” (record number 179017) and the project “Identification, Measurement and Development of Cognitive and Emotional Competences for Important European-Focused Communities” (record number 179018), Ministry of Education, Science and Technological Development of the Republic of Serbia.

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The advancement of psychiatry through the interdisciplinary methodology of integrative bioethics

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This presentation will serve as a platform for introducing the methodological model of integrative bioethics which is characterized by interdisciplinarity, transdisciplinarity, pluriperspectivity and integrativity. After a brief definition of each of the mentioned elements, the issue of monoperspective approach to mental disorders and diseases is tackled. Furthermore, matter of discussion is the phenomenon of psyche in general, often present in psychiatric institutional science throughout the world. The project of integrative bioethics of psyche implies a dialogue of disciplinarily diverse perspectives, ranging from philosophy, anthropology, sociology, and psychology, to psychiatry, cognitive sciences, and neuroscience, and emphasizes the thesis that the connection and constructive pragmatic dialogue of these disciplines can contribute to the efficiency of medical science in particular field of treating the mental suffering. The emphasis is especially on the subject of life protection as the starting point of study and responding action. In the context of aforementioned disciplinary constellation, neuroscience reflects as an extremely important element since it represents a kind of scientific physicalist pattern in which the activity of person`s psyche is printed through biological neurotransmitter impulses. Thus, on a macro-related plane of psychic life, human brain represents a biological precondition for the so-called “psychic activity”, but it`s performance products are usually stimulated and determined by various other factors, the social ones above all. Henceforth, it will be hypothesized that apart from psychology, the other socio-humanistic sciences are also needed to improve the existing paradigm of treating psychic disorders. To sum up, this approach offers another perspective on the global plan of the study of psyche, bearing in mind each of the above mentioned disciplinary perspectives as extremely important, with the overall aim to demonstrate multiple interlacing of the majority of views.

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Pharmacokinetics of clopidogrel in neuroradiological interventional procedures

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Interventional neuroradiology is known to be associated with potentially serious perioperative neurological complications as a result of thromboembolic phenomena. The prevalence of antiplatelet drug resistance among patients who undergo cerebrovascular stent placement is unknown. We retrospectively collected medical, laboratory, and radiographic data on patients who underwent cerebrovascular stent placement. We used the P2Y12 assay to calculate P2Y12 reaction units and percentage platelet inhibition and the rapid platelet function assay-aspirin (RPFA-ASA) to calculate aspirin reaction units (ARU). Clopidogrel resistance was defined as percentage platelet inhibition 40% whereas aspirin resistance was defined as ARU 550. Among 47 patients treated between January 1, 2017 and May 31, 2017, stent indications were the following: wide-neck aneurysm (36, 76.0%), carotid stenosis (4, 8%), symptomatic intracranial stenosis (7, 14.5%), and vertebral stenosis (1, 1.5%). Among 34 patients on clopidogrel, the median dosage per week was 525 mg with a mean platelet inhibition of 43.2%. 10 patients (32%) were clopidogrel-resistant. Platelet inhibition was found to be lower in patients with diabetes (21.8 versus 45.8, P= .036), older than 55 years of age (37.2 versus 53.0, P= .031), hypercholesterolemia (34.4 versus 46.2, P= .153) or hypertension (35.1 versus 48.2, P= .077), or hypercholesterolemia (34.4 versus 46.2, P= .153). We found, using point-of-care tests, that aspirin resistance is relatively uncommon, whereas clopidogrel resistance occurred in one third of patients undergoing cerebrovascular stent placement.

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Evaluation of the role of vertebral elements through stimulation of relative or absolute stenosis of the spinal canal during axial loaded MR imaging of lumbosacral spine on levels L3 – S1

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Low back pain (LBP) affects up to 80% of population at some point in life. LBP is commonly associated with spinal canal stenosis. Spinal stenosis and dynamic spinal stenosis are defined through dural sac cross section area (DSCSA) values. Intervertebral discs and ligamenta flava are in the vicinity of the spinal canal and prone to volume changes, when under compressive load, and subsequently compressing the spinal canal. To evaluate the changes in volume of intervertebral discs and ligamenta flava on L3/L4, L4/L5 and L5/S1 levels under compressive load and determine which of the two has bigger impact on DSCSA reduction. Intervertebral disc surface area (IDSA), DSCSA and ligamenta flava thickness were measured retrospectively with magnetic resonance imaging (MRI) before and after compressive load application. MRI of 16 low back pain patients with clinical suspicion on spinal canal stenosis were measured in sagital plane and axial plane on levels L3/L4, L4/L5 and L5/S1. There was a correlation between DSCSA reduction and IDSA increase on L3/L4, L4/L5 and L5/S1 ($p1=0.06$, $p2=0.034$ and $p3=0.04$). Somewhat smaller correlation between DSCSA reduction and ligamenta flava thickness increase has been noticed on level L3/L4 ($p=0.016$), with no correlation on levels L4/L5 and L5/S1 ($p1=0.38$, $p2=0.19$). Apparently, DSCSA is reduced by IDSA increase after applying compressive load, however connection between ligamenta flava thickness increase and DSCSA reduction remains somewhat unclear. Further studies with larger patient numbers are needed to understand the clinical significance between DSCSA, intervertebral disc and ligament volume changes.

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Purpose of anti-GAD antibodies in autoimmune cerebellar ataxia

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Anti-GAD (anti-glutamic acid decarboxylase) are rare kind of antibodies, which by inhibiting GAD (glutamic acid decarboxylase), which is essential for creating GABA (gamma-aminobutyric acid), can lead to decreased production and concentration of GABA and therefore cause decreased level of inhibition in the central nervous system (CNS). This could cause various diseases, such as cerebellar ataxia, eye movement dysfunction, epilepsy, Miller-Fisher syndrome. Apart from causing neurological disorders, they have also been found in the blood of those patients who suffer from diabetes and they point out to type 1 diabetes. A 65-year-old female patient has been admitted to the Department of Neurology due to diplopia. For the last ten years, she has been suffering from the progressively increasing ataxia of unknown cause. During her hospitalization, she has been submitted to various examinations, including ophthalmic examination. After this examination, physicians have concluded that her diplopia had the same etiology as ataxia. This patient also suffers from diabetes and she has been treated by endocrinologist. Physicians have decided to submit her to another test in order to search for anti-GAD antibodies. This test came back positive and she was diagnosed with autoimmune cerebellar ataxia. After she was diagnosed, she was hospitalized in order to receive pulse corticosteroid therapy. Two months after receiving therapy, patient looks objectively much better. Even though they are rare, anti-GAD antibodies are important for diagnosing the exact etiology of ataxia. After we discover those antibodies, we are able to determine right diagnosis, correct and efficient way of treatment and improve patient's quality of life, as it was in this presented case.

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Dandy Walker malformation: complications and their management

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The Dandy-Walker malformation (DWM) is the most common posterior fossa malformation. The estimated prevalence of this malformation and its related variants is about 1/30.000 live births. The diagnosis is based on MRI including complete or partial agenesis of the cerebellar vermis, cystic dilation of the fourth ventricle, formation of a cyst and an enlarged posterior fossa due to a high tentorial insertion. In most patients (75 – 90%), the symptoms of obstructive hydrocephalus are visible during the first three months. Treatment is primarily based on the associated symptoms such as hydrocephalus with a shunt or an endoscopic third ventriculostomy. Since the shunts are vulnerable to blockage, many revisions are necessary. The aim of this study is to present the clinical manifestations, diagnosis and treatment of complications due to a cystic formation in a female patient with DWM. The authors reviewed a case treated at Department of Neurosurgery Clinical Center University of Sarajevo (CCUS) with data that was taken from the CCUS patient database. The female patient is presented with irritability, an increased head circumference and bulging fontanelle after birth and DWM was diagnosed based on the MRI. Shortly thereafter, a ventriculoperitoneal shunt was placed. In the following years, the patient had numerous emergency shunt revisions due to high intracranial pressure (ICP). In August 2015, a cystoperitoneostomy was performed. The shunt lasted until May 2017, when the patient's condition worsened. A Y connector was placed instead of having two separate shunts. Since then the patient had no further complications. The DWM can be both asymptomatic or have many complications, as is the case with this patient. The main symptoms are due to elevated ICP. Since the patient had two systems of drainage - supratentorial and infratentorial, it was decided that the best course of action was to connect them and drain as one.

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Sexual dysfunction in multiple sclerosis

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Sexual problems in patients diagnosed with multiple sclerosis can be described as primary, secondary or tertiary. Foundation of sexual dysfunction comes from changes to the nervous system that directly impair the sexual response and/or sexual feelings (total loss of libido, diminished sensations in the genitals, vaginal dryness in woman and erectile dysfunction in men). Secondary changes are not directly related to reproductive organs, but can interfere with interest and ability to participate in sex (bladder and/or bowel incontinence, muscle weakness, tremor and problems with concentration). Tertiary sexual dysfunction results from psychosocial and cultural issues that interfere with one's sexuality (depression, loss of confidence, performance anxiety and body-image concerns). We present a case of a 37-year-old male patient diagnosed with multiple sclerosis in January 2013. He was hospitalized and treated with pulse corticosteroid therapy. In June 2015 during his hospitalisation due to a relapse, psychosis symptoms were recognized. An initial psychiatric evaluation was done, with the patient stressing out his dissatisfaction in sexual relations with his wife. Sulpirid was prescribed. A urologist was consulted due to symptoms of detrusor sphincter dyssynergia and erectile dysfunction. Avanafil was prescribed, but caused severe vertigo and nausea. In July 2015, dimetil fumarat therapy was started and continued, with pulse corticosteroid therapy given during two relapse episodes. The patient's current neurological status is stable for several months, with only minor neurological deficits: discreet head tremor, blurred left eye vision without a focal vision field deficit, supranuclear facial paresis on the right side of the face, myotatic reflex on upper extremities and patellar reflex are lively, with an atypical plantar reflex response. Urgency and occasional incontinence persist. Sexual contentment greatly affects the quality of one's life. Patients with multiple sclerosis should be boldly asked about their sexual functions and unhesitantly treated with a multidisciplinary approach.

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Pediatric brain tumors: diagnosis, treatment and outcome

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Brain tumors are the most common solid tumor type in the pediatric population and the leading cause of death among all childhood neoplasms. The signs and symptoms of a brain tumor in children are often nonspecific and may be easily overlooked resulting in diagnostic delay that can affect treatment and outcome of the patients. The aim of this study is to analyse the incidence, clinical and radiological findings, treatment strategy focusing on the role of surgery, histological types and outcome of the children with brain tumors admitted at Department of Neurosurgery Clinical Center University of Sarajevo (CCUS) in the last five years. The authors retrospectively reviewed the records of 28 pediatric patients admitted at Department of Neurosurgery CCUS from January 2013 to December 2017. The data was taken from the CCUS patient database and processed using Microsoft Office 2010 package. The sample represents the most common changes of neurological status were ataxia, observed in 42.86% of the patients; 23.81% reported consciousness disorders; 14.9% of the patients had symptoms of increased intracranial pressure. The most common presenting symptoms were headache and vomiting due to raised intracranial pressure. The most frequent location of pediatric brain tumors were posterior fossa (60.72%). Most frequent patohistological diagnosis was glioma (28.6%), followed by medulloblastoma and primitive neuroectodermal tumor (PNET) – both 14.29%. Surgery followed by radiation therapy was used in the majority of the cases. Early diagnosis of pediatric brain tumors should be prompted through the multidisciplinary team approach. In most cases treated at CCUS during the monitored period the main symptom was ataxia followed by increased intracranial pressure symptoms. From the pathohistological standpoint, the most common type of tumor was glioma. The patohistology, anatomical location and extent of tumor resection followed by radiation therapy and chemotherapy can influence the outcome of the patients.

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Postpartum seizures with posterior reversible encephalopathy syndrome (PRES)

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Posterior reversible encephalopathy syndrome (PRES) is a reversible clinicoradiological entity that typically presents with a consciousness impairment, headache, seizure activity, nausea/vomiting and visual abnormality. At magnetic resonance imaging (MRI) it occurs with white matter vasogenic oedema most commonly affecting the posterior occipital and parietal lobes of the brain. PRES is most commonly associated with exposure to toxic agents, hypertension, preeclampsia/eclampsia, infection, autoimmune disease etc. Eclampsia is the onset of seizures (convulsions) in a woman with preeclampsia. Eclampsia affects 1 in 2000 pregnancies and occurs normally between 20 weeks gestation and 48 h or even later in the postpartum period. Among the reported cases, up to 90% suffered from headache and visual disturbance before the seizures and no classical preeclamptic signs were present in over 50%. A 33-year-old primigravida, with unremarkable antenatal period, developed seizures on eighth day postpartum. During parturition, her pain was occupied by epidural anaesthesia, but the birth was completed by Caesarean section in the general endotracheal anaesthesia due to secondary uterine inertia. The only symptoms preceding the seizures were headache few days before seizures. There was no evidence of preeclampsia in antepartum or postpartum period. All clinical investigations were normal and excluded all other possible causes of seizures in postpartum period. MRI demonstrated lesions typically for PRES. It is considered that this patient fits the criteria for late postpartum eclampsia. She was discharged five days after her seizures on anticonvulsive and ablactive therapy. The need for multidisciplinary approach of gynecologist, neurologist, radiologist and anaesthesiologist in early diagnosis of seizures in postpartal period and prompt treatment is emphasized to avoid any short and long-term neurological sequelae including death in a reversible condition like PRES.

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The prototype of integrated model for evidence-based sound therapy

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Neurofeedback (NFB) is a type of biofeedback that uses real-time displays of brain activity - most commonly electroencephalography (EEG). Typically, sensors are placed on the scalp to measure activity, with measurements displayed using video displays or sound. Research show neurofeedback may be a potentially useful intervention for a range of brain-related conditions. Main aim of our research is to compare neurofeedback effects on human subjects while listening golden ratio sound sample (Bach's fugue) and sound patterns created by our prototype software, based on EEG waves, to establish the model for evidence-based sound therapy. Research and included 20 healthy subjects of different age (25 – 74 years old) and sex. Subjects were tested for neurofeedback response to golden ratio sound sample (Bach's fugue) and sound patterns based on human EEG waves as well silence, during five minutes of measurement. To record EEG samples and create database and to measure and analyse neurofeedback effects Biopac Pro system was used. For EEG wave samples sonification we developed our own software, based on correlation between sequence of sound samples and brain wave amplitude range. For statistical analysis, MS Excel and Statistica for Windows were used. Results reveal changes in morphology of brain waves, presented as periodic peak patterns, while listening Golden ratio sound sample and EEG-based sound sample, remarkable in all subjects. Results of Fast Fourier Transform analysis reveal more frequent brain activity in alpha and beta frequency range. Interpretation of preliminary research results show that used stimuli can be used for inducing alpha and beta brain activity and therefore used as a prototype for evidence-based sound therapy, as well as it opens the possibility of creating an integrated model and software upgrade, which could include sound amplitude and frequency as a parameter for creating individual evidence-based sound therapy.

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The impact of stroke on language performance

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A stroke is a medical condition in which poor blood flow to the brain or rupture of a blood vessel in the brain result in cell death. It is the first leading cause of disability in the Republic of Croatia. Among the most common stroke symptoms are sudden weakness/numbness of face, arm or leg on one side of the body and difficulty speaking and/or understanding speech. Latest research report complex inconsistency in post-stroke language manifestations according to the side and location of the brain lesion and dominance of the hemisphere. The aim of our study was to investigate the correlation between side and location of the stroke lesion and stroke mechanism and type of post-stroke language disturbances. For this study, 18 patients who survived stroke were examined during a period of 3 months with a battery of adjusted and translated questions based on diagnostic and screening tests for aphasia standardised for English speaking population such as Western aphasia test (WAB). In addition, their CT scans, medical diagnosis and verbal score were compared to determine the similarities and diversities. The results showed that out of the total number of 18 patients, 8 patients had ischemic stroke in right hemisphere. Even though right hemisphere strokes are not supposed to have aphasia as a consequence, 4 out of 8 patients had severe aphasia. Moreover, out of 10 patients with left hemisphere damage, 8 had aphasia but the severity varied inconsistently. We emphasise the importance of verbal score on aphasia tests and differential diagnosis with other speech disturbances when diagnosing the type of aphasia. Although the localisation can be helpful in the final decision, it should not be the only factor when deciding the type and existence of aphasia.

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Modulating the endocannabinoid system in human health and disease

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The endokanabinoid system combines enzymes, receptors and lipid molecules, which play an important role in human physiology. Distributed in the brain and periphery, it participates in maintaining energy homeostasis, reducing inflammation and raising overall quality of life by alleviating pain and muscle cramps in severe pathophysiological conditions. The aforementioned effects are small part of the potency of cannabinoids, and extensive research is carried out in order to legalize their clinical application. Currently available drugs such as Sativex® are primarily used to relieve muscle spasms and urgent incontinence in multiple sclerosis, while the remaining two (Marinol® and Cesamet®) are prescribed in the United States, Canada and throughout Europe due to antiemetic properties and as an appetite stimulator. In the Republic of Croatia since October 15th 2015, medical cannabis has been legalized. The aim of this paper was to analyse the available scientific literature in order to examine impact of this group of molecules on human health. Significant anticancer activity was observed by applying cannabinoid receptor agonists in experimental models of glioblastoma. CB1 and CB2 receptor agonists inhibited tumor tissue growth by stimulating de novo synthesis of ceramide and activating ER stress response that causes autophagy-mediated death of tumor cells. From a palliative point of view, it has been shown that endocannabinoids can suppress GABAergic transmission. This approach gives hope in the future to reduce pain in diseases such as rheumatoid arthritis, diabetic polyneuropathy, fibromyalgia and even epilepsy. It should also be considered that cannabinoid-based drugs contain THC, which leads to addiction, depression, memory loss, and has shown to be a risk factor for development of mental illnesses. Additionally, this article highlights the negative impact on male fertility, spermatogenesis, and sperm function. Future therapeutic potential relies on increasing tone of endogenous THC equivalents by inhibiting their hydrolysis, and development of CB2 selective ligands, which do not exhibit psychotropic effects.

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Olfactory bulb – potential drug target for Alzheimer's disease

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According to literature data, olfactory dysfunction could be one of the earliest clinical symptoms in sporadic Alzheimer's disease (sAD). The olfactory dysfunction in AD could be associated with hyperphosphorilation of tau protein. Since exact pathophysiological mechanism of olfactory dysfunction in sAD is not fully understood, this study aims to investigate possible relationship between changes of insulin receptor (IR), insulin degrading enzyme (IDE), tau (t-tau) and phosphorylated tau (p-tau) in olfactory bulb (OFB) at different time points and doses after the streptozotocin-intracerebroventricularly (STZ-icv) treatment. STZ-icv is sAD representative animal model. Male Wistar rats were injected with STZ-icv (0.3, 1, 3 mg/kg) or vehicle (controls) and sacrificed one and three months after the treatment. Protein expressions of IR, IDE, t-tau and p-tau in OFB were measured by Western blot. Data were analysed by Kruskal-Wallis and Mann-Whitney U test ($p<0.05$). At the dose of 0.3 mg/kg no change of expression of investigated proteins were found. IDE and ratio of p/t tau were unchanged after both time points. Only 1 month after STZ-icv, IR was decreased at the dose of 1mg/kg, while dose of 3mg/kg first increased IR after 1 month then decreased IR after 3 months. After 3 months, the increment of p/t tau ratio was found at 3 mg/kg STZ-icv. Decreased IR could lead to the increased tau phosphorylation in olfactory bulb. These results can provide better understanding of pathophysiological mechanism behind the olfactory dysfunction in sAD. The changes in olfactory bulb should be further explored as a potential drug target.

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Chromatography-based isolation of intracranial extracellular vesicles from patients with severe traumatic brain injury

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Extracellular vesicles (EVs) are nanosized spherical particles enclosed by phospholipid membrane and secreted by cells in physiological and pathological conditions. EVs can indicate ongoing processes in tissues and organs since I) they participate in intercellular communication and their content reflects the condition and type of cells they originate from; and II) EVs are released into body fluids and thus can be accessed. Recently it was shown that intracranial EVs after severe traumatic brain injury (TBI) change their composition and might indicate neuroregenerative processes in the brain. As such, EVs could be prognostic markers of neuronal recovery after severe TBI in which intracranial damage is caused by external trauma and can have life-threatening consequences due to the impairment of brain functions. However, comprehensive changes in TBI-EV composition are not known and depend on quality of isolated EVs. Here, we show an in-house developed chromatography-based isolation of total EVs from cerebrospinal fluid (CSF) during acute phase after severe TBI. Our study included 6 TBI patients who underwent ventriculostomy placement for intracranial pressure management. The samples of TBI-CSF were collected at days 1, 3, and 7 after injury. Samples of control-CSF were derived from 6 healthy subjects who underwent lumbar puncture as part of the standard diagnostic procedure. Obtained clinical CSF samples were combined into 4 pools (control and TBI-day 1, 3 and 7) and applied to size-exclusion chromatography on sepharose CL-6B. Up to 80 chromatography fractions per analysed CSF-pool were collected by gravity flow and subsequently used for protein characterisation. Soluble proteins as determined by Bradford assay were efficiently separated from EVs, which were identified by two independent methods: measurement of acetylcholinesterase activity and immunodetection of CD9 tetraspanin. In conclusion, our chromatography protocol provides efficient and cost-effective method to isolate total EVs, which can be used for further analyses.

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Whose mouth works faster than their brain? – the matter of language innateness

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One of the crucial characteristics that makes distinction between animals and human beings is the ability to talk. We verbally communicate our ideas, feelings and attitudes. However, important questions arise: what about people who cannot speak and, yet, fully understand the message we are trying to convey? And, on the other hand, if we assume that animals are unable to verbalize their needs, how do they interpret us? In this paper, we will make a comparative analysis of human and animal speech. First, we will give a short literature review about genetic predisposition with a special focus on the role of FOXP2 and microcephalin gene, as well as on biological predispositions, including the development and the position of larynx and other speech organs and how these determine the ability of speaking and speech comprehension. This issue will also be examined from the aspect of neuroscience, where the matter of brain lateralization and neural mirrors will be taken into account. Brain development will further be connected with the speech (dis)ability. By presenting case reports on monkeys who showed limited performance, we will explain how mind, body and brain interact and why animals can understand gesticulations but not syntax. Finally, we will describe an experiment based on interaction with a dog that was given instructions in Serbian and in English and provide a qualitative analysis of the dog's response. We will compare this to the aforementioned cases in order to conclude how and whether animals distinguish languages and if we can say that animals have developed language system, as well, although they may not be able to use some complex syntactic structures due to different brain development.

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From recurrent peripheral facial palsy to multiple sclerosis

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Multiple sclerosis (MS) is a chronic autoimmune disease that occurs most commonly in young adults and is characterized by multiple areas of the central nervous system (CNS) white matter inflammation, demyelinization and glial scarring. MS could be presented with many different neurological manifestations and the symptoms vary according to the area of the CNS involved. The prevalence of facial palsy in MS patients is 2.6 – 52% while prevalence of it as the first MS symptom is 1 – 4.8%. A 35-year-old female developed a purely right sided facial palsy with no sensory abnormalities and no other neurologic findings. The audiology examination: pure tone audiogram, impedance audiometry and electronystagmography (ENG) indicating the most common benign idiopathic facial palsy called Bells palsy. After corticosteroids treatment and physical therapy, the recover was complete without any residua. One year after, a new appearance of facial palsy on the same side provoked the suspicion that the first diagnosis was missed. Despite a normal neurological status and Expanded Disability Status Scale score 0, extensive diagnostic procedures were done. Magnetic resonance imaging (MRI) showed demyelinization areas. The cerebrospinal fluid (CFS) laboratory analysis was also abnormal. Despite positive laboratory and MRI findings patient did not have the clinical dissemination in space so the diagnosis of MS was not definitive. Ten months later the patient had another relapse, the transient left sided lesion of the abducens nerve lasting for about one month and resolved after the corticosteroid therapy. The clinical dissemination was presented in space, therefore primary demyelinization could be diagnosed. The diagnosis was confirmed in the moment of dissemination in space and when the symptoms of the sixth cranial nerve appeared. MS can mimic other more benign conditions. Facial palsy is rarely ascribed to multiple sclerosis as first syndrome but specialists should consider MS as a reason of facial palsy.

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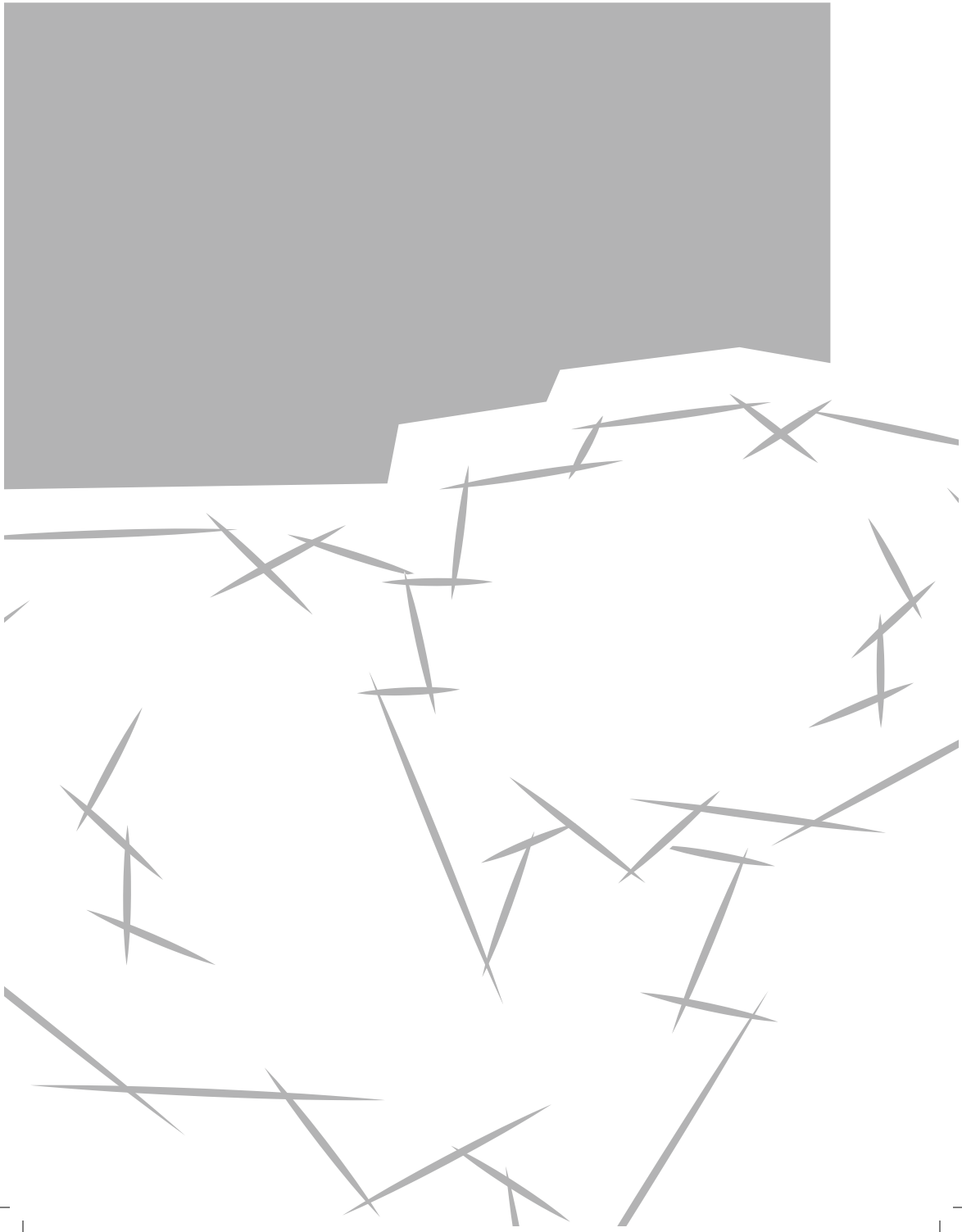
Poster Session



Spine injuries in elite synchronized skaters

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Synchronized skating is a very attractive, interesting, but also very dangerous sports discipline due to the introduction of more difficult and demanding elements imposed by the rules of the International Skating Federation. To determine the frequency and localization of spine injuries in Croatian professional synchronized skaters an anonymous questionnaire was used. The questionnaire contained general data, a table in which was necessary to mark the time, type and mechanism of injury. The research was conducted on a sample of 20 Croatian national team members in synchronized skating between the ages of 16 and 28. Data analysis used descriptive statistics in Microsoft Excel. The results showed that all the examined skaters during their skating career were at least injured once and several of them more than once. The greatest number of injuries was related to lower extremity injuries. 13 out of 20 skaters (65%) had knee problems and 7 out of 20 skaters (35%) had problems with the lumbar spine: contusions of the lumbar spine, head and concussion. Most injuries are caused by group skating elements and lifting elements, mostly at the end of the training session. The number of spine injuries and head contusions in synchronized skating is troublesome, especially the number of injuries arising from mutual contact of teammates on the ice. The reason for this may be associated with raised quality and attractiveness of the sport, which should attract the interest of experts from various fields of medical science.

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Paroksetin treatment of burning mouth syndrome – case report

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Burning mouth syndrome (BMS) is a chronic recurrent burning in the mouth without obvious cause. The disease usually affects clinically normal tissue and presents with symptoms like burning, dryness and alternated taste. According to the etiology, BMS can be divided into primary and secondary. Primary type includes no clinical or lab abnormalities and some researchers suggest that it is connected with taste and sensory nerves of the peripheral or central nervous system. The secondary type is associated with established organic cause such as nutritional deficiencies, oral local neuropathy, etc. There is no definitive cure of disease but the treatment is usually directed as its symptoms. The research studies the effects of low dosages of clonazepam, chlordiazepoxide and tricyclic antidepressants. A 55-year-old white woman reported with a complaint of burning sensation in the mouth. The pain was moderate intensity (7 on a 10-point visual analogical scale), worsening by the end of the day. There were no local factors associated with pain. She reported that she suffers from depression that wasn't treated by a psychiatrist. She also reported xerostomia but the salivary flow rate of unstimulated saliva was within normal limits. The intraoral inspection was normal and there was no caries, periodontal disease or alternation on X-ray. Patient wears superior and inferior partial denture both in good condition. Blood analysis was performed and blood routine were within limits. According to the clinical and laboratory results, the patient was diagnosed with BMS. The treatment was based on a small doses of antidepressant called paroksetin (20 mg/day). After six weeks of treatment the burning symptoms disappeared and there weren't any side effects. Antidepressants are used because she suffers from depression and in low dosages they act as analgetics. Following treatment with paroksetin represents effective and additional therapeutic option in treatment of BMS.

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Potential biomarkers of glioblastoma

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Biomarkers are validated molecules that indicate normal or aberrant process in the organism and can be a sign of an underlying condition or a disease. In most cases, they are low abundance proteins determined from blood, stool, urine, tumor tissue and other tissues or bodily fluids. Glioblastoma (GBM) is a lethal disease with incidence of only 2 – 3 cases per 100 000 people all around the world. The purpose of this article is to emphasize the importance of discovering new molecules, which could perhaps find an application in development of medical products for this progressive disease. This abstract is focused on some specifically regulated genes in glioblastoma: CALU, OPN, TIMP genes and circulating microRNAs. Calumenin (CALU) is an upregulated gene in glioblastoma. The product of this gene is a calcium-binding protein involved in ER functions like protein folding and sorting. It was shown that this gene is secreted in glioblastoma. Until today, the significance of upregulation of CALU in GBMs is not known. TIMP1, which stimulates proliferation of many cell types, was shown to be upregulated in glioblastoma. In normal circumstances, TIMP3 promotes apoptosis, possibly through stabilization of tumor necrosis factor α receptors, but in glioblastoma TIMP3 transcripts are downregulated when compared to lower grade astrocytomas. Osteopontin (OPN) is a potential serum biomarker, which has been found to be overexpressed in many cancers and associated with tumor progression and metastasis. High OPN levels detected by immunohistochemistry correlate with poor patient survival in glioblastoma and other cancers. MicroRNAs are involved in proliferation, differentiation, apoptosis, migration and invasion of GBM, so we can conclude that these miRNAs have been associated with patient survival and therapeutic treatment response. The possible benefits of miRNAs as biomarkers include easy detection and non-invasive diagnosis. Identified biomarkers have potential utility in GBM prognosis and could lead to development of better-targeted therapies.

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Polymorphisms in PLA2G4A and PLA2G6 genes and plasma lipid and glucose concentrations in schizophrenia patients

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The release of arachidonic acid (20:4n-6, ARA) from membrane phospholipids via the activation of phospholipase A2 (PLA2) enzymes is thought to be involved in dopaminergic signalling and insulin secretion. Altered dopaminergic neurotransmission, disturbances of glucose and lipid metabolism and increased PLA2 activity are repeatedly observed in schizophrenia patients. The rs10798059 (BanI) and rs4375 polymorphisms in (PLA2) G4A and PLA2G6 genes have proved to be relevant in etiology and clinical expression of schizophrenia, as measured by the Positive and Negative Syndrome Scale and/or the age of disease onset. We investigated whether fasting plasma lipid and glucose concentrations might be influenced by rs10798059 (BanI) and rs4375 polymorphic variants among chronically ill Croatian schizophrenia patients. Genotyping was performed by polymerase chain reaction/restriction fragment length polymorphism analysis for 263 patients (males/females: 139/124). Total cholesterol and LDL cholesterol concentrations in females and triglyceride levels in males were slightly elevated relative to the reference values, and mean body mass index values were in the overweight range in both genders. We revealed no significant association between PLA2G6 polymorphism and plasma lipid and glucose concentrations neither among male, nor among female patients, whereas the PLA2G4A polymorphism significantly contributed to plasma glucose levels in female patients only. Specifically, females carrying the PLA2G4A-G allele (PLA2G4A-GG homozygous and PLA2G4A-AG heterozygous) had lower glucose levels than PLA2G4A-AA homozygous carriers (5.5 ± 0.8 vs. 6.6 ± 2.0; $F=13.03$, $P<0.001$). The PLA2G4A genotype accounted for approximately 6% of the variability in glucose levels. BanI polymorphism in the PLA2G4A gene has significant, although weak influence on plasma glucose levels among female patients, yet it does not affect any other metabolic parameters, neither among males, nor among females. Finally, the rs4375 (PLA2G6) polymorphism does not contribute to lipid or glucose concentrations in the patient group.

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Transcranial magnetic stimulation as a part of comprehensive treatment of alcohol and benzodiazepines addiction

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Repetitive transcranial magnetic stimulation (rTMS) is a non-invasive treatment that delivers repetitive pulses of an MRI-strength magnetic field from a coil placed over the scalp. TMS is safe and is becoming a novel therapeutic tool for reducing addictive behaviour. We present a 47-year-old male patient diagnosed with alcohol and benzodiazepines addiction. He has been addicted for 10 years and was hospitalized several times in various institutions. After the first two hospitalizations at our institution, he did not follow the psychiatrist recommendations. During the third hospitalization the patient was taking the prescribed pharmacotherapy and followed the psychiatrist recommendations. The last hospitalization was due to the craving for benzodiazepines and increasing tremor. During hospitalizations patient's psychopharmacotherapy was corrected and titrated and he was included in sociotherapy, family therapy, group and individual psychotherapy. During the last hospitalization, the patient was treated by using rTMS and application was performed according to standard protocol. The therapeutic procedures applied during the last hospitalization have improved his mental condition. The patient continues to take the prescribed therapy as recommended, he is fully functional at work and in family relations, has returned to his hobbies and has also quit smoking. The patient has been advised to continue outpatient psychiatric treatment, to regularly use pharmacotherapy and attend family therapy. So far, TMS is mostly applied in treating depression, PTSD, OCD, schizoaffective disorder and autism complications. In the addiction treatment, it is used for alcohol, cocaine and nicotine dependence, and it helps to reduce and control the symptoms of addiction. Further clinical studies are required to better understand underlying mechanism and potential therapeutic benefits of rTMS in the addiction field.

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Development of HPLC method for serotonin, dopamine and noradrenaline determination in rat brain tissue samples

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Research of neurotransmitter levels in animal models for brain disorders, such as rat, is important for better understanding of different pathological processes. Serotonin, dopamine and noradrenaline are one of the most frequently analysed neurotransmitters. Affordable analytical method, which can be used for this purpose, is high-performance liquid chromatography (HPLC). Aim of this study was to develop and validate a rapid HPLC method with UV detection for serotonin, dopamine and noradrenaline determination in rat brain tissue. Ten samples of prefrontal cortex of 22 days old Wistar rats were collected and homogenized in deproteinization solution, centrifuged and diluted for a run through HPLC machine. Serotonin, dopamine and noradrenaline standards were initially used for spiking for identification of peaks in brain samples and later for making daily calibration curves. Reverse phase HPLC method was used, with C18 column as stationary phase and mix of formic acid and acetonitrile as a mobile phase. Gradient elution was optimized for flow (0.5 – 0.8 ml/min), duration (5 – 25 min), injection volume (10 – 50 µL) and organic phase percentage (0.5 – 20%). Peaks were identified by UV detector at 280 nm wavelength. Best results were achieved with a flow of 0.7 ml/min, duration of 21 min, injection volume of 20 µL and gradient elution of the organic phase with highest peak of 12.5% in 10 – 15th minute of elution. The method showed good selectivity for all three neurotransmitters. Linearity and repeatability were good for serotonin, while they were not completely satisfactory for dopamine and noradrenaline, presumably due to their oxidative degradation. For the further development of the method, it is necessary to examine the quality of the sample preparation and the influence of the pH of the mobile phase on the separation of these compounds.

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The effect of α-2 adrenergic receptors on renal sympathetic activity (RSNA) during exposure to acute intermittent hypoxia (AIH) in rats

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The aim of this research was to determine the effects of α-2 adrenergic receptors blockade on sympathetic nervous system measured by changes in renal nerve activity during acute intermittent hypoxia in rats. Experiments were carried out on 13 urethane anesthetized, vagotomised and mechanically ventilated male Sprague-Dawley rats weighing 300 – 350 g. Sympathetic activity was monitored on the left renal nerve. Ten minutes prior to exposure to the AIH protocol (5x3 min 9% O2) α-2 adrenergic antagonist yohimbine (1 mg/kg) was intravenously administered in the experimental group (N=7). During all 5 hypoxic events (H1 – H5) of the AIH protocol and 15 minutes (T15) after the last hypoxia, sympathetic activity and mean arterial pressure were analysed. Changes in the activity of the nerve and values of blood pressure were compared to the values of the baseline conditions before exposure to hypoxia (T0). The control group (N=6) received intravenous injection of the saline instead of yohimbine and underwent AIH protocol. During AIH protocol the control group showed significant increase of RSNA activity in H1 (142.34 ± 38.46%; p=0.043) and decrease in H5 and T15 (61.46 ± 32.39%; p=0.033; 61.88 ± 33.66%; p=0.039) compared to T0. In the experimental group, significant increase of RSNA activity was seen only in H1 (206.56 ± 90.74%; p=0.021). RSNA activity was significantly different between the control and the experimental group in H2, H3, H4 and H5 (p=0.022; p=0.010; p=0.010; p=0.010). Exposure to acute intermittent hypoxia leads to decrease of mean arterial pressure in both experimental and control group compared to the baseline values (67.79 ± 13.67% vs. 75.58 ± 12.28%; p=0.195). Acute intermittent hypoxia leads to decreased sympathetic nerve activity measured by renal nerve activity, whereas intravenous administration of yohimbine evokes increase of sympathetic nerve activity during exposure to acute intermittent hypoxia. Systemic administration prevented us from drawing conclusions about precise site of action of yohimbine since α-2 adrenergic receptors are dispersed throughout the central and peripheral nervous system.

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Student satisfaction and burnout: a repeated measure study among medical students at School of Medicine, University of Split, Croatia

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Burnout is a state of mental and physical exhaustion related to work, study or care-giving activities and has been negatively associated with medical students' academic performance, empathy, professionalism and physical activities. It was the goal of our study to assess burnout and program satisfaction of all medical students attending the University of Split, School of Medicine. In December 2012 and June 2013, we conducted a previously designed student satisfaction survey, as well as the Oldenburg and Copenhagen Burnout inventories, on all enrolled students. All data is presented with accompanying 95% CI and statistical analyses performed in MedCalc (Ostend, Belgium, Version 15.2.1.). In total 350 (73%) of students returned the completed questionnaires in the first round of testing, and 317 (66%) in the second. A grade point average (GPA) of students was 4.0 (95% CI 3.9 to 4.1), with no differences between study years (Kruskal-Wallis test, P=0.29). Students' satisfaction with their studies was negatively correlated with their year of study (r=−0.59, 95% CI −0.52 to −0.66) and ranged from an average of 4.4 (out of max 5.0) on their first to 2.5 on their sixth year. Additionally, both personal and study burnout measured by Copenhagen Burnout inventory increased with each study year (1st year=44 vs. 6th year=66, out of 100, and 1st year =33 vs 6th year=67, respectively), as did the exhaustion and disengagement measured by the Oldenburg inventory (1st year=2.3 vs 6th year=3.2, out of 4, and 1st year=2.0 vs 6th year=2.7, respectively). Our study has shown that medical students´ burnout and dissatisfaction with their studies at the University of Split School of Medicine increases with each year of medical school. It is important to discover and counter the reasons behind this phenomenon and investigate effective interventions that would alleviate the current state and ultimately improve the students' performance and satisfaction during these six or more years of their lives.

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Sex differences in schizophrenia

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Schizophrenia is a mental disorder characterised by positive, negative, affective, cognitive and aggressive symptoms. The specific cause of schizophrenia is still unknown but there are some evidences, such as hippocampal reduction and changes in neurotransmitter system that imply genetic background. Symptoms in schizophrenia can be characterized as positive symptoms, such as hallucinations and delusions, or negative symptoms, such as amotivation and asociality. Schizophrenia most often manifests in late teen years or in the early 20s but in female population, there is a critical period when women enter menopause period. It affects 1% of general population. We present the case of 64-year-old male patient and 62 years old female patient both with diagnosed schizophrenia. The male patient had the first episode in the 18th year with predominantly negative symptoms such as lack of hygiene and anxiety. He was hospitalised for 5 weeks and treated with psychopharmacs, primarily antipsychotic medications. The female patient had the first episode in the 24th year but with predominantly positive symptoms like hallucinations and bizarre behaviour. She was hospitalised for 3 weeks and treated with psychopharmacs (antipsychotics, anxiolitics). In the next years the male patient still had predominantly negative symptoms and developed alcohol dependence, he was hospitalised multiple times. The female patient still had positive symptoms, she was also multiple times hospitalised, but in the 47th year, when she was entering menopausal period, her cognitive abilities were significantly decreased. Both patients still visit psychiatrist and both continued maintenance therapy. Therefore, we put emphasis on differences between male and female patients with diagnosed schizophrenia. It was observed that condition in the female patient got worst when she entered menopausal period, on the other hand, the male patient started abusing the alcohol and developed comorbid alcohol dependence.

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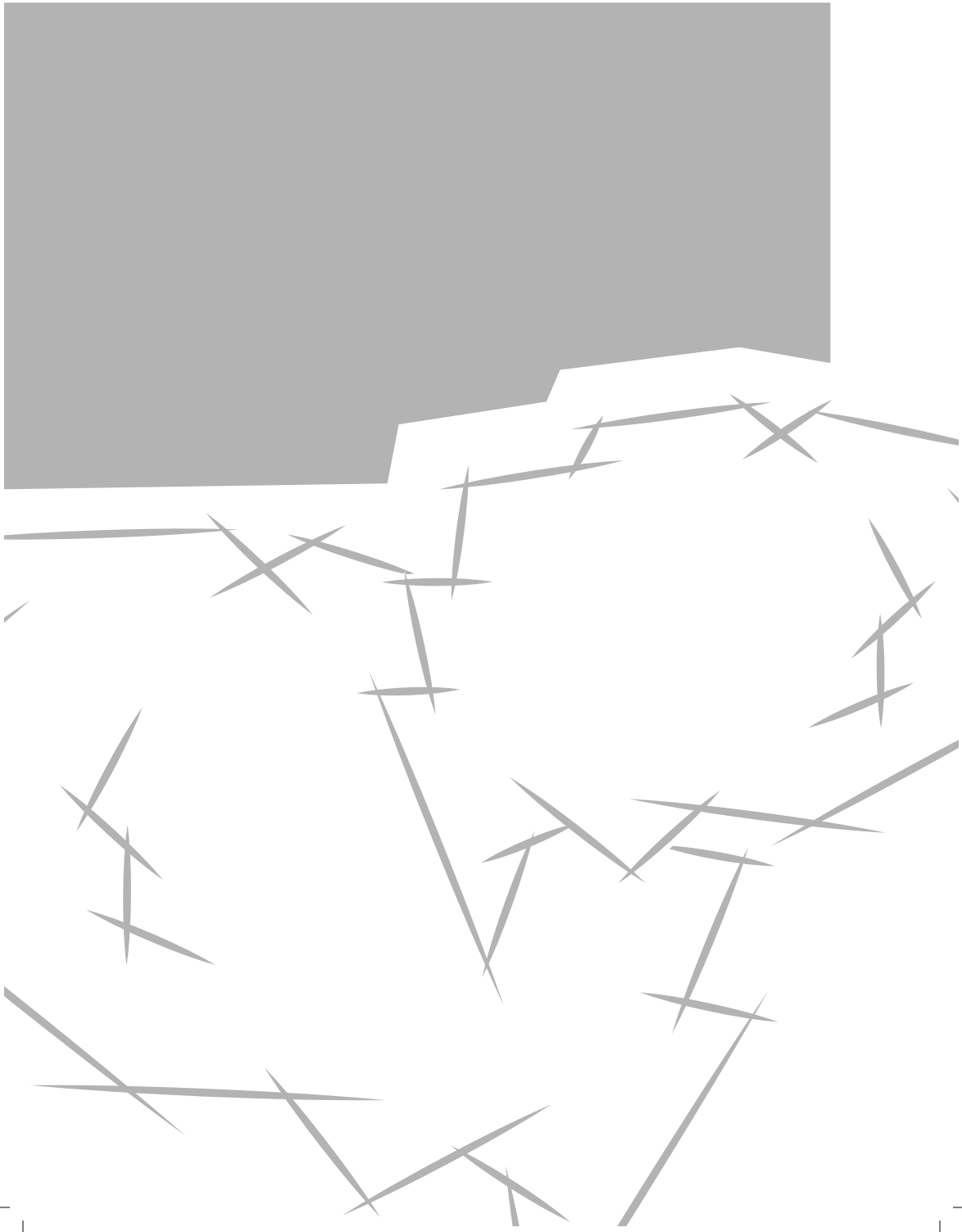
Workshops



Normal EEG in children (EEG workshop)

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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 consciousness 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 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, tumors, 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. 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 is not uncomfortable, and patients do not feel any shocks on the scalp or elsewhere. However, having electrodes pasted to the scalp can be a little stressful for children. 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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Fear of public speaking

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Public speaking fear is highly prevalent in student population, and many students that seek help at Psychological Counseling Center report this specific type of anxiety. Negative automatic thoughts, exaggerated fear of embarrassment or humiliation, as well as intensive physiological symptoms while giving a public speech can have a negative impact on the quality of the presentation as well as on the perception of self as a speaker. Dissatisfaction with the presentation and self generates further negative expectations, which may lead to additional fears while giving a new speech. This vicious circle can lead to avoidance of public speaking and academic failure in students. Cognitive-behavioural model of public speaking anxiety as well as some coping strategies to overcome it will be presented in the workshop.

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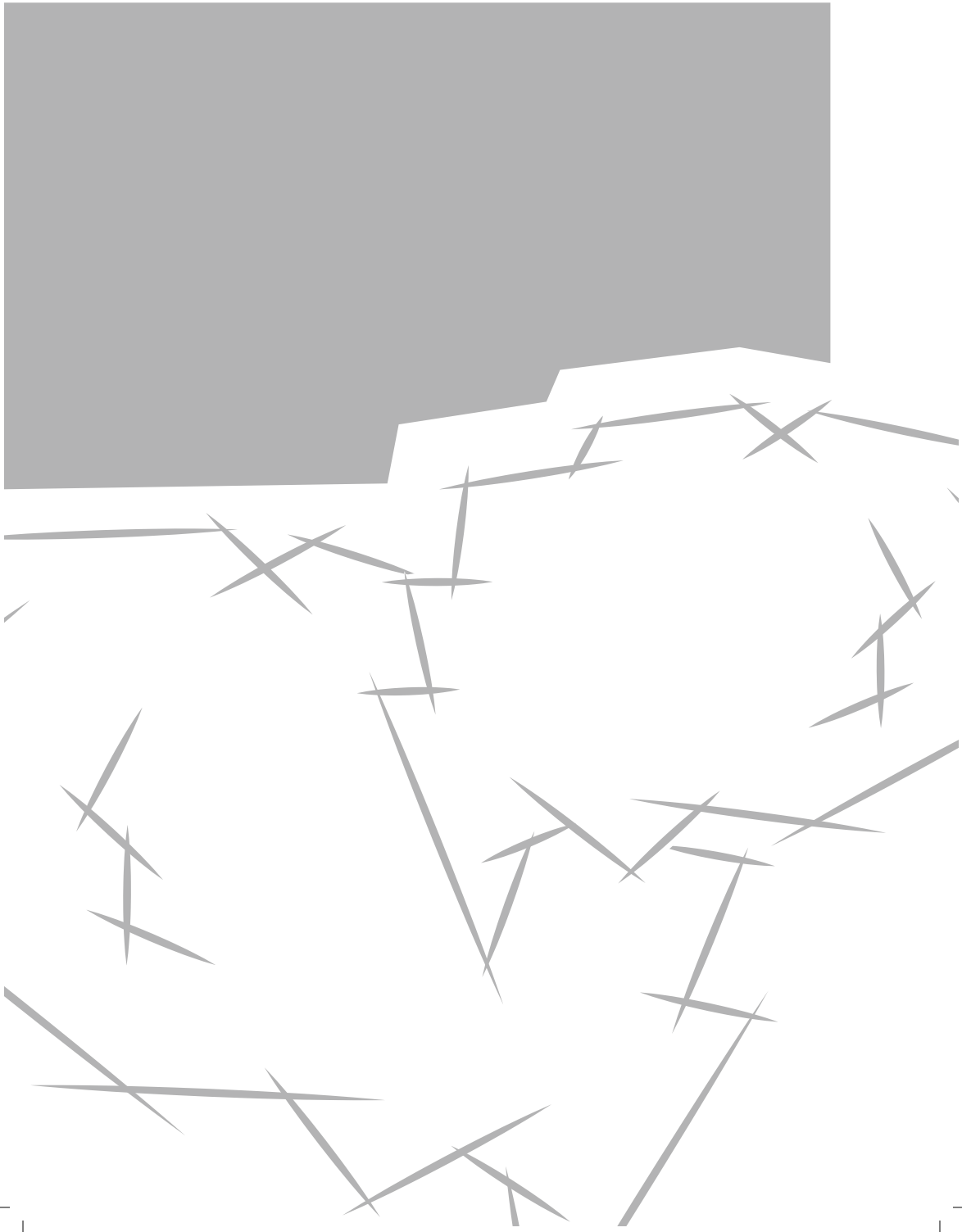

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