Center for Experimental
and Applied Physiology
Faculty of Pharmacy
University of Belgrade

Centar za eksperimentalnu
i primenjenu fiziologiju
Farmaceutskog fakulteta
Univerziteta u Beogradu

2nd Symposium in Biomedicine: Basic and Clinical Neuroscience

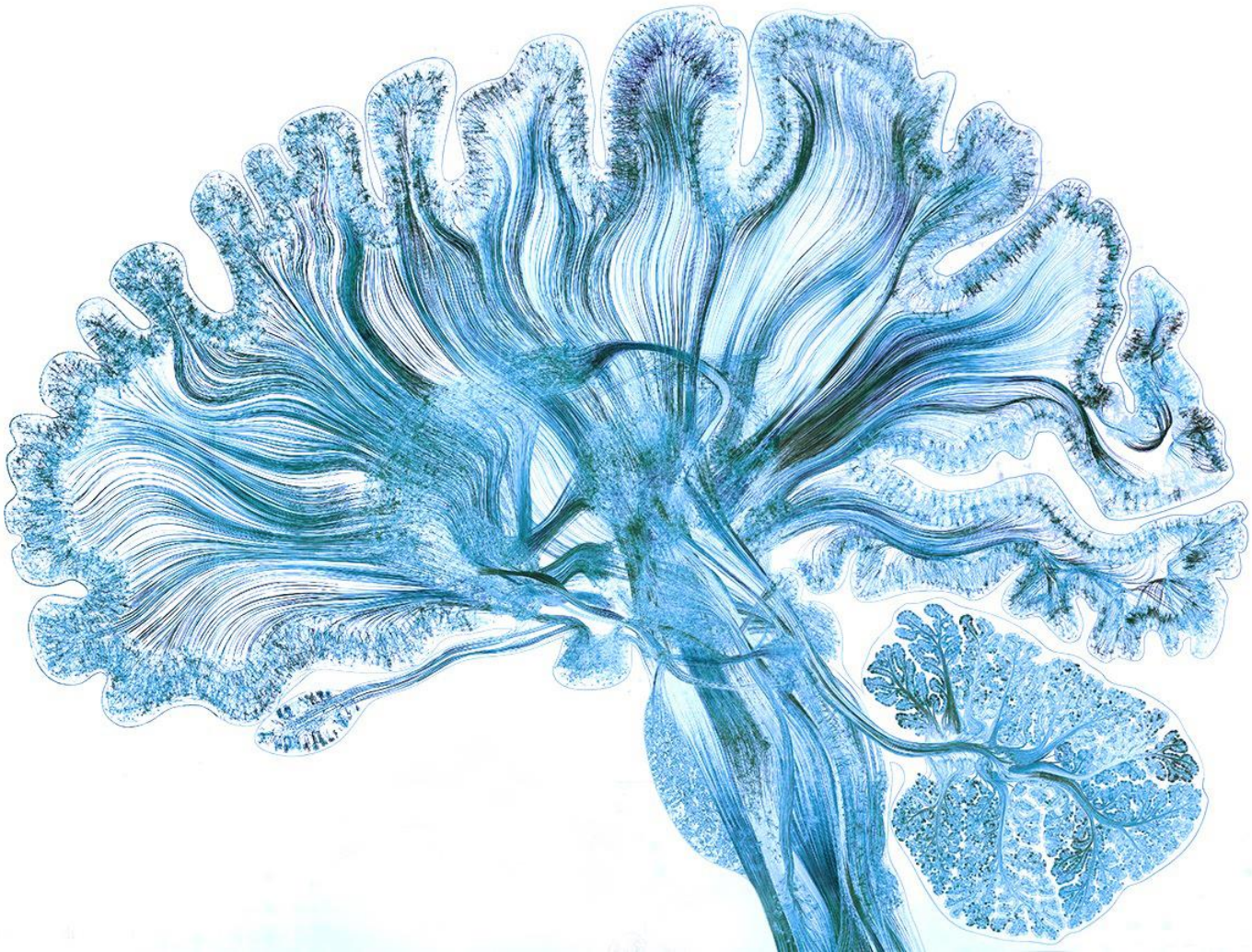
May 9, 2019

2. Simpozijum iz biomedicine: bazična i klinička Neuronauka

9. maj 2019.

ABSTRACT BOOK

KNJIGA SAŽETAKA



P 08

Short term fish oil treatment alters fatty acid composition and cholesterol-related gene expression affecting the visual cycle in mouse retina and RPE

Irena Jovanovic Macura[1], Ivana Djuricic[2], Marjana Brkic[3], Desanka Milanovic[1], Sladjana Sobajic[2], Selma Kanazir[1] and Sanja Ivkovic[1]
[1] Institute for Biological research "Sinisa Stankovic", University of Belgrade, Serbia, [2] Farmacy Faculty, University of Belgrade, Belgrade, Serbia, and [3] Center for the promotion of Science, Belgrade, Serbia

Age-related macular degeneration (AMD) is a progressive and degenerative disease of the retina and major cause of blindness among the elderly population, whose etiology is not known. Changes in cholesterol metabolism and in the uptake of unsaturated fatty acids (DHA) in the retina and retinal pigmented epithelium (RPE) have been implicated in the pathogenesis of AMD. Because the continuous renewal of retinal membranes requires a constant supply of omega-3 fatty acids by RPE cells, diets rich in DHA may improve retinal function and may delay the development of exudative AMD. Thus, we hypothesized that short-term DHA supplementation (3 weeks), may serve as a prophylaxis in AMD prevention. We used real-time PCR to quantify the expression levels of genes involved in retinal cholesterol metabolism and fatty acid uptake in retina and RPE in control and FO treated animals (4 months-old). We analyzed the retinal expression pattern of genes regulating biosynthesis (*hmgcr*, *lxrβ*, *srebp-2*), transport (*abca1*, *apoE*) and elimination (*cyp27*, *cyp46*) of cholesterol and its metabolites and of two different DHA transporters - *adipoR1* and *mfsd2A*, necessary for the photoreceptor proper function. As a functional outcome we analyzed the expression profile of visual cycle genes in RPE. Our results showed that FO supplementation elicited significant changes in the phospholipid composition and transcriptional networks of the cholesterol-mediated and DHA transporter genes. Finally, the FO supplementation decreased the expression of the key regulatory genes of the visual cycle in RPE.

P 09

Fructose-rich diet and walnuts supplementation differentially regulates hypothalamic and hippocampal glucose transporters expression

Aleksandra Velickovic[1], Tanja Jevdjovic[1], Tamara Dakic[1], Iva Lakic[1], Mojca Stojiljkovic[2], Goran Koricanac[2], Jelena Djordjević[1]
[1]Department for Comparative Physiology and Ecophysiology, Institute for Physiology and Biochemistry, Faculty of Biology, University of Belgrade, Belgrade, Serbia
[2]Laboratory for Molecular Biology and Endocrinology, Vinca Institute of Nuclear Sciences, Belgrade, Serbia

Introduction: Metabolic syndrome (MS) is a major health risk challenge. Previous studies have shown that fructose-rich diet can induce MS whereas a nut-rich diet may reduce the risk of developing MS. The aim of this study was to examine the effects of fructose-rich diet and walnuts supplementation on the glucose transporters (GLUT) expression in rat hypothalamus and hippocampus.
Methods: Male Wistar rats were divided into four groups: (C) - standard chow diet and drinking water; (F) - standard chow and drinking water supplemented with fructose (10%) during 15 weeks; (CW) - standard diet supplemented with 2,4 g of walnuts during the last 6 weeks of the experiment; (FW) - standard chow and drinking water supplemented with fructose (10%) during 15 weeks whereas in the last 6 weeks standard diet was supplemented with walnuts. Hypothalamic and hippocampal membrane protein fraction was isolated using the subcellular protein fractionation kit. The amount of GLUT1, 2 and 3 was measured by Western blot method.
Results: In the rat hypothalamus, all treatments increased GLUT1 and GLUT2 protein levels, whereas GLUT3 was increased only in CW and F groups. In the rat hippocampus, GLUT1 content was increased only in FW group, whereas GLUT3 level was decreased in the same group. Decreased amount of membrane GLUT2 was detected in hippocampal tissue of all experimental groups.
Conclusion: Fructose-rich diet and walnuts supplementation increased membrane GLUT1 content in rat hypothalamus and hippocampus. In contrast, GLUT2 and GLUT3 membrane content in examined brain regions was differently regulated under applied dietary regimes.

P 10

Sex differences in the regulatory changes of HPG axis during experimental autoimmune encephalomyelitis in rats

Ana Milosevic[1], Marija Janjic[1], Irena Lavrnja[1], Sanja Pekovic[1], Ivana Bjelobaba[1]
[1] Department of Neurobiology, Institute for Biological Research "Sinisa Stankovic", University of Belgrade, Bulevar Despota Stefana 142, 11060 Belgrade, Serbia

Multiple sclerosis (MS) is a chronic inflammatory neurodegenerative disease, two to three times more common in women than in men. Because the effects of neuroinflammation on the reproductive status have not been fully explored, our aim was to investigate the impact of experimental autoimmune encephalomyelitis (EAE), the rat model of MS, on hypothalamo-pituitary-gonadal axis.

EAE was actively induced in Dark-Agouti rats of both sexes. The animals were examined daily for disease symptoms, weight changes, and estrous cycle phase. The animals were sacrificed at the onset, peak, and end of the disease. Hypothalamic and pituitary tissues were dissected for qRT-PCR analyses. Blood was collected for LH measurements. In separate experiments, groups of male and female animals at the peak of EAE and naïve controls received a subcutaneous injection of buserelin acetate, a potent synthetic GnRH analogue.
The obtained data implied that hypothalamic neuroinflammation occurs during onset and/or peak of the disease in both sexes (upregulation of *Gfap*, *Il1b*, *Il6*, *Ccl2* and *Spp1* mRNA expression). However, hypothalamic *Kiss1* and *Gnrh* mRNA expression was affected differently in males and females, as well as mRNA expression of pituitary signature genes - *Lhb*, *Fshb* and *Gnrhr*. LH levels drop transiently following the course of the disease; in females, this drop coincided with the arrest in diestrus. Nevertheless, the pituitary remained responsive to buserelin treatment.
Our results indicate that EAE affects the regulation of hypothalamo-pituitary-gonadal axis in both sexes. Further analyses are needed to elucidate the causes and details of differences in hypothalamic response to neuroinflammation.

P 11
Effects of a high-fat diet on expression of the hypothalamic NADPH oxidases

Aleksandra Ružičić1, Nebojša Jasnić1, Tanja Jevđović1, Tamara Dakić1, Mathieu Klop2, Damir Kračun2, and Jelena Đorđević1
1- University of Belgrade - Faculty of Biology, Studentski trg 3, 11000 Belgrade, Serbia
2- Experimental and Molecular Pediatric Cardiology, German Heart Center Munich at the Technical University Munich, Munich, Germany

Background and Aims - Obesity is an increasing epidemic worldwide; therefore, numerous clinical and basic studies focus on the potential mechanisms underlying this complex disorder. High-fat (HF) diet-induced obesity is associated with mild inflammation in peripheral tissues. NADPH oxidases (NOX) are recognized as a physiological source of reactive oxygen species (ROS) contributing to the inflammation. Previous studies proposed that similar events may also occur in the hypothalamus, a cerebral area responsible for the regulation of energy homeostasis.
Purpose of this study was to examine the effects of a HF diet on expression of the hypothalamic NADPH oxidases. We also examined expression of transcription factor HIF-1alpha (HIF-1α) owing to its potential involvement in the upregulation of the NOX system.
Methods - Male rats were placed on HF diet starting at 9 weeks of age and lasting for 12 weeks. Expression of NOX 2/gp91phox, NOX 4, p22phox subunit, and HIF-1α in the hypothalamus was evaluated by Western blot analysis.
Results - The HF diet significantly increased the expression of NOX 4 and its p22phox subunit in the hypothalamus. No significant changes in the levels of NOX 2 and HIF-1α were observed.
Conclusions – The present study suggests that NOX 4 but not NOX 2, might be involved in the onset of the hypothalamic inflammation underlying the HF diet-induced obesity. The involvement of HIF-1α needs to be further investigated.

P 12
Can sneezing leave you paralized? A case report of spinal fracture and flaccid paraplegia after sneezing

Jelena Dragićević [1 2], MD, Lela Mihajlović – Jovanović [2 3], MD, Emilio Miletić [1], MD
[1] Zdravstveni centar Knjaževac, Služba hitne medicinske pomoći
[2] Poliklinika Zdravlje i zdrav život, Knjaževac
[3] Zdravstveni centar Knjaževac, Odsek za neurologiju i psihijatriju
***Correspoonding author**: jelena.d.dragicevic.90@gmail.com*

Introduction: Sneezing is a universal protective reflex that can be caused by a number of stimuli, irritans or chronic imphlamatory deseases. The closed - airway sneeze results from a voluntary effort to repress the sneeze and restrict the audible rush of air through the nasal cavities. Active occlusion of oral cavity and nasopharynx results in airway pressures up to 20 times the pressure in a normal sneeze. The transference of this high pressure to other parts of the respiratory tract may result potential variety of injuries.
Methods: Retrospective analysis of medical history documentation.
Case report: We reported a case of 67-year old male patient with past medical history of prostate cancer, lower back pain and lower extremities paraparesis, with a suden onsent of flaccide paraplegia, as well as impairment of previous lower back pain. Three days before this event, the patient had violent episode of sneezing while simultaneously obstruction both nostrils. After performing clinical and neurological examination, magnetic resonace and electromyoneurography we found that onset of flaccid paraplegia was most likely caused with pathological fracture of thoracic and lumbal spine which was prevopously weakened by metastatic implantation.
Conclusion: Sneeze injuries are rare clinical entity but can be life treating, especially when a closed – airway sneeze is attempted. To our knowlage, this is the first reported case of spine fracture and flaccid paraplegia triggered by sneezing.
Key words: sneezing, paraplegia, pathologic fractures